An Econometric Analysis of Veterans' Health Care Utilization Using Two-Part Models*

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SUMMARY: Based on 1992 US *National Survey of Veterans*, we analyzed the nature of veterans' inpatient and outpatient health care utilization by estimating a count data two-part hurdle model. We also identified factors that affect veterans' choices between VA and non-VA health care facilities, using a bivariate probit model. Not surprisingly, we found that health condition measures are the most important factors in determining veterans' health care utilization. Gender, income and health insurance are also significant. Family income is the most important factor which affect veterans' health facility choice decision. Veterans with lower income, without health insurance coverage, or those living near VA health care facilities are more likely to use VA health care system than the others. Most demographic characteristics are not significant.

KEY WORDS—Veterans' Administration, National Survey of Veterans, Hurdle Model, Negative Binomial Count Data Model, Bivariate Probit, Inpatient and Outpatient Care.

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1 Introduction.

The primary goal of the Veterans Administration (VA) is to serve all veterans, especially in the field of health care. The VA health care system was established in 1930, primarily to provide for the rehabiliation and continuing care of veterans injured during wartime services. At that time, neither public nor private health insurance were available to meet the health care needs of America's veterans. With nearly seven decades of development, VA health care system has become one of nation's largest health care systems, which include about 400 service delivery locations, serving about 2.9 million of the nation's 26 million veterans, at a cost of 19 billion in 1998. It has grown from a system primarily covering hospital care for veterans with war-related injuries to a system covering a wide array of hospital and other medical services for both war-time and peace-time veterans, with and without service-connected disabilities. VA now has multiple categories of eligible veterans based on a number of factors.

In recent years, however, the VA health care system has been facing several challenges. First, it has been experiencing increases in health care spending that the nation as a whole has encountered. The budgetary pressure requires VA to run its health care system more efficiently with reduced cost. Second, recent reforms of the nation's health care system also has impacted the VA health care system. Since most veterans now have one or more alternatives to VA health care, VA health care system is facing more competition from other programs than before. Health care reforms such as adding prescription drug coverage and expanding long-term care services under Medicare would likely to cause many veterans to leave the system unless VA benefits change to encourage more use of VA facilities. Without such a change, VA would likely to lose a large portion of its acute hospital workload. Third, the nation's veterans' population is expected to decline significantly in the future. VA estimates that the veteran population will drop to 16 million in 2020 [GAO/HEHS-98-194]. So if VA can not attract more proportion of veterans to its health care system, its workload will also decrease. The budgetary pressure and increasing competition from other health care providers is forcing VA to reform and adjust its health care system. Such changes include, adopting new eligibility rule, establishing new provider networks, signing new health care service contracts, balancing health care services between inpatient and outpatient services, etc. However, for reforms to be effective, VA needs a detailed investigation about veterans' health care demand trends and patterns, such as factors that affect their demand, determine their choices between VA or non-VA health care services, and between inpatient and outpatient services. To be more specific, for eligibility reform VA needs to know the effects of such factors as service-connected disability, employment status and income of veterans on their health care utilization. For establishing new provider networks and signing new health care service contracts, VA needs to know the effects of location and type of insurance on veterans' health care usage. To balance inpatient and outpatient services, VA needs to know the demand trends of inpatient and outpatient services, and the factors that affect veterans' inpatient and outpatient service demand.

Empirical analysis of questions like these is the main purpose of this paper.

More specifically, we will first analyze veterans' demand for health care, and the main factors that determine veterans' health care utilization. Second, we would like to analyze why most veterans choose non-VA health care facilities instead of VA health care facilities. What characteristics distinguish the VA from the non-VA users? For studying the health care facility choices, we will use a bivariate probit model. For health care utilization, including outpatient visits and inpatient admissions, count data models will be utilized.

A number of studies have been done in the field of health care utilization using count data models. Cameron and Trivedi (1988) developed a microeconometric model for interdependent demand for health insurance and health care using Australian survey data. Pohlmeier and Ulrich (1995) used the negative binomial hurdle model and empirically analyzed ambulatory service demand based on a cross-section of the West German Socioeconomic Panel. Gurmu (1997) introduced a semi-parametric estimation method for hurdle (two-part) count regression model to analyze individual-level Medicaid utilization data. Windmeijer and Silva (1997) discussed the GMM estimation technique for count data models with endogeneity, and utilized data from British Health and Life-style Survey 1991-1992 in explaining the number of doctor visits , taking self-reported health condition as endogenous. All these studies are useful to us in that they provide useful methods to choose from and results to be compared with. In this paper, we analyze the health care utilization of a very special group of people —the American veterans. Our estimates are based on a 1992 US survey data of 11645 veterans that were available early in 1994.

Research on the health care utilization of veterans is comparatively scant. A study report from General Accounting Office [GAO/ HEHS-95-13] analyzed the use of VA health care services by Medicare-eligible veterans, that is, the effect of Medicare insurance on the usage of VA health care services by veterans. Another GAO paper [GAO/HEHS-96-13] analyzed how the distance a veteran lives from a VA hospital or outpatient clinic affects his/her use of VA health care services. Romeis *et al.* (1988) analyzed older veterans' future use of VA health care services. Hoff and Rosenheck (1998) examined whether female veterans differed from male veterans on the likelihood of using any VA health care facilities. A special issue of Medical Care (Vol.37, No.4, 1999) include several articles on the cost and economic analysis in veterans' health care facilities. However these papers examined the effect of only one or two factors on veterans' health care usage. In our analyses, we will comprehensively examine the effects of many possible elements that may affect veterans' health care utilization and health care facility choices in a multivariate framework.

The outline of the paper is as follows. Section 2 describes the survey data, gives the definitions of variables and their descriptive statistics. Section 3 presents estimation results, including hurdle model estimation results of veteran's demand for inpatient admissions and outpatient visits, and a bivariate probit model estimation results of why more veterans choose non-VA health care facilities rather than VA facilities. Section 4 contains the main conclusions that can be drawn from this study.

2 The Survey Data

The data is from the *National Survey of Veterans(NSV1992)*. The NSV was conducted in 1993. The survey data file includes information on veterans' military experience, demorgraphics, health status, use of medical benefits, use of compensation and pensions, use of other VA programs and income. The sample population is 11645, 5529 had been selected from RDD (Random-Digit-Dialing) and 6116 from VA files of veterans who receive compensation and pension, or used medical facilities before (For detailed description of this survey, see [5]). The main variables that will be used in our empirical analysis is now presented.

•Self-assessment of general health.

When comparing their general health with people of their own age, 24% of veterans rate their own health as excellent, 28.4 % as very good, 26.3 % as good, 13.9 % as fair, 7.4 % as poor. Fewer older veterans view their health as excellent or very good than younger veterans even in comparison to people of their own age. Veterans who are young, white, do not have a service-connected disability, have a yearly pre-tax family income in excess of $40,000, or have at least a college degree are most apt to report their health as excellent.

•Medical care of 1992 veterans.

All veterans are eligible for treatment at VA medical facilities. However, payment and availability of care varies depending on the type of treatment needed, the financial situation of the veteran, and whether or not the veteran has a service-connected disability or receive a low income VA pension. The degree of disability is a factor in treatment cost and treatment priority.

In 1992, 54.8 % of all veterans received some kind of medical care. Of those requiring care, 78.8 % received only outpatient care and the remainder received some type of inpatient care. Among veterans requiring some type of care only 10% used VA facilities, and 90% used non-VA facilities. Of the 10 % of veterans who received care in VA facilities, 5.6% received care exclusively, and 4.4 % received both VA and non-VA care.

Service-connected disability status also determines a veteran's medical service usage to a great extent. Of those veterans with service-connected (SC) disability, 71.9 % used medical facilities in 1992, while only 52.7 % of the non-SC veterans required medical services. Clearly age is an important factor in the need for medical care. As Table 1 shows, as veterans get old, they are more likely to require health care services, and the care services is likely to be inpatient service. Female veterans seem to use health care system more often than males, but the difference lies mainly in the receipt of outpatient treatment. Veterans having more education or higher family income used more outpatient care than the others. Hispanics are somewhat less likely to have used any type of health care services than the other three racial groups.

•The source of health care.

As shown before, more veterans get needed medical care from non-VA medical facilities than from VA facilities. In the following, we will take a look at some important factors that determine veterans' choice of VA vs.

non-VA health care facilities. Inpatient and outpatient usage will be analyzed separately. People who used both types of facilities are included in the inpatient group.

VA inpatient users:

As shown in the Table 6, veterans with service-connected disabilities are more likely to use VA inpatient services than those without disabilities. A total of 23.6 % of SC veterans needing inpatient services in 1992 used VA facilities, four times the rate of 6.5 % VA usage for those without SC.

A second predictor of usage is the health status of users. Those who consider themselves to be in poorer health are more likely to use VA facilities. Only 8.5 % of all inpatient users' self-assessed health condition was good, or better, while 19.8 % was "fair" and 34.3 % in "poor" health.

Demographics seem to account for some variation in inpatient usage patterns. Veterans' use of VA inpatient facilities decreased as their incomes increased. For example, over 44% of veterans with incomes under $ 10,000 received inpatient care from VA compared with 2.5 % of those with income over $50,000. Male, Blacks and Hispanics, and those with less formal education were also more likely to use VA facilities for their inpatient care in 1992.

VA Outpatient Users:

Similar to inpatient use, veterans with SC are also more likely to use VA outpatient facilities than those without SC. Those with poor self-rated health used VA outpatient facilities more often as well. Lower income, male, less formal education and being black are all indicators of higher VA outpatient service use.

The similarity of results between inpatient and outpatient service usage suggests a common perspective and common determinants of both types of medical service use. Veterans seem to be inclined to use or not use the system for similar sets of reasons. The strong relationship between income on the one hand, and race and education on the other, suggests that income may be the most important single factor in the choice of VA health care facilities.

The survey results also show that cost is the most frequently reason cited by veterans for choosing a VA hospital for inpatient care. Over 19% cited cost as a reason for choosing a VA hospital, while less than 1 % cited cost as a reason for choosing private or public hospitals.

Veterans who used VA facilities were also less likely than users of non-VA facilities to have other form of health insurance. In our analysis, veterans are divided into four insurance groups: those with private coverage only, those with public insurance only, those covered by both types of polices, and those with no insurance coverage. In our sample, almost half of veterans under 25 have no insurance. However, as age increase so does the probability that the veteran will be covered by public insurance. Among veterans 65 and over, about 93 percent are covered entirely or partly by public insurance(mostly Medicare), 2.3 percent are covered by private insurance only, 3.6 percent have no insurance coverage, and 0.9 percent with unknown type of coverage. The majority of veterans between 25 and 65 have private insurance policies generally obtained through their employment. Veterans' use of VA facilities is also influenced by the distance they have to travel to visit the facilities.

The definition of variables used in our analyses and their means are given in Table 11. Figures 1 and 2 illustrate some features of veterans' inpatient and outpatient utilization.

3 Multivariate Analysis.

This section includes two sub-sections. In the first subsection, we will present count data estimation results for veterans' health care demand, including the number of inpatient admissions and outpatient visits. We estimated Poisson, NB2 [cf. Cameron *et al.* (1988, 1998), Gurmu (1997), Winkelmann et. al (1995)] and the NB2 hurdle models, but only NB2 hurdle estimation results will be reported here since it was found to be more superior to the other two by LR tests [cf. Cameron and Trivedi (1998), Pohlmeier et. al (1995)]. In the second subsection, we will estimate a bivariate probit model, and identify factors that affect veterans' health care facility choice between VA and Non-VA.

Up to this point, we need to address the theoretical foundation on which our model and variables selection is based.

Cameron et al. (1988) derived a demand function for medical care services by using a two-period utility maximization. Suppose a consumer with a two-period utility function defined by $U[C_0, C_1(s), H(\mathbf{e}, s|\mathbf{A}, \mathbf{B})]$, where C denotes consumption and H denotes health measured as income equivalent. U and H are both increasing in their arguments. The subscripts 0 and 1 refer respectively, to the current and future periods, s to the uncertain health state on which will depend the demand for health care services denoted by K-dimensional vector $\mathbf{e}$. $\mathbf{A}$ refers to the vector of consumer's attributes or characteristics, and $\mathbf{B}$ to the vector of attributes of the insurance policy. $H(\mathbf{e}, s|\mathbf{A}, \mathbf{B})$ may be regarded as the health production function with inputs $\mathbf{e}$ in state s. Since s is unknown when choosing insurance policy, they used stochastic utility maximization subject to budgets constraints. After some assumptions and derivations, they get the demand for the k-th medical service e_k as the form of

$$E[e_k(s)] = \exp(X'\beta_k + \sum_{j=1}^{J} \eta_{jk} D_j + \varepsilon_k)$$

where X is consumer's attributes, including income, health condition etc., and D_j is an insurance dummy variable.

Goodman et al. (1993) suggested the following demand function for physician visits after a theoretical consumer choice and demand analysis.

$$V = f(P, r, t, P_0, Y, HS, AGE, ED...)$$

where P is the price per visit, r is the patient's coinsurance rate, P_0 is the price of other goods, Y is a measure of income, t is a time price, HS is the patient's health status, and AGE and ED represent variables such as age and education to reflect other need and taste factors.

Basically we based on these two theoretical models to select our variables and models for medical service demand.

3.1 Estimation Results from Two-Stage Hurdle Models.

3.1.1 Model Description

The count data hurdle model is a modification of a simple count data model. The hurdle model assumes that the statistical process governing individuals with zero counts and individuals with one or more counts can be different. It is composed of a dichortomous model for the count being zero or positive and a 'truncated at zero' model for strictly positive outcomes. In the first stage, the individual decides whether or not to consume, and conditional on a positive decision, in the second stage he decides on the quantity. Moreover, the hurdle model is not subject to the restriction of independence of events as in the Poisson model. By accounting for the hurdle and using a truncated distribution at the second stage, the independence property of the Poisson model is avoided; in other words, the number of counts in a subinterval is no longer independent of the number of counts prior to this interval.

For the case of health care utilization, the decision on whether to use and the decision on the frequency of usage may be based on different decision making processes. Generally the patient is responsible for making the initial decision, while factors from the supply side such as insurance, distance to health care facility, physician and the providers' service quality may affect the subsequent usage decision. This makes the hurdle model appropriate to describe such data.

Assume that both f_1 and f_2 are any probability distribution functions for non-negative integers. If f_1 governs the hurdle part and f_2 the process once the hurdle has been passed, the probability distribution of the hurdle model is given by:

$$P(Y = 0) = f_1(0) \tag{1}$$

$$P(Y = y) = f_2(y)\frac{1 - f_1(0)}{1 - f_2(0)} = \Phi f_2(y),\ y = 1, 2, ... \tag{2}$$

$1 - f_1(0)$ is the probability of crossing the hurdle, and $1 - f_2(0)$ is the truncation normalization for f_2. If $\Phi = 1$, the hurdle model collapses to the standard count data model.

The hurdle model can be specified in various ways by choosing different probability distributions of f_1 and f_2. For the Poisson hurdle considered by Mullahy (1986), let y_i $(i = 1, 2, ...n)$ denote the count data of interest, such as the number of doctor visits, x_i be a $(p \times 1\ )$ vector of explanatory variables, and λ_i the parameter of Poisson distribution. Then we have:

$$P(Y = y_i = 0) = \exp(-\lambda_{1i})\lambda_{1i}^{y_i}/y_i! = \exp(-\lambda_{1i}) \tag{3}$$

$$1 - P(y_i = 0) = \sum_{y_i > 0} P(y_i) = 1 - \exp(-\lambda_{1i}) \tag{4}$$

and

$$P(y_i|y_i > 0) = \lambda_{2i}^{y_i}/\{[\exp(\lambda_{2i}) - 1]y_i!\}, \quad y_i = 1, 2, ... \tag{5}$$

Parameterizing $\lambda_{1i} = \exp(x_i'\beta_1)$, $\lambda_{2i} = \exp(x_i'\beta_2)$, we can maximize the likelihood function and estimate β_1 and $\beta_{2.}$

For the NB2 hurdle specification [cf. Cameron and Trivedi (1998, Ch4)], we have:

$$P(Y = y_i = 0) = \left(\frac{1/\alpha_1}{\varphi_{1i} + 1/\alpha_1}\right)^{1/\alpha_1} = \left(\frac{1}{\alpha_1\varphi_{1i} + 1}\right)^{1/\alpha_1} \qquad (6)$$

$$1 - P(y_i = 0) = \sum_{y_i>0} P(y_i) = 1 - \left(\frac{1}{\alpha_1\varphi_{1i} + 1}\right)^{1/\alpha_1} \qquad (7)$$

$$P(y_i|y_i > 0) = \frac{\Gamma(y_i + \alpha_2^{-1})}{\Gamma(\alpha_2^{-1})\Gamma(y_i + 1)} \frac{1}{(1 + \alpha_2\varphi_{2i})^{1/\alpha_2} - 1} \left(\frac{\varphi_{2i}}{\varphi_{2i} + \alpha_2^{-1}}\right)^{y_i} \qquad (8)$$

Parameterizing $\varphi_{1i} = \exp(x_i'\beta_1)$, $\varphi_{2i} = \exp(x_i'\beta_2)$,we can maximize the likelihood function and estimate the parameters. Note that equations (3) and (6) give the probabilities of zero counts, equations (4) and (7) give the probabilities that the threshold is crossed, and (5) and (8) give the probabilities of a non-zero count given that the threshold has been crossed.

The reason that we chose NB2 specification is also because it has a number of special features not shared by other models in this class. It is a member of LEF for specified α. So MLE of NB2 is robust to distribution misspecification. Thus, as long as the conditional mean is correctly specified, MLE of NB2 is consistent for β. However, the associated standard errors of the MLE generally will be inconsistent if there is any distributional misspecification. In this case, we can use the Sandwich estimator form for the variance matrix [refer White (1982), Cameron (1998) Ch2].

3.1.2 Endogeneity Test

Given the previous literature, we suspect that explanatory variables such as the self-reported health status, family income and insurance may be endogenous. To test the endogeneity of some of the explanatory variables, we utilized a Hausman-type test. Grogger (1990) and Windmeijer et. al (1997) have discussed how to implement this test for discrete and count data model. Basically, two estimates are needed—one should be consistent under endogeneity, the other should be consistent and efficient under the null (exogeneity). For the first one, we can use non-linear instrumental (or GMM) estimate. For the second one, ML estimate can be chosen. The test statistic is

$$h = (\gamma_{NLIV} - \gamma_{ML})' [V(\gamma_{NLIV}) - V(\gamma_{ML})]^{-1} (\gamma_{NLIV} - \gamma_{ML})$$

where $\gamma_j's$ are the estimated coefficients of the suspected endogenous variables and $V(\gamma_j)$ is the estimated variance (or covariance matrix) of γ_j. Under the null, $h \sim \chi^2(1)$. The instruments used for self-reported health are: age, education, employment status, some diagnostic conditions, marital status and home ownership, while instruments for income and private insurance were: age, education, employment status, race and home ownership. Age, employment status, home ownership are significant in explaining the three suspicious variables as instruments. However, we will see below that they are not significant in the outpatient and inpatient utilization equations. In other words, they explain health care utilizations only through insurance, income or health status. The computed test statistics are listed in Table 12.

We can see that at the 5% level the exogeneity of self-rated health status, income and insurance are not rejected in either the inpatient or the outpatient equations.[1] Windmeijer et. al (1997) also rejected the endogeneity of self-reported health in explaining the number of doctor visits using Hausman test. Cameron et. al (1988) tested the exogeneity of insurance in determining various health care utilizations, and found that the null was rejected in some categories but accepted in the others. Dwyer and Mitchell (1999) found that self-rated health is not endogenous in their labor supply equation. The exogeneity of the private health insurance can be explained by the fact that the insurance coverage is mostly determined by working job status in the labor market. As table 10 shows, 76.4 percent of all full-time employed veterans have private insurance – more than twice the rate for any other group.

3.1.3 Estimation Results

Table 13 presents the results of NB2 hurdle estimates of the number of inpatient admissions, while Table 14 contains NB2 hurdle estimation results of the number of outpatient visits. The first stage equation represents the contact decision, while the second stage equation models the frequency decision. The selection of explanatory variables is based on theoretical models discussed earlier, i.e. veterans' attributes such as age, health status, income, education etc.. We also included health insurance, and distance to health care facility which may reflect effects of supply side.

[1]When some diagnosed conditions are not included in the regressors, the exogeneity of self- rated health is rejected in both inpatient and outpatient equations. This is resonable, because when the objective diagnosed condition variables are included, the effect of the subjective self-rated health variable will decrease.

The two-stage hurdle estimates show that health condition measures such as self-described health status, disability status, whether or not the patient has a military service-connected disability, and various diagnosed conditions are the most significant elements in determining whether to go for inpatient treatment. Veterans with a poor health condition are more likely to get an inpatient treatment than other veterans. Diagnosed conditions involving heart, cancer, kidney, drug abuse or diabetes increase veterans' chance of seeking inpatient care. Being female has positive effect on a veteran's decision for an inpatient treatment. Having private insurance reduces the probability of an inpatient treatment decision. Age, race, level of education, employment and marital status are not relevant for the inpatient treatment decision. The lowest income veterans have the highest probability for seeking inpatient care. Variables with large marginal effects[2] are also the various health condition measures, and private health insurance coverage. Veterans' chances of seeking inpatient treatment will increase about 14% if they have service-connected disabilities, and will increase about 16% if diagnosed with drug abuse. Chances of inpatient use will be 6% less if one have private health insurance coverage.

For the frequency of inpatient admissions, estimated results show that health condition measures are still the most important factors. Those who are disabled, or have bad self-rated health condition have high frequency of

[2]Since the estimated coefficients are difficult to interpret for non-linear model, so we computed marginal effects of regressors. Marginal effects are partial derivatives of expected value of dependent variable with respect to the vector of characteristics, evaluated at the means of $X's$. For further explanation and the calculation of marginal effects, refer to Louis et al (1997).

inpatient admissions. Disabled veterans, and veterans with poor self-rated health condition have on the average about 0.15 and 0.21 more inpatient admissions than the others respectively (i.e., implying about 8% and 12% increase from the average value of 1.8 admissions of those inpatient users respectively). Veterans with cancer or diabetes will have 10% more inpatient admissions. But contrary to the first stage, service-connected disability is not significant in determining the frequency. Age, marital status, gender, race and education are also irrelevant. Veterans with private health insurance coverage have on the average 0.17 less inpatient admissions, that is about 9% lower than the average. This result can be explained by the fact that veterans with private health insurance coverage are mostly working people who tend to have less health impairments. In addition, being a VA inpatient user also significantly increases total number of inpatient admissions. The estimated overdispersion parameter α is 4.88 and is significant; this means that the inpatient admissions is highly dispersed.

Interestingly, the hurdle results for outpatient visits are much different from those of inpatient admissions. Age shows a concave relationship with doctor visit in the frequency decision, but the first order term is not significant. For the contact stage, age is also insignificant. Gurmu (1997) found a concave relationship between age and number of doctor visits. But a significant convex relationship between age and doctor visit was obtained by Cameron *et al.* (1988) using Australian data, and by Pohlmeier & Ulrich (1995) using Germany data. Similar to what we found before, the health condition measures are highly significant in both stages, except that self-rated health condition is insignificant in the contact stage. Being a subjective heath condition measure, self-rated health variable should play a less important role than some objective health measure variables, like disability status and diagnostic conditions, in determining health care usage. People with drug abuse may not be willing to see doctors, but once they made the first visit, they will have a higher number of subsequent visits. Veterans with mental problem have both higher probability and frequency of outpatient visits. Diagnostic conditions such as cancer, eye, heart, kidney, diabetes, post-traumatic stress disorder (PTSD), accident and other diagnosed problems also increase a veteran's frequency of outpatient visits. Lower income veterans have a lower probability of contacting outpatient facilities than higher income veterans, and have less subsequent outpatient visits. Veterans with higher level of education are more willing to contact outpatient physicians, but their number of subsequent visits is not significantly larger. Employment status is not significant in determining outpatient usage. Being white raises the probability of contacting a doctor, but the number of subsequent visits is less than that for a non-white. Women are more likely to seek outpatient treatments and have high frequency of outpatient visits than men. Similarly to an earlier finding, private insurance coverage reduces the probability and the frequency of outpatient visits. Distance to the nearest VA health care facility also has negative effect on a veteran's frequency of outpatient visits, but it does not affect the inpatient facility use.

Marginal effects show that service-connected condition, disability status and gender have large effects on the probability and frequency of outpatient visits. Having service-connected condition will increase the chances of outpatient visit by 18 %, and about 1.2 more subsequent visits (i.e. about 12% increase from the average number of visits of 10 among those outpatient users); disabled veterans have 9% more chances for outpatient treatment, and 2 more subsequent visits; Female veterans are also 14% more likely to seek outpatient services, and have 2.4 more outpatient visits than males; veterans with diagnosed mental problems have about 5% more chance to visit outpatient clinics, and 2 more subsequent visits. Veterans living 100 miles further from VA facilities will have 0.3 (3 %) less outpatient visits. Being a VA outpatient user also significantly increases total number of subsequent usage. The estimated overdispersion parameter α is 0.93 for the frequency of outpatient visits and is significant, this means that the outpatient visits is also dispersed, but not as severe as inpatient admissions.

Some may question whether the hurdle specification is appropriate, because in one year period, patients may have multiple illness spells and multiple first contacts, and the first contact of the year may belong to an illness episode of the preceding year. But, we included health status and many chronic diagnosis conditions to control for severe of illness. Multiple first contacts also means poor health, so it's similar to more visits in one illness episode. Besides, we have many common explanatory variables in the first and second stages.

3.2 Bivariate Probit Model Results for Health Care Facility Choice

The purpose of the empirical analysis of this subsection is to identify factors that affect veterans' choices between VA and Non-VA health care facilities. A bivariate probit model with partial observability will be used in our econometric analysis.

At the beginning, a veteran decides whether or not to use medical services, and conditional on a positive decision, he/she then decides whether to use VA or non-VA health care facility. In our analysis, veterans using both VA and Non-VA facilities are included in the VA users' group. Suppose I_1 and I_2 are two index variables measuring respectively the propensity to use health care services and the propensity to choose VA as care provider. Define the two variables as follows: (i) $I_1 > 0$ if a veteran is a health care service user, $I_1 \leq 0$ otherwise; (i) $I_2 > 0$ if a veteran uses VA health care facility, $I_2 \leq 0$ otherwise. Denote $X_j's$ and $\beta_j's$ as vectors of explanatory variables and coefficients, then bivariate probit model can be written as:

$$I_1 = X_1'\beta_1 + u_1, \quad I_2 = X_2'\beta_2 + u_2; \;\; (u_1, u_2) \sim \; N(0, 0, 1, 1, \rho).$$

i.e. (u_1, u_2) follow a bivariate normal density and ρ is the correlation coefficient between u_1 and u_2. Since we do not know the potential health care facility choices of non-users, this bivariate probit model is only partially observed.

In order to know the reasons why veterans choose VA over Non-VA health care facilities, we need to know the differences in VA and Non-VA health care systems. The VA health care system was established primarily to treat war-related injuries and help rehabilitate veterans with disabilities incurred or aggravated as a result of military service, such as service-connected disabilities. Subsequently, the system was expanded to provide services to veterans who did not have service-connected disabilities and who lack the resource to pay. Today, all veterans are eligible for treatment at VA medical facilities, but few are entitled to the full range of services under the existing complex eligibility requirements. For example, veterans with service-connected disabilities are eligible for cost-free hospital care, while high income veterans without such disabilities are eligible for such care, but may receive it only if space and resources are available. The high income veterans are also subject to copayment and, if insured, their insurers must be billed for services provided by VA facilities.

The VA health care system is fundamentally different from private or public health insurance programs. VA generally delivers health care to patients directly using salaried physicians, nurses and other professionals in VA facilities. Insurance programs, on the other hand, provide services on a fee-for-service basis or through contracts with private providers. Insurance programs typically charge premiums to, impose deductibles on, and require copayment from all enrollees. In addition, VA provides some services that insurance programs typically do not provide. For example, VA covers outpatient prescription drugs and dental care that are not covered by Medicare. Similarly, while Medicare and most private insurance programs provide short-term nursing home care following on hospitalization, VA may, in some instances, offer more extensive, long-term nursing home and domiciliary care.

The above analysis indicates that veterans' insurance status, income level, and SC or non-SC conditions should be included in explaining the choices between VA or Non-VA hospital facilities. The other explanatory variables we choose are demographic characteristics, employment status, educational level and health conditions. Distance to VA facility is also included since it is one of the reasons most frequently cited by veterans for not using VA facilities. As before, we consider inpatient admissions and outpatient visits separately.

Similar to what we did earlier, we need to test the endogeneity of health status, income and insurance variables in the bivariate probit model. Blundell and Smith (1986) provided a simple two stage approach to do this test. The first stage is to regress the suspicious variables on exogenous variables. The second step is to estimate the original probit model with the sets of residuals from stage one as additional regressors, and jointly test the hypothesis that coefficients of the residual vectors are zeros. Since our suspicious variables are binary, probit generalized residuals are used (see Gourieroux et al. (1987)). The probit generalized residuals for a model $Y_i^* = X_i\beta_i + \varepsilon_i$ are given by:

$$\widehat{\varepsilon_i} = (Y_i - \Phi(X_i\widehat{\beta_i}))\phi(X_i\widehat{\beta_i})((1 - \Phi(X_i\widehat{\beta_i}))^{-1}\Phi(X_i\widehat{\beta_i})^{-1}$$

The χ^2 statistics that these additional coefficients are zeros for the outpatient utilization decision and facility choice equations are 4.58 and 3.91 respectively, while for the two inpatient equations, they are 5.05 and 3.76

respectively. So exogeneity is not rejected for the three variables for both inpatient and outpatient equations. Again, variables such as age, full-time employment status and home ownership are significant in the insurance, health and income equations, but are not significant in the inpatient and outpatient bivriate probit equations. (Note: $\chi^2(3) = 7.82$ at the 5% level of significant. We used age, employment status, educational level, home ownership and gender as exogenous regressors for the probit test)

Table 15 presents the results for inpatient admissions. Similar to our findings before, veterans having worse health conditions, with some diagnosed health problems, unemployed due to disability, or being female are more likely to use inpatient health care services. Veterans with private health insurance coverage, having own home or good health condition are less likely to seek inpatient treatment.

White veterans or veterans with private health insurance, higher education and income level, tend to use non-VA inpatient facilities. Veterans living far from VA hospitals are also less likely to use VA facilities. VA inpatient users are those with low income, high disability rating, worse health condition or living near VA hospitals. Veterans with diagnosed high blood pressure, cancer, kidney, diabetes or drug abuse also tend to use VA inpatient care. Among inpatient users, drug abuse veterans have 11% more chance to use VA, lower income veterans are 14% more likely to use VA . Veterans with private health insurance coverage have 8% more probability to be non-VA users. Thus, income seems to be more important than health measure variables in deciding veterans' health care facility choice. The estimated correlation of errors for the inpatient bivariate probit equations is 0.83. This means that the unobserved factors that increase the probability of inpatient service use also increase the probability of using a VA inpatient facility.[3]

Table 16 present results for outpatient visits. Our sample includes 9318 veterans, of which 6436 used some kind of outpatient care, and among the outpatient care users, 2675 veterans chose to use VA facility. Similar to our first stage results of NB2 hurdle model, veterans having worse health condition, with high education and income level, being female, being white have higher probability of using outpatient care services.

Results show that VA outpatient users tend to have worse health conditions, with diagnosed PTSD, high blood pressure, stomach, or mental problems, and are more likely to be non-white, lower income veterans. The non-VA users are those having higher level of income and education, with private insurance coverage, having own home or living far from VA outpatient clinics. Age, gender, employment status, marital status are not significant. Among outpatient users, veterans with PTSD, high blood pressure, stomach problem, or mental problems have about 7% more chance to choose VA. The lowerest income veterans are 18% more likely to use VA. Private health insurance holders has about 22% more probability to be a non-VA user. Veterans living 100 miles further from VA facilities will decrease their chances of using VA outpatient services by 12%. The estimated correlation of errors for the outpatient bivariate probit equations, like the inpatient equations, is

[3] See Jones (1989) for an interpretation of this coefficient as 'selection' bias in the context of general double hurdle models.

positive and high.

4 Summary and Conclusion.

Based on the 1992 veterans' survey data, we analyzed veterans' health care utilization, including inpatient admissions and outpatient visits, by using count data hurdle models. We also analyzed veterans' health care facility choices by using a bivariate probit model.

The major findings are:

Health condition measures are the most important factors in determining health care utilization. Veterans who are disabled, have a service-connected disability, have bad self-rated health condition or some specific diagnosed health problems use more health care services than others. Most demographic characteristics like marital status, age, employment status etc. are less significant. Veterans having private health insurance coverage tend to use less health care services. Family income is negatively related to inpatient usage, but positively related to outpatient usage. Level of education did not have significant effect on inpatient usage, but have positive effect on the probability of outpatient usage.

Family income is the most important factor on deciding veterans' health care facility choice. Other factors include race, health insurance, distances to the nearest VA health care facility and some diagnosis health conditions. Non-white veterans, veterans with lower income, poor health condition, without public or private insurance coverage, or those living near VA health care facility tend to choose VA as care provider.

We hope the above findings of factors that affect veterans' health care utilization and facility choices, and the magnitude of their effects, can provide useful quantitative benchmark for VA's health care system reform and for increasing service quality and efficiency in these facilities.

Table 1 : Type of Medical Care By Age Group(1992 Veterans)

	Percentage of Each Age Group						
Type of care	Age<25	25-34	35-44	45-54	55-64	65-74	>74
Inpatient	1.2	1.4	1.6	3.5	4.4	3.7	6.5
Outpatient	39.4	41.6	41.8	42.7	44.3	48.7	40.3
Both	2.7	3.8	7.2	5.8	8.7	12.8	17.7
None	56.7	53.2	49.4	48	42.6	34.8	35.5
Total	100	100	100	100	100	100	100

Table 2 : Medical Care Usage By Each Age Group(1992 Veterans)

	Average Usage of Each Age Group						
Type of care	Age<25	25-34	35-44	45-54	55-64	65-74	>74
Number of inpatient adm.	0.31	0.38	0.49	0.49	0.61	0.63	0.75
Number of outpatient visit	3.88	5.84	7.31	6.99	6.44	6.02	5.69

Table 3: Type of Medical Care By Gender(1992 Veterans)

Type of care	Male(Percentage)	Female (Percentage)
Inpatient only	3.3	2.1
Outpatient only	43.5	55.8
Both	8.4	12.8
None	44.8	29.3
Total	100	100

Table 4: Type of Medical Care By Education Level(1992 Veterans)

Type of care	<HS(%)	HS(%)	Adv. Training(%)	BA or + (%)
Inpatient only	5.1	3.9	3.1	1.2
Outpatient only	36	38.8	43.7	58.3
Both	10.4	7.8	8.6	8.2
None	48.5	49.5	44.6	32.3
Total	100	100	100	100

Table 5: Type of Medical Care By Race(1992 Veterans)

Type of care	White(%)	Black(%)	Hispanic (%)	Other (%)
Inpatient only	3.3	3.9	1.5	2.7
Outpatient only	44.8	40.8	34.1	42.4
Both	8.7	10	5.3	6.6
None	43.2	45.3	59.1	48.3
Total	100	100	100	100

Table 6: Source of 1992 Inpatient Care By SC Disability Status

Source of Care	Service-Connected (%)	Non-SC (%)
VA	23.6	6.5
Non-VA	55.4	88.7
Both	21.0	5.4
Total	100	100

Table 7: Source of Inpatient Care By Self-reported Health Status

Source of Care	Percentage Using Source for Inpatient Care				
	Excellent	Very Good	Good	Fair	Poor
VA	5.1	3.1	5.6	10.8	17.9
Non-VA	91.9	95.1	88.8	80.2	65.7
Both	3.0	1.8	5.6	9.0	16.4
Total	100	100	100	100	100

Table 8: Source of 1992 Outpatient Care Use By SC Disability Status

Source of Care	Service-Connected (%)	Non-SC(%)
VA	16.0	3.2
Non-VA	66.8	95.2
Both	17.2	1.6
Total	100	100

Table 9: Source of Outpatient Care By Self-Described Health Status

Source of Care	Percentage Using Source for Inpatient Care				
	Excellent	Very Good	Good	Fair	Poor
VA	1.4	2.3	4.0	9.8	15.1
Non-VA	97.4	96.1	92.3	82.8	75.4
Both	1.2	1.6	3.7	7.4	9.5
Total	100	100	100	100	100

Table 10: Types of Insurance Coverage by Employment Status (%)

Insurance type	Employment Status				
	Full-time	Part-time	Looking	Retired	Disabled
None	8.8	19.5	37.7	1.4	12.7
Public	3.5	15.2	11.3	19.2	38.0
Private	76.4	35.0	34.5	15.3	13.7
Public&Private	10.6	27.2	13.7	63.6	32.1
Unknown	0.7	3.1	2.8	0.5	3.5
Total Percent	100	100	100	100	100

Figure1: Inpatient Admissions

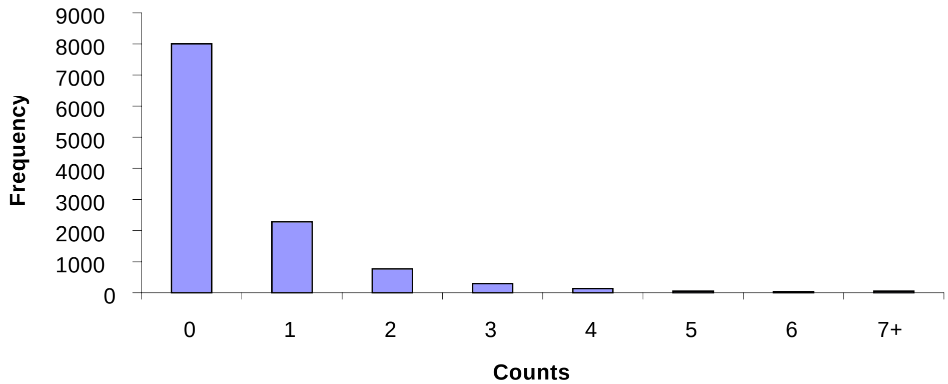

Figure2 : Outpatient Visits

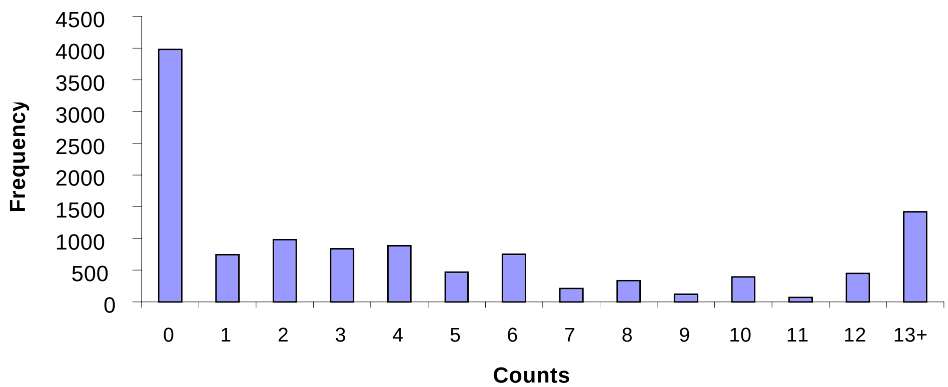

Table 11: Definition of Variables

Variable	Definition	Mean
INS_PV	1 if has private health insurance only, 0 otherwise.	0.33
PV_ANY	1 if covered by either private health insurance only, or both private and public health insurance, 0 otherwise.	0.62
IPADM	Number of of inpatient admissions in 1992	0.56
IPADM_VA	Number of inpatient admissions to VA in 1992.	0.31
OPVT	Total number of outpatient visits in 1992.	6.88
OPVT_VA	Number of OP visits to VA facilities.	3.04
AGE	Veterans' age. AGE2 is square of age.	54.90
DISABLE	Disability status. 1 if disabled, 0 otherwise.	0.56
EDU_HIGH	Level of education: BA or higher =1, 0 otherwise	0.18
EMP_FT	Full-time employed=1, other=0.	0.38
UEMP_DI	Unemployed due to disability=1, other=0.	0.19
WHITE	White=1, other=0.	0.84
BLACK	Black=1, other=0.	0.09
GOODHLTH	Self-described health status: excellent, good=1, other=0	0.35
BADHLTH	Self-described health status: bad, worse=1, other=0	0.41
LOWINC	Family income. =1, if $0-$20,000, other=0	0.48
MARRIED	Marital status: married=1, other=0.	0.74
DIS_SER	Service-connected Disability status. 1 if yes, 0 if no.	0.39
MALE	1=male, 0 =female.	0.96
OWNHOME	1 if owns home, 0 if not.	0.75
DIST_IP	Distance to VA hospital (miles).	49.00
DIST_OP	Distance to VA outpatient facilities (miles).	43.01
DIST_IPNV	Distance to non-VA hospital (miles).	10.62
DIST_OPNV	Distance to non-VA outpatient facilities (miles).	6.54
VAIPUSER	1 if ever used VA inpatient services, 0 otherwise	0.51
VAOPUSER	1 if ever used VA outpatient services, 0 otherwise	0.41
HBP	Diagnosed condition: High blood pressure	0.39
HEAR	Diagnosed condition: Hearing problem	0.36
EYE	Diagnosed condition: Eye or vision problem	0.21
CANCER	Diagnosed condition: Cancer	0.11

Table 11: Definition of Variables (Continued)

Variable	Definition	Mean
HEART	Diagnosed condition: Heart trouble	0.26
STROKE	Diagnosed condition: Stroke	0.07
KIDNEY	Diagnosed condition: Kidney/bladder trouble	0.18
RHEU	Diagnosed condition: Rheumatism or arthritis	0.36
DIABT	Diagnosed condition: Diabetes	0.12
STOMACH	Diagnosed condition: Stomach/Digestive disorder	0.23
DRGABUS	Diagnosed condition: Drug abuse or Alcoholism	0.07
PTSD	Diagnosed condition: Post-traumatic stress disorder	0.07
MENTAL	Diagnosed condition: Mental /Emotional problem	0.08
ACCIDT	Diagnosed condition: Accident related injury	0.25
DIGOTH	Diagnosed condition: Other series condition	0.14
#COND	Toatl number of diagnosed conditions	3.07

Table 12: Hausman test statistics for endogeneity

	Inpatient Admissions		Outpatient Visits	
Variable	First stage	Second stage	First stage	Second stage
BADHLTH	3.71	1.49	3.34	0.72
LOWINC	0.91	0.49	0.05	0.31
INS_PV	0.60	0.73	0.26	0.11

Note: The $\chi^2(1)$ critical value at the 5% level is 3.84.

Table 13: NB2 Hurdle Model Estimates for Inpatient(IP) Admissions[4].

	First Stage(Contact)			Second Stage(Frequency)		
Variable	coeff.	|t-ratio|	m-effect	coeff.	|t-ratio|	m-effect
CONST	-1.7**	5.04		-2.48**	3.74	
AGE$\times 10^{-2}$	1.74	1.22	0.34	-0.68	0.31	-0.38
AGE2$\times 10^{-4}$	-1.85	1.42	-0.36	-0.69	0.34	-0.39
DISABLE	0.44**	6.50	0.09	0.27*	2.17	0.15
EDU_HIGH	-0.12	1.63	-0.02	0.08	0.67	0.05
EMP_FT	-0.13	1.69	-0.03	-0.12	1.00	-0.07
UEMP_DI	0.36**	5.16	0.07	0.27**	2.87	0.15
WHITE	-0.03	0.47	-0.01	-0.05	0.48	-0.03
LOWINC	0.15*	2.36	0.03	0.09	0.90	0.05
BADHLTH	0.36**	5.85	0.07	0.37**	4.01	0.21
MARRIED	-0.07	1.17	-0.01	0.07	0.68	0.04
DIS_SER	0.70**	12.89	0.14	0.02	0.27	0.01
MALE	-0.32*	2.39	-0.06	0.21	1.12	0.12
OWNHOME	-0.26**	3.83	-0.05	0.12	1.16	0.07
INS_PV	-0.30**	4.10	-0.06	-0.30*	2.35	-0.17
DIST_IP$\times 10^{-3}$	-0.21	0.49	-0.04	0.91	1.58	0.51
HBP	0.11	1.78	0.02	0.02	0.26	0.01
CANCER	0.34**	4.39	0.07	0.32**	3.43	0.18
HEART	0.50**	7.54	0.10	0.14	1.38	0.08
KIDNEY	0.34**	4.97	0.07	0.00	0.01	0.00
DIABT	0.17*	2.13	0.03	0.30**	2.76	0.17
STOMACH	0.14*	2.14	0.03	0.09	0.94	0.05
DRGABUS	0.80**	7.97	0.16	-0.12	0.86	-0.07
ACCIDT	0.07	1.07	0.01	-0.12	1.29	-0.07
DIGOTH	0.23**	3.25	0.05	-0.01	0.07	-0.00
#COND	0.05*	2.09	0.01	0.10**	3.15	0.06
DIST_IPNV$\times 10^{-3}$				-1.94	0.68	-1.09
VAIPUSER				0.36**	3.93	0.51
α	1.00	fixed		4.88*	2.42	
-LOGL	4650			3077		

[4]Note: (*) and (**) indicate significance at 5% and 1% level, and so for the other tables. M-effect is marginal effect for first stage and conditional marginal effect for second stage.

Table 14: NB2 Hurdle Model Estimates for Outpatient(OP) Visits

	First Stage (Contact)			Second Stage (Frequency)		
Variable	coeff.	|t-ratio|	m-effect	coeff.	|t-ratio|	m-effect
CONST	0.13	0.37		1.77**	9.96	
AGE$\times 10^{-2}$	-0.01	0.01	-0.00	0.79	1.19	5.61
AGE2$\times 10^{-4}$	-0.34	0.26	-0.07	-1.86**	3.01	-13.19
DISABLE	0.46**	6.93	0.09	0.29**	9.64	2.02
EDU_HIGH	0.64**	8.89	0.13	-0.00	0.16	-0.03
EMP_FT	0.04	0.56	0.01	-0.05	1.60	-0.37
UEMP_DI	0.21*	2.44	0.04	0.13**	3.31	0.88
WHITE	0.23**	3.36	0.05	-0.06	1.76	-0.43
LOWINC	-0.32*	4.79	-0.06	-0.11**	3.51	-0.78
BADHLTH	0.05	0.74	0.01	0.13**	4.35	0.91
MARRIED	0.13	1.95	0.02	0.04	1.23	0.26
DIS_SER	0.94**	15.34	0.18	0.17**	6.83	1.20
MALE	-0.72**	5.09	-0.14	-0.35**	5.80	-2.45
OWNHOME	0.00	0.02	0.00	-0.07*	2.25	-0.48
INS_PV	-0.24**	3.46	-0.05	-0.17**	5.90	-1.24
DIST_OP$\times 10^{-3}$	-0.72	1.35	-0.14	-0.47*	2.33	-3.36
HBP	0.29**	3.82	0.06	0.07*	2.23	0.51
HEAR	0.06	0.86	0.01	0.04	1.11	0.25
EYE	0.02	0.19	0.00	0.09*	2.48	0.64
CANCER	0.10	1.02	0.02	0.16**	3.96	1.15
HEART	0.11	1.31	0.02	0.07	1.88	0.52
KIDNEY	0.07	0.76	0.01	0.07	1.93	0.51
DIABT	0.10	1.00	0.02	0.12**	2.66	0.84
STOMACH	0.23**	2.69	0.04	0.04	1.07	0.26
DRGABUS	-0.31**	2.54	-0.06	0.21**	4.56	1.45
PTSD	0.05	0.37	0.01	0.21**	4.56	1.47
MENTAL	0.26*	2.06	0.05	0.29**	6.57	2.02
ACCIDT	0.21**	2.61	0.04	0.12**	3.61	0.84
DIGOTH	0.15	1.62	0.03	0.14**	3.90	1.01
#COND	0.16**	3.59	0.03	0.05**	2.84	0.38
DIST_OPNV$\times 10^{-3}$				-1.10	0.78	-7.76
VAOPUSER				0.22**	7.45	1.55
α	1.00	FIXED		0.93**	32.51	
-LOGL	4744			18184		

Table 15: Bivariate Probit Estimates for VA Inpatient(IP) Admissions

	Participation			Facility Choice		
Variable	Coeff.	|t-ratio|	m-effect	Coeff.	|t-ratio|	m-effect
CONST	-1.16**	5.05		-0.96*	2.17	
AGE$\times 10^{-2}$	0.95	1.12	0.32	-0.22	0.20	-0.04
AGE2$\times 10^{-4}$	-0.96	1.26	-0.32	-0.69	0.71	-0.13
DISABLE	0.26**	6.65	0.09	0.33**	5.14	0.06
EDU_HIGH	-0.07	1.73	-0.03	-0.24**	3.25	-0.05
EMP_FT	-0.08	1.74	-0.03	0.01	0.10	0.00
UEMP_DI	0.23**	5.62	0.08	0.27**	5.06	0.05
WHITE	-0.02	0.41	-0.01	-0.22**	3.22	-0.04
LOWINC	0.10*	2.37	0.03	0.77**	7.33	0.14
BADHLTH	0.23**	6.16	0.08	0.26**	4.89	0.05
MARRIED	-0.04	1.09	-0.01	-0.10	1.87	-0.02
DIS_SER	0.43**	13.50	0.14	0.10	1.23	0.02
MALE	-0.20*	2.59	-0.07	-0.17	1.58	-0.03
OWNHOME	-0.15**	3.75	-0.05	-0.21**	3.86	-0.04
INS_PV	-0.18**	4.13	-0.06	-0.45**	4.38	-0.08
DIST_IP$\times 10^{-3}$	-0.09	0.34	-0.03	-2.19**	5.80	-0.41
HBP	0.10**	3.02	0.03	0.15**	3.29	0.03
CANCER	0.23**	5.16	0.08	0.13*	2.04	0.02
HEART	0.34**	9.55	0.11	-0.08	1.19	-0.02
KIDNEY	0.24**	6.44	0.08	0.27**	5.38	0.05
DIABT	0.13**	2.81	0.04	0.13*	2.12	0.02
STOMACH	0.12**	3.59	0.04	0.04	0.81	0.01
DRGABUS	0.52**	9.21	0.17	0.59*	8.44	0.11
ACCIDT	0.08*	2.25	0.03	-0.02	0.39	-0.00
DIGOTH	0.17**	4.24	0.06	0.12*	2.14	0.02
ρ	0.83	6.18				

Table 16: Bivariate Probit Estimates for VA Outpateirent Visits

	Participation			Facility Choice		
Variable	Coeff.	|t-ratio|	m-effect	Coeff.	|t-ratio|	m-effect
CONST	0.22	1.05		-0.85**	3.45	
AGE$\times 10^{-2}$	-0.66	0.84	-0.22	1.24	1.44	0.39
AGE2$\times 10^{-4}$	0.83	1.13	0.28	-1.09	1.37	-0.34
DISABLE	0.33**	8.42	0.11	0.38**	8.25	0.12
EDU_HIGH	0.38**	9.15	0.13	-0.14**	2.64	-0.04
EMP_FT	-0.01	0.15	-0.00	0.07	1.35	0.02
UEMP_DI	0.16**	3.30	0.05	0.15**	3.17	0.05
WHITE	0.15**	3.62	0.05	-0.17**	3.47	-0.05
LOWINC	-0.17**	4.34	-0.06	0.58**	10.81	0.18
GOODHLTH	-0.15**	4.06	-0.05	-0.27**	6.00	-0.09
MARRIED	0.08*	2.21	0.03	-0.05	1.00	-0.01
DIS_SER	0.59**	17.11	0.20	0.38**	9.10	0.12
MALE	-0.43**	5.53	-0.14	-0.04	0.39	0.01
OWNHOME	-0.01	0.28	-0.00	-0.19**	4.07	-0.06
PV_ANY	0.00	0.09	0.00	-0.70**	13.40	-0.22
DIST_OP$\times 10^{-3}$	-0.36	1.13	-0.12	-3.86**	10.58	-1.21
HBP	0.27**	8.30	0.09	0.28**	7.54	0.09
HEART	0.16**	4.03	0.05	0.01	0.33	0.00
STOMACH	0.24**	6.18	0.08	0.23**	5.72	0.07
PTSD	0.16*	2.32	0.06	0.23**	3.83	0.07
MENTAL	0.23**	3.67	0.08	0.22**	3.79	0.07
ACCIDT	0.22**	5.94	0.07	0.01	0.35	0.00
DIGOTH	0.19**	4.07	0.06	0.11*	2.31	0.03
ρ	0.73**	6.32				

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