# THE DEMAND FOR A MEDICARE PRESCRIPTION DRUG BENEFIT: EXPLORING CONSUMER PREFERENCES IN A HYPOTHETICAL MANAGED COMPETITION ENVIRONMENT

By

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A dissertation submitted in partial fulfillment of the

requirements for the degree of

Doctor of Philosophy

(Pharmacy)

At the

UNIVERSITY OF WISCONSIN – MADISON

2001

## DEDICATION

This work is dedicated with love to my wife, Heidi Lynn:
Without her love and support, my graduate education would
not have been possible;

and to

Professor Joseph B. Wiederholt:
A model teacher, researcher, and person.

## ACKNOWLEDGEMENTS

I would like to thank my wife and constant companion, Heidi, for the time, effort, and love that she provided during this project. It could not have been completed without her support.

Many thanks to my advisor, Dr. David A. Mott. His rational manner and encouraging demeanor helped to strengthen and guide this project (and my graduate studies) throughout. Specifically, his willingness to let me pursue my own ideas has helped to make me a better researcher.

To my committee members, Professors Mark Browne, David Kreling, Jeanine Mount, and Stephanie Robert, I owe a debt of gratitude. They provided many helpful suggestions that proved invaluable in the completion of this project and undoubtedly improved it.

I would like to thank my Mother and Father for their love and support during all of my educational endeavors. Specifically, I thank my Mother for inspiring in me the belief that I could and I thank my Father for inspiring in me a life-long love of learning.

I thank my fellow graduate students Mary Gurney, Carol Hermansen, I-Chi Liao, Tim Lobner, Surcharat Ngorsuraches, and Piyarat Nimpitakpong; their help in assembling the survey packets was vital to the timely fielding of the survey instrument in this project.

I would like to acknowledge all the other graduate students in the Social and Administrative Sciences graduate program at the University of Wisconsin-Madison; especially my office mates Julie Ganther, Mary Gurney, Carol Hermansen and friend

Nate Rickles. The spontaneous conversations we have shared are an essential part of the graduate experience.

Thanks to the folks at DOIT printing services: their help in the design and formatting of the pre-notification and cover letter was essential in the completion of this project.

Many thanks to the Sonderegger Research Center for providing funding for this project and to the American Foundation for Pharmaceutical Education which provided funding throughout my graduate education.

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## ABSTRACT

Recently, a variety of proposals for adding a prescription drug benefit to the federal Medicare program recently have been advanced, many of which would rely on consumer choice and private market forces to promote quality and efficiency. However, little information exists regarding the extent to which plans using common cost-control mechanisms are likely to experience adverse selection or regarding the extent of price sensitivity among Medicare beneficiaries. The objectives of this research were (1) to better understand the features of drug benefit plans associated with purchase intentions, (2) to better understand how individual characteristics are associated with purchase intentions among drug benefit plans with select features, and (3) to explore the utility of the managed competition model for a Medicare prescription drug benefit.

A cross-sectional, descriptive survey design was used in the current study. Data were collected by means of a mailed, self-administered survey. The survey was administered to a random sample of community dwelling individuals age 65 and older living in the state of Wisconsin. The dependent variable was the respondent's most likely choice from a menu of four hypothetical drug plans that varied with respect to four attributes: premium, copayment amount, drug formulary use, and mail-order pharmacy use. Independent variables included factors from five domains: drug plan features, health status indicators, information about the respondent's current use of prescription drugs, attitudes about formal medical care, and demographic characteristics. Data were analyzed in several stages, including bivariate cross-classification of individual characteristics by plan choice and by various logit regression

models using plan choice as the dependent variable and drug plan and individual characteristics as independent variables.

The overall response rate to the survey was 59.0% with a usable response rate of 53.4%. Respondents who were older and with lower education and income levels were most likely to skip the plan choice item on the survey. Among those responding to the plan choice item, it was found that consumers age 65 and older were price sensitive when choosing among stand-alone drug plans, a relationship that held with respect to both plan premium and expected out of pocket costs under each plan. Respondents in this study appear to dislike plans that require the use of mail-order pharmacies but appear to place a positive value on a plan's use of a drug formulary. Individual characteristics were also important in purchase intentions with wealthier individuals more likely to express intentions to purchase more expensive drug benefit plans. Respondents with more chronic diseases were more likely to express purchase intentions for the drug plan with fewest restrictions, as were individuals with a college education or more.

The results of this study with respect to consumer choice and managed competition with the implementation of a Medicare prescription drug benefit are mixed. Consumers seemed to exhibit significant price sensitivity when selecting among the hypothetical drug benefit plans presented in this study, thus satisfying a necessary condition to drive efficiency in such a choice driven market. Considerable heterogeneity in consumer tastes is also evident, suggesting that a consumer choice strategy is preferable to a regulated monopoly approach in the administration of a Medicare drug benefit. However, data analyses also suggest the potential for significant selection

problems, with given combinations of cost-control mechanisms seeming to attract disproportionate numbers of especially high or low drug utilizers. The results also suggest that older adults of lower socio-economic status are likely to have difficulty making optimal choices in a choice-driven regime. Policy makers should consider these findings in the design and implementation of a Medicare prescription drug benefit.

# I. INTRODUCTION

## Drug Utilization and Spending Among Older Adults in the United States

Prescription drugs play an increasingly important role in the delivery of medical care in the United States. Medications commonly are used as substitutes for other more expensive, invasive medical therapies (e.g. surgery) and new drugs are becoming available for conditions that were heretofore not treatable (Levit, Cowan, Braden, et al., 1998). The increasing importance of prescription medications is evidenced by the growing proportion of national health expenditures accounted for by drugs. For example, in 1980 national spending on drugs was $12.0 billion, or 4.9 percent of total health care expenditure (Health Care Financing Administration, 2000). By 1990, this figure had grown to $37.7 billion, or 5.4 percent of total health care expenditures. In 1999, prescription medications accounted for over $100 billion in health expenditures, or 8.2 percent of all health care expenditures. Although prescription medicines still account for a relatively small fraction of all health care expenditures in the United States it should be noted that spending on drugs is increasing at a rate far faster than other factors in the health care economy. For example, in 1998 drug spending increased 15% over the prior year while spending for physician services increased 5% and spending for hospital services increased at 3% (Kreling, Mott, Wiederholt, Lundy, and Levit, 2000).

Persons over 65 use the largest proportion of prescription drugs in the US. In 1998 the elderly comprised 13% of the US population but accounted for 34% of prescription drugs used and 42% of all prescription drug expenditures (Families USA, 2000). As a group, the elderly use twice the number of prescription drugs annually as all

other age groups (Adamcik, 1998). A recent analysis shows that the average non-institutionalized Medicare beneficiary used 18.5 prescriptions in 1995 with estimated total expenditures of approximately $600 per person (Davis, Poisal, Chulis, & Zarabozo, 1999). In total, Medicare beneficiaries spent slightly more than $22 billion on prescription drugs in 1995, accounting for 36 percent of the $61.1 billion in total drug expenditures in that year (Poisal, Murray, Chulis, & Cooper, 1999). It was estimated that expenditures would average $1,205 per elderly person in 2000, with total drug expenditures of $42.9 billion for the entire elderly population (Families USA, 2000).

Overall, recent reports indicate that only 73% of the elderly population has any drug insurance coverage (Poisal & Murray, 2001). Although this number appears to have increased slightly in recent years (Poisal & Chulis, 2000) other research suggests that point estimates of the proportion of this population with drug benefits are misleading. For example, Stuart, Shea, & Briesacher (2001) point out the transitory nature of drug benefits for many Medicare beneficiaries, noting that during the 1995-1996 biennium nearly one-third of all beneficiaries lost, gained, or had gaps in coverage.

Instability in drug coverage may be attributable to a number of factors. First, former employers provide the largest proportion of Medicare beneficiaries with drug coverage (46%) but this number has been declining in recent years due to new tax reporting rules requiring future retirement benefits to be counted against the firm's book value (Gluck, 1999; Morrissey, 1994). Stuart et al. (2001) provide evidence supporting the thesis that losses from private employers may be a primary source of instability in drug coverage. Second, payment changes required by the Balanced Budget Act of 1997

that decrease payments to Medicare + Choice health maintenance organizations may force many of these plans to decrease the generosity of their drug benefits or drop them completely.

In addition, prescription drug coverage among the non-institutionalized elderly is often inadequate, with many Medicare beneficiaries spending substantial amounts to cover cost-sharing provisions of their drug plans. The average Medicare beneficiary was expected to spend $410 out-of-pocket for prescription drugs in 1999 (Gibson, Brangan, Gross, & Caplan, 1999). Those with any coverage were projected to spend $320 out-of-pocket on average, while those with no coverage were expected to spend $590. To place these figures in perspective it should be noted that the average Medicare beneficiary used medicines worth approximately $1000 dollars in 1999 (Families USA, 2000).

Among the elderly, drug costs are likely to fall most heavily on the poorest and sickest. Forty-five percent of those without drug coverage have incomes less than 200 percent of the federal poverty level, compared with 33 percent of those having coverage (Gross & Brangan, 1999). Individuals with one or more limitations in activities of daily living (ADLs) were projected to spend $620 on out of pocket drug expenses, compared to $390 for those with no limitations in ADLs (Gibson, Brangan, Gross, & Caplan, 1999). Those with poor or fair health status were expected to spend $590 out-of-pocket compared to $225 for those with excellent health status.

**Medicare and Prescription Drug Benefits**

Consideration of these facts prompted health care policy makers to consider expansion of the Medicare program to cover prescription drugs at several points in

recent years (Zarobozo, 1999). The Medicare Catastrophic Coverage Act of 1988 would have provided drug coverage for senior citizens who have high out of pocket spending, but was repealed before it could be implemented (Long, 1994). President Clinton was elected on a platform that included his Health Security Plan, a comprehensive national health insurance scheme that would have provided comprehensive drug coverage for all US citizens. This plan was never implemented. Because the elderly represent the fastest growing demographic segment of the US population and prescription drug expenditures are expected to rise rapidly in coming years, the issue of a Medicare prescription drug benefit has once again surfaced (Government Accounting Office (GAO) 1999; Soumerai & Ross-Degnan, 1999).

If a drug benefit is to be added to the Medicare program, fundamental questions for health care policy makers are how and by whom such a program should be implemented and administered. A variety of possibilities exists with respect to this question. For example, Soumerai and Ross-Degnan (1999) have advocated a plan involving the joint participation of Federal and state governments to create pharmaceutical assistance programs for the poor and near-poor elderly (i.e. those at 200% and less of the current poverty level). Unfortunately, this option would not help those elderly with somewhat higher incomes that face exposure to significant out-of-pocket drug costs. Another option would be to require existing Medigap plans to cover prescriptions drugs (Long, 1994). This proposal suffers from a number of problems, also. For example, those elderly with Medigap plans who have low drug expenditures may dislike the associated rise in premiums that this additional benefit would entail.

Additionally, many of the low-income elderly cannot afford supplemental Medigap policies.

Another alternative for providing the elderly with drug coverage is to offer this benefit to all Medicare enrollees by fundamentally altering the Medicare program. This proposal has the advantages of being both equitable and providing access for all Medicare enrollees, regardless of income. Importantly, this type of comprehensive coverage is favored by powerful political groups such as the American Association for Retired Persons (AARP) (McKinnon, McGinley, & Burkins, 2000) and the Pharmaceutical Research and Manufacturers Association (PhRMA) (Pear, 2000). Both lawmakers and PhRMA have advocated private market-driven controls for such a plan. These groups envision a system in which pharmacy benefit managers (PBMs) would compete for business by offering federally subsidized drug insurance plans with certain minimum standards to individuals (McClellan, Spatz, & Carney, 2000).

The manner in which PBMs might be utilized to implement a Medicare drug benefit is a matter of considerable debate. For example, Huskamp, Rosenthal, Frank, & Newhouse (2000) advocate a regulated monopoly model for administration of a drug benefit. In this model, PBMs would bid for exclusive rights to the drug benefit contract in a given geographic area on a semi-annual basis. The contract would be awarded to the single lowest bidding PBM, with consumers having no choice of plan. Huskamp and colleagues eschew allowing consumers any choice of plans noting, "…this approach almost certainly would result in adverse selection…" (Huskamp et al., 2000, pg. 10). Adverse selection is defined as "…the tendency of buyers with high expected losses to buy more coverage than buyers with low expected losses when charged the same

premium" (Harrington & Niehaus, 1999, pg.117). Huskamp et al. (2000) argue that the adverse selection resulting from free consumer choice would result in instability in this insurance market. Instability could result from plans that experience a great deal of adverse selection exiting the market, leaving remaining plans to take up former members. If this process continues without outside intervention, the entire market could collapse.

Others argue that consumer choice among competing plans may be a viable method of administering a prescription drug benefit. For example, Danzon (2000) argues that a choice driven model, in which consumers are able to choose what they want in a benefit has the potential to promote both efficiency and quality within this program. Such a competitive, choice-driven, private market structure for Medicare prescription drug plans seemingly has much to recommend it. If certain conditions were met, (e.g. the government contributes a fixed amount of the premium across all plans) this scheme would be similar to the managed competition strategy promulgated by Enthoven (1993; Enthoven & Kronick, 1989). Because of the government's fixed dollar contribution, consumers are forced to pay the marginal cost of their care. Because the government would fix minimal standards with respect to the services offered by each plan, individual plans would be forced to compete based on quality and price, theoretically promoting optimal market conditions.

**Pharmacy Benefit Managers and Medicare Drug Benefits**

As PBMs have evolved, they have developed and implemented various strategies to control drug costs for their clients (Lipton, Kreling, Collins, & Hertz,

1999). One common cost control mechanism is a closed drug formulary. A closed formulary is a limited list of medications representing each therapeutic class that the insurance plan will reimburse (Dillon, 1999). Drugs not listed on the formulary are not paid for, requiring patients using non-covered medications to either pay out of pocket or have their health care providers prescribe a similar, covered drug. A second control mechanism is the use of mail order pharmacy programs. Mail order pharmacies provide economies of scale in the dispensing of drugs used for chronic conditions. These firms achieve economies of scale by centralizing distribution and dispensing several months of medication at each dispensing encounter. Finally, copayments would almost certainly be part of any drug benefit plan. Copayments are fixed dollar payments per prescription. Copayments are intended to discourage over-utilization by forcing the beneficiary to pay a portion of the cost for each service.

These private market control mechanisms raise a number of issues for the administration of a Medicare drug benefit (GAO, 2000). Arguably, the most important issue to be dealt with in such a free choice environment is that of who will choose what kind of plan. Little information exists concerning the extent to which individuals with different health status and drug utilization levels would be likely to enroll in plans with certain control mechanisms (i.e. adverse selection). Although many authors have examined adverse selection in consumer choice of health plans (e.g. Browne & Doerpinghaus, 1994; Grazier, Richardson, Martin, and Diehr, 1986) results are often conflicting concerning the extent of this problem. Again, there is little evidence bearing on the extent and severity of this phenomenon when drug benefits are offered alone.

Other questions arise with regard to the feasibility and viability of a competitive model for Medicare prescription benefits. For example, in order for the managed competition strategy to work consumers must be sensitive to price differentials among plans. Although a number of studies have found a significant negative relationship between premiums and purchase probabilities for health plans (e.g. McGuire, 1981; Royalty and Solomon, 1998), other studies have suggested that price sensitivity may be minimal (e.g. Juba, Lave, and Shaddy, 1980; LaTour, Friedman, and Hughes, 1986). Little information exists regarding price sensitivity with respect to stand-alone prescription drug plans.

Despite evidence that consumers value drug benefits when offered as part of an overall health benefit package (Kreling & Wiederholt, 1987; Short & Taylor, 1989) no studies known to the author have examined consumer choices among stand-alone drug benefit plans. This is likely because drug benefits are most often bundled with other health benefits (e.g. physician services, hospital stays, etc.) making study of the impact of specific drug benefit provisions (e.g. formularies) on choice difficult. At this time there exists little empirical evidence on the types drug plans that elderly consumers value or the types of individuals likely to select plans with certain characteristics.

**Study Objectives**

The objectives of this study are to address three primary questions:

1. Are prescription drug plan features associated with consumer purchase intentions?
    a) Specifically, do drug benefit plan features such as closed formularies, copayments, use of mail-order pharmacy, and premiums impact choices among drug plans?
2. Are characteristics of consumers associated with prescription drug plan purchase decisions?
    a) Specifically, do characteristics such as health status, current prescription utilization, demographics, and attitudes toward medical care influence choices among drug plans?
3. Could a managed competition framework be a viable strategy for implementing a Medicare drug benefit?
    a) Specifically, is there a tendency for drug plans with given features to attract a disproportionate number of especially ill (or healthy) individuals? Do elderly consumers appear to be price-sensitive when choosing among plans?

## II. REVIEW OF THE LITERATURE

This section of the dissertation proceeds in the following manner. First, the theoretical underpinnings of the study are discussed. Specifically, these include the economic theory of demand for health insurance and a model of health plan choice developed by Berki and Ashcraft (1980). Next, because little direct evidence exists with respect to consumer choices among stand-alone pharmaceutical benefits, prior studies of health plan choice are reviewed. These studies are reviewed using constructs from the Berki and Ashcraft model to organize the discussion. Hypotheses specific to each section of the model are advanced. Finally, the chapter concludes with a brief discussion of the tenets of managed competition and the evidence regarding its efficacy.

**The Economic Theory of the Demand for Insurance**

The economic theory of demand for insurance conceptualizes this demand as a utility maximization problem for the consumer (Folland, Goodman, & Stano, 2001). When the consumer is faced with the decision of whether and how much coverage to purchase they must attempt to balance the known premium costs with the probability of future illnesses and their expected costs. More formally, the consumer evaluates a gamble, represented as

$$EV = p_1V_1 + p_2 V_2 + \ldots + p_nV_n \quad (1)$$

where $EV$ = The expected value of the gamble

$p_n$ = the probability that event *n* will occur

$V_n$ = the gain or loss if event *n* occurs

If the consumer is risk neutral (i.e. she or he is indifferent between a sure payment and gamble with equal expected value) and insurance policies are priced at their actuarially fair price, the consumer is indifferent between purchasing insurance and paying for their losses out of pocket.

Empirical evidence, however, suggests that most consumers are not risk-neutral; instead, most are risk-averse (e.g. Friedman, 1974). A risk-averse consumer prefers a sure thing to a gamble of equal expected value. For a risk-averse consumer, the disutility of losing some amount of money (due to illness) is greater than the utility of gaining the same amount. For these consumers the purchase of an insurance policy is a rational decision because the expected utility of the policy is greater than the premium.

Although the theory of demand for insurance provides a sound rationale for *why* an individual might choose to purchase an insurance policy, it does not explain *how* the individual chooses among several policies once the decision to purchase has been made. Researchers studying choices among health plans typically have employed a variant of the previously discussed form of expected utility theory (EUT) as a framework for studying these choices (Friedman, 1974; Feldman, Finch, Dowd, & Cassou, 1989). This theory, (which could be termed a multi-attribute, multi-alternative form of EUT) posits that consumers have preferences for various features of insurance policies (e.g. covered services, convenience, etc.) and some estimate of their probabilities of experiencing various health states that might require treatment. The consumer then decides on the most appropriate trade-offs to make among premiums, other out-of-pocket costs, and plan features. Finally, the consumer chooses the insurance policy with the greatest expected utility from among those offered.

The fact that the importance of plan features might vary systematically with characteristics of the individual has also been recognized by those studying these choices. For example, in a study of Medicare supplement coverage choices, Dowd and colleagues (1994) found that those living only part of the year in the Twin Cities area were more likely to choose a Medicare fee-for-service plan in conjunction with a traditional supplemental Medigap policy over several local Medicare HMOs. This presumably occurred because these individuals valued the portability of the more traditional plans.

This focus on individual level variables is entirely consistent with the study of adverse selection: for example, for adverse selection to occur, individuals with larger expected expenditures must be cognizant of these expected expenditures and preferentially select a given plan relative to other available plans based upon these expectations.

This discussion suggests that an individual's utility for a given health plan is a function of both plan attributes and individual characteristics. Scanlon, Chernew, and Lave (1997) have provided a useful taxonomy of variables relating to health plans and individuals. Attributes of health plans are referred to as *primary variables*. These attributes might include factors such as premium, services covered, and provider restrictions. These variables are considered the primary determinants of health plan choice. Individual characteristics are referred to as *secondary variables*. These variables might include factors such as health status, age, or income. Scanlon et al. (1997) note that secondary variables are important because they influence the weight placed on the primary variables by the individual when deciding on a plan.

**The Berki & Ashcraft Model of Health Plan Choice**

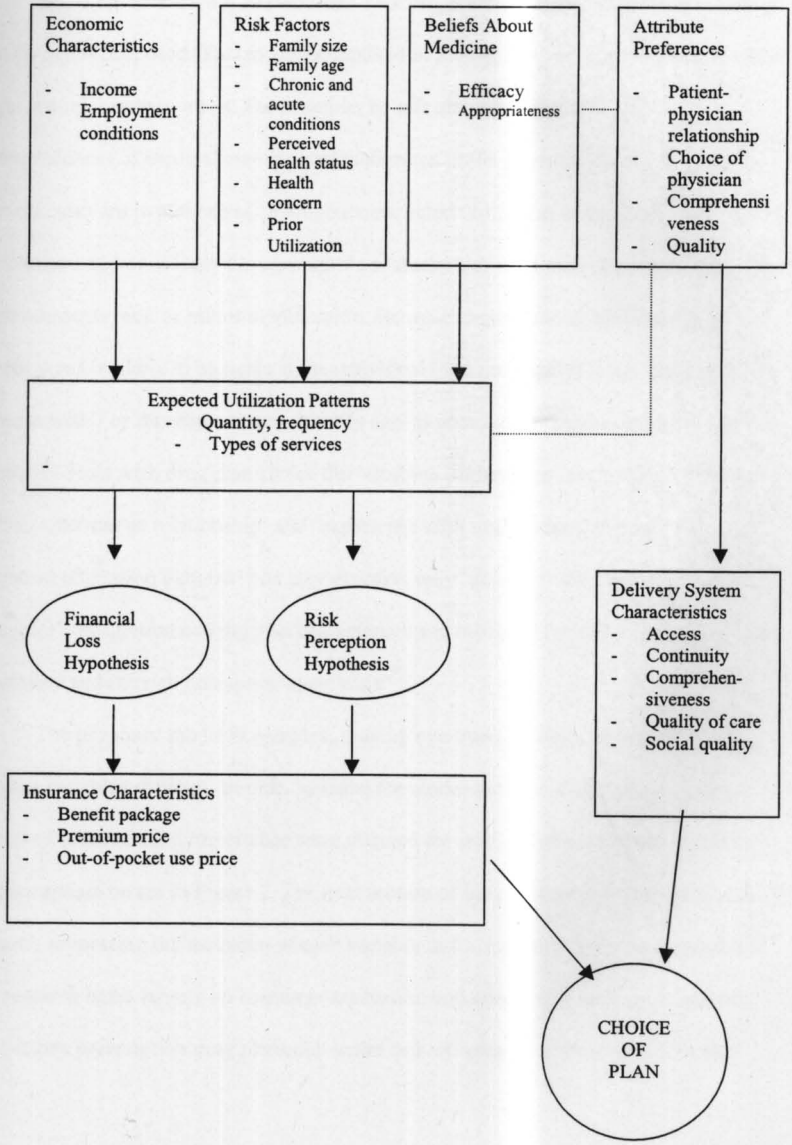
Berki and Ashcraft (1980) reviewed the literature pertaining to consumer choices among health maintenance organizations (HMOs). Their review of this literature provided the motivation for a model of health plan choice that provides a useful framework for the study of these choices. Although the authors noted that the model was intended for the study of HMO choices, the model is adaptable for the

current study because it incorporates and organizes many variables that are conceivably relevant to the study of prescription drug insurance plan choices and formalizes the relationships among these variables. This model is shown in Figure 1.

Inspection of the Berki and Ashcraft model reveals many similarities to the EUT model of health plan choice. For example, the Berki and Ashcraft model posits that consumer preferences for plan attributes such as access to a usual source of care and quality of care influence their evaluation of various health plans and ultimately, their choice of a plan. Risk factors such as number of chronic and acute conditions, perceived health status, and previous utilization are hypothesized to influence the consumer's expected utilization patterns, which in turn affect the consumer's choice of plan.

The influence of expected utilization patterns on the evaluation of insurance characteristics and plan choice is presumed to be mediated by the consumer's perception of two types of risk. The first, labeled 'financial risk hypothesis' in Figure 1, relates to the individual's expectation of utility losses due to spending for medical care. This component of the model would incorporate the individual's evaluation of the premium required by each plan as well as any other cost sharing requirements (i.e. copayments, coinsurance amounts). The second type of risk, labeled 'risk perception hypothesis', relates to the individual's perception of the likelihood of future health care needs. These perceptions are in turn hypothesized to be a function of past utilization patterns, perceived health status, and attitudes toward risk. Berki and Ashcraft (1980) noted that the concept of adverse selection is captured under the risk perception hypothesis in their model.

FIGURE 1
BERKI-ASHCRAFT MODEL OF HEALTH PLAN CHOICE

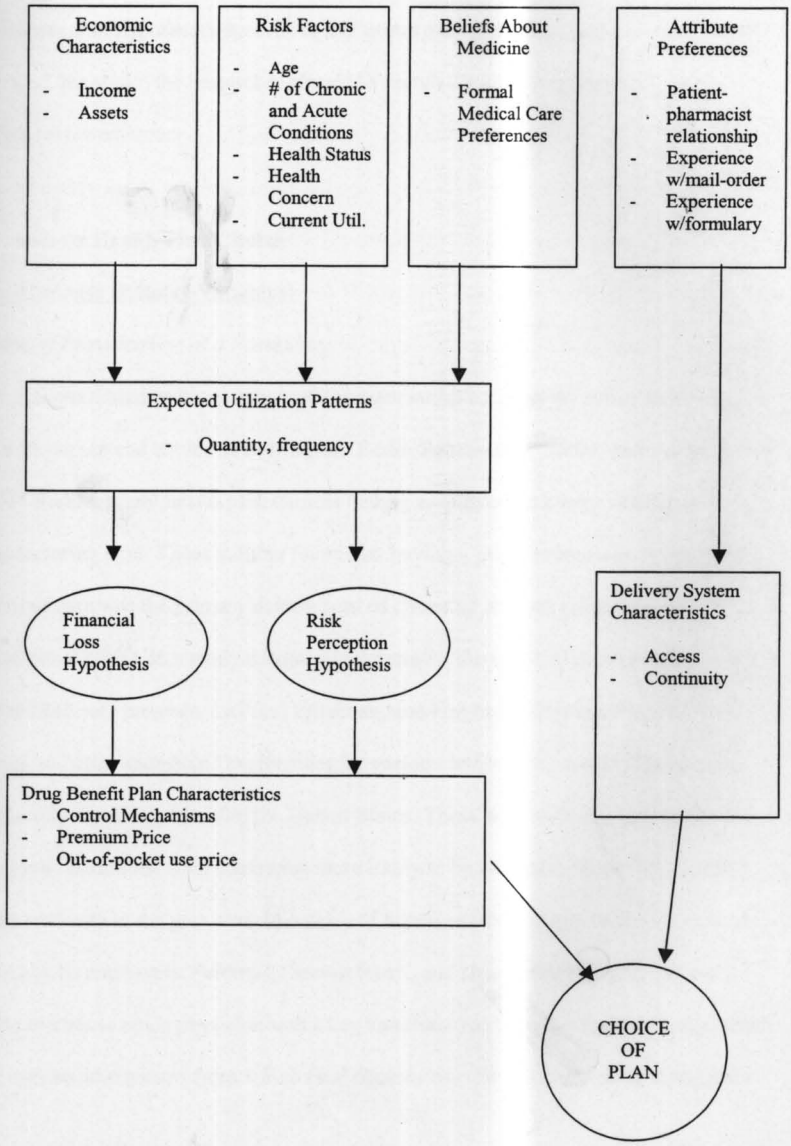


**A Model of Prescription Drug Plan Choice**

Building on the work of Berki and Ashcraft (1980) a model of prescription drug plan choice is proposed. This model is depicted in Figure 2. Many of the elements of the original model remain intact. For example, beliefs about the efficacy and appropriateness of medical care (operationalized as preferences for the use of formal medical care) are hypothesized to influence expected utilization of prescription medications and eventually the consumer's evaluation of drug plan characteristics. Other elements receive minor modification. Because choice among Medicare drug benefit plans is likely to be made at the individual (and not family) level, 'family size' is eliminated. For this same reason, 'family age' is changed to 'individual age'. Because the model deals with drug plan choice the 'attribute preferences' construct is altered to 'patient-pharmacist relationship' and 'experience with mail-order/formulary'. The 'expected utilization patterns' box now contains only 'quantity' and 'frequency'. The consumer's evaluation of drug plan characteristics is mediated by both the financial loss hypothesis and the risk perception hypothesis.

The proposed model is complex, making operationalization and study of all relevant variables difficult. In order to make the model more manageable, variables perceived to be of most importance were selected for study. These variables appear in the appropriate boxes in Figure 2. The next section of the proposal presents empirical research supporting the inclusion of each variable in the model. It must be stressed that this research bears largely on consumer evaluation and choice of health plans and not stand-alone prescription drug plans due to the lack of research in this area. It is also

FIGURE 2
PROPOSED RESEARCH MODEL OF DRUG PLAN CHOICE



important to note that few studies of health plan choice focus on the elderly making the development of hypotheses specific to this group difficult. Because of the exploratory nature of this study, the researcher elected to search for and use generalities from studies reviewed here.

**Research on Health Plan Choice**

Plan Attributes (Primary Variables)

*Choice of Provider/Use of a Formulary*

Several studies have examined the association between the ability to choose one's physician and choice of health plan. Berki, Penchansky, Fortus, and Ashcraft (1978) studied actual health plan choices among employees at a large Michigan manufacturing firm. These authors found that having a private physician as the usual source of care was the primary determinant of choosing an open panel instead of a closed panel HMO. In a study designed to determine the feasibility of a voucher system for the Medicare program, LaTour, Friedman, and Hughes (1986) used hypothetical choices to better understand preferences for various attributes of health plans among community dwelling elderly in the United States. These authors found that plans with physician restrictions were somewhat more likely to be chosen by those with fewer physician visits in the past year. In a study of actual health plan choice in a sample of Minneapolis employers, Feldman,Cassou, Finch, and Dowd (1989) found that the ability to choose one's physician was a key variable used by individuals to divide health plan options into groups from which final choices were made. These studies suggest

that the ability to choose one's provider is an important determinant of health plan choice and that these features may be important in 'segmenting' the markets for health plans.

On average, we expect that elderly consumers will prefer drug benefit plans that do not require the use of mail-order pharmacies or do not use drug formularies, which may represent a break with their usual source and type of medications. A plan's use of these mechanisms takes away a 'degree of freedom' from the consumer and thus it seems logical to expect that, all else equal, consumers will attach a negative value to these control mechanisms. This evidence leads to the first study hypotheses:

**H1:** *The use of mail-order pharmacies will be associated with lower consumer purchase intentions.*

**H2:** *The use of drug formularies will be associated with lower consumer purchase intentions.*

*Premium*

Economic theory suggests that all else equal, consumers should prefer lower premiums to higher. In large part, empirical studies have found support for this hypothesis. McGuire (1981) found that, among employees at Yale University, the likelihood of joining a prepaid group practice (PGP) increased as the premium for a traditional Blue Cross/Blue Shield fee-for-service (FFS) plan became relatively more expensive. Using conjoint analysis, Hershey, Kunreuther, Schwartz, and Williams (1984) found that preferences for health plans varied inversely with increases in premiums. In a national study of preferences for health plan attributes among Medicare beneficiaries LaTour and colleagues (1986) found premiums to be influential in health

plan choice, although to a lesser degree than many other plan attributes. Long, Settle, and Wrightson (1988) studied the HMO choices of a sample of Minneapolis employees. These authors found a statistically significant relationship between premium increases and disenrollment rates among the three HMOs studied. These findings provide the basis for the second study hypothesis:

**H3:** *Higher premium levels will be associated with lower consumer purchase intentions.*

*Copayments, Coinsurance, and Deductibles*

Consumers are also likely to consider the cost sharing provisions of health benefit plans when choosing among available options. A copayment is defined as a constant dollar amount charged to the patient per use of a service. For example, a patient may have to pay five dollars each time they receive a prescription at a pharmacy, regardless of the actual cost of the medication obtained. A coinsurance amount varies with the charge for each service provided. Thus, a patient with a twenty percent coinsurance rate for prescription drugs would be asked to pay four dollars for a medication costing twenty dollars and ten dollars for a medication costing fifty dollars. A deductible is a dollar amount that the patient must spend before the insurance plan pays any portion of medical expenses.

Juba, Lave and Shaddy (1980) studied actual health plan choices of employees at Carnegie Mellon University. These employees were offered a choice between a traditional fee-for-service plan and two HMOs. These authors combined health plan premiums with an estimate of expected out-of-pocket health care expenditures in order to predict these choices. They failed to find a significant relationship between plan

choice and expected out-of-pocket expenses. In a study of hypothetical choices among privately insured Dutch citizens, Van de Ven and Van Praag (1981) found that individuals with more physician visits in the last year were less likely to express a desire for a deductible in their current policy, suggesting that these individuals understood the implications of the deductible for their utilization patterns. Hershey et al. (1984) found that consumers prefer smaller deductibles to larger deductibles, and lower coinsurance rates to higher. Barringer and Mitchell (1994) found that both premiums and deductibles were significant determinants of health plan choices in a sample of employees of a large manufacturing firm, with likelihood of choice being inversely related to both. This evidence suggests the fourth study hypothesis:

**H4:** *Higher copayment levels will be associated with lower consumer purchase intentions.*

Individual Characteristics (Secondary Variables)

*Economic Characteristics*

Income, both family and individual, is often used as an explanatory variable in studies of health plan choice. Theoretically, we would expect those with higher incomes to be more likely to choose plans that are more expensive, all else equal. In this case, more expensive might refer to both premium and to expected out-of-pocket costs. Empirical research largely supports this hypothesis.

Berki et al. (1978) found that families with higher incomes were more likely to choose open panel HMOs or traditional fee-for-service (FFS) insurance plans than closed panel HMOs (the least expensive of the three options). Juba et al. (1980) report a similar result. Davidson, Sofaer, and Gertler (1992) studied the choices of Medicare

beneficiaries choosing among Medicare only, Medicare with a Medigap supplement, or a Medicare HMO. These authors found that income remaining after premium payment was a significant factor predicting choice in this group, with more income remaining being preferred to less. In a study of workers within a single manufacturing firm, Barringer and Mitchell (1994) found that employees with higher incomes were less likely to choose a prepaid group practice which was the least expensive health plan option available.

This evidence suggests that in general, individuals with higher incomes are more likely to choose plans that allow greater freedom of choice. This likely results from the fact that individuals with higher incomes are better able to afford the higher cost sharing provisions (i.e. deductibles, copayments) typically associated with less restrictive health plans. Because the elderly may depend not only on income from pensions and other sorts of annuities but also on accumulated assets for their livelihood, the following two hypotheses are proposed:

**H5:** *Individuals with higher incomes will show higher purchase intentions towards plans with higher premiums*

**H6:** *Individuals with greater financial assets will show higher purchase intentions towards plans with higher premiums*

*Risk Factors*

Age often appears as an explanatory variable in health plan choice studies. Because age is likely to be negatively correlated to overall health status, its inclusion in models of health plan choice is important for at least two reasons. First, it is theoretically relevant because it is likely related to an individual's expectation of current

or future health care needs. Second, it is of practical relevance to analysts because it may provide evidence of adverse selection into a given plan.

Past studies provide conflicting evidence with respect to age and its relation to health plan choice. For example, a number of researchers have found no relationship between age and plan choice. Juba et al. (1980) found that age was not a significant predictor of health plan choice. Long, Settle, and Wrightson (1988) found that age was not a significant predictor of HMO disenrollment. Davidson, Sofaer, and Gertler (1992) did not find a relationship between age and choice of Medicare supplementary coverage.

Still other studies find age to be a significant determinant of plan choice. Grazier et al. (1986) found that older individuals were less likely than younger individuals to switch from a traditional FFS plan to a newly offered independent practice association (IPA) type HMO. However, these authors also reported that older individuals were *more* likely to change to the IPA if they were previously enrolled in a staff-model HMO. Feldman et al. (1989) found that older individuals were more likely to select plans that did not restrict physician choice. Using data from the National Medical Care Expenditure Survey, Short and Taylor (1989) found that individuals over the age of 65 were more likely to choose a 'high option' FFS plan (i.e. one with more generous benefits and lower cost-sharing provisions) compared to individuals under the age of 65. However, Short and Taylor also found that when offered a choice between a traditional FFS plan and an HMO, those over 65 were more likely to choose an HMO. In a study of Medicare option choice, Dowd and colleagues (1994) found that males

over the age of 85 were less likely to choose a network HMO relative to basic Medicare. Thus, because the empirical evidence concerning the association of age and health plan choice is mixed, the following null hypothesis is proposed with respect to this variable:

**H7:** *Age will have no relationship to prescription drug plan purchase intentions in this study.*

*Health Status*

Theoretically, an individual's health status should be an important factor in health benefit choice. Other factors held constant, we would expect sicker individuals to prefer benefits that are more comprehensive. This hypothesis has received mixed support in empirical studies. It is important to note that health status has been operationalized in a number of different ways, including counts of chronic conditions, past health care utilization, and other multi-item health status measures.

Berki et al. (1978) found that those with greater numbers of chronic conditions were more likely to choose an open panel HMO relative to a FFS plan. These authors also found that individuals with more chronic conditions were more likely to choose an open panel HMO relative to a closed panel HMO. These authors explained the first finding by pointing out the more generous payments of many HMOs compared to FFS plans and explained the second by noting that the open-panel plan allowed these persons the greatest freedom in choosing their providers.

However, given that, in the present study the level of benefits is held constant by design (with only cost and convenience features manipulated) the level of benefits provided should not be important. Latour et al. (1986) found that elderly persons with

higher physician utilization rates expressed a preference for health plans without physician restrictions. Short and Taylor (1989) found no relationship between the proportion of a family in poor health and their choice of health plan. Davidson et al. (1992) found that healthier individuals were more likely to select both Medicare HMOs and Medicare with a Medigap supplement relative to standard Medicare coverage only. These studies seem to suggest that in some circumstances sicker individuals do prefer the more generous (in terms of out of pocket payments) benefits typically offered by HMOs, although similar persons place significant weight on maintaining the ability to choose providers.

Attitudinal measures have also been employed on occasion to measure an individual's or family's health plan enrollment decisions. Berki et al. (1978) used a three-item measure of health concern, defined as a person's present and future concern for their health, in their study of HMO enrollment decisions. These authors found that higher levels of health concern were significantly related to the likelihood of choosing a closed panel HMO. However, they attributed this effect to the fact that closed panel HMOs were more likely to cover preventive services; a factor that is not relevant in the current study because of the standard benefits. Davidson et al. (1992) used a single item measure of health concern in their study of health plan choices among Medicare beneficiaries, but it was combined with other items into an index, making elucidation of its effect impossible.

Given the evidence presented above, it seems reasonable to propose the following hypotheses:

**H8**: *Consumers with more chronic illnesses will show greater purchase intentions towards plans with the $5 (as opposed to $10) copayment.*

**H9**: *Higher levels of health concern will not affect drug insurance plan purchase intentions.*

*Beliefs about Medicine/ Prior Utilization*

One's beliefs concerning the desirability and appropriateness of formal medical care are theoretically important in health plan decisions. For example, it would be reasonable to expect that consumers who believe self-care is preferable to formal medical care would be less likely to purchase comprehensive benefit packages. Few studies, however, have examined the relationship between health plan choice and attitudes toward medical care. Notable exceptions are provided by Vistnes and Banthin (1997) who studied the influence of attitudes toward medical care and risk on the decision to purchase supplemental Medicare policies and Ganther (1999) who studied prescription drug utilization among ambulatory residents of Wisconsin aged 55 and older.

Vistnes and Banthin (1997) found that attitudes are associated significantly with supplement purchase decisions. Specifically, they found that those having negative opinions of medical care were less likely to purchase any supplemental insurance and less likely to purchase policies covering prescription drugs. This study suggests that the inclusion of measures of medical care preferences in studies of health plan choice might provide a more complete understanding of these decisions. However, it must be kept in mind that these authors studied choices among plans that covered different services, and not among health plans that varied only with respect to administrative attributes.

Ganther (1999) found that higher scores on a measure of preferences for using formal medical care (as opposed to self-care) predicted greater use of prescription medicines, controlling for economic and insurance status. By extension, this greater use of prescription drugs would impact out-of-pocket spending through copayment levels. In the current study, the scale developed and employed Ganther is used as a measure of the consumer's attitudes towards prescription medicines.

Individuals reasonably can be expected to take account of their prior utilization of heath care services when choosing among health benefit options. Those with higher past utilization patterns should prefer more generous benefits to less generous benefits. Ellis (1986) examined this hypothesis using data from a large manufacturing firm offering employees a choice among three FFS plans that varied in both deductible and stop-loss amounts. The author found that those choosing the most generous plan had prior year expenditures more than five times greater than those choosing the least generous plan, providing strong evidence for adverse selection among the offered plans. However, given the fact that many persons are shielded from the costs of the medications they use no hypothesis is advanced with respect to prescription drug expenditures.

Greater expected expenditures may impact health plan choices in other ways, especially when measured using variables the consumer is likely to have full knowledge of (e.g. chronic conditions). For example, Berki et al. (1978) found that those with higher numbers of chronic conditions were more likely to choose plans with fewer

restrictions compared to those with fewer chronic conditions. In sum, this discussion leads to the following hypothesis:

**H10**: *Consumers with higher scores on the formal medical care use scale will show higher purchase intentions for plans with the $5.00 (as opposed to the $10) copayment level.*

**H11**: *Consumers with greater numbers of chronic conditions will choose plans with fewer restrictions.*

*Attribute Preferences*

Consumers' attribute preferences, specifically for the physician-patient relationship, are also an important factor in their health plan choices. Juba et al. (1980) found that respondents who reported being very satisfied with their current physician were more likely to select a traditional FFS plan than one of two newly offered HMOs that limited physician choice. Conversely, families with lower average satisfaction with their current providers were more likely to elect HMO coverage. In their study of choice between a traditional FFS plan and a new IPA type HMO, Grazier et al. (1986) found that the single strongest predictor of IPA choice was the proportion of a family's usual providers enrolled in the IPA. Davidson et al. (1992) found that Medicare eligible individuals who had been seeing the same physician for five years or longer were more likely to choose standard Medicare alone or Medicare with a supplement over a Medicare HMO. These studies suggest strongly that consumers' preferences for provider-patient relationships are influential in their health insurance choices.

A burgeoning literature suggests that, analogous to patient-physician relationships, patient-pharmacist relationships may impact prescription drug plan choice. Worley and Schommer (1999) found that individuals who perceived their

pharmacist to be highly expert in providing medication consultation and who communicated with their pharmacist frequently formed high quality relationships with high levels of commitment. Hermansen (1998) found that patients who had experienced a medication-related critical incident and who perceived their drug therapy to be important formed high quality pharmacist relationships. This evidence suggests that consumers are likely to consider restrictions on pharmacy providers when making choices among drug benefit plans. This leads to the next study hypothesis:

**H12** *Individuals with stronger relationships with their current pharmacists will be more likely to choose plans that do not use mail-order pharmacies.*

Consumers' experiences with health plan features are also likely to be influential in forming their attribute preferences. For example, Grazier et al. (1986) found that the amount of experience with two currently offered health plans a family reported was a significant determinant of switching to a newly offered IPA. In order to proxy for the respondents' degree of experience with drug plan features in this study, two variables were included in the analysis. The first was an indicator variable taking the value '1' if the respondent reported currently using mail-order pharmacies to obtain prescription drugs and '0' otherwise. The second was an indicator variable taking the value '1' in the respondent reported being enrolled in any sort of service benefit drug insurance program (because these might possibly use a drug formulary) and '0' if they reported having indemnity of no drug insurance.

*Other Socio-Demographic Factors*

Studies of health plan choice often have included various other personal characteristics as potential explanatory variables. These factors have included gender,

race, marital status, and educational attainment level. Although the theoretical relevance of these factors is sometimes less clear than those previously discussed, they often provide useful descriptive information about the types of persons likely to choose a given plan.

Gender has often been hypothesized to influence health plan choice because females are likely to value certain services more than males. For example, Feldman et al. (1989) noted that women are more likely than men to use preventive services and thus should prefer plans that offer these services. These authors found that females were more likely to choose an IPA type HMO relative to a FFS plan. Interestingly, McGuire (1981) found that females were less likely than males to join a PGP relative to a traditional FFS plan. Grazier et al. (1986) found that females were more likely to switch to a newly offered IPA type HMO from a FFS plan than males. These studies provide mixed support for the hypothesis that females prefer plans with coverage for more preventive services.

Race is sometimes included in health insurance studies as a proxy for the demand for medical care (e.g. McGuire, 1981). Few studies of health plan choice have included this variable. McGuire (1981) found that being of non-white ethnicity was associated with choosing no health insurance, but did not differentiate those choosing PGP or FFS plans. Davidson et al. (1992) found that race was not related to the health plan choices of Medicare beneficiaries. The paucity of studies incorporating race makes drawing conclusions about its association with health plan choice difficult.

Short and Taylor (1989) found that married males and females were less likely than single males to choose a 'high option' FFS plan over a 'low option' plan. They did not explain this finding. Dowd et al (1994) found that married persons were more likely to choose a network HMO relative to basic Medicare alone. The authors attributed this to the possibility that married individuals may be more likely to have transportation to the less convenient clinic sites of HMOs. Davidson et al. (1992) found that married individuals were more likely to choose a Medicare HMO relative to both basic Medicare and Medicare with a Medigap supplement. The authors did not propose a reason for this finding.

Juba and colleagues (1980) hypothesized that those with more education would be more likely to enroll in a newly offered HMO because these individuals were more accepting of innovation. This hypothesis was confirmed in their study of health plan choice among university employees. Farley and Short (1989) report a similar finding, although the effect was of marginal significance in their study. Davidson et al. (1992), however, found that higher educational attainment reduced the probability of enrolling in a Medicare HMO relative to choosing Medicare with a supplement. Beeson-Royalty and Solomon (1998) found that higher levels of education were predictive of selecting less restrictive health plans. Thus, evidence concerning the influence of education on health plan choice is mixed. These findings are perhaps not surprising given that higher levels of education are often correlated with higher income levels. Because there are no firm theoretical or empirical bases for developing hypotheses related to these variables they are included and analyzed but no directional hypotheses are tested.

**Managed Competition**

The preceding sections of this chapter have offered theoretical explanations for a consumer's motivation to purchase insurance as well as their reason(s) for choosing a given health plan from several alternatives. Empirical evidence concerning these choices was then presented. A central reason for the concern among health economists and other health services researchers with choice is its presumed capacity to motivate both efficiency and quality in health care markets (Dranove, 2000). However, as Bernstein and Gauthier (1999) note, the assumptions necessary for such a market driven model of the health economy to work should not be taken as given (i.e. consumers understand and use relevant information about different health plans in making their choices) and are not necessarily present in all health care choice situations. Managed competition is one strategy that has been advanced as a way to promote the advantages of a market economy (i.e. quality and efficiency) with a modicum of intervention (be that from government or employment sources).

Managed competition is a strategy for ensuring cost efficiency and improving quality among health insurance plans (Enthoven & Kronick, 1989). The originator of this strategy, Alain Enthoven, has defined managed competition as "...a purchasing strategy to obtain maximum value for consumers and employers, using rules for competition derived from microeconomic principles" (Enthoven, 1993, pg. 25). Various large employers have adopted the managed competition strategy, and variants of it are found in programs such as the Federal Employees Health Benefits Program (FEHBP) and the Health Insurance Plan of California (HIPC).

In free markets for health insurance (especially traditional fee-for-service plans), a variety of problems may occur because of the incentives facing the parties involved. For example, it is in the insurers interest to classify individuals according to their expected expenditure levels (underwrite) and then charge an appropriate premium. This practice can lead to the very ill being unable to afford insurance and the very healthy with the lowest premiums. Second, it is difficult for consumers to choose among plans in a rational manner because a lack of standardized benefits makes comparisons among plans difficult. Third, fee-for-service insurance provides no incentive for providers or insurers to minimize the costs of treatment or plan administration.

Managed competition attempts to address these market failures by providing regulations where necessary and allowing choice behavior where appropriate. Under a managed competition strategy an employer or government agency (the plan 'sponsor') allows several health plans, all of which provide a minimum set of benefits, to compete for members. These plans must be capitated (as opposed to fee-for-service) so that providers within the plan have an incentive to minimize treatment costs. Because the important plan characteristics are constant across plans, the plans must then compete on price and/or quality. Consumers are given information about the relevant features of each competing plan, facilitating comparisons across plans. Underwriting is disallowed; all consumers are offered coverage at the same price, regardless of health status.

In order to ensure that consumer choice drives cost-minimization, premium subsidies are treated in a special manner under managed competition. The plan sponsor sets the premium subsidy with respect to the premium of the lowest cost plan. Thus,

when a consumer chooses a plan that is more expensive than the lowest cost provider in the market, they are forced to pay the marginal cost in full.

The Federal Employees Health Benefit Program (FEHBP) offers one of the oldest and largest examples of an insurance program with an important choice component (Feldman, Dowd, and Coulam, 1999). However, it is important to note two differences between the FEHBP and a 'pure' managed competition scheme: first, plan benefits are not standardized and second, the government's premium contribution is not set with respect to the lowest bidder in each market. Feldman et al. (1999) reviewed the performance of the FEHBP with respect to program costs and adverse selection. These authors concluded that the FEHBP was relatively more effective than private sector health insurance plans at controlling cost increases during the years between 1985 and 1995, averaging about 10% per year compared to a private sector rate of approximately 12%. These authors also suggest that, despite a lack of standardized benefits, adverse selection has not been a major problem in this program.

Other studies of the FEHBP have produced findings that are not as favorable. For example, Thorpe, Florence, and Gray (1999) studied the rate of premium growth as it relates to the maximum subsidy set by the plan sponsor in the FEHBP during the decade of the 1990's. These authors found that premium increases for plans below the government's subsidy cap rose much faster than premiums for those plans above the cap during this period. These findings suggest that the FEHBP might have performed more efficiently had its premium contribution been set more conservatively. This study

underscores the importance of basing the sponsor's premium subsidy on the lowest price plan available.

Yegian, Buchmueller, Smith, and Monroe (2000) reported the results of a qualitative evaluation of the Health Insurance Plan of California (HIPC) during its first year of operation. The HIPC was a purchasing cooperative that allowed small employers to offer a choice of health plans to their employees. Yegian et al. (2000) report that the choice component of the HIPC likely contributed to a more competitive market (and hence lower premium growth) in the California small group market that might have otherwise prevailed. Adverse selection was initially problematic in the HIPC with two preferred provider organizations (PPOs) exiting the market due to biased selection. However, after these plans left the market, selection problems were minimized due to the greater standardization of benefits among the remaining plans, which were largely HMOs. This study suggests that when benefits are standardized (as prescribed by the managed competition strategy) consumer choice is likely to result in efficiency gains in the health insurance market.

Marquis and Long (1999) studied the prevalence and impacts of employers' adoption of the managed competition paradigm. These authors report that only 43% of all employer-based health plan enrollees were offered a choice of health plans in 1997; a figure two percentage points lower than in 1993. Between 1993 and 1997 costs appeared to have increased at a slower rate in firms where plan choice was offered compared to firms where no choice existed although no difference in premiums was evident between the two groups. Marquis & Long also find that a fixed dollar

contribution across plans was associated with more employees choosing the lowest-price plan offered, although the fixed dollar contribution was not associated with lower overall premiums. This study provides mixed support for the managed competition model although it is unclear to what extent a lack of benefit standardization and poor information provision within firms might have impacted the results.

This brief review suggests that the evidence regarding managed competition is at least tentatively favorable. Setting premium contributions in accord with the lowest priced plan in an area appears to promote choice of that plan; standardization of benefits also seems to promote cost-conscious choice. Perhaps not surprisingly, the model seems to break down when these features are absent or only weakly adhered to. In the present study, all managed competition strategies are used: the premium contribution is set with respect to the lowest cost plan in the choice set; benefits are standardized; easily understandable information is provided to allow comparison among plans. Thus, by using a hypothetical choice task, the present study attempts to provide a preliminary examination of the viability of a free-choice system for the provision of a prescription drug benefit to the elderly. Specifically, the analyses of these choices allows an understanding of 1) the presence and degree of price sensitivity for free-standing drug plans and 2) the presence and degree of adverse selection likely to occur in the hypothetical market presented here.

**Summary of Study Questions and Hypotheses**

1) Are prescription drug plan features associated with consumer purchase intentions?

A) Specifically, do drug benefit plan features such as closed formularies, copayments, use of mail-order pharmacy, and premiums impact choices among drug plans?

**H1:** *The use of mail-order pharmacies will be associated with lower consumer purchase intentions.*

**H2:** *The use of drug formularies will be associated with lower consumer purchase intentions.*

**H3:** *Higher premium levels will be associated with lower consumer purchase intentions.*

**H4:** *Higher copayment levels will be associated with lower consumer purchase intentions.*

2) Are characteristics of consumers associated with prescription drug plan purchase decisions?

A) Specifically, do characteristics such as health status, current prescription utilization, demographics, and attitudes toward medical care influence choices among drug plans?

**H5:** *Individuals with higher incomes will show higher purchase intentions towards plans with higher premiums*

**H6:** *Individuals with greater financial assets will show higher purchase intentions towards plans with higher premiums*

**H7:** *Age will have no relationship to prescription drug plan purchase intentions in this study.*

**H8**: *Consumers with more chronic illnesses will show greater purchase intentions towards plans with the 5$ (as opposed to $10) copayment.*

**H9**: *Higher levels of health concern will not affect drug insurance plan purchase intentions.*

**H10**: *Consumers with higher scores on the formal medical care preference use scale will show higher purchase intentions for plans with the $5.00 (as opposed to the $10) copayment level.*

**H11**: *Consumers with greater numbers of chronic conditions will choose plans with fewer restrictions.*

**H12** *Individuals with stronger relationships with their current pharmacists will be more likely to choose plans allowing free choice of pharmacy.*

3) Could a managed competition framework be a viable strategy for implementing a Medicare drug benefit?

A) Specifically, is there a tendency for drug plans with given features to attract a disproportionate number of especially ill (or healthy) individuals? Do elderly consumers appear to be price-sensitive when choosing among plans?

# III. RESEARCH METHODS

In this section of the dissertation, the methods used to address the research questions are discussed. These include the design of the study, the data collection procedures, and the statistical methods used to analyze the data and test the study hypotheses. Definition and measurement of the study variables is discussed. Multi-item scale reliability and validity assessment techniques are described including methods used to purify these measures. The conditional logit model used as the multivariate analysis technique is discussed.

**Study Design**

Prescription drug benefits typically are bundled with other health plan components, making it difficult to study these choices using existing data sets. Consequently, it was necessary to collect primary data to address the objectives of this study. A cross-sectional, descriptive survey design was used to collect data. Characteristics of the sample members are measured only once in this type of design (Churchill, 1995). In a descriptive design, theoretically relevant variables are operationalized, measured, and not manipulated, as they would be in an experimental design. The variables that were measured followed from the model of prescription drug plan choice outlined in the previous chapter (Figure 2).

Researchers studying health plan choices typically have employed one of two techniques. The first source of data is administrative data sets in which it is possible to observe actual health insurance choices among members of a given group (e.g. Juba et al., 1980). These data may be augmented with survey data to make them more complete with respect to theoretically relevant variables (e.g. Beeson-Royaly & Solomon, 1999). This approach has the advantage of being based on actual choices but limits the researcher in the types and combinations of plan features that can be studied.

The second technique used in health plan choice studies is to study choices or judgments of purchase likelihood among hypothetical health plans (e.g. LaTour et. al., 1986). Researchers employing these methods have traditionally employed conjoint analysis or some variant of this technique (e.g. Hershey et al. 1984; Gates, McDaniel, and Braunsberger, 2000). One limitation of this technique is that actual choices are not observed. Another limitation of the studies published to date using this technique is that

they have seldom utilized individual level variables in their analyses, making judgments of the importance of these variables in health plan decisions impossible (a notable exception is provided by LaTour et al., 1986). In the current study, a hybrid approach was used: respondents were asked to make a choice from a menu of hypothetical drug benefit plans. The hypothetical approach allowed the researcher to manipulate and maximize the differences between plans. The survey research technique allowed for the collection of a wide variety of potentially relevant individual level variables.

**Data Collection**

Data were collected using a self-administered mail survey. The survey asked respondents about their most likely choices from a menu of four hypothetical prescription drug plans. The survey also collected data on other theoretically relevant variables including health status, prescription drug usage, demographic information and attitudes about the strength of the respondent's relationship with their current pharmacist and the degree to which the respondent favors the use of formal medical care over self-treatment for health conditions.

Sampling Procedure and Data Collection

*Sample Size Calculation*

The necessary sample size for the proposed study was calculated by consideration of two factors. First, the sample size necessary to estimate the proportion of individuals choosing each hypothetical drug plan was considered. Second, consideration was given to statistical power issues in the use of the bivariate and

multivariate analyses proposed here. Calculations yielded a minimum sample size of 1050 respondents. Details of these calculations can be found in Appendix A. Assuming a survey response rate of 50%, it was estimated that 2100 surveys would have to be mailed in the main mailing (1050/0.50).

*Sampling Frame and Plan*

The target population for this study was non-institutionalized persons aged 65 and older residing in Wisconsin. The sampling frame consisted of a list of names of elderly non-institutionalized persons residing in Wisconsin. The list of names was maintained by KM Lists, Inc. (an Axciom company), a commercial mailing list company. KM Lists, Inc. compiles a complete listing of names for the United States from publicly available sources including telephone directories, drivers' license databases, and other public records. KM Lists, Inc. continually updates their lists and tests them for validity. A sample of 2100 names was selected using simple random sampling for use in the current study.

State level, as opposed to national level, data were collected for two reasons. First, prior experience in the Department of Social and Administrative Sciences at The University of Wisconsin suggested that the response rates to mail surveys would be higher in Wisconsin than in the United States as a whole. Second, the current emphasis at the national level on devolving prescription drug insurance plan design authority to the state level makes state-level studies of this type relevant.

*Survey Design*

The survey instrument was designed following the principles of the Tailored Design Method (TDM) advocated by Dillman (2000). These principles have been field

tested extensively and shown to improve survey response rates and to decrease item non-response. The survey instrument was designed to collect data from five domains. These included (variable definitions follow later in this chapter):

(1) The respondent's most likely choice of drug benefit plans from a menu of four such plans.

(2) Information on the respondent's health status, including perceived health status, number of limitations in activities of daily living (ADLs), degree of health concern, and the number of comorbidities they currently suffer from.

(3) Detailed information about prescription drug usage in the past 30 days including name of drug, strength of drug, dosage instructions, and quantity used.

(4) Respondent attitudes concerning two topics: (a) preferences for using prescription drugs to treat illness as opposed to self-treatment strategies and (b) the degree of commitment the respondent perceives toward their usual pharmacist.

(5) Socio-demographic information including age, marital status, household income, total wealth, number of persons currently living in household, gender, race, and educational attainment.

*Survey Pre-Test*

The pre-testing of a survey involves the scrutinization of the items comprising the survey form before any formal data collection begins (Churchill, 1995; Converse & Presser, 1986). In this manner survey items that may prove confusing or ambiguous can be reworded or otherwise altered. The survey form was reviewed by two groups prior to any mailings. The first group consisted of members of the researcher's examining committee. Several of these persons were familiar with mail survey research. The second group consisted of two of the researcher's relatives who were over 65 years of age and one relative of the researcher's major advisor who was over the age of 65. After review, comments and suggestions were incorporated into the instrument.

*Survey Administration*

The survey was fielded using a modification of methods outlined by Dillman (2000) and proceeded in three steps. First, a one-page pre-notification letter was sent to all potential respondents. This letter explained briefly the nature and purpose of the forthcoming survey and asked for the respondent's cooperation in completing it. This letter appeared on color, 8 1/2" by 11" School of Pharmacy letterhead and featured the signatures in blue ink of the researcher and his advisor. The letter was sent in a color-embossed School of Pharmacy business size envelope. A copy of this letter can be found in Appendix B.

Second, the survey packet was sent to each potential respondent approximately four days later. This packet was mailed in a six-by-nine white envelope featuring the School of Pharmacy's return address. The packet contained a one-page cover letter explaining the purpose of the survey and its importance as well as a request for the respondent's help with completing the survey. This letter also was printed on color, 8 1/2" by 11" School of Pharmacy letterhead and featured the signatures of the researcher and his advisor in blue ink. A copy of this letter can be found in Appendix C. The packet also contained the survey form. The survey form was printed on cream heavyweight paper and was folded once (with the cover letter on top) before it was placed in the envelope. A copy of the survey form can be found in Appendix D. This packet also contained a one-dollar bill as a token incentive and a postage-paid, white, six-by-nine inch return envelope.

Finally, a reminder postcard was sent to each potential respondent thanking him or her for his or her participation if s/he had completed the survey and asking that s/he do so if s/he had not. This postcard was sent five days after the survey packet. These postcards were printed on heavyweight cream bond and featured the School of Pharmacy's return address. A copy of this postcard can be found in Appendix E.

*Survey Pilot-Test*

The survey was pilot-tested on a sub-sample of 300 individuals. The pilot-test was used to help identify potential problems that might occur in the main mailing not identified by pre-testing (Dillman, 2000). These problems might include item non-response and survey non-response. The results from this pilot-test were used to guide modifications of the survey instrument and changes to the administration method that might be needed. No responses from the pilot-test were analyzed with those of the main mailing.

Questionnaire Design and Variables

*Dependent Variable*

The dependent variable in the current study was the respondent's choice of a single, hypothetical prescription drug benefit plan. Respondents were asked to imagine that the federal Medicare program offers a drug benefit and that each Medicare recipient is allowed to choose from a menu of qualified plans provided by local pharmacy benefit managers (PBMs). Respondents were asked to choose a plan that best satisfied their own individual needs and preferences and *not* those of spouses or other family members (i.e. the choice was to be made on an individual, not a family, basis).

This choice was made from a menu of four drug benefit plans designed by the researcher. These plans varied with respect to four dimensions. These were: the use of a formulary (yes or no), the required use of a mail-order pharmacy network forcing the respondent to change from their usual pharmacy (yes or no), the copayment amount ($5 or ($10), and the monthly premium (the amount the consumer would have to pay regardless of prescription usage) charged for the plan ($41.50, $45.00, $47.00, $60.00).

The order of presentation for the plans was counter-balanced to avoid order effects. An order effect is a confound that occurs when the order of presentation of alternatives has some impact on alternative choice (Tourangeau, Rips, and Rasinski, 2000). For example, if a given drug plan always occurred first in a list, respondents might use this plan as a basis on which to compare all other plans, resulting in an impact not accounted for by theoretically relevant variables (e.g. plan attributes or individual characteristics). By randomly varying the order of presentation of plans, any impact of order is relegated to random error. This was accomplished using four separate survey forms that differed only in the order of presentation of the plans (i.e. on one fourth of the forms Plan "A" was listed first, on one-fourth Plan "B" first, and so on). These four forms were distributed randomly to survey recipients.

*Independent Variables*

Plan Features

Standard conjoint analysis techniques would require the serial evaluation of multiple alternatives with varying attributes by each respondent. In the current study, the researcher wanted to generate data that would look more similar to that available from 'real world' insurance choices (i.e. we observe only a single choice by each

respondent). Thus, an alternative approach was employed in the current study. Respondents were presented with a menu of four drug plans and asked to choose the plan they would most likely pick in the situation previously outlined. Respondents were asked to choose a plan whether they currently had prescription drug coverage or not, with those currently having drug insurance asked to imagine that they did not and to choose accordingly. Definitions for each plan feature were provided immediately preceding the choice task to minimize confusion with respect to the nature and function of each plan feature. Please see Appendix D for a facsimile of the survey form. This approach had the added benefit of decreasing respondent burden.

Four features of prescription drug plans were hypothesized to influence consumer choice. These included (1) the use of a drug formulary (yes or no), (2) the use of a mail-order pharmacy program (yes or no), (3) the copayment amount ($5 or $10) and (4) the plan premium ($41.50, $45.00, $47.00, $60.00). Following Hershey et al. (1984) the plan premium was not manipulated but instead determined by reference to the first three features. Details of the method for setting the premium for each plan are found in Appendix F.

Manipulation of the first three plan features in a complete factorial design would have required the presentation of eight (2 x 2 x 2) distinct plans to respondents. In order to decrease respondent burden and facilitate comparisons among plans, methods developed by Taguchi (1988) for the creation of fractional factorial designs were employed. Fractional factorial designs allow for the presentation of fewer plans to respondents while still permitting the unconfounded estimation of all relationships between plan features and plan choice.

Specifically, Taguchi's $L_4$ table is employed to design the four plans in the current study. Use of this table allows the estimation of main effects of each plan feature on choice, but its parsimony precludes estimation of interaction effects. The four plans are summarized in the following table:

TABLE 1
Hypothetical Drug Plan Summary

| PLAN | FORMULARY | MAIL ORDER | COPAY AMOUNT | MONTHLY PREMIUM |
|---|---|---|---|---|
| Plan "A" | Yes | Yes | $5.00 | $45.00 |
| Plan "B" | Yes | No | $10.00 | $41.50 |
| Plan "C" | No | Yes | $10.00 | $47.00 |
| Plan "D" | No | No | $5.00 | $60.00 |

Prescription Drug Use

Respondents were asked to provide information about their use of prescription medications during the past 30 days. A 30-day period was used because previous research conducted using the National Medical Care Expenditure Survey (NMCES) suggested that recall bias limits the validity of prescription drug information collected by self-report for longer periods (Berk, Schur, & Mohr, 1990). Information collected about each medication used during this period included the name of drug, strength of drug, dosage instructions for each drug, and quantity of drug used in the past 30 days.

Out-of-Pocket Prescription Drug Spending

In order to determine the respondent's expected out-of-pocket costs under each plan, data provided on prescription drug use in the past 30 days was used. Expected monthly out-of-pocket costs (exclusive of the monthly premium) were estimated for

each plan by multiplying the number of different prescriptions used by the respondent by the copayment for that plan. Thus, expected copayment costs are treated as a continuous, plan-level covariate. Similarly, monthly premium amounts were treated as a continuous variable.

Prescription Drug Pricing

Following Mott (1995), values then were assigned to each prescription using the average wholesale price (AWP) for all branded prescription products and the federal upper limit (FUL) price for all generic products where available. Where a FUL price was not available, the median cost of generic products was used. These prices were assigned using the year 2000 edition of The *Red Book* (Medical Economics, 2000). The *Red Book* is a pharmacy trade reference containing a variety of data including the availability and prices (AWP and/or FUL) for all drug products currently distributed in the United States.

Cost per unit was determined by reference to consistent pack sizes (i.e. bottles of 100) because prices differ across pack sizes. For tablets and capsules, cost was based on a pack size of 100. For liquids, cost was computed by reference to the cost of a pint bottle. For metered dose inhalers and other unit-of-use products (e.g. creams, bottles of insulin, etc.) cost was based on the appropriate pack size. In order to compute prescription values the per-unit cost was multiplied by the number of units that would have been consumed during the prior 30 days if the respondent had followed the stated dosing instructions. These values were then summed across all prescriptions used by the respondent in the last 30 days.

Thus, this total dollar amount represents one measure of value and is not intended to mirror retail costs or charges precisely. Rather, this system allows one to assign a constant metric of economic value to each respondent's prescription drug usage in the past 30 days. Both the AWP (and subsequent discounts from these amounts) and FUL commonly are used by third-party insurance programs when assigning reimbursement amounts to pharmacy providers, and thus, are particularly relevant for the purposes of this study. This variable is treated as a continuous, individual-level covariate in univariate and bivariate analyses.

Health Status

Health status was assessed using four measures. Respondents were asked to rate their perceived health status (compared to others their age) on the five-point E-VG-G-F-P scale. Next, the respondent was asked whether they currently had any difficulty performing any of the six activities of daily living (ADLs) comprising the Katz et al. (1963) ADL scale. The number of ADLs was added to form a summary score with a possible range of zero to six and then categorized so that respondents who reported any limitations in ADLs received a '1' for this measure and all other respondents received a '0'. Next, the respondent was asked whether a physician had ever told them that she or he had suffered from any of 22 chronic conditions. The number of chronic diseases was added to form a summary score with a possible range of zero to 22. The diseases included in this list were adapted from the Medicare Current Beneficiary Survey (MCBS) and augmented with suggestions from the researcher's examining committee.

Finally, a three-item measure of health concern developed by Berki et al. (1978) was employed to measure this construct. This construct has been defined as the degree

to which one thinks about one's current and/or future health. The response to each item was measured on a five-point Likert type scale. These item scores were then summed to form a possible score ranging from 3 to 15 with higher scores representing higher degrees of health concern.

Attitudes about Medical Care/Pharmacist Relationship

Attitudes toward medical care are operationalized in this study as the individual's preference for using prescription drugs and formal medical care rather than self-treatment strategies to treat illness episodes. This construct was measured using a scale developed by Ganther (1999). Ganther (1999) showed that this scale had acceptable internal consistency reliability (> 0.80) and that higher scores were significantly associated with higher levels of prescription drug use and greater numbers of physician visits. Although the scale originally contained nine items the author suggested that seven of these items might be adequate to measure the construct (J.M. Ganther, personal communication, 2000). These seven items were employed in the current study. Each of these items was scored on a five-point Likert type scale ranging from '1' (strongly disagree) to '5' (strongly agree). The scores on each of these items were summed, so that scores on this measure could range from seven to thirty-five.

The respondent's degree of relational commitment to their usual pharmacist was measured using a three-item measure developed by Worley & Schommer (1999). These authors defined this construct as a patient's likelihood of seeking future contact with a given pharmacist. Worley and Schommer (1999) further noted that a high degree of relationship commitment would suggest a favorable view of the current pharmacist-patient relationship. Each of the three items used to measure this construct was scored

on a five-point Likert type rating scale ranging from '1' (strongly disagree) to '5' (strongly agree). The scores on each of these items were summed, so that scores on this measure could range from three to fifteen.

Experience with Drug Plan Features

Two variables were created to proxy for the respondent's experience with two drug plan features: use of a formulary and use of a mail-order pharmacy. These variables were created using two items on the survey form. One survey item asked the respondent to check a statement that best described the manner in which he or she paid for prescription drugs: 1) I pay nothing for each prescription I get, 2) I pay a fixed dollar amount for each prescription I get, 3) I pay a percentage of the full cost for each prescription I get or 4) I pay the full cost for each prescription I get and then send the receipt to the insurance company to get reimbursed. Persons checking any of the first three statements were placed into a category labeled "Formulary exposure likely" because these payment types suggest the respondent was enrolled in some sort of service-benefit drug insurance program that might use a formulary as a cost control mechanism. Persons checking the last statement or who stated that they did not have drug insurance were placed into a category labeled "Formulary exposure less likely".

A second survey item asked the respondent what type of pharmacies he or she used to obtain prescription drugs. All respondents checking the mail order pharmacy box were placed into a category labeled "Currently uses mail-order pharmacy". All those who did not check this box were placed into a category labeled "Does not currently use mail-order pharmacy". The complete distributions (before collapsing) for both of these variables can be found in Appendix H.

Socio-Demographic Factors

Information on several socio-demographic factors also was collected on the survey form. These factors included:

Age - naturally coded as a continuous variable

Education - coded into five discrete levels representing less than high school, high school graduate, some post high school education, college graduate, or higher

Gender – coded as a '1' for males and '0' for females

Annual household income – coded into eight discrete levels representing less than $10,000/year, $10,000 to $14,999/year, $15,000 to $24,999/year, $25,000 to $34,999/year, $35,000 to $49,999/year, $50,000 to $64,999/year, $65,000 to $79,999/year, and $80,000 or more per year

Total household assets – was coded into five discrete levels representing less than $15,000, $15,001 to $30,000, $30,001 to $50,000, $50,001 to $100,000, and more than $100,000

Number of persons living in household – naturally coded as a continuous variable

Marital status – was coded into five discrete levels representing 'married', 'widowed', 'divorced', 'separated', or 'never married'

Race – was coded into six discrete levels representing White/Caucasian, Hispanic/Latino, Black/African American, Asian, American Indian/Native American, or 'Other'

The wording for these items was derived from health surveys conducted by the federal government such as the Medicare Current Beneficiary Survey and the Medical Expenditure Panel Survey as well as from a survey form developed by Ganther (1999).

**Data Processing and Entry**

All survey forms were returned to the School of Pharmacy by first class U.S. mail. Use of first class mail allowed the researcher to identify non-deliverable survey

packets and thus develop a more accurate estimate of the response rate. Upon receipt of the survey forms each form was stamped with a consecutive number that was then used as an identifier for the form during data entry.

Data entry and tabulation represent potentially serious sources of error in the conduct of research requiring the collection of primary data. In order to minimize this source of error all data were coded and entered by the researcher. When data entry was complete, the data were examined using frequency counts for all variables. Aberrant cases were then isolated and corrected by referral to the appropriate survey form.

Missing Data

Missing data represent a potentially serious problem for all data analyses, especially multivariate data analyses. This is because most multivariate data analysis techniques require a square (i.e. complete) data matrix (Hair, Anderson, Tatham, and Black, 1995). Thus, these techniques serially reject each case with missing values on any variable (dependent or independent), potentially reducing the power of a given analysis by a substantial amount.

Missing data for independent variables in the current study were handled in the following ways: For variables with few (~1-2%) of their values missing, a crude 'hot-deck' procedure was conducted, in which a case with similar values on most other variables was located and the value from this case was substituted for the case missing the value (Levy and Lemeshow, 2000). For variables with a relatively large number of values missing (> 2%) the stochastic regression imputation technique was utilized (Hair et al., 1995; Levy and Lemeshow, 2000).

The stochastic regression imputation technique (Levy and Lemshow, 2000) involves using data from cases in which the variable in question is present to estimate a prediction equation for the missing variable. The raw score regression coefficients are then used in combination with values for other variables present on cases with the missing variable to estimate a value for the missing variable. Finally, a value representing a random draw from the regression's error distribution is added to this predicted value. This prevents the predicted values from being too regressive. This technique was utilized for five variables in the current study: attitudes toward formal medical care, pharmacist relationship commitment, health concern, annual income, and total assets. The prediction equations for these variables can be found in Appendix G.

Missing data on dependent variables in any analysis are difficult, if not impossible, to replace in a valid way (e.g. Cohen and Cohen, 1983). For example, if in the current study a 'random pick' for plan choice was utilized, it is likely that the coefficients in the multivariate models would be downwardly biased. At the other extreme, if some sort of predictive method was used to replace these values, these same coefficients might be upwardly biased. Hence, those cases in which the 'plan choice' item was left blank were excluded from the current study.

**Data Analyses**

Univariate Analyses

Data analyses for this project proceeded through a number of steps including univariate, bivariate, and multivariate phases. First, descriptive statistics were calculated for all variables. These included means and standard deviations for all continuous

variables and proportions and counts for all categorical variables. These analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 10.0.

Psychometric Evaluation of Multi-Item Measures

All multi-item measures employed in the study were subjected to psychometric evaluations of reliability and validity. The multi-item measures were first purified if necessary, following the paradigm advanced by Churchill (1979). Briefly, this method involves first deleting items that fail to exhibit relatively high corrected item-total correlations. For purposes of this study, items failing to exhibit a corrected item-total correlation of 0.40 or higher were deleted. Churchill's method also involves the use of reliability and validity analyses, discussed next.

Simply put, reliability is the extent to which an instrument measures some trait on an individual at different times, consistently (Streiner & Norman, 1995). It is a necessary, but not sufficient condition that must be met in order for an instrument to be valid. One type of reliability is internal consistency reliability. Internal consistency reliability is a function of the average correlations among items in a measure and the number of items comprising a measure (Nunnally & Bernstein, 1994). Internal consistency reliability for all scales that were assumed to be scored on at least an interval scale was assessed using Cronbach's Coefficient Alpha. These analyses were conducted on the scale measuring attitudes toward formal medical care, the respondent's usual pharmacist, and the 'health concern' measure. Internal consistency reliability for the Katz ADL scale (scored using dichotomous items) was determined using the Kuder-Richardson-20 statistic.

Validity concerns the degree to which an instrument measures what it is supposed to measure (Nunnally & Bernstein, 1994). The various types of validity have traditionally been discussed in terms of three categories: Content, criterion, and construct. Briefly, content validity concerns the extent to which the items that comprise a measure adequately cover or describe the trait under study. Criterion validity describes the extent to which scores on a measure are able to predict the trait under study. Content and criterion validity for each measure were assumed based on prior use and testing of each measure.

The final type of validity is construct validity. A construct can be described as a latent variable that is not directly observable and measurable (Streiner & Norman, 1995). One method that can be used to study the construct validity of the items used to measure a construct is factor analysis (Nunnaly & Bernstein, 1994). Factor analysis allows us to explore two aspects of the validity of the items used to measure a given construct: convergent and discriminant. Convergent validity involves the extent to which items that should correlate highly with a trait do so. Discriminant validity concerns the extent to which items in a measure that should not correlate with other measures do not correlate with them. Convergent and discriminant validity of each measure were assessed through an exploratory factor analysis using PROMAX rotation that involved all three scales utilizing interval level scaling simultaneously.

Briefly, factor analysis is a statistical method that allows one to examine the correlations that exist among a set of items and to determine whether these items can be condensed into a smaller, underlying set of dimensions (Hair, et al., 1995). Standardized factor loadings of 0.40 or higher were assumed to provide evidence of convergent

validity for the items comprising each measure. A high loading on a single, distinct factor and low loadings on other factors was assumed to provide evidence of discriminant validity. All reliability and factor analyses were conducted using 'available case' analysis and the sample sizes available are as noted in Tables 7 through 10 in Chapter 4.

Bivariate Analyses

Third, all respondent-level independent variables were cross-classified by chosen drug benefit plan. The bivariate relationships between the independent variables and plan choice were tested using the Pearson chi-square test of independence for categorical variables and the one-way analysis of variance for continuous variables (Hays, 1994). Tests of specific study hypotheses also involved Student's t-test and the chi-square goodness-of-fit test. All statistical tests were evaluated at a minimum alpha (Type I error) level of 0.05. These analyses were conducted using SPSS version 10.0.

Multivariate Analyses

A multinomial conditional logit model was employed as the primary multivariate analysis technique. This model was developed by McFadden (1973), who showed that the model could be derived from utility maximization principles. This technique is useful for this study because it models discrete choices as a function of both individual characteristics (e.g. health status) and plan characteristics (e.g. premium). The model can be represented as:

$$L_{ij} = \Sigma\beta_{jk}x_{ik} + \Sigma\gamma_m(z_{j,m} - z_{1,m}) + \nu \qquad (2)$$

Where:

$L_{ij}$ = the logit (or log odds) of choice of the $j^{th}$ drug plan by the $i^{th}$ person

$x_{ik}$ = the value of the $k^{th}$ individual-level explanatory variable for the $i^{th}$ person.

$\beta_{jk}$ = the parameter relating the $k^{th}$ individual-level explanatory variable to the $j^{th}$ drug plan.

$z_{jm}$ = the value of the $m^{th}$ drug plan characteristic for the $j^{th}$ drug plan.

$z_{1,m}$ = the value of the $m^{th}$ drug plan characteristic in the reference drug plan.

$\gamma_m$ = the parameter relating the $m^{th}$ drug plan characteristic to choice.

$\nu$ = a stochastic error term assumed to have a Type II extreme error distribution that captures the influence of unobserved individual characteristics on drug plan choice.

Model estimation simultaneously produces two sets of coefficients. A single set of coefficients ($\gamma_m$) relate drug plan attributes to the likelihood of choice and can be interpreted as utility weights. Second, $J - 1$ (three in this study) sets of coefficients ($\beta_{jk}$) relate individual-level covariates to drug plan choices. The statistical significance of the coefficients was evaluated with the t-statistic. The overall fit of the model was assessed using McFadden's pseudo r-squared measure ($\sim R^2$). This model was estimated via maximum likelihood using the STATA 7.0 statistical package for personal computers.

A significant concern when estimating discrete choice models is that of violations of the independence of irrelevant alternatives (IIA) assumption (Long, 1997). Briefly, the IIA assumption holds that the odds of selecting one option over another should not change when another option is introduced to the choice set. This assumption will be tested using a procedure developed by Hausman & McFadden (1984). If evidence exists that the assumption is violated then a nested logit model will be estimated that provides a better fit to the data.

# IV. RESULTS

In this chapter of the dissertation the results of the study are discussed. The results of the pilot-test procedure are discussed. Descriptions of the study sample are provided, as are the results of the validity and reliability testing of the multi-item measures used in this study. Descriptions of the groups choosing each hypothetical plan are provided. The results of bivariate tests of study hypotheses are provided. Finally, the results of multivariate models of prescription drug plan choices and hypothesis tests are discussed. These results are displayed in a series of tables.

**Pilot Test Results**

Three hundred survey packets were mailed for the pilot test in the current study. The fielding procedure for these surveys involved a pre-notification letter; a packet containing a cover letter, the survey, a postage-paid return envelope, and a $1 incentive; and finally a reminder postcard (see Appendices 4, 5 and 6 for facsimiles of these documents). These mailing pieces and the survey methodology are described in detail in Chapter 3 of this document. Each of these mailings was separated in time by approximately one week.

A response rate of 55.5% (162/292) was obtained in the pilot test (eight surveys were not deliverable). This response rate was deemed adequate by the researcher and thus no changes were made to the fielding method in the main mailing. Inspection of the survey forms showed that no particular items were problematic with respect to non-response or inappropriate responses, so no revisions were made to individual items for these reasons.

Two issues were identified in the pilot test that were troublesome: First, an analysis of the responses showed that the sample was nearly evenly split between males and females, while population estimates from 1998 showed that males comprised approximately 41.5% of the ambulatory, 65 and older population in Wisconsin (Bureau of Health Information, Division of Health Care Financing, Wisconsin Department of Health and Family Services, 1998). Some of this problem likely resulted from the sampling frame itself, which was comprised of nearly 60% males. In order to rectify this problem a new sampling frame was purchased from KM Axciom Lists, Inc. where males made up only 50% of the frame.

Second, reliability analyses of the multi-item measures contained in the survey showed that the 'pharmacist relationship commitment' scale had unacceptably low reliability (Cronbach Alpha = 0.33). These analyses suggested that much of the problem resulted from the third item in the measure ("If a less expensive pharmacy opened near my present pharmacy, I would change pharmacies"), which showed a poor corrected item-total correlation with the other two items in the measure. In order to remedy this problem the researcher replaced this item with a new item currently being used by one of the scale's developers (M. Worley, personal communication 2000). This item was "I plan to use my current pharmacist to meet my prescription needs in the future". After these modifications, the survey was then mailed to a sample of 2100 community dwelling adults age 65 and older living in Wisconsin in January of 2001. No pilot test responses were analyzed with those from the main mailing.

**Main Survey Mailing Results**

Survey Response Rate and Study Sample

The main survey mailing for this study took place in late January of 2001. Twenty-one hundred surveys were mailed in this stage of the study. The results of this mailing are summarized in Table 2. Of the 2100 surveys mailed, 77 were considered undeliverable for various reasons. In total, 1194 surveys were returned yielding an adjusted overall response rate of 59.0%, which was similar to that obtained in the pilot test.

TABLE 2
Summary of Survey Responses
(n = 1194)

| Status | N (% of Total Mailed) |
|---|---|
| Total Surveys Mailed | 2100 (100) |
| Returned – Intended Respondent Deceased | (14) |
| Returned – Respondent Under Age 65 | (5) |
| Returned – Respondent in Nursing Home | (4) |
| Eligible Respondents | 2077 |
| Returned – Marked "Undeliverable" | (54) |
| Assumed Deliverable | 2023 |
| Total Returned | 1194 |
| *Adjusted Overall Response Rate*[a] | *59.0%* |
| Eliminated – "Plan Choice" item blank | 108 |
| Surveys Available for Analysis | 1086 |
| *Adjusted Effective Response Rate*[b] | *53.7%* |

a = Calculated as (Total Returned/Assumed Deliverable) x 100%
b = Calculated as (Surveys Available for Analysis/Assumed Deliverable) x 100%

Of the 1194 returned surveys, 108 respondents did not complete the 'plan choice' item. These surveys were not used in any of the analyses that follow (with the exception of that contained in Tables 3 and 4), yielding a study sample of 1086 respondents. Table 3 contains a bivariate analysis of the similarities and differences that exist between those that responded to the 'plan choice' item and those that did not for select variables. In general, it appears that those respondents not completing this item were older, less educated, and had lower annual incomes than those completing this item.

TABLE 3
A Comparison of Respondents Completing the "Plan Choice" Item
With Those Who Did Not for Select Variables
(n = 1194)

| Variable | Completers (n = 1086) | Non-Completers (n = 108) | T-Score (df) |
|---|---|---|---|
| | Mean (S.D.) | | |
| Number of Prescription Drugs Used in Past 30 Days | 3.52 (2.76) | 3.08 (2.69) | 1.57 (1192) |
| Number of Chronic Diseases | 3.04 (2.07) | 2.65 (1.99) | 1.86 (1192) |
| Health Status | 3.01 (0.94) | 2.89 (1.04) | 1.36 (1192) |
| Age | 74.79 (5.90) | 76.91 (6.57) | 3.53* (1192) |
| | N (%)[a] | | Chi-Square (df) |
| *Gender* | | | |
| Male | 485 (44.7) | 38 (35.8) | 3.1 (1) |
| Female | 599 (55.3) | 68 (64.2) | |
| Any ADLs | | | |
| Yes | 892 (82.1) | 83 (76.9) | 1.83 (1) |
| No | 194 (17.9) | 25 (23.1) | |
| *Had help with survey* | | | |
| Yes | 820 (75.6) | 86 (81.1) | 1.64 (1) |
| No | 265 (24.4) | 20 (18.9) | |
| *Prescription Drug Insurance Costs* | | | |
| All Paid For | 52 (4.8) | 6 (5.6) | 0.50 (2) |
| Part Paid For | 563 (52.0) | 52 (48.6) | |
| None Paid For | 468 (43.2) | 49 (45.8) | |
| *Education Level* | | | |
| < College | 923 (85.0) | 102 (94.4) | 7.23* (1) |
| 4 year College or More | 163 (15.0) | 6 (5.6) | |
| *Income*[b] | | | |
| < $35,000/yr | 828 (76.2) | 104 (96.3) | 23.06* (1) |
| >$35,000/yr | 258 (23.8) | 4 (3.7) | |

* = $p < 0.05$, two-tailed
a = All percentages are column percentages,
b = Based on n = 1020 due to missing data

TABLE 4
Study Sample Characteristics
(n = 1086)

| Variable | N (%) | Mean (SD) |
|---|---|---|
| Age | | 74.87 (5.80) |
| Female | 601 (55.3) | |
| Male | 485 (44.7) | |
| White Race | 1068 (98.3) | |
| Non-White Race | 18 (1.7) | |
| *Marital Status* | | |
| Married | 706 (65.0) | |
| Not Married | 380 (35.0) | |
| *Education* | | |
| Less Than College Graduate | 923 (85.0) | |
| College Graduate | 163 (15.0) | |
| *Annual Household Income* | | |
| Less Than $35,000 | 807 (74.3) | |
| More Than $35,000 | 279 (25.7) | |
| *Total Liquid Assets* | | |
| Less Than $50,000 | 702 (64.6) | |
| More Than $50,000 | 384 (35.4) | |
| *Self-Rated Health Status* | | |
| Fair or Poor | 302 (27.8) | |
| Good, Very Good, or Excellent | 784 (72.2) | |
| *Any Limitation in Activities of Daily Living (ADLs)* | | |
| Yes | 194 (17.9) | |
| No | 892 (82.1) | |
| Number of Chronic Diseases | | 3.04 (2.07) |
| *Any Prescription Drug Insurance* | | |
| Yes | 615 (56.6) | |
| No | 471 (43.4) | |
| Number of Different Prescription Drugs Used in Past 30 Days | | 3.53 (2.75) |
| Value of Prescription Drugs in Past 30 Days | | $129.54 (146.44) |

TABLE 4 (cont.)

| Variable | N (%) | Mean (SD) |
|---|---|---|
| *Formulary Exposure* | | |
| Likely | 486 (44.8) | |
| Less Likely | 600 (55.2) | |
| *Mail-Order Use* | | |
| No | 944 (86.9) | |
| Yes | 142 (13.1) | |

Table 4 contains a summary of the study sample characteristics after deletion of those respondents not completing the 'plan choice' item. The average age of respondents in the study sample was approximately 75 years. The majority of the study sample respondents was female (55.3%), married (65.0%), and high school graduates (64.2%). Most reported annual household incomes less than $35,000 (74.3%) and total household assets less than $50,000 (64.6%). Nearly 28% perceived their health status as fair or poor and approximately 18% reported the presence of at least one limitation in their activities of daily living. On average these respondents reported the presence of three chronic diseases and using nearly four prescription drugs in the past 30 days

In order to assess the representativeness of the study sample two methods were used. First, characteristics of this sample were compared with known characteristics of the population sampled. Table 5 contains a bivariate comparison of select study sample estimates with estimated population parameters from the over 65 community dwelling population in Wisconsin in the years 1998 and 1999. For the five variables for which data are available the study sample seems to compare well with the exception being the 'annual household income' variable. Second, the first 20% of the respondents were compared to the last 20% of the respondents across selected variables. This analysis is shown in Table 6. Finally, The characteristics of the study sample were compared for three variables for which data were provided for the survey sample. This analysis is shown in Table 7.

TABLE 5
Comparison of Study Sample and Population Parameters for Select Variables
(n = 1086)

| Variable | Study Sample (%) | Population Estimate (%) | Chi-square Goodness of Fit Statistic |
|---|---|---|---|
| *Age and Gender*[a] | | | |
| Female 65-74 | 26.6 | 27.6[a] | 6.33, 5 df |
| Female 75-84 | 24.7 | 21.3 | |
| Female >84 | 4.1 | 9.6 | |
| Male 65-74 | 24.0 | 23.6 | |
| Male 75-84 | 18.6 | 14.0 | |
| Male >84 | 2.0 | 4.1 | |
| *Education*[b] | | | |
| Less than High School | 20.8 | 20.1[b] | 0.25, 2 df |
| Graduated High School | 39.3 | 41.5 | |
| Post High School | 39.9 | 38.4 | |
| *Marital Status*[b] | | | |
| Married | 65.0 | 59.6[b] | 1.97, 2 df |
| Widowed | 28.4 | 30.1 | |
| Divorced, Separated, or Never Married | 6.6 | 4.2 | |
| *Annual Household Income*[c] | | | |
| < $35,000 | 74.3 | 89.5[c] | 24.68*, 1 df |
| > $35,000 | 25.7 | 10.5 | |
| *Health Status*[b] | | | |
| Fair or Poor | 27.8 | 26.0[b] | 0.17, 1 df |
| Good, Very Good, or Excellent | 72.2 | 74.0 | |

a = Source: "1999 Population Estimates", Wisconsin Department of Health and Family Services

b = Source: *1998 Family Health Survey*, Bureau of Health Information, Division of Health Care Financing, Wisconsin Department of Health and Family Services.

c = Source: January 2001 *Current Population Survey*, United States Bureau of the Census.

* = $p<0.01$, all two-tailed tests

TABLE 6
A Comparison of the First 20% and Last 20% of Respondents on Select Variables
(n = 480)

| Variable | First 20% (n = 240) | Last 20% (n = 240) | T-Score (df) |
|---|---|---|---|
| | Mean (S.D.) | | |
| Number of Prescription Drugs Used in Past 30 Days | 3.37 (2.76) | 3.80 (3.00) | 1.63 (478) |
| Number of Chronic Diseases | 3.03 (2.21) | 3.28 (2.12) | 1.27 (478) |
| Health Status | 2.92 (0.92) | 2.98 (0.95) | 0.64 (478) |
| Age | 74.95 (5.67) | 75.32 (6.28) | 0.68 (478) |
| | N (%)[a] | | Chi-Square (df) |
| *Gender* | | | |
| Male | 105 (44.1) | 100 (41.7) | 0.29 (1) |
| Female | 133 (55.9) | 140 (58.3) | |
| *Any ADLs* | | | |
| No | 194 (80.8) | 192 (80.0) | 0.05 (1) |
| Yes | 46 (19.2) | 48 (20.0) | |
| *Had help with survey* | | | |
| Yes | 57 (23.8) | 61 (25.4) | 0.16 (1) |
| No | 182 (76.2) | 179 (74.6) | |
| *Prescription Drug Insurance Costs* | | | |
| All Paid For | 8 (3.3) | 12 (5.0) | 0.85 (1) |
| Part Paid For | 127 (52.9) | 126 (52.5) | |
| None Paid For | 105 (43.8) | 102 (42.5) | |
| *Education Level* | | | |
| < College | 213 (88.8) | 201 (83.8) | 2.53 (1) |
| 4 year College or More | 27 (11.3) | 39 (16.3) | |
| *Income*[b] | | | |
| < $35,000/yr | 193 (80.4) | 187 (77.9) | 0.46 (1) |
| >$35,000/yr | 47 (19.6) | 53 (22.1) | |

a = All percentages are column percentages, b = Based on n = 1020 due to missing data

TABLE 7

A Comparison of Study Sample Characteristics with those Provided for the Study Sample by KM Axciom Lists

| Variable | Study Sample (N = 1086) | KM Axciom Lists (N = 2100) | T-Score (df) |
|---|---|---|---|
| | Mean (S.D.) | | |
| Age | 74.87 (5.80) | 75.19 (6.82) | 1.81 (1085) |
| | N (%)[a] | | Chi-Square[b] (df) |
| *Gender* | | | |
| Male | 485 (44.7) | 1050 (50.0) | 496.00* (1) |
| Female | 601 (55.3) | 1050 (50.0) | |
| *Income* | | | |
| <$15,000 | 308 (28.4) | 403 (19.2) | 557.24* (2) |
| $15,000 to $49,999 | 653 (60.1) | 1171 (55.8) | |
| $50,000 and above | 125 (11.5) | 526 (25.0) | |

a = All percentages are column percentages
b = Chi-square goodness of fit test
* = $p < 0.05$

Psychometric Evaluations of Multi-item Measures

Before proceeding further with bivariate or multivariate analyses of the study sample, psychometric evaluations of the multi-item measures employed in the study were conducted. Each of these analyses is conducted using 'available cases' and thus the number of cases available for each analysis is not 1086, but varies as noted in each table. These analyses began with an examination of the corrected item-to-total correlations for the items in each scale assumed to be measured at the interval level. The corrected item-to-total correlation is the correlation of the score of that particular item with the total score of the scale with that item deleted (Churchill, 1979). The results of this analysis are displayed in Table 8.

TABLE 8
Corrected Item-Total Correlations for Multi-Item Scales Assumed To be Interval Level in Nature
(N as noted within Table)

| | |
|---|---|
| *Medical Care Preferences (n = 1026)* | |
| MEDPREF1 | 0.69 |
| MEDPREF2 | 0.64 |
| MEDPREF3 | 0.46 |
| MEDPREF4 | 0.47 |
| MEDPREF5 | 0.63 |
| MEDPREF6 | 0.65 |
| MEDPREF7 | 0.59 |
| *R.Ph. Relationship Commitment (n = 1022)* | |
| RPHCOM1 | 0.56 |
| RPHCOM2 | 0.45 |
| RPHCOM3 | 0.60 |
| *Health Concern (n = 975)* | |
| HLTHCN1 | 0.64 |
| HLTHCN2 | 0.66 |
| HLTHCN3 | 0.23 |

Inspection of the Table 8 shows that, with the exception of the variable HLTHCN3 with a corrected item-total-correlation of 0.23, all items displayed item-total-correlations of 0.45 or higher. Given the relatively dramatic difference between this correlation and others the researcher elected to drop this item before proceeding with further analyses.

As a next step in the assessment of the multi-item measures a common factor analysis using PROMAX rotation was conducted on the remaining items. This analysis helps to ascertain the discriminant validity of the measures and also helps to ensure that individual items correlate highly with the measures they are proposed to. The results of this analysis are displayed in Table 9.

TABLE 9
Pattern Matrix for Oblique Rotation of Multi-Item Scales Assumed to be Interval Level in Nature
(N = 975)

| | *FACTOR* | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| MEDPREF1 | 0.76 | | |
| MEDPREF2 | 0.72 | | |
| MEDPREF3 | 0.46 | | |
| MEDPREF4 | 0.52 | | |
| MEDPREF5 | 0.72 | | |
| MEDPREF6 | 0.72 | | |
| MEDPREF7 | 0.64 | | |
| RPHCOM1 | | | 0.70 |
| RPHCOM2 | | | 0.53 |
| RPHCOM3 | | | 0.80 |
| HLTHCN1 | | 0.91 | |
| HLTHCN2 | | 0.87 | |

Notes: Common factor analysis with PROMAX rotation: Loadings less than 0.30 not shown in table.

The results of this analysis showed that all remaining items exhibited loadings of greater than 0.50 with their proposed measures. The results also show that no items loaded significantly on more than one factor. Thus, the researcher judged that the items used to measure each construct sensibly could be grouped together to form a summary score for each respondent for each measure.

Finally, reliability analyses were performed for each multi-item measure used in the study. These analyses consisted of Cronbach's Coefficient Alpha for all measures consisting of items assumed to be measured at the interval level and the Kuder-Richardson 20 Statistic for all items assumed to be measured at the nominal level. The results of these analyses, as well as other descriptive statistics for each measure, are featured in Table 10.

TABLE 10
Reliablility and Summary Statistics for Purified Multi-Item Scales
(N as noted in Table)

| Scale | Items[a] | Reliability | Mean | Standard Deviation | Per-Item Mean |
|---|---|---|---|---|---|
| Medical Care Preferences (n = 1026) | 7/7 | 0.84[b] | 22.52[e] | 5.65 | 3.22 |
| R.Ph. Relationship Commitment (n = 1022) | 3/3 | 0.72[b] | 11.96[e] | 2.18 | 3.99 |
| Health Concern (n = 975) | 3/2 | 0.80[c] | 6.98[e] | 1.91 | 3.49 |
| Activities of Daily Living (n = 1077) | 6/6 | 0.74[d] | 0.34[f] | 0.90 | 0.06 |

a = Items in original measure/ items in final measure
b = Cronbach coefficient alpha
c = Pearson correlation
d = Kuder-Richardson 20
e = Items measured by 1 = Strongly Disagree to 5 = Strongly Agree
f = Items measured by 1 = limitation present or 0 = limitation not present

Reliability analyses for the 4 multi-item measures revealed acceptable reliability for each measure. Scores for each respondent were computed for each measure by summing the scores on each individual item for that measure for the medical care preferences scale, the pharmacist-relationship commitment scale, and the health concern scale. These scores were then used in all remaining bivariate and multivariate items. The activities of daily living scale was scored as a '1' if the respondent reported limitations in any of the six ADLs and a '0' otherwise. The researcher chose to score this measure in this manner for a number of reasons. First, the summated scores on this measure were not normally distributed. Second, because of the low average score on this measure, the dichotomous score was more meaningful.

Bivariate Analyses

For the next step in the analyses of the data, the researcher began by cross-tabulating each individual level variable by chosen drug-benefit plan. This allowed an in-depth examination of relevant descriptive statistics before multivariate model estimation began. The overall bivariate relationships between each variable and chosen drug benefit plan were tested using appropriate statistics to provide preliminary guidance as to which variables were important in these decisions.

The levels of four variables (health status measured on a five point scale, education level, income, and assets) were collapsed into two levels each for all remaining analyses. This decision was made in order to both increase the power of the statistical tests and to simplify interpretation of the analyses. The levels chosen were based on both the distributions of each variable and upon levels that the researcher

believed would be most meaningful and facilitate comparisons with past research. The complete distributions of these variables can be found in Appendix G.

Table 11 features a comparison of all variables assumed categorical in nature across chosen drug benefit plan. Gender had a statistically significant relationship with plan choice. This difference is most apparent when one examines the proportions choosing Plan B (31.1% for males vs. 39.1% for females). Education also had a significant relationship with plan choice, with many differences apparent across the plans. For example, many more consumers with a college education chose Plan D than consumers without a college education (47.8% vs. 32.1%). Large and significant differences are also seen across plan choices for income level and asset level, with most of these differences paralleling those seen for education level. These findings suggest (not surprisingly) that these three variables are interrelated. Experience with plan characteristics (mail-order and formulary use) is also associated with plan choice. Those reporting current use of mail-order pharmacies are more likely to choose plans using this feature (A and C) and less like likely to choose plans not using it (B and D). In the case of formulary exposure, those more likely to be exposed to formulary use are more likely to choose Plans C and D (which do not use formularies) and less likely to choose Plan B (which uses a formulary).

TABLE 11
Comparison of Respondent Characteristics Across Chosen Drug Benefit Plan for all Categorical Variables
(N = 1086)

| Variable | Plan Chosen | | | | |
|---|---|---|---|---|---|
| | Plan "A" (n = 206) (19.0%) N (%) | Plan "B" (n = 386) (35.5%) N (%) | Plan "C" (n = 120) (11.1%) N (%) | Plan "D" (n = 374) (34.4%) N (%) | Chi-square value[a] |
| *Health Status* | | | | | |
| Fair or Poor | 49 (16.2) | 102 (33.8) | 33 (10.9) | 118 (39.1) | 4.64 (3 df) |
| Good, Very Good, or Excellent | 157 (20.0) | 284 (36.2) | 87 (11.1) | 256 (32.7) | |
| *Any Limitations in ADLs* | | | | | |
| Yes | 46 (23.7) | 60 (30.9) | 18 (9.3) | 70 (36.1) | 5.07 (3 df) |
| No | 160 (17.9) | 326 (36.5) | 102 (11.4) | 304 (34.1) | |
| *Gender* | | | | | |
| Male | 103 (21.2) | 151 (31.1) | 59 (12.2) | 172 (35.5) | 8.43* (3 df) |
| Female | 103 (17.1) | 235 (39.1) | 61 (10.1) | 202 (33.6) | |
| *Marital Status* | | | | | |
| Married | 137 (19.4) | 250 (35.4) | 77 (10.9) | 242 (34.3) | 0.27 (3 df) |
| Otherwise | 69 (18.2) | 136 (35.8) | 43 (11.3) | 132 (34.7) | |
| *Education* | | | | | |
| Less than College | 189 (20.5) | 339 (36.7) | 99 (10.7) | 296 (32.1) | 20.41* (3df) |
| 4 Year College Degree or More | 17 (10.4) | 47 (28.8) | 21 (12.9) | 78 (47.9) | |
| *Income* | | | | | |
| Less than $35,000/yr | 162 (20.1) | 299 (37.1) | 91 (11.3) | 255 (31.6) | 11.54* (3 df) |
| $35,000/yr or more | 44 (15.8) | 87 (31.2) | 29 (10.4) | 119 (42.7) | |
| *Assets* | | | | | |
| Less than $50,000 | 112 (22.0) | 190 (37.3) | 47 (9.2) | 160 (31.4) | 10.88* (3 df) |
| > $50,000 | 94 (16.3) | 196 (34.0) | 73 (12.7) | 214 (37.1) | |

TABLE 11 (cont.)

| Variable | Plan Chosen | | | | |
|---|---|---|---|---|---|
| | Plan "A" (n = 206) (19.0%) N (%) | Plan "B" (n = 386) (35.5%) N (%) | Plan "C" (n = 120) (11.1%) N (%) | Plan "D" (n = 374) (34.4%) N (%) | Chi-square value[a] |
| *Formulary Exposure* | | | | | |
| Likely | 101 (20.8) | 145 (29.8) | 62 (12.8) | 178 (36.6) | 13.13* (3) |
| Less Likely | 105 (17.5) | 241 (40.2) | 58 (9.7) | 196 (32.7) | |
| *Uses Mail-Order* | | | | | |
| Yes | 43 (30.3) | 20 (14.1) | 40 (28.2) | 39 (27.5) | 77.82* (3) |
| No | 163 (17.3) | 366 (38.8) | 80 (8.5) | 335 (35.5) | |

Note: All percentages are row percentages

Note: Plan "A": Formulary, Mail Order, copay = $5, premium = $45.10; Plan "B": Formulary, copay = $10, premium = $41.48, Plan "C": Mail-Order, copay = $10.00, premium = $47.16, ; Plan D: copay = $5.00, premium = $60.05.

a = Pearson chi-square test of association, * = $p < 0.05$

Table 12 contains the results of a similar analysis for variables assumed to be measured at the interval level or higher. Four of these variables have a statistically significant relationship with plan choice: number of prescriptions used in past 30 days, value of prescriptions used in past 30 days, number of chronic diseases, and medical care preference scores. The first three of these variables are logically correlated and thus the pattern of the relationship seen with chosen plan is the same for each. What is most striking is that respondents with the highest levels of each seem to express a preference for Plan D. The relationship of medical care preference score to plan choice is not so clear-cut.

TABLE 12
Comparison of Respondent Characteristics Across Chosen Drug Benefit Plan for all Continuous Variables
(N = 1086)

| Variable | Plan Chosen | | | | |
|---|---|---|---|---|---|
| | Plan "A" (n = 206) (19.0%) Mean (SD) | Plan "B" (n = 386) (35.5%) Mean (SD) | Plan "C" (n = 120) (11.1%) Mean (SD) | Plan "D" (n = 374) (34.4%) Mean (SD) | F-test Value (df) |
| Number of Prescriptions Used in Past 30 Days | 3.35 (2.44) | 3.07 (2.56) | 3.46 (2.51) | 4.13 (3.06) | 10.10* (3, 1082) |
| Value of Prescriptions Used in Past 30 Days | $122.72 (133.39) | $106.26 (135.33) | $120.59 (125.53) | $160.20 (164.66) | 9.22* (3, 1082) |
| Number of Chronic Diseases | 2.92 (1.93) | 2.68 (1.93) | 3.09 (2.18) | 3.45 (2.19) | 9.11* (3, 1082) |
| Age | 75.17 (5.40) | 75.14 (5.68) | 74.08 (5.53) | 74.69 (6.19) | 1.34 (3, 1082) |
| Health Concern | 7.01 (1.88) | 6.94 (1.91) | 7.04 (1.87) | 6.98 (1.89) | 0.12 (3, 1082) |
| Medical Care Preferences | 22.77 (5.72) | 21.73 (5.67) | 23.28 (5.80) | 23.02 (5.47) | 4.39* (3, 1082) |
| R.Ph. Relationship Commitment | 11.97 (2.20) | 11.94 (2.21) | 12.07 (2.08) | 12.19 (2.15) | 0.97 (3, 1082) |

Note: Plan "A": Formulary, Mail Order, copay = $5, premium = $45.00; Plan "B": Formulary, copay = $10, premium = $41.50, Plan "C": Mail-Order, copay = $10.00, premium = $47.00, ; Plan D: copay = $5.00, premium = $60.00.
* = $p < 0.05$

The researcher then elected to test several of the hypotheses advanced in Chapter 2 in a bivariate format before proceeding to multivariate hypothesis testing. These hypotheses were tested using the chi-square goodness-of-fit statistic or the T-statistic as appropriate. Four hypotheses were advanced with respect to the effects that prescription drug plan characteristics might have on consumer choice. These are tested here in a bivariate format.

Table 13 compares the proportion of respondents choosing plans requiring the use of mail-order pharmacies (A and C) with the proportion that would have been expected if this attribute were not associated with choices. The table shows that the required use of mail order pharmacies is associated with significantly fewer respondents choosing plan with that attribute than might have been expected if respondents simply disregarded this attribute. Hypothesis #1 stated that a plan's use of mail-order pharmacy would lead to lower purchase intentions; the difference was statistically significant, lending support to Hypothesis #1.

TABLE 13

A Comparison of the Proportion of Respondents Choosing Plans Requiring the Use of Mail Order Pharmacies (A and C) and the Proportion Choosing Plans not Requiring the Use of Mail order Pharmacies (B and D) with the Proportions Expected if Choice was Random

(N = 1086)

| | Chose Plans Not Requiring the Use of Mail Order N (%) | Chose Plans Requiring the Use of Mail Order N (%) | Chi-Square Statistic[a] (df) |
|---|---|---|---|
| Observed Proportion | 760 (69.98) | 366 (33.70) | 144.42* (1) |
| Expected Proportion | 543 (50.00) | 543 (50.00) | |

a = chi-square goodness-of-fit statistic

* = $p < 0.05$

Table 14 displays a comparison of the proportion of respondents choosing plans requiring the use of a formulary (A and B) with those not requiring a formulary (C and D) with those that would have been expected if this attribute had no effect on choices. The distribution of data in the table does not appear to be consistent with the hypothesis that respondents find the use of a formulary aversive when making choices among the plans presented. The difference is statistically significant, although the observed proportions are in the opposite direction of those hypothesized. Thus, Hypothesis #2 (The use of drug formularies will be associated with lower consumer purchase intentions) was not supported.

Table 15 displays a comparison of the proportion of respondents choosing plans with a low premium (defined here as those plans with relatively similar premiums (A, B, and C) with the plan requiring a high premium (D) with the distribution that would have been expected if premium had no impact on choice. The difference is statistically significant, although the observed proportions are in the opposite direction of those hypothesized. Thus, Hypothesis #3 (Higher premium levels will be associated with lower levels of consumer purchase intentions) was not supported.

Table 16 displays a comparison of the proportion of respondents choosing plans with a low copayment (A and D) with those choosing plans with a high copayment (B and C) with the distribution that would have been expected if copayments were not associated with choice. The difference is statistically significant and in the hypothesized direction, lending support to Hypothesis #4 (Higher copayment levels will be associated with lower consumer purchase intentions).

TABLE 14

A Comparison of the Proportion of Respondents Choosing Plans Using a Formulary (A and B) and the Proportion Choosing Plans Not Using a Formulary (C and D) with the Proportions Expected if Choice was Random

(N = 1086)

| | Chose Plans Not Using a Formulary N (%) | Chose Plans Using a Formulary N (%) | Chi-Square Statistic[a] (df) |
|---|---|---|---|
| Observed Proportion | 494 (45.5) | 592 (54.5) | 8.84* (1) |
| Expected Proportion | 543 (50.0) | 543 (50.0) | |

a = chi-square goodness-of-fit test

* = $p < 0.05$

TABLE 15

A Comparison of the Proportion of Respondents Choosing Plans with a "Low" Premium (A, B, C) and the Proportion Choosing Plans with a "High" Premium (D) with the Proportions Expected if Choice was Random
(N = 1086)

| | Chose Plans with a "Low" Premium N (%) | Chose Plans with a "High" Premium N (%) | Chi-Square Statistic[a] (df) |
|---|---|---|---|
| Observed Proportion | 712 (65.6) | 374 (34.4) | 52.17* (1) |
| Expected Proportion | 815 (75.0) | 271 (25.0) | |

a = chi-square goodness-of-fit test
* = $p < 0.05$

TABLE 16

A Comparison of the Proportion of Respondents Choosing Plans with a "Low" Copayment (A and D) and the Proportion Choosing Plans with a "High" Copayment (B and C) with the Proportions Expected if Choice was Random
(N = 1086)

| | Chose Plans with a "Low" Copayment N (%) | Chose Plans with a "High" Copayment N (%) | Chi-Square Statistic[a] (df) |
|---|---|---|---|
| Observed Proportion | 580 (53.4) | 506 (46.6) | 5.04* (1) |
| Expected Proportion | 543 (50.0) | 543 (50.0) | |

a = chi-square goodness-of-fit test
* = $p < 0.05$

Table 17 features a comparison of the mean number of chronic diseases across those respondents choosing the lower copayment plans (Plan A and Plan D) with those respondents choosing the higher copayment plans (Plans B and C). As hypothesized, those respondents choosing plans requiring the lower copayment amount had more chronic diseases, on average. The difference was statistically significant, lending support to Hypothesis #8 (Consumers with more chronic illnesses will show greater purchase intentions towards plans with the $5 (as opposed to $10) copayment level).

TABLE 17
A Comparison of Mean Number of Chronic Diseases Across Respondents Choosing Plans Requiring a $5 Copayment (A and D) and Plans Requiring a $10 Copayment (B and C)
(N = 1086)

| | N | Mean | SD | T-test Value (df) |
|---|---|---|---|---|
| $5 Copayment per Prescription | 580 | 3.26 | 2.11 | 3.83* (1084) |
| $10 Copayment per Prescription | 506 | 2.78 | 2.00 | |

* = $p < 0.05$

Table 18 displays a comparison of those respondents choosing prescription drug plans with $5 copayments (Plans A and D) with those choosing drug plans with requiring a $10 copayment per prescription (Plans B and C). As hypothesized, respondents choosing plans with lower copayments had higher scores on the medical care preference score. This difference was statistically significant and lends support to Hypothesis #10 (Consumers with higher scores on the formal medical care preferences use scale will show higher purchase intentions for plans with the $5 (as opposed to the $10) copayment level).

TABLE 18

A Comparison of Mean Score on Medical Care Preference Score Across Respondents Choosing Plans Requiring a $5 Copayment (A and D) and Plans Requiring a $10 Copayment (B and C)
(N = 1086)

| | N | Mean | SD | T-test Value (df) |
|---|---|---|---|---|
| $5 Copay per Prescription | 580 | 22.94 | 5.55 | 2.43* (1084) |
| $10 Copay per Prescription | 506 | 22.10 | 5.73 | |

* = $p < 0.05$

TABLE 19

A Comparison of Pharmacist Relationship Commitment Mean Scores Across Respondents Choosing Plans Requiring the Use of Mail Order Pharmacy (A and C) and Plans not Requiring the Use of Mail Order Pharmacy (B and D)
(N = 1086)

| | N | Mean | SD | T-test Value (df) |
|---|---|---|---|---|
| Chose Plan Not Requiring the Use of Mail Order | 760 | 12.06 | 2.18 | 0.40 (1084) |
| Chose Plan Requiring the Use of Mail Order | 326 | 12.01 | 2.16 | |

Table 19 features a comparison of pharmacist-relationship commitment scores across those respondents choosing plans requiring the use of mail-order pharmacies (Plans A and C) with those not requiring the use of mail order pharmacies (Plans B and D). The difference in this score was not significant; thus, Hypothesis #12 (individuals with stronger relationships with their current pharmacists will be more likely to choose plans allowing free choice of pharmacy) was not supported.

Multivariate Analyses

In the next section of the analysis, three multivariate logit models were estimated. These models enabled the researcher to analyze the data within a discrete choice framework appropriate to the nature of the data generated in the current study. These models also allowed the testing of previously untested hypotheses as well as previously tested hypotheses in a multivariate framework.

Before beginning model estimation the researcher developed a zero-order correlation matrix of all individual-level variables employed in the multivariate models. The correlation matrix allowed a check for possible multi-collinearity problems that might exist within this set of variables. This matrix is displayed in Table 20. Because the largest correlation in this table was 0.43 (that between number of chronic diseases and being in fair or poor health) the researcher judged that multivariate analyses could proceed without discarding or transforming any of these variables.

TABLE 20
Correlation Matrix for Individual-Level Variables Employed in Multivariate Analyses
(N = 1086)

| | Med. Care Pref. Score | R.Ph. Relationship Commitment Score | Health is Fair or Poor | Number of Chronic Diseases | Any Limits in ADLs | Health Concern Score |
|---|---|---|---|---|---|---|
| Medical Care Preference Score | | | | | | |
| Pharmacist-Relationship Commitment Score | 0.11* | | | | | |
| Health is Fair or Poor | 0.16* | 0.03 | | | | |
| Number of Chronic Diseases | 0.20* | 0.09* | 0.43* | | | |
| Any Limits in ADLs | 0.07* | 0.09* | 0.35* | 0.24* | | |
| Health Concern Score | 0.19* | 0.13* | 0.27* | 0.19* | 0.19* | |
| Age | 0.11* | 0.01 | 0.19* | 0.13* | 0.24* | 0.06* |
| Male Gender | 0.10* | -0.09* | 0.06* | 0.07* | 0.002 | 0.02 |
| Has College Education or More | -0.001 | -0.07* | -0.10* | -0.04 | -0.06 | -0.11* |
| Income is $35,000/yr or more | 0.01 | -0.08* | -0.13* | -0.09* | -0.16* | -0.09* |
| Assets are $50,000 or more | 0.004 | -0.06 | -0.08* | -0.06* | -0.11* | -0.08* |
| Currently Married | 0.01 | -0.04 | -0.01 | 0.03 | -0.03 | -0.05 |

$p < 0.05$, two-tailed test

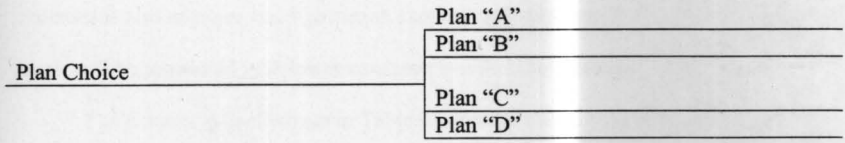
TABLE 20 (cont.)
Correlation Matrix for Individual-Level Variables Employed in Multivariate Analyses
(N = 1086)

| | Age | Gender | Has College Education or More | Income is $35,000/yr or more | Assets are $50,000 or More | Currently Married |
|---|---|---|---|---|---|---|
| Male Gender | -0.05 | | | | | |
| Has College Education or More | -0.06* | 0.09* | | | | |
| Income is $35,000/yr or more | -0.18* | 0.11* | 0.34* | | | |
| Assets are $50,000 or more | -0.16* | 0.16* | 0.28* | 0.40* | | |
| Currently Married | -0.25* | 0.01 | 0.05 | 0.25* | 0.19* | |

$p < 0.05$

The first two multivariate analyses are conditional logit models that assume the consumer evaluates the four hypothetical prescription drug plans together, as one set, and does not view any of the alternatives within the set as a good substitute for any other. When one alternative is viewed as a good substitute for some other alternative in the choice set this is a violation of the independence of irrelevant alternatives (IIA) assumption that is necessary if the estimated models are to be viewed as structural, and not reduced, models of choice (Long, 1997). A diagram of the choice process assumed to occur is displayed in Figure 3.

FIGURE 3
Schematic of Choice Process Estimated by Conditional Logit Models




The results of the first conditional logit estimation are displayed in Table 21. The table contains entries for only three of the four plan characteristics because entering the fourth (use of a formulary) created a multicollinearity problem. This is in part because premium was always set as a function of the other three attributes and because of the fact that the method used to design the plans ensures orthogonality. Thus, a

second conditional logit model incorporating 'use of a formulary' and removing 'required use of mail-order pharmacy' was estimated and the results are displayed in Table 22.

The first three entries in Table 21 are the coefficients and T-statistics for the effect of plan characteristics on choice (alternative contrasts for both conditional logit models can be found in Appendix I). The coefficient for required use of a mail-order pharmacy is negative and statistically significant, suggesting that a plan's use of mail-order pharmacy decreases the likelihood of choice. Thus, Hypothesis #1 (the use of mail-order pharmacies will be associated with lower consumer purchase intentions) is supported. The coefficient for plan premium is also negative and statistically significant, lending support to Hypothesis #3 (higher premium levels will be associated with lower consumer purchase intentions). The coefficient for expected out-of-pocket expenses is also negative and significant, supporting Hypothesis #4 (Higher copayment levels will be associated with lower consumer purchase intentions).

The remaining coefficients in Table 21 concern the associations between individual characteristics and plan choice. In order to identify this portion of the model, it was necessary to exclude one of the choices. The researcher arbitrarily decided to exclude Plan D; it is the plan with the highest monthly premium ($60.00) and the only plan with no restrictions (formulary or mail-order), facilitating interpretation of the coefficients with respect to stated hypotheses

Both health status and number of chronic diseases have significant associations with plan choice. In particular, as number of chronic diseases increases the log odds of choosing both Plan A and Plan B relative to Plan D (the least restrictive plan) decrease,

lending support to Hypothesis #11 (consumers with greater numbers of chronic conditions will choose plans with fewer restrictions). Those reporting their health as 'fair or good' were less likely to choose Plan A relative to Plan D. Unlike the results from the preceding bivariate analysis, medical care preference score is not significantly associated with drug plan choice. As hypothesized (Hypothesis # 9: higher levels of health concern will not affect drug insurance plan purchase intentions), health concern score is not related to drug plan choice. As in the previous bivariate analysis, pharmacist commitment score is not related to drug plan choices; again, Hypothesis #12 (individuals with stronger relationships with their current pharmacists will be more likely to choose plans allowing free choice of pharmacy) is not supported. Higher income decreases the chance of selecting Plan B relative to Plan D, giving some support to Hypothesis #5 (individuals with higher incomes will show higher purchase intentions towards plans with higher premiums), while having assets over $50,000 has a similar relation with Plan A, giving some support to Hypothesis # 6 (individuals with greater financial assets will show higher purchase intentions towards plans with higher premiums). Finally, those respondents currently using mail-order pharmacies were more likely to choose Plans A and C (both requiring use of mail-order pharmacies) relative to Plan D.

TABLE 21
Conditional Logit Model of Drug Benefit Plan Choice as a Function of Plan Attributes and Individual Characteristics – Use of Mail-Order is Qualitative Attribute
(N = 1086)

| Variable | | | |
|---|---|---|---|
| Mail-Order Use is Required | | -1.43 (2.69)** | |
| Premium | | -0.10 (3.32)** | |
| Expected Out-of-Pocket Expenses | | -0.01 (1.66)* | |
| | *Plan A vs. Plan D* | *Plan B vs. Plan D* | *Plan C vs. Plan D* |
| Health is Fair or Poor[a] | -0.47 (1.97)* | 0.18 (0.64) | -0.02 (0.07) |
| Number of Chronic Diseases | -0.14 (2.85)** | -0.14 (3.11)** | -0.09 (1.52) |
| Any ADLs Present | 0.47 (1.91)* | -0.08 (0.37) | -0.13 (0.41) |
| Med. Care Preferences Score | 0.01 (0.46) | -0.02 (1.37) | 0.003 (0.15) |
| Health Concern Score | 0.04 (0.77) | 0.03 (0.65) | 0.01 (0.14) |
| College Education or More[b] | -0.85 (2.75)** | -0.47 (2.07)** | -0.05 (0.15) |
| Income is $35,000 or more per year[c] | -0.29 (1.22) | -0.36 (1.83)* | -0.56 (1.94)* |
| Assets are $50,000 or more[d] | -0.38 (1.80)* | -0.16 (0.93) | -0.10 (0.42) |
| Single Male[e] | -0.35 (1.09) | -0.54 (1.85) | -0.71 (1.70) |
| Single Woman[e] | -0.38 (1.58) | -0.02 (0.08) | -0.21 (0.74) |
| Married Woman[e] | -0.38 (1.68) | 0.04 (0.31) | -0.49 (1.76) |

TABLE 21 (cont.)
Conditional Logit Model of Drug Benefit Plan Choice as a Function of Plan Attributes and Individual Characteristics – Use of Mail-Order is Qualitative Attribute
(N = 1086)

| | *Plan A vs. Plan D* | *Plan B vs. Plan D* | *Plan C vs. Plan D* |
|---|---|---|---|
| Currently Uses Mail Order | 0.91 (3.47)* | -0.55 (1.82) | 1.62 (5.68)** |
| Likely Exposed to Formulary | -0.05 (0.28) | -0.22 (1.41) | -0.24 (1.01) |
| Pharmacist Commitment Score | -0.02 (0.41) | -0.05 (1.35) | -0.03 (0.70) |

Note: Coefficient (T-statistic);
Model $\chi^2 = 366.02$ (45 df), $p < 0.05$; $\sim R^2 = 0.12$
Note: Plan "A": Formulary, Mail Order, copay = $5, premium = $45.00; Plan "B": Formulary, copay = $10, premium = $41.50, Plan "C": Mail-Order, copay = $10.00, premium = $47.00, ; Plan D: copay = $5.00, premium = $60.00.
a = Health is good, very good, or excellent is reference
b = Less than college education is reference
c = Less than $35,000/yr is reference
d = Less than $50,000/yr is reference
e = Married male is reference
* = $p < 0.05$ (one-tailed)
** = $p < 0.05$ (two-tailed)

TABLE 22

Conditional Logit Model of Drug Benefit Plan as a Function of Plan Attributes and Individual Characteristics – Use of Formulary is Qualitative Attribute

(N = 1086)

| Variable | | | |
|---|---|---|---|
| Formulary Use is Required | | 2.47 (2.68)** | |
| Premium | | 0.05 (0.92) | |
| Expected Out-of-Pocket Expenses | | -0.01 (1.94)* | |
| | *Plan A vs. Plan D* | *Plan B vs. Plan D* | *Plan C vs. Plan D* |
| Health is Fair or Poor[a] | - 0.45 (1.85) | 0.12 (0.59) | -0.03 (0.12) |
| Number of Chronic Diseases | -0.15 (2.99)** | -0.14 (2.96)** | -0.08 (1.35) |
| Any ADLs Present | 0.50 (2.05) | -0.08 (0.36) | -0.13 (0.42) |
| Med. Care Preferences Score | -0.01 (0.51) | -0.02 (1.07) | 0.01 (0.46) |
| Health Concern Score | 0.01 (0.11) | 0.04 (0.90) | 0.02 (0.37) |
| College Education or More[b] | -0.91 (2.95)** | -0.46 (2.03)** | -0.07 (0.22) |
| Income is $35,000 or more per year[c] | -0.35 (1.45) | -0.35 (1.75)* | -0.56 (1.91) |
| Assets are $50,000 or more[d] | -0.45 (2.12)* | -0.15 (0.85) | -0.07 (0.29) |
| Single Male[e] | -0.40 (1.25) | -0.53 (1.81) | -0.69 (1.66) |
| Single Woman[e] | -0.48 (2.00)** | -0.01 (0.04) | -0.18 (0.63) |
| Married Woman[e] | -0.45 (1.99)** | 0.06 (0.30) | -0.47 (1.66) |

TABLE 22 (cont.)
Conditional Logit Model of Drug Benefit Plan as a Function of Plan Attributes and Individual Characteristics – Use of Formulary is Qualitative Attribute

| | *Plan A vs. Plan D* | *Plan B vs. Plan D* | *Plan C vs. Plan D* |
|---|---|---|---|
| Currently Uses Mail Order | 0.87 (3.29)** | -0.53 (1.78) | 1.65 (5.75)** |
| Likely Exposed to Formulary | -0.06 (0.34) | -0.22 (1.39) | -0.23 (0.98) |
| Pharmacist Commitment Score | -0.08 (2.19)** | -0.03 (0.91) | -0.01 (0.15) |

Note: Coefficient (T-statistic)
Model $\chi^2 = 366.23$, $p < 0.05$ (45 df); $\sim R^2 = 0.12$
Note: Plan "A": Formulary, Mail Order, copay = $5, premium = $45.00; Plan "B": Formulary, copay = $10, premium = $41.50, Plan "C": Mail-Order, copay = $10.00, premium = $47.00, ; Plan D: copay = $5.00, premium = $60.00.
a = Health is good, very good, or excellent is reference
b = Less than college education is reference
c = Less than $35,000/yr is reference
d = Less than $50,000/yr is reference
e = Married male is reference
* = $p < 0.05$ (one-tailed)
** = $p < 0.05$ (two-tailed)

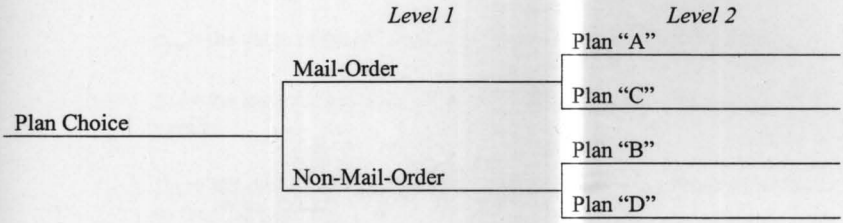
Table 22 features the results from the second conditional logit model, this time featuring 'use of formulary' as opposed to 'use of mail-order' as the qualitative plan characteristic that is used in model estimation. As in the preceding bivariate analysis, the use of a formulary has a statistically significant, although positive, association with plan choice. Thus, Hypothesis #2 is not supported. The coefficient for expected out-of-pocket expenses is now negative and statistically significant, giving support to Hypothesis #4. Most other relationships are similar to those found in Table 16, with these exceptions: pharmacist commitment score is now negative and significant with respect to the choice between Plan A (requiring mail-order use) and Plan D (not requiring mail-order use), lending support to Hypothesis #12. Marital status and gender also become significant determinants of choice in this model.

In the next step of the multivariate analysis strategy, a specification test developed by Hausman and McFadden (1984) was applied to the conditional logit models previously estimated. Briefly, this procedure tests for a significant difference between the coefficients of a model assumed to fully efficient (in our case, a model with all plans represented) and the coefficients of a model assumed to be less efficient (in our case, a model with plans using mail-order deleted). This procedure yielded a chi-square value of 332.33 with 16 degrees of freedom ($p < 0.01$). The researcher deemed this result significant and elected to estimate and test a nested logit model of drug plan choice.

The nested logit model differs from the conditional logit model previously used in that it allows for the possibility that two (or more) alternatives in the choice set might be viewed as close substitutes. Thus, in the present situation, it might be that consumers

viewed both plans requiring the use of mail-order pharmacy as roughly similar and both plans not using mail-order pharmacy as roughly similar. This situation is depicted graphically in Figure 4.

FIGURE 4
Schematic of Possible Choice Process Estimated by Nested Logit Models




Level 1 of the model is the level at which the consumer decides what 'nest' or what grouping of plans to select the final plan from; Level 2 is the level from which the consumer makes their final choice, given the decision at Level 1. One issue with such analyses in the current context is the lack of strong theory to guide model specification. Only one paper (Feldman et al., 1989) has used this technique to the researcher's knowledge, providing little empirical or theoretical ground for the construction of 'nests' or even the number of levels (e.g. two or three) that such models might have.

Given these issues, the researcher elected to estimate one plausible model, check the specification of the model statistically, and proceed from there. The model estimated is that displayed in Figure 4 and can be represented by the following equations:

$$L_{ij \text{ plan} \mid \text{nest choice}} = \Sigma\gamma_m z_{j,m} + \nu \qquad (3)$$

and

$$L_{iv \text{ nest choice}} = \Sigma\beta_{jk}x_{ik} + \Sigma\tau_k w_{ik} + \nu \qquad (4)$$

Where:

$L_{ij}$ = the logit (or log odds) of choice of the $j^{th}$ drug plan by the $i^{th}$ person

$\gamma_m$ = the parameter relating the $m^{th}$ drug plan characteristic to choice.

$z_{jm}$ = the value of the $m^{th}$ drug plan characteristic for the $j^{th}$ drug plan.

$L_{iv}$ = the logit (or log odds) of choice of the $v^{th}$ drug plan nest by the $i^{th}$ person.

$\beta_{jk}$ = the parameter relating the $k^{th}$ individual-level explanatory variable to the $j^{th}$ drug plan.

$x_{ik}$ = the value of the $k^{th}$ individual-level explanatory variable for the $i^{th}$ person.

$\tau_k$ = the inclusive parameter relating the $k^{th}$ inclusive value to nest choice

$w_k$ = the inclusive value for the $k^{th}$ nest.

$\nu$ = a stochastic error term assumed to have a Type II extreme error distribution that captures the influence of unobserved individual characteristics on drug plan choice.

In the model estimated, plan characteristics are assumed to operate at Level 2 while individual characteristics are assumed to operate at Level 1. The results of this estimation are displayed in Table 23.

TABLE 23

Nested Logit Model of Drug Benefit Plan as a Function of Plan Attributes and Individual Characteristics – Nests Defined by Plan's Use of Mail-Order Pharmacy (N = 1086)

| Variable | Coefficient | Standard Error | T-Statistic |
|---|---|---|---|
| *Level 2 of Model* | | | |
| Premium | -0.02 | 0.005 | 4.82* |
| Expected Out-of-Pocket Expenses | -0.02 | 0.004 | 6.39* |
| *Level 1 of Model (Mail Order Plans are Chosen over Non-Mail-Order Plans)* | | | |
| Medical Care Preference Score | 0.02 | 0.01 | 1.59 |
| Health Concern Score | 0.01 | 0.04 | 0.18 |
| Pharmacist-Relationship Commitment Score | 0.004 | 0.03 | 0.13 |
| Number of Chronic Diseases | -0.01 | 0.04 | 0.29 |
| Any Limitations in ADLs | 0.37 | 0.20 | 1.87 |
| Health Status is Fair or Poor[a] | -0.32 | 0.19 | 1.71 |
| College Education or More[b] | -0.27 | 0.22 | 1.18 |
| Income is $35,000 or more per year[c] | -0.22 | 0.19 | 1.21 |
| Assets are $50,000 or more[d] | -0.20 | 0.16 | 1.20 |
| Single Male[e] | -0.25 | 0.27 | 0.95 |
| Single Woman[e] | -0.30 | 0.18 | 1.64 |
| Married Woman[e] | -0.42 | 0.18 | 2.39* |
| Possibly Exposed to Formulary | 0.03 | 0.15 | 0.20 |
| Currently Uses Mail-Order | 1.45 | 0.20 | 7.16* |

TABLE 23 (cont.)

| | | | |
|---|---|---|---|
| *Inclusive Value Parameters* | | | |
| Chooses Mail-Order Plans | -15.55 | 9.38 | 1.61 |
| Chooses Non-Mail-Order Plans | -14.75 | 8.94 | 1.65 |

Model $\chi^2 = 301.8$ (18 df), $p < 0.05$
Inclusive Value Parameters: $\chi^2 = 8.03$ (2 df), $p < 0.05$
* = $p < 0.05$ (two-tailed)
a = Health is good, very good, or excellent is reference
b = Less than college education is reference
c = Less than $35,000/yr is reference
d = Less than $50,000/yr is reference
e = Married male is reference

In the nested logit model, the coefficients for both premium and out-of-pocket costs are negative and significant, again supporting Hypotheses # 3 and # 4. The coefficient contrasting married women to married men is negative and significant, suggesting that this group is less likely to choose those plans requiring the use of mail-order pharmacies. The coefficient representing the group currently using mail-order pharmacy is positive and significant, indicating that this group would be more likely to choose plans requiring the use of mail-order. This finding is similar to that in the first two conditional logit models estimated. The overall test of the significance of the inclusive value parameters is significant suggesting that the previously estimated conditional logit models may not provide a reasonable representation of the choice process studied here. However, given the largely exploratory nature of further model specification and estimation, the researcher elected to discontinue multivariate analyses at this point.

# V. DISCUSSION AND CONCLUSIONS

This chapter presents a discussion and interpretation of the results of this study. A discussion of the research methods employed in this study begins this section. A discussion of the results as they pertain to each research question and summary of tests of the hypotheses advanced follows. Next, the implications of these results for future research follow. Finally, the limitations of the research are then noted.

**Study Methodology**

This study used a combination of mail survey data collection methods and a hypothetical choice task in order to explore the feasibility of one possible method of administering a Medicare prescription drug benefit. Using this methodology the researcher hoped to, *a priori*, gain some meaningful insight into a choice process that was heretofore unexplored and relevant to healthcare policy in the United States.

There was concern at the start of this project that many potential respondents would not understand the choice task and thus skip the item (or not return the survey at all), making data collection difficult. In general, this did not appear to be the case. The data collection methods employed achieved an acceptable response rate (59%) overall. Of those that returned the survey form, 91% completed the hypothetical drug plan choice question, suggesting that such a task was not overly difficult for this population. This result is qualified by the fact that response to this item was positively correlated with education level and negatively with higher income levels.

This finding that consumers of lower socio-economic status often failed to respond to the plan choice item is important in and of itself when considering the use of free choice markets in the administration of a Medicare drug benefit. Given that response to the choice item was lower among persons of lower socio-economic status, this may indicate that many poorer, less educated older adults will not be able to make drug plan choices that best suit their needs. This problem could be addressed in a number of ways. For example, a 'default' plan might be chosen by the government and all those not making a choice could be placed into it. Second, some sort of intervention, such as a telephone call or home visit by a social worker, might be used to better

explain and clarify the choice task. Finally, predictive models, such as those developed in this study, could be used to model the individual's most likely choice and assign their plan accordingly.

Age also was related to non-response for the choice task, with older respondents less likely to complete the choice item. This result extends those of Kaldenberg, Koenig, and Becker (1994) who studied the completion rate for four types of questions in a mail survey among a population of adults 65 and older. These authors found that an item in which respondents were asked to rank the importance of six information delivery systems in their retirement health plan was more prone to missing data than other types of items (i.e. open-ended, Likert scale, items dealing with recent contacts with an insurance carrier). However, age was positively correlated with the likelihood of missing data for all item types.

The researcher also found that response to the survey as a whole was related to gender. In the pilot test it was discovered that males were less likely to respond to the survey and females were more likely to respond. The researcher attempted to correct for this finding in the main mailing by over-sampling males and under-sampling females. This finding may be important for future researchers using mail surveys to study older adults in that other sampling frames may need to be adjusted or sampling weights used in order to accurately represent the population.

Another concern with using a hypothetical choice task was, that even given that the individual made a choice, the individual's choice would be nonsensical (i.e. the choice would bear no relation to plan or individual characteristics). The results of the data analyses in this project suggest otherwise. Following a utility maximization model

of prescription drug plan choice, most of the hypotheses based on this model and prior empirical studies in an analogous literature (research on health plan choice) appear to hold. This finding bodes well for the concept of free choice in Medicare drug benefits markets, as it suggests that consumers can provide much of the market discipline necessary for this method of administration to be feasible.

A strength of the current study was that an attempt was made to set the premium for each hypothetical plan at its actuarial value so that the choice scenario was realistic. Some past studies using hypothetical plans and conjoint analyses (e.g. Gates et al, 2000) have simply varied premium randomly, without respect to other plan features that might logically impact premium (e.g. copayments). If premium had been varied randomly, individuals may have avoided drug plans they may otherwise have chosen, drawing into question the validity of the results of the study. Another strength is that data were generated that were more similar to what might actually be observed in a 'real-world' choice situation i.e. the respondent picks only once, not multiple times as they might in a conjoint experiment.

**Research Question Number One**

The first goal of this research was to develop a better understanding of the manner in which prescription drug plan characteristics might be associated with consumer purchase intentions in a population of ambulatory, age 65 and older persons in Wisconsin. This question is 1) of scientific interest, because to the researcher's knowledge, no past studies have examined this question and 2) of practical interest to

the firms who may market these products because they are likely to influence market share.

Four variables were studied as possibly being associated with consumer purchase intentions in the current study. One of these was premium price, or the amount the consumer would have to pay for the drug benefit regardless of their current amount of prescription use. The premium used in this study was adjusted for a subsidy that was set equal to one-half the premium of the lowest priced plan in the hypothetical market. In two of the three multivariate models estimated the premium variable had a negative and statistically significant relation to choice. This was as hypothesized and suggests that the demand curve for these benefits is downward sloping, as economic theory would suggest. This result is congruent with much past research on the effects of health plan premiums on purchase likelihood (e.g. Long, Settle, and Wrightson (1988), Feldman et al. (1989)). Thus, this study adds to the literature on health plan choices by extending a result from one context to another.

A second feature of prescription drug plans that was hypothesized to be associated with purchase intentions was expected out-of-pocket costs. Expected out-of-pocket costs were operationalized in the current study as the number of different prescription drugs used in the past 30 days multiplied by the required copayment for each plan. Again, in two of the three multivariate models expected out-of-pocket costs showed a significant and negative relationship with drug plan choice. The consideration of out-of-pocket costs likely operates through the 'financial risk hypothesis' construct of the drug plan choice model.

Past research on health plan choice has shown mixed findings with respect to expected out-of-pocket costs and choice. For example, Juba, Shady, and Lave (1980) found no relationship between a family's expected monthly out-of-pocket costs under several plans and plan choice. Barringer and Mitchell (1994) however, found that deductibles were inversely and significantly related to health plan choices. The significant result here may have occurred (as opposed to the Juba et al. study) because prescription drugs may be easier for the consumer to think about and quantify than a number of different health care services would. An important implication of this finding is that firms who might market stand alone drug benefits will not be able to 'cost-shift' by lowering premiums (making this attribute more attractive) and simultaneously increasing copayments in order to attract customers.

Past research has shown that consumers prefer health plans with fewer physician restrictions (e.g. Gates et al. 2000; Mechanic, Ettel, and Davis, 1990). It was hypothesized that required use of a mail-order pharmacy (as opposed to the respondent's traditional source of prescription medications) would be viewed as a negative attribute by consumers. Both bivariate and multivariate analyses confirmed this hypothesis.

The size of this finding is notable. Table 11 shows that nearly 70% of respondents chose one of the two hypothetical plans (B or D) that would not have required the use of a mail-order pharmacy. This result might be explained by the results of a study conducted by Carroll and Fincham (1993). These authors found that elderly persons who typically patronized community pharmacies (and not mail-order pharmacies) worried that the use of a mail-order pharmacy might result in running out

of a necessary medication. Given that only 13.1 percent of the respondents in this study reported the use of mail-order pharmacies, this result is perhaps not surprising.

Finally, a drug plan's use of a formulary was posited to be associated with hypothetical drug plan choices. Following a similar rationale as that used for the required used of a mail-order pharmacy, the researcher hypothesized that the use of a formulary would be viewed negatively by consumers, and thus result in lower purchase intentions. The opposite result emerged, however. Both bivariate and multivariate analyses showed that the presence of a formulary was actually associated with higher purchase intentions.

This association may actually be due to a number of causes. First, it may be the case that respondents in this study actually viewed the presence of a formulary as a positive attribute. Respondents may have viewed the presence of a formulary positively because they saw it as a check on prescriber behavior. Respondents may believe that the formulary promotes the use of superior pharmaceutical therapies and discourages the use of inferior, less safe, drugs.

Second, it may also be the case that respondents in this study simply did not understand the concept of a drug formulary. It is possible that, despite the description provided, respondents simply disregarded this attribute when choosing. This may be the case for two reasons. First, approximately 55% of the respondents in this survey reported having no or indemnity drug insurance and thus, may not have been acquainted with drug formularies. Second, bivariate analyses show that the use of mail-order pharmacy seems to be much more important in choices (with nearly 70% of respondents choosing plans not requiring this feature) compared to the use of a drug formulary (with

only about 55% choosing plans with this feature) suggesting that this finding may be statistically, but not substantively, significant.

Finally, it may be the case that the fractional factorial method used to assign attribute levels to plans in this study caused some anomaly in the analyses that simply made formularies appear to be positively associated with choice. Thus, a design effect may be at work here. Therefore, the associations found may actually be artifactual.

**Research Question Number Two**

The second objective of this research was to better understand the relationships between individual characteristics and drug plan purchase intentions. A variety of individual characteristics was explored in relation to these intentions, including the respondent's health status as measured by the number of chronic conditions from which the respondent currently was suffering from. Two hypotheses were advanced with respect to the relationship between this variable and drug plan purchase intentions. Based on past empirical evidence, Hypothesis #8 stated that persons with greater numbers of chronic conditions would be more likely to choose one of the hypothetical plans with the $5 (instead of $10) copayments. A bivariate analysis supported this hypothesis (see Table 13). This finding is consistent with past empirical research (e.g. Berki et al., 1978) and with the predictions of the drug plan choice model (see Figure 2), operating through the 'Financial Risk' construct.

The second hypothesis (Hypothesis #11) advanced with respect to number of chronic conditions was that those respondents suffering from greater numbers of chronic conditions would prefer plans that were less restrictive. Both conditional logit

models estimated (see Tables 16 and 17) showed that consumers with greater numbers of chronic conditions expressed a preference for Plan D compared to both Plan A and Plan B, although no difference was found between Plans C and D. Given that Plan D was the least restrictive offering, it appears that Hypothesis #11 has at least some support. This finding can be seen as operating through the 'Attribute Preference – Delivery System Characteristic' path in the choice model, with the consumer's perceived lack of autonomy under a given plan leading to the choice of a plan that is less restrictive.

Perceived health status (rated on a five point scale) and limitations in ADLs were also explored as possible determinants of plan choice in this study, although no specific hypotheses were advanced concerning their relations. Persons who reported their health as 'fair or poor' expressed a preference for Plan D over Plan A in the first conditional logit model (see Table 16). The explanation for this may be similar to the finding that those with greater numbers of chronic conditions expressed a similar preference. Whether a respondent had any limitations in ADLs was not predictive of purchase intentions in any model. This finding held in both bivariate and multivariate analyses.

The respondent's degree of health concern also was explored as a possible determinant of drug plan choice. Berki and colleagues (1978) found that those with higher scores on this measure were more likely to enroll in a closed (as opposed to an open) panel HMO, presumably because of the greater emphasis on preventive care in closed HMOs. No relationship was found between level of health concern and purchase intention in either bivariate or multivariate analyses, lending support to Hypothesis #9.

Given that drug benefits are quite different than other health plan benefits with respect to this 'preventive' dimension of care it is perhaps not surprising that this variable was not related to drug plan choice purchase intentions.

Two attitudinal measures were also posited as predictors of health plan choice. The first was a scale measuring the respondent's attitudes toward the use of formal medical care (as opposed to home treatments). Hypothesis #10 stated that consumers with higher scores on this measure (indicating greater preferences for the use of formal medical care) would be more likely to choose drug plans with a $5 (as opposed to $10) copayment. This hypothesis was supported (see Table 17) in bivariate analyses, but not in multivariate analyses (see Tables 21 and 22). One explanation for this is that the preference for formal medical care is manifested through an individual's use of prescription medicines, a factor already accounted for in the multivariate analyses.

The respondent's degree of commitment to the pharmacist-patient relationship also was hypothesized as a predictor of drug plan purchase intentions. Specifically, Hypothesis #12 stated that persons with higher scores on the pharmacist-patient relationship commitment scale would be more likely to choose plans that did not require the use of a mail-order pharmacy (Plans B and D). This hypothesis was not supported in the bivariate analysis (see Table 19) and appears as a significant predictor only once; in the second conditional logit model (Table 22) where respondents with higher scores on this measure were less likely to choose Plan A compared to Plan D. This relationship is in the hypothesized direction (Plan A requires mail-order, Plan D does not).

This finding is of interest given that respondents expressed a general preference for drug plans that did not require mail-order pharmacy use. Given that scores on the

pharmacist-patient relationship scale were, in general, not predictive of these choices it would seem that some other factor underlies this preference for plans not requiring the use of mail-order plans. It could be, for example, that consumers value the freedom to have prescriptions dispensed at the pharmacy of their choosing, regardless of the relationship they have with their pharmacist. Another possible reason for this preference is that consumers view the use of mail-order pharmacy by a prescription drug plan as a sign of low quality in other dimensions. Future inquiry is necessary in this area.

A respondent's current use of mail-order pharmacy was found to be positively associated with his or her choice of a plan requiring mail-order use. This finding is of interest because in general, mail-order use was associated with lower purchase intentions. There are a number of reasons that could underlie this finding. For example, it might be that once one experiences mail-order pharmacy, it is actually a favorable experience and thus leads to one favoring plans that employ this mechanism. However, it may also be the case that those currently using mail-order pharmacy self-selected themselves into an actual plan that employs this mechanism for one or another reason, and thus this finding reflects these other reasons. This is an area for future study.

Household wealth, as measured by annual income and total assets, was also hypothesized to be associated with purchase intentions towards hypothetical drug plans. Specifically, Hypothesis #5 stated that individuals with higher incomes would show greater purchase intentions towards plans with higher premiums and Hypothesis #6 stated that individuals with greater financial assets would show greater purchase intentions towards plans with higher premiums.

The first conditional logit model (see Table 21) shows that persons reporting a household income of $35,000 or greater showed a preference for Plan D as opposed to Plan B. This model also showed that those reporting assets of $50,000 or more reported a preference for Plan D over Plan A. This pattern held in the second conditional logit model (see Table 19). This finding likely operates from the 'economic characteristics' box of the drug plan choice model to the 'drug insurance characteristics' box. These results show mixed support for Hypotheses #5 and #6. Given that the premiums for these plans are similar (all in the range of $41.50 to $47.00) it is surprising that the effect of income and assets is not more consistent in these analyses (i.e. significant in the comparison of Plans A, B, and C with Plan D). The reason for this finding is a matter for further investigation.

Three other individual characteristics were entered into the multivariate models. The first was education level, here divided into two levels (having a college degree or more and having less than a college degree). This variable shows the same association with drug plan choice in both conditional logit models (see Tables 17 and 18). Those with a college education or more prefer Plan D to both Plan A and Plan B. One could argue that much of the effect of education operates through income and assets, but given that these variables are controlled for, this reasoning does not seem satisfactory.

The association of plan choice with education level might also be explained by a human capital argument. Briefly, human capital theory holds that individuals evaluate the costs and benefits (both monetary and non-monetary) of higher education before undertaking it, deciding to go to college only if this investment might yield positive returns (e.g. Ehrenberg and Smith, 1997). The value of the non-monetary returns to

college education is likely to be influenced by the tastes and preferences for different types of work between those pursuing and not pursuing a college education. These preferences for different types of work are likely to extend to preferences for different types of healthcare investments. The type of drug benefit plan an individual chooses is one such investment.

Another possible reason for this finding is that those persons with more education have different kinds of jobs (than the less educated) throughout their working lives. Because they have different kinds of jobs (typically higher paying with more generous benefits), these persons may have experience with different kinds of health insurance. In turn, their experiences with health insurance may differentially influence their preferences in a choice task such as that present in this study.

Gender and marital status were explored as possibly being associated with drug plan choice. Neither of these variables was associated with choice in the first conditional logit model (see Table 17). In the second conditional logit model single males expressed a preference for Plan D over Plan C, while both single and married women expressed a preference for Plan D over Plan A. In the nested logit model (see Table 19) married women were more likely to choose plans not requiring the use of mail-order pharmacies. The researcher knows of no *a priori* theoretical or empirical reasons for these findings.

Finally, the study of individual characteristics in this study yields the insight that tastes and preferences for drug benefit plans among the elderly are not homogeneous. Although two plans (B and D) were chosen most often, all plans were chosen by a significant number of respondents. Thus, it seems unlikely that a 'one size fits all'

approach for a Medicare prescription drug benefit is likely to be as popular as an administrative approach allowing consumer choice. It would seem that in order to receive widespread acceptance a Medicare drug benefit must allow at least some choice to this program's beneficiaries.

**Research Question Number Three**

Research question #3 asked if a managed competition strategy could be a viable strategy for implementing a Medicare prescription drug benefit. In a managed competition scheme, consumers would be allowed free choice from among insurance products offered by private firms. These insurance products would be standardized with respect to benefits covered and the government subsidy deducted from each plan's premium would be based on that of the lowest cost plan, much as was done in this study.

One condition necessary for such a managed competition strategy to succeed is that consumers must be sensitive to prices when choosing among alternatives. Without such price sensitivity, there would be no incentive for plans in this market to be cost efficient, thus holding program costs to a minimum for the Federal government. In this study, the researcher found evidence that individuals are price sensitive with respect to both premiums and out-of-pocket costs. This suggests that consumers attempt to minimize total costs when choosing among these plans, providing a strong incentive for insurance firms to minimize costs in the design and administration of stand-alone drug benefits.

Other findings from this study are not as promising with respect to a free-choice market and Medicare prescription drug benefits. Bivariate results (see Table 12) show that respondents choosing Plan B used only 3.07 prescription drugs in the past 30 days while the overall average was 3.53 (see Table 4). Conversely, those choosing Plan D used 4.13 prescriptions in the past 30 days. A similar pattern held for the value of these prescriptions ($106.26 for those choosing Plan B vs. $129.54 overall; $160.20 for those choosing Plan D). Multivariate results show that respondents with higher numbers of chronic diseases were more likely to choose Plan D relative to both Plan A and Plan B. Together, these results show that there may be significant potential for both adverse and favorable selection in managed competition markets for stand alone drug benefit plan markets.

Problems similar to these are discussed by Yegian et al. (2000) in their evaluation of the Health Insurance Plan of California (HIPC). In the HIPC PPOs eventually exited the market due to adverse selection. In the hypothetical situation presented in this study Plan D (with its lack of administrative restrictions) may well be analogous to the PPOs (which typically had less restriction on providers) in the HIPC. However, Yegian and colleagues also report that after the exit of the PPOs, selection problems were minimized and those that occurred were remedied by premium cross-subsidization among plans. Thus, it seems likely that if a choice-driven market is introduced as an administrative mechanism for a Medicare prescription drug benefit some 'weeding out' of plans may be necessary before such a market runs efficiently.

Still, it is intriguing that more high risk respondents chose Plan D despite the fact that its premium was significantly higher that those of the other plans. Elderly

consumers who understand they are relatively high utilizers may be willing to pay for less restrictive drug coverage, even when given a choice of plans with lower premiums. This finding has implications for the success of these less restrictive plans; for example, the market itself may take care of cross-subsidization by allowing such plans to obtain an economic "rent" from this group of consumers.

**Implications for Future Research**

Several of the results obtained in the current study may be worthy of further investigation by policy analysts, health services researchers, and health economists. In the current study, a simple hypothetical choice task was used in an attempt to understand what might occur under one scenario of drug benefit choice. The results obtained appear to be plausible, suggesting that such a method may be useful for the *a priori* evaluation of other policies. This method has the advantages of being inexpensive, flexible with respect to the hypothetical scenarios presented, and (if a technique such as mail-survey is used as the data collection method), able to collect a great deal of data on the individual themselves so that the types of persons giving certain answers can be identified. To the researcher's knowledge, only one other study (LaTour et al., 1986) has used a similar method in an *a priori* evaluation of health plan choice.

Although survey research has the advantage of allowing the researcher to collect a great deal of information with relatively small cost there may be some question concerning the validity of this data. Given that this survey asked respondents to list the names, strengths, and quantities of medications they were currently using as well as to

identify all chronic conditions they were currently suffering from, a future research project might concern some verification of these self-reports.

In the current study, the researcher found that 'use of a formulary' had an unexpected, positive association with drug plan purchase intentions. One reason advanced for this finding was that respondents did not understand what a drug formulary was or the implications of such a mechanism. One potentially fruitful research program might be to explore what the elderly understand about prescription drug benefits and what factors are associated with that knowledge. Cafferata (1984) conducted such a study of the elderly and knowledge of their overall health benefits, finding that the very old and non-white persons were least likely to have an adequate understanding of their health benefits.

This type of research could have other important implications for the functioning of such markets. One assumption necessary for the efficient functioning of a market is that of perfect (or at least adequate) information among its participants. However, recent research on Medicare beneficiaries and their understanding of health plan workings suggests that this may not be the case (Hibbard, Jewett, Engelmann, and Tusler, 1998).

An association was found between having a college education or more and choosing (on average) the least restrictive drug plan. This association persisted when controlling for the effects of income and assets. It was hypothesized that these two groups were likely to have worked different kinds of jobs that allowed differential access to health benefits during their working lives, and that in turn, these experiences led to different purchase intentions. This hypothesis should be explored further, because

it has implications for equity in access to these benefits. It may be the case that certain groups of older adults might require different and/or more education about drug benefits if such a choice-based system is put in place.

In the current study, one specification of the nested logit model was rejected because it did not fit the data. However, it should be kept in mind that given enough searching, one may have been able to find a model with acceptable fit indices. This area requires more investigation. The research program alluded to previously (gaining a better understanding of drug insurance by the elderly) likely would help analysts to proceed from a more theoretically grounded perspective in this endeavor.

The current study provided only a snapshot of what might occur when four drug plans with various combinations of cost-control mechanisms begin to offer benefits. Future research could use the data obtained in this study to better understand which plans would be likely to make (or lose) money. It should also be kept in mind that these markets are likely to be dynamic in nature with plans entering and exiting the market, and existing plans changing as necessary. This is also an area for future study.

**Limitations**

As with all research, the results of this study must be interpreted in light of its limitations. The first of these that should be kept in mind is that the study was conducted in only one state (Wisconsin). Persons living in Wisconsin might conceivably differ in ways that could be material to the results of the current study. For example, if the use of prescription drugs was more (or less) common in a given region, consumers should consider this when making decisions about which hypothetical drug

plan to choose. This regional difference could impact the size and statistical significance of the coefficients relating both premium and expected out-of-pocket expenses to choice. There might also be regional differences with respect to exposure to managed care prescription drug benefits and associated cost-control mechanisms. This differential exposure and knowledge of these mechanisms might conceivably impact preferences. However, as previously noted, the emphasis in the current presidential administration on state autonomy in the administration of these benefits makes state-level data of this type of particular interest.

The overall response rate to the survey analyzed in the current study was 59.0%, with only 53.4% (see Table 1) providing surveys complete enough for analysis. It is unknown whether non-respondents differed from those with complete surveys in important ways. These individuals were compared on a few variables for which data were available from the state of Wisconsin and few (but important) differences were found. An analysis of the first versus last 20% of respondents was also conducted showing no differences; however this technique assumes that the last 20% of respondents are similar to non-respondents and thus, is limited.

There are many other attributes, both measured and unmeasured, that might differ between these groups and potentially impact the results of this study. For example, Grotzinger, Stuart, and Ahern (1994) found that, among the Pennsylvania elderly, those not responding to a survey concerning prescription use were more likely to be more ill than those responding. It is also possible that attitudes towards medical care (and perhaps pharmacists specifically) differ among respondents and non-respondents.

Four attributes of prescription drug plans were examined as possible determinants of hypothetical drug plan purchase intentions. Many other conceivable attributes could be studied for their possible associations with purchase intentions. These might include closed vs. open pharmacy networks and various coinsurance proportions.

The manner in which the hypothetical prescription drug plans were designed (i.e. making premium a function of other plan attributes) did not allow all attributes to enter the multivariate analyses simultaneously. Thus, it was impossible to evaluate the impact of each attribute on choice controlling for that of each of the others. This problem occurred because the researcher was not familiar with the interaction between the plan design method and the conditional logit statistical models that might occur.

A limited set of individual-level characteristics were studied as possible determinants of hypothetical drug plan purchase intentions. Although the researcher used theory and past empirical research to guide the selection of which characteristics on which to collect data, it is doubtless that there are other characteristics that are relevant in the study of these choices. However, the use of theory and past empirical research helped avoid random selection of variables.

In this study participants were asked to use attribute definitions provided by the researcher and imagine a 'what would you do if you had to' situation. A great deal of attention was paid to designing drug plans with realistic features and prices. In general, results seem to accord with those from analogous studies. What is unknown is if these same results would obtain in a 'real world' situation. This matter must wait for data of this kind to become available.

**Conclusions**

The goals of this study were to better understand how prescription drug plan attributes and individual characteristics are associated with purchase intentions for stand-alone drug benefit plans and to assess the feasibility of a managed competition strategy for administering a Medicare prescription drug benefit. The study was conducted using a mailed survey and a hypothetical choice task among community dwelling older adults living in Wisconsin. The results show that older adults in Wisconsin are quite price sensitive and that qualitative attributes of drug plans (e.g. required use of mail-order pharmacy) are important in their evaluations of these plans.

The results also suggest that individual characteristics are important in factors in purchase intentions towards plans with given combinations of attributes. Health status measures, income and assets, educational attainment, and experience with drug plan features were predictive of plan choices in both bivariate and multivariate analyses. Heterogeneity in preferences for drug plan features suggests that a consumer choice model for the administration of a Medicare prescription drug plan is likely to better promote consumer welfare relative to a regulated monopoly approach.

The price-sensitivity in this group bodes well for the implementation of a managed competition framework for a Medicare prescription drug benefit although adverse selection may be problematic for plans using few cost-control mechanisms. Future research is needed to assess the associations among purchase intentions, plan attributes and individual characteristics not examined in this study.

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# APPENDIX A

## Sample Size Calculations

Method 1

An important descriptive statistic to be gained from this research is the proportion of respondents choosing each drug plan. Using the following formula for estimating a proportion in a population provided in Churchill (1995) a sample size of 1050 respondents was estimated:

$$n = (z^2/H^2)\,(p(1-p))$$

Where:

n = sample size to be determined

z = Desired confidence level (in this case 2 for 95%)

H = Desired level of absolute precision (0.03 in this case)

p = estimated proportion in the population (0.50 in this case)

This estimate is based upon the projected size of the over-65 population in the state of Wisconsin for the year 2000 (690,000). This estimate assumes maximum variability in the proportions (i.e. at least one is 0.50). This sample size provides a confidence level of 95% and a 3% margin of error.

Data analyses will include testing the bivariate relationships between all individual level variables and drug plan choice. The specific procedures will include the one-way analysis of variance (ANOVA) for all variables assumed to be measured at the interval level. Sample sizes for this procedure were computed using the following parameters: there are four drug plans to choose from, the Type I error rate is set at 0.05, and the Type II error rate is set at 0.20 (power equal to 0.80).

In order to obtain likely values for the mean and standard deviation of the population age an article by Dowd et al. (1994) was consulted. Using age as a representative interval level variable, sample size formulae provided by Glantz (1992) suggest that in order to detect differences in age as small as three years among the groups choosing each plan, each of the four cells will require a minimum of 132 respondents, for a total of 528 respondents. Unless the distribution of respondents among the four drug plans is highly skewed, the sample size necessary to estimate accurately the proportion choosing each plan should be adequate to cover this requirement.

Finally, consideration was given to the sample size necessary to estimate the multinomial conditional logit model proposed for multivariate analyses. Long (1997) suggests that a minimum of 500 observations are necessary for maximum likelihood estimates to be reliable. Long (1997) further suggests adding a minimum of 10 observations for each parameter to be estimated. Again, the 1050 respondents previously estimated should be adequate to satisfy this criterion.

# APPENDIX B

## Pre-Notification Letter for Survey

(LETTERHEAD)

Dear Sir or Madam,

A few days from now you will receive in the mail a request to fill out a questionnaire for an important research project being conducted by the School of Pharmacy at the University of Wisconsin-Madison.

It concerns prescription drug insurance and medication use among people age 65 and over, and their opinions about the features of drug insurance plans.

We are writing to you in advance because we have found many people like to know ahead of time that they will be contacted. This study is an important one that may help government agencies and insurance companies design drug insurance plans that are better suited to people age 65 and over.

Your name has been selected at random and your participation in this research study is completely voluntary. Your responses will be completely anonymous and no one will know whether you chose to participate or not.

Thank you for your time and consideration. It's only with the generous help of people like you that our research can be successful.

Sincerely,

Richard R. Cline, M.S., R.Ph.
Doctoral Candidate

David A. Mott, Ph.D., R.Ph.
Assistant Professor

P.S. We will be enclosing a small token of appreciation with the questionnaire as a way of saying thanks.

# APPENDIX C

## Cover Letter for Survey

(LETTERHEAD)

January 2001

Dear Sir or Madam,

You are invited to participate in a research study on prescription drugs and insurance for prescription drugs among those 65 and older living in Wisconsin. The purposes of this study are to 1) find out what kinds of drug insurance people have, 2) find out the most common kinds of medicines older adults use, and 3) find out what kinds of people might choose different kinds of drug insurance plans if given a choice. Approximately 2100 people are invited to participate in this study.

As you may know, there is currently a great deal of debate about adding prescription drug coverage to the Medicare program. However, little is known about the features of drug insurance plans that people over 65 like or dislike or the kinds of people that might choose different kinds of drug plans that might be available in the future. **Even if you are not covered by the Medicare program and/or do not use any prescription drugs, your responses will help us greatly. Although there is no direct benefit to you from participating in this study, we hope that the results will be used to improve access to prescription drugs, and this may help consumers in the future.**

We would appreciate it if you would take 25 to 30 minutes to complete the enclosed survey and return it to us in the postage paid return envelope. Your name was selected at random for the study and your participation is voluntary. There should be no physical risks or discomforts related to being in the study. The only inconvenience to you is the time that it will take to complete the survey. You may skip any questions that you do not feel comfortable answering. A $1 bill is included as a small token of our appreciation for your help.

Please do not place your name or address anywhere on the survey. Your name will not be connected with your responses to the survey in any way and no one will be able to tell whether you participated in this study or what your responses were. If you decide not to participate, you will not lose any benefits to which you are entitled. Your insurance coverage will not be affected and your doctor will still take care of you.

Thank you very much for your time and help! Your cooperation is valued and greatly appreciated. If you have comments or questions about this survey, please call us at (608) 265-9268.

Sincerely,

Richard R. Cline, M.S., R.Ph.
Doctoral Student
Division of Social and
Administrative Sciences

David A. Mott, Ph.D., R.Ph.
Assistant Professor
Division of Social and
Administrative Sciences

P.S. **The $1 bill is yours to keep!**

# APPENDIX D

## Survey Instrument

# Survey on Prescription Drug Insurance Plans and Use Among Older Adults in Wisconsin

You can help us learn about how persons over the age of 65 who use different kinds of prescription drugs and have different kinds of insurance feel about several features of potential Medicare prescription drug plans. **We are interested in responses both from people currently enrolled in the Medicare program as well as people who have other types of health insurance. Your thoughts and opinions are important to us whether you use prescription drugs or not.**

All responses are very important to us!!

Answering these questions will take 20 to 30 minutes. To preserve the anonymity of your responses, please do not write your name anywhere on the form or put your address on the return envelope. If you wish, you can give us additional comments in the space provided at the end of the form. Again, these comments should not include your name, address, or any other information that would identify you.

Before most people get a prescription drug they have to see a doctor. Because of this we would like to know a little about how often you see your doctor and how you pay for doctor visits.

**Part A: Medical Care Use and Insurance**

1. Is there an insurance plan or other program that pays for your doctor visits?

   _____ yes, All of my doctor visit costs are paid for
   _____ yes, Part of my doctor visit costs are paid for
   _____ no
   _____ don't know

2. Are you enrolled in Medicare?

   _____ yes, Part A only (**answer question 3**)
   _____ yes, Parts A and B (**answer question 3**)
   _____ no (**please skip to question 4**)

3. Do you have a supplemental Medicare insurance (i.e. Medigap) plan?

   _____ yes
   _____ no
   _____ don't know

4. Is there a particular medical person or clinic you usually go to when you are sick or when you need advice about your health?

   _____ yes
   _____ no
   _____ don't know

5. Do you belong to a health maintenance organization (HMO)?

   _____ yes
   _____ no
   _____ don't know

6. How many times did you visit a doctor in the last 30 days?

_____

7. About how many days did you spend in a hospital for any reason in 2000?

_____days

**The following statements concern your beliefs and attitudes about health care. Please use the following scale to rate the following statements.**

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

8. For most health problems, I would rather treat myself than go to the doctor. _____

9. For most health problems, I prefer to avoid taking prescription drugs. _____

10. I usually like to talk to a doctor when I have a health problem. _____

11. I know my health better than most doctors do. _____

12. For most health problems, I wait and see if I get better on my own before taking a prescription drug. _____

13. When I have a health problem, I often prefer to use home remedies instead of prescription drugs. _____

14. When I have a health problem, I usually contact a doctor right away. _____

15. I prefer to treat most health problems without help from doctors or

prescription drugs. _____

## Part B: Prescription Drug Use and Insurance

We would like to know about the kinds of prescription drugs you currently use and the way you pay for them. Please mark the appropriate response or write in your answer to each question.

16. Is there a private insurance plan or other program that pays for your prescription drugs?

_____ yes, **All** of my prescription drug costs are paid for.
_____ yes, **Part** of my prescription drug costs are paid for.
_____ no (**skip to question 19**)
_____ don't know

17. What is the source of your prescription drug insurance? (If you have more than one source of prescription drug insurance check **ALL** that apply.)

_____ my employer, my spouse's employer, or a former employer
_____ Medicaid (medical assistance)
_____ Veteran's Administration
_____ part of my supplemental Medicare (Medigap) policy
_____ I belong to a Medicare HMO and they cover prescription drugs
_____ other (please describe)
_____

18. Which of the following statements best describes the way you pay for your prescription drugs?

_____ I pay nothing ($0) for each prescription I get

_____ I pay a fixed dollar amount for each prescription I get (for example, $5 for generic drugs and $8 for brand name drugs)

_____ I pay a percentage of the full cost for each prescription I get (for example, 10% of the cost for generic drugs and 20% of the cost for brand name drugs)

_____ I pay the full cost for each prescription I get and then send the receipt(s) to the insurance company to get reimbursed

19. How many different prescription drugs did you use in the last 30 days?

_____

20. How much did you spend on prescription drugs in the last 30 days?

$_____

**The following statements concern the pharmacy and pharmacists from which you obtain prescription drugs. Please use the following scale to rate the following statements.**

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

21. It is important to me to take my prescription to the same pharmacist or group of pharmacists whenever I need a prescription filled. ____

22. If I had a general health related question that did not require me to obtain a prescription, I would still rely on my pharmacist for advice related to these matters.

____

23. I plan to use my current pharmacist to meet my prescription needs in the future.

____

24. What types of pharmacies do you get prescription drugs from? (Check **ALL** that apply)

_____ chain pharmacy (for example Walgreens, Shopko, K-mart, Wal-Mart, Osco)
_____ independent pharmacy (pharmacy that is locally owned)
_____ clinic pharmacy (pharmacy that is inside a medical clinic)
_____ mail order pharmacy
_____ other (please describe) _____

We would like to find out if people who use different types of drugs have different opinions about what's important in a prescription drug plan.

Please list the drug name and strength, the directions for use, and about how many you used for each prescription drug you took in the last 30 days (you may need to look at your prescription vials to get some of this information).

**OR**

If it would be easier, you can get this information from your pharmacy. To do this: 1) ask your pharmacy to print out a report of the prescriptions you purchased in the last 3 months – we need 3 months because all of the prescription drugs you used in the last month may not have been purchased in the last month, 2) remove your name from the report, and 3) mail the report back with the survey. Most pharmacies print out this report for you free of charge.

| **Drug Name and Strength** | **Directions (how you took it)** | **Quantity used in last 30 days** |
|---|---|---|
| **Example**: Zocor 20mg | 1 tablet each evening | 30 |
| **Example**: Albuterol Inhaler | 2 puffs every four hours | 1 |
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## Part C: Choosing Prescription Drug Insurance Plans

We would like to know a little about the features of prescription drug insurance plans that you think are important. Please read the descriptions below before answering the questions.

Recently, there has been a great deal of talk about whether the Medicare program should cover prescription drugs and if so, how that coverage should be designed. Under some proposals, you would be able to pick a single plan from those available in the area of the country in which you live. Although all the plans would help pay for your prescription drugs, the specific features of each plan would probably be a little different. The terms used to describe these features are confusing to many people, so we've defined some of them for you here.

A **Drug Formulary** is a limited list of drugs that the insurance plan will pay for. If a drug is not listed on the drug formulary, the insurance plan will not pay for it. If a drug you are taking right now is not on this list, your doctor would have to change your prescription to another similar drug that is on the list.

A **Mail Order Pharmacy** plan means that for prescriptions you use on a regular basis (for example, a medicine for your blood pressure) you would receive these medications through the mail from a pharmacy located outside your town. If you needed a prescription immediately (like an antibiotic or a pain medicine) you would still be able to get these from your usual pharmacy.

A **Copayment** is the amount you have to pay for each prescription you get at the pharmacy. So, for example, if you use three prescriptions each month and the copayment for your plan is $5.00, you would spend $15.00 each month on your prescriptions.

The **Monthly Premium** is the amount you pay each month to belong to a drug insurance plan. You pay this amount whether you get any prescriptions or not, the same way you have to pay for your car or homeowners insurance.

Now we would like you to pretend for a moment that the Medicare program offers you a choice of several prescription drug plans. Also, imagine that you don't have any prescription drug insurance, <u>even if you do</u>. Finally, imagine that you <u>have to</u> pick a

drug plan; going without any drug plan is not an option. Keep in mind that the drug plan you pick would be for you only and not your spouse or other family members; they would be allowed to pick their own plan.

Please look at the following drug plan descriptions and then decide which one you would most likely choose in this situation. **Remember**: you must choose 1 plan.

| PLAN | Does the plan use a drug formulary? | Does the plan require me to use a mail-order pharmacy? | How much is the copayment amount? | How much is the monthly premium? |
|---|---|---|---|---|
| PLAN "A" | Yes | Yes | $5.00 | $45.00 |
| PLAN "B" | Yes | No | $10.00 | $41.50 |
| PLAN "C" | No | Yes | $10.00 | $47.00 |
| PLAN "D" | No | No | $5.00 | $60.00 |

25. After reading the descriptions above, which plan would you most likely choose?

Plan "A" _____
Plan "B" _____
Plan "C" _____
Plan "D" _____

**We would also like to know how you feel about <u>each</u> of the plans described above. Please use the following scale to rate how likely you would be to choose each of the plans described above.**

| Not Likely to Choose At All | Not Very Likely to Choose | 50 –50 Chance of Choosing | Somewhat Likely to Choose | Very Likely to Choose |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

Plan "A" _____
Plan "B" _____
Plan "C" _____
Plan "D" _____

26. Think for a minute about your current drug insurance situation. If you <u>did not</u> have to select one of the plans listed before (that is, you could keep the same drug plan you have now) about how likely do you think you would be to purchase the plan you selected in Question #25?

____ Very likely
____ Somewhat likely
____ Not very likely
____ Not likely at all

**Part D: Information About Your Health**

In order to understand how opinions differ among people with different types of health problems, we would like to know a little about your current health.

31. In general, would you say your physical health is excellent, very good, good, fair, or poor?

_____ Excellent
_____ Very Good
_____ Good
_____ Fair
_____ Poor

32. Please check any of the following medical conditions that a doctor has ever told you that you have.

_____ Angina (chest pain)
_____ Arthritis (not rheumatoid)
_____ Asthma or emphysema
_____ Cancer
_____ Broken hip
_____ Chronic obstructive pulmonary disease (COPD)
_____ Coronary heart disease
_____ Congestive heart failure
_____ Dementia
_____ Depression
_____ Fragile or soft bones (osteoporosis)
_____ Hardening of the arteries (arteriosclerosis)
_____ Heart attack
_____ High blood pressure
_____ High blood sugar (diabetes)
_____ High cholesterol
_____ Parkinson's disease
_____ Problems with your heart rhythm
_____ Rheumatoid arthritis
_____ Skin problems (psoriasis or other)
_____ Stroke or brain hemorrhage
_____ Other health problem

33. Please check any of the following activities that you currently have trouble doing without special equipment and/or help from someone else.

_____ Bathing or showering
_____ Dressing
_____ Eating
_____ Getting in or out of bed or chairs
_____ Walking
_____ Using the toilet

**The following statements describe your concern about your health. Please rate the statements below using the following scale:**

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

34. I think about my current health a great deal. _____

35. I think about my future health a great deal. _____

36. I am satisfied with my ability to count on good health. _____

## Part E: Information About Yourself

Finally, we would like to ask some questions about you to help us analyze the results of this survey.

37. What is your age?

_____ years

38. What is your gender?

_____ female
_____ male

39. What is your level of education? (Please check the highest level that you completed)

_____ elementary school or some high school
_____ graduated high school
_____ some post high school education
_____ graduated 4-year college
_____ Masters, Ph.D., or professional degree

40. What is your zip code?

_____

41. Are you currently employed?

_____ No, I'm retired or otherwise not working
_____ Yes, I work 1 to 14 hours per week.
_____ Yes, I work 15 to 34 hours a week
_____ Yes, I work 35 or more hours each week

42. How do you describe yourself?

_____ White/Caucasian
_____ Hispanic/Latino
_____ Black/African-American
_____ Asian
_____ American Indian/Native American
_____ Other (please describe) _____

43. What was your approximate annual household income, before taxes in 1999?

_____ less than $10,000
_____ $10,000 to $14,999
_____ $15,000 to $24,999
_____ $25,000 to $34,999
_____ $35,000 to $49,999
_____ $50,000 to $64,999
_____ $65,000 to $79,999
_____ $80,000 or more

44. Think about all the things you (or you and your spouse) own besides your home. These things might include a farm or business, any vehicles, bank accounts, IRAs or Keogh accounts, CDs, mutual funds, stocks and bonds, and other properties. If you added up what all these things are worth and then subtracted out the amount you owe for bills, loans, and other debts, about how much money do you think would be left?

_____ Less than $15,000
_____ $15,001 to $30,000
_____ $30,001 to $50,000
_____ $50,001 to $100,000
_____ More than $100,000

45. Are you currently:

_____ Married
_____ Widowed
_____ Divorced
_____ Separated
_____ Never Married

46. How many people (including yourself) regularly live in your household?

_____ people regularly live in my household

47. Which of the following statements best describes how you filled out this survey?

_____ I filled this survey out by myself, with no help from anyone else
_____ I filled this survey out with help from somebody else (for example, a spouse, other relative, or a friend)

We welcome any comments about Medicare, prescription drugs, drug coverage, or the

**THANK YOU VERY MUCH FOR YOUR HELP!**

Please fold the survey and return it in the enclosed postage paid envelope. Do not put your name or address anywhere on the survey or the envelope.

# APPENDIX E

## Follow-up Postcard used after Survey

Dear Sir or Madam:

A few days ago you should have received a survey from us concerning prescription drug insurance plans and medication use. If you have already completed the survey and returned it, **Thank You Very Much!** If you haven't completed the survey yet, we would very much appreciate it if you would take the time to do so now. If you did not receive a survey or have misplaced the first one, please call us at (608) 265-9537 and we will be happy to send you another.

Please remember that your participation is completely voluntary and that all responses you provide are completely anonymous. We look forward to receiving your completed survey.

Sincerely,

Richard R. Cline, M.S., R.Ph. David A. Mott, Ph.D., R.Ph.

# APPENDIX F

## Sample Calculations for Drug Plan Premium Pricing

Step 1

In order to calculate the appropriate premium for each prescription drug plan, we begin by assuming that each insurer prices their plans believing that they will attract the 'average' consumer (i.e. they do not expect favorable or adverse selection). Thus, each insurer estimates average drug expenditures for each person at $1200 per year (Families, USA, 2000). Second, it is assumed that insurers will attempt to compete on price, so that cost savings are passed on to consumers (at least in part).

Step 2

Next, each insurer adjusts the $1200 figure by the expected cost savings gained from the use of any control mechanism (i.e. formulary, mail-order pharmacy, copayment level). Based on work by Motheral & Henderson (1999) we estimate that a drug formulary saves the plan 10%. No studies known to us have estimated the savings from using a mail-order pharmacy, so this figure is set arbitrarily at 4%. These figures seem congruent with results from Grabowski & Mullins (1997). Both of these amounts are subtracted from the amount of expected expenditures.

Step 3

Next, each insurer further adjusts the $1200 figure by considering the copayment amount to be charged and the average number of prescriptions to be used by each insured. Poisal et al. (1999) estimated that the average Medicare beneficiary used 18.5 prescriptions per year. Motheral & Henderson (1999) found that the use of a formulary decreased the number of prescriptions used in a nine-month period by approximately

one. The insurer then multiplies the expected number of prescriptions in a year by the copayment amount and subtracts this product from the net amount remaining after savings from control mechanisms.

Step 4

The insurer then considers their required rate of return and uses a multiplicative loading to calculate the amount in excess of actuarial value that must be added to the cost of the policy. It is assumed that the market is competitive so that all firms charge approximately the same loading. This loading is arbitrarily set equivalent to 10% of the actuarial value of the plan.

Step 5

In keeping with our managed competition framework we assume that HCFA pays 50 percent of the premium of the lowest cost plan for each beneficiary. In the plan set offered in this study, Plan "B" has the lowest premium at $995.50 per year. One-half of this amount ($497.75) is then subtracted from each plan's premium and the resulting amount is divided by 12 to arrive at the appropriate monthly premium.

# APPENDIX G

## Equations Used for Stochastic Regression Imputation Method in Replacing Data

REGRESSION EQUATION #1

The Prediction of Variable Income
(N = 997)

| Variable | Raw Score Coefficient | Standardized Coefficient | T-Score |
|---|---|---|---|
| Constant | 1.93 | | 2.68* |
| Has Medicare Supplement | 0.30 | 0.07 | 2.74* |
| Has Rx Drug Ins. | 0.24 | 0.07 | 2.47* |
| Chose Plan B[a] | -0.01 | -0.004 | 0.10 |
| Chose Plan C | 0.02 | 0.003 | 0.11 |
| Chose Plan D | 0.24 | 0.07 | 1.83 |
| Health Status | 0.20 | 0.11 | 3.41* |
| Graduated High[b] School but Not College | 0.82 | 0.23 | 6.94* |
| Graduated College or More | 2.36 | 0.50 | 14.89* |
| Number of Prescription Drugs Used in Past 30 Days | 0.01 | 0.02 | 0.67 |
| Number of ADLs | -0.07 | -0.04 | 1.22 |
| Age | -0.02 | -0.05 | 1.76 |
| Gender | 0.14 | 0.04 | 1.41 |
| Currently Married[c] | 1.14 | 0.32 | 11.09* |

$F = 39.12,\ p < 0.05$ Adj. $R^2 = 0.36$

* = $p < 0.05$

a = Reference category is 'Chose Plan A'

b = Reference category is 'Did not finish high school'

c = Reference category is 'Widowed, divorced, or never married'

REGRESSION EQUATION #2

The Prediction of Variable Assets
(N = 877)

| Variable | Raw Score Coefficient | Standardized Coefficient | T-Score |
|---|---|---|---|
| Constant | 1.19 | | 4.89* |
| Chose Plan B[a] | 0.11 | 0.03 | 0.80 |
| Chose Plan C | 0.34 | 0.07 | 1.91 |
| Chose Plan D | 0.29 | 0.09 | 2.13* |
| Health Status | 0.14 | 0.08 | 2.68* |
| Graduated High[b] School but Not College | 0.74 | 0.22 | 5.90* |
| Graduated College or More | 1.54 | 0.36 | 9.22 |
| Gender | 0.37 | 0.12 | 3.60* |
| Currently Married[c] | 0.77 | 0.23 | 7.29* |

$F = 22.83$, $p < 0.05$ Adj. $R^2 = 0.20$

* = $p < 0.05$

a = Reference category is 'Chose Plan A'

b = Reference category is 'Did not finish high school'

c = Reference category is 'Widowed, divorced, or never married'

REGRESSION EQUATION #3

The Prediction of Variable Health Concern-Total Score
(N = 975)

| Variable | Raw Score Coefficient | Standardized Coefficient | T-Score |
|---|---|---|---|
| Constant | 8.01 | | 24.2* |
| Has Medicare Supplement | 0.19 | 0.04 | 1.36* |
| Has Rx Drug Ins. | 0.24 | 0.06 | 1.97* |
| Chose Plan B[a] | -0.01 | -0.002 | 0.04 |
| Chose Plan C | 0.06 | 0.01 | 0.29 |
| Chose Plan D | -0.10 | -0.03 | 0.60 |
| Health Status | -0.50 | -0.24 | 6.94* |
| Graduated High School but Not College[b] | 0.12 | 0.03 | 0.76 |
| Graduated College or More | -0.29 | -0.06 | 1.41 |
| Number of Prescription Drugs Used in Past 30 Days | 0.02 | 0.02 | 0.63 |

$F = 12.00$, $p < 0.05$ Adj. $R^2 = 0.10$

* = $p < 0.05$

a = Reference category is 'Chose Plan A'

b = Reference category is 'Did not finish high school'

REGRESSION EQUATION #4

The Prediction of Variable Pharmacist-Commitment Total Score
(N = 1022)

| Variable | Raw Score Coefficient | Standardized Coefficient | T-Score |
|---|---|---|---|
| Constant | 12.91 | | 13.47* |
| Gender | -0.39 | -0.09 | 2.82* |
| Has Rx Drug Ins. | 0.19 | 0.04 | 1.36 |
| Belongs to an HMO | 0.23 | 0.04 | 1.29 |
| Physician Visits in Past 30 Days | 0.07 | 0.05 | 1.43 |
| Chose Plan B[a] | 0.02 | 0.004 | 0.09 |
| Chose Plan C | 0.14 | 0.02 | 0.54 |
| Chose Plan D | 0.23 | 0.05 | 1.18 |
| Number of ADLs | 0.09 | 0.04 | 1.04 |
| Graduated High School but Not College[b] | -0.05 | -0.01 | 0.27 |
| Graduated College or More | -0.33 | -0.06 | 0.27 |
| Number of Prescription Drugs Used in Past 30 Days | 0.11 | 0.14 | 4.11 |

$F = 4.33$, $p < 0.05$ Adj. $R^2 = 0.04$

* = $p < 0.05$

a = Reference category is 'Chose Plan A'

b = Reference category is 'Did not finish high school'

REGRESSION EQUATION #5

The Prediction of Variable Medical Care Preferences Total Score
(N = 1026)

| Variable | Raw Score Coefficient | Standardized Coefficient | T-Score |
|---|---|---|---|
| Constant | 15.03 | | 5.71* |
| Gender | 1.11 | 0.10 | 3.33* |
| Currently Works | -1.17 | -0.07 | 2.39* |
| Has a Regular Source of Medical Care | 2.22 | 0.08 | 2.73* |
| Chose Plan B[a] | -0.83 | -0.07 | 1.73 |
| Chose Plan C | 0.42 | 0.02 | 0.67 |
| Chose Plan D | -0.31 | -0.03 | 0.65 |
| Number of ADLs | -0.53 | -0.08 | 2.58* |
| Age | 0.06 | 0.07 | 2.13* |
| Health Status | -0.41 | -0.07 | 1.93 |
| Number of Prescription Drugs Used in Past 30 Days | 0.57 | 0.28 | 8.28* |

$F = 16.62$, $p < 0.05$ Adj. $R^2 = 0.13$

* = $p < 0.05$

a = Reference category is 'Chose Plan A'

DISTRIBUTIONS AND VALUES OF MISSING VARIABLES BEFORE IMPUTATION

| Variable (N) | N (%) | Mean (SD) |
|---|---|---|
| Medical Care Preferences Score | | 21.35 (3.79) |
| Pharmacist Relationship Score | | 11.96 (2.18) |
| Health Concern Score | | 6.98 (1.91) |
| *Assets* | | |
| < $15,000 | 180 (20.3) | |
| $15,001 to $30,000 | 125 (14.1) | |
| $30,001 to $50,000 | 93 (10.5) | |
| $50,001 to $100,000 | 147 (16.6) | |
| > $100,000 | 343 (38.6) | |
| *Income* | | |
| < $10,000 | 103 (10.8) | |
| $10,000 to $14,999 | 157 (16.5) | |
| $15,000 to $24,999 | 253 (26.5) | |
| $25,000 to $34,999 | 182 (19.1) | |
| $35,000 to $49,999 | 140 (14.7) | |
| $50,000 to $64,999 | 60 (6.3) | |
| $65,000 to $79,999 | 19 (2.0) | |
| $80,000 or more | 39 (4.1) | |

# APPENDIX H

## Complete Distributions for Categorical Variables Collapsed

TABLE #1
Health Status Distribution
(N = 1086)

| Self-Rated Health Status | N | Percent |
|---|---|---|
| Poor | 53 | 4.9 |
| Fair | 249 | 22.9 |
| Good | 467 | 43.0 |
| Very Good | 259 | 23.8 |
| Excellent | 5.3 | 5.3 |

TABLE #2
Education Level Distribution
(N= 1086)

| Education Level | N | Percent |
|---|---|---|
| Elementary or Some High School | 224 | 20.6 |
| High School Diploma | 429 | 39.5 |
| Some Post-High School Education | 270 | 24.9 |
| College Graduate | 103 | 9.5 |
| Advanced Degree | 60 | 5.5 |

TABLE #3
(N = 1086)

Income Distribution

| Income Level | N | Percent |
|---|---|---|
| Less than $10,000 | 124 | 11.4 |
| $10,000 to $14,999 | 184 | 16.9 |
| $15,000 to $24,999 | 288 | 26.5 |
| $25,000 to $34,999 | 211 | 19.4 |
| $35,000 to $49,999 | 154 | 14.2 |
| $50,000 to $64,999 | 63 | 5.8 |
| $65,000 to $79,999 | 21 | 1.9 |
| $80,000 or more | 41 | 3.8 |

TABLE #4
(N = 1086)

Liquid Assets Distribution

| Asset Level | N | Percent |
|---|---|---|
| Less than $15,000 | 197 | 18.1 |
| $15,001 to $30,000 | 162 | 14.9 |
| $30,001 to $50,000 | 150 | 13.8 |
| $50,001 to $100,000 | 193 | 17.8 |
| More than $100,000 | 384 | 35.4 |

TABLE #5
(N = 1086)

Prescription Drug Insurance Type

| Insurance Type | Number | Percent |
|---|---|---|
| Pays Nothing | 40 | 3.7 |
| Pays a Copayment | 354 | 32.6 |
| Pays a Coinsurance Amount | 92 | 8.5 |
| Has an Indemnity Plan | 137 | 12.6 |
| Has no Drug Insurance | 463 | 42.6 |

TABLE #6

Utilization of Different Types of Pharmacies
(N = 1086)

| Type of Pharmacy | Number | Percent |
|---|---|---|
| Chain Pharmacy | 631 | 58.1 |
| Independent Pharmacy | 360 | 33.1 |
| Clinic Pharmacy | 134 | 12.3 |
| Mail-Order Pharmacy | 142 | 13.1 |
| Other Type of Pharmacy | 27 | 2.5 |

Note: Numbers of respondents and percentages do not sum to 1086 and 100% respectively because respondents could select none or more than one answer for this item.

# APPENDIX I

## Alternative Contrasts for Logit Models

Table 1
Mail-Order is Qualitative Attribute: Plan A Excluded
(N = 1086)

| *Variable* | | | |
|---|---|---|---|
| Mail-Order Use is Required | -1.43 (2.69)** | | |
| Premium | -0.10 (3.32)** | | |
| Expected Out-of-Pocket Expenses | -0.01 (1.66)* | | |
| | *Plan B vs. Plan A* | *Plan C vs. Plan A* | *Plan D vs. Plan A* |
| Health is Fair or Poor[a] | 0.59 (2.43)** | 0.45 (1.46) | 0.47 (1.97)** |
| Number of Chronic Diseases | -0.002 (0.04) | 0.05 (0.71) | 0.14 (2.85)** |
| Any ADLs Present | -0.55 (2.20)** | -0.60 (1.77) | -0.47 (1.91)* |
| Med. Care Preferences Score | -0.03 (1.64) | -0.01 (0.23) | -0.01 (0.46) |
| Health Concern Score | -0.01 (0.23) | -0.03 (0.49) | -0.04 (0.77) |
| College Education or More[b] | 0.38 (1.18) | 0.90 (2.36)** | 0.85 (2.75) |
| Income is $35,000 or more per year[c] | -0.07 (0.29) | -0.27 (0.85) | 0.29 (1.22) |
| Assets are $50,000 or more[d] | 0.22 (1.03) | 0.28 (1.02) | 0.38 (1.80)* |
| Single Male[e] | -0.19 (0.55) | -0.36 (0.80) | 0.35 (1.09) |
| Single Woman[e] | 0.36 (1.54) | 0.17 (0.58) | 0.38 (1.58) |
| Married Woman[e] | 0.42 (1.68) | -0.11 (0.38) | 0.38 (1.68) |

Table 1 (cont)

| | *Plan B vs. Plan A* | *Plan C vs. Plan A* | *Plan D vs. Plan A* |
|---|---|---|---|
| Currently Uses Mail Order | -1.46 (4.81)** | 0.71 (2.46)** | -0.91 (3.47)** |
| Possibly Exposed to Formulary | -0.17 (0.90) | -0.18 (0.72) | 0.05 (0.28) |
| Pharmacist Commitment Score | -0.03 (0.78) | -0.01 (0.35) | 0.01 (0.41) |

Note: Coefficient (T-statistic);
Model $\chi^2 = 366.02$ (45 df), $p < 0.05$; ~$R^2 = 0.12$
Note: Plan "A": Formulary, Mail Order, copay = $5, premium = $45.00; Plan "B": Formulary, copay = $10, premium = $41.50, Plan "C": Mail-Order, copay = $10.00, premium = $47.00, ; Plan D: copay = $5.00, premium = $60.00.
a = Health is good, very good, or excellent is reference
b = Less than college education is reference
c = Less than $35,000/yr is reference
d = Less than $50,000/yr is reference
e = Married male is reference
* = $p < 0.05$ (one-tailed)
** = $p < 0.05$ (two-tailed)

Table 2
Mail-Order is Qualitative Attribute: Plan B is Excluded
(N = 1086)

| *Variable* | | | |
|---|---|---|---|
| Mail-Order Use is Required | -1.43 (2.69)** | | |
| Premium | -0.10 (3.32)** | | |
| Expected Out-of-Pocket Expenses | -0.01 (1.66)* | | |
| | *Plan A vs. Plan B* | *Plan C vs. Plan B* | *Plan D vs. Plan B* |
| Health is Fair or Poor[a] | -0.59 (2.43)** | -0.14 (0.49) | -0.12 (0.59) |
| Number of Chronic Diseases | 0.002 (0.04) | 0.05 (0.82) | 0.14 (3.11)** |
| Any ADLs Present | 0.55 (2.20)** | -0.05 (0.15) | 0.08 (0.37) |
| Med. Care Preferences Score | 0.03 (1.64) | 0.02 (1.15) | 0.02 (1.37) |
| Health Concern Score | 0.01 (0.23) | -0.02 (0.32) | -0.03 (0.65) |
| College Education or More[b] | -0.38 (1.18) | 0.52 (1.60) | 0.47 (2.07)** |
| Income is $35,000 or more per year[c] | 0.07 (0.29) | -0.20 (0.68) | 0.36 (1.83)* |
| Assets are $50,000 or more[d] | -0.22 (1.03) | 0.06 (0.23) | 0.16 (0.93) |
| Single Male[e] | 0.19 (0.55) | -0.17 (0.38) | 0.54 (1.85) |
| Single Woman[e] | -0.36 (1.54) | -0.19 (0.69) | -0.02 (0.08) |
| Married Woman[e] | -0.42 (1.87) | -0.53 (1.90) | -0.04 (0.20) |

Table 2 (cont.)

| | *Plan A vs. Plan B* | *Plan C vs. Plan B* | *Plan D vs. Plan B* |
|---|---|---|---|
| Currently Uses Mail Order | 1.46 (4.81)** | 2.17 (6.71)** | 0.55 (1.82) |
| Possibly Exposed to Formulary | 0.17 (0.90) | -0.01 (0.05) | 0.22 (1.41) |
| Pharmacist Commitment Score | 0.03 (0.78) | 0.02 (0.36) | 0.05 (1.35) |

Note: Coefficient (T-statistic);
Model $\chi^2 = 366.02$ (45 df), $p < 0.05$; $\sim R^2 = 0.12$
Note: Plan "A": Formulary, Mail Order, copay = $5, premium = $45.00; Plan "B": Formulary, copay = $10, premium = $41.50, Plan "C": Mail-Order, copay = $10.00, premium = $47.00, ; Plan D: copay = $5.00, premium = $60.00.
a = Health is good, very good, or excellent is reference
b = Less than college education is reference
c = Less than $35,000/yr is reference
d = Less than $50,000/yr is reference
e = Married male is reference
* = $p < 0.05$ (one-tailed)
** = $p < 0.05$ (two-tailed)

Table 3
Mail-Order is Qualitative Attribute: Plan C is Excluded
(N = 1086)

| *Variable* | | | |
|---|---|---|---|
| Mail-Order Use is Required | | -1.43 (2.69)** | |
| Premium | | -0.10 (3.32)** | |
| Expected Out-of-Pocket Expenses | | -0.01 (1.66)* | |
| | *Plan A vs. Plan C* | *Plan B vs. Plan C* | *Plan D vs. Plan C* |
| Health is Fair or Poor[a] | -0.45 (1.46) | 0.14 (0.49) | 0.02 (0.07) |
| Number of Chronic Diseases | -0.04 (0.07) | -0.05 (0.82) | 0.09 (1.52) |
| Any ADLs Present | 0.60 (1.77) | 0.05 (0.15) | 0.13 (0.41) |
| Med. Care Preferences Score | 0.004 (0.23) | -0.02 (1.15) | -0.002 (0.15) |
| Health Concern Score | 0.03 (0.49) | 0.02 (0.32) | -0.01 (0.14) |
| College Education or More[b] | -0.90 (2.36)** | -0.52 (1.60) | -0.05 (0.15) |
| Income is $35,000 or more per year[c] | 0.27 (0.85) | 0.20 (0.68) | 0.57 (1.94)* |
| Assets are $50,000 or more[d] | -0.28 (1.02) | -0.06 (0.23) | 0.11 (0.42) |
| Single Male[e] | 0.36 (0.80) | 0.17 (0.38) | 0.71 (1.70) |
| Single Woman[e] | -0.17 (0.19) | 0.19 (0.69) | 0.21 (0.74) |
| Married Woman[e] | 0.11 (0.38) | 0.53 (1.90) | 0.49 (1.76) |

Table 3 (cont.)
(N = 1086)

| | *Plan A vs. Plan C* | *Plan B vs. Plan C* | *Plan D vs. Plan C* |
|---|---|---|---|
| Currently Uses Mail Order | -0.71 (2.46)** | -2.17 (6.71)** | -1.62 (5.68)** |
| Possibly Exposed to Formulary | 0.18 (0.72) | 0.01 (0.05) | 0.24 (1.01) |
| Pharmacist Commitment Score | 0.01 (0.35) | -0.02 (0.36) | 0.03 (0.70) |

Note: Coefficient (T-statistic);
Model $\chi^2 = 366.02$ (45 df), $p < 0.05$; $\sim R^2 = 0.12$
Note: Plan "A": Formulary, Mail Order, copay = $5, premium = $45.00; Plan "B": Formulary, copay = $10, premium = $41.50, Plan "C": Mail-Order, copay = $10.00, premium = $47.00, ; Plan D: copay = $5.00, premium = $60.00.
a = Health is good, very good, or excellent is reference
b = Less than college education is reference
c = Less than $35,000/yr is reference
d = Less than $50,000/yr is reference
e = Married male is reference
* = $p < 0.05$ (one-tailed)
** = $p < 0.05$ (two-tailed)

Table 4
Formulary is Qualitative Attribute: Plan C is Excluded
(N = 1086)

| *Variable* | | | |
|---|---|---|---|
| Plan Uses Formulary | | 2.48 (2.68)** | |
| Premium | | 0.05 (0.92) | |
| Expected Out-of-Pocket Expenses | | -0.01 (1.94)* | |
| | *Plan A vs. Plan C* | *Plan B vs. Plan C* | *Plan D vs. Plan C* |
| Health is Fair or Poor[a] | -0.41 (1.33) | 0.15 (0.53) | 0.03 (0.12) |
| Number of Chronic Diseases | -0.07 (0.97) | -0.05 (0.87) | 0.08 (1.35) |
| Any ADLs Present | 0.64 (1.88) | 0.06 (0.17) | 0.13 (0.42) |
| Med. Care Preferences Score | -0.02 (0.80) | -0.02 (1.24) | -0.01 (0.46) |
| Health Concern Score | -0.03 (0.42) | 0.02 (0.26) | -0.02 (0.37) |
| College Education or More[b] | -0.99 (2.57)** | -0.53 (1.62) | -0.07 (0.22) |
| Income is $35,000 or more per year[c] | 0.21 (0.66) | 0.21 (0.70) | 0.56 (1.91)* |
| Assets are $50,000 or more[d] | -0.38 (1.37) | -0.08 (0.30) | 0.07 (0.29) |
| Single Male[e] | 0.29 (0.64) | 0.16 (0.37) | 0.69 (1.66) |
| Single Woman[e] | -0.30 (1.00) | 0.19 (0.67) | 0.18 (0.63) |
| Married Woman[e] | 0.02 (0.07) | 0.52 (1.86) | 0.47 (1.66) |

Table 4 (cont.)
(N = 1086)

| | *Plan A vs. Plan C* | *Plan B vs. Plan C* | *Plan D vs. Plan C* |
|---|---|---|---|
| Currently Uses Mail Order | -0.78 (2.67)** | -2.18 (6.73)** | -1.65 (5.75)** |
| Possibly Exposed to Formulary | 0.17 (0.66) | 0.01 (0.05) | 0.23 (0.98) |
| Pharmacist Commitment Score | -0.08 (1.39) | -0.02 (0.52) | 0.01 (0.15) |

Note: Coefficient (T-statistic);
Model $\chi^2 = 366.23$ (45 df), $p < 0.05$; ~$R^2 = 0.12$
Note: Plan "A": Formulary, Mail Order, copay = $5, premium = $45.00; Plan "B": Formulary, copay = $10, premium = $41.50, Plan "C": Mail-Order, copay = $10.00, premium = $47.00, ; Plan D: copay = $5.00, premium = $60.00.
a = Health is good, very good, or excellent is reference
b = Less than college education is reference
c = Less than $35,000/yr is reference
d = Less than $50,000/yr is reference
e = Married male is reference
* = $p < 0.05$ (one-tailed)
** = $p < 0.05$ (two-tailed)

Table 5
Formulary is Quantitative Attribute: Plan B is Excluded
(N = 1086)

| *Variable* | | | |
|---|---|---|---|
| Plan Uses Formulary | | 2.48 (2.68)** | |
| Premium | | 0.05 (0.92) | |
| Expected Out-of-Pocket Expenses | | -0.01 (1.94)* | |
| | *Plan A vs. Plan B* | *Plan C vs. Plan B* | *Plan D vs. Plan B* |
| Health is Fair or Poor[a] | -0.56 (2.33)** | -0.15 (0.53) | -0.12 (0.59) |
| Number of Chronic Diseases | -0.01 (0.24) | 0.05 (0.87) | 0.14 (2.96)** |
| Any ADLs Present | 0.58 (2.34)** | -0.06 (0.17) | 0.08 (0.36) |
| Med. Care Preferences Score | 0.01 (0.44) | 0.02 (1.24) | 0.01 (1.07) |
| Health Concern Score | -0.04 (0.91) | -0.02 (0.26) | -0.04 (0.90) |
| College Education or More[b] | -0.46 (1.42) | 0.53 (1.62) | 0.46 (2.03)** |
| Income is $35,000 or more per year[c] | 0.001 (0.01) | -0.21 (0.70) | 0.35 (1.75)* |
| Assets are $50,000 or more[d] | -0.30 (1.42) | 0.08 (0.30) | 0.15 (0.85) |
| Single Male[e] | 0.13 (0.37) | -0.16 (0.37) | 0.53 (1.81) |
| Single Woman[e] | -0.49 (2.11)** | -0.19 (0.67) | -0.01 (0.04) |
| Married Woman[e] | -0.50 (2.28)** | -0.52 (1.86) | -0.06 (0.30) |

Table 5 (cont.)
(N = 1986)

| | *Plan A vs. Plan B* | *Plan C vs. Plan B* | *Plan D vs. Plan B* |
|---|---|---|---|
| Currently Uses Mail Order | 1.40 (4.63)** | 2.18 (6.73)** | 0.53 (1.78) |
| Possibly Exposed to Formulary | 0.16 (0.82) | -0.01 (0.05) | 0.22 (1.39) |
| Pharmacist Commitment Score | -0.05 (1.54) | 0.02 (0.52) | 0.03 (0.91) |

Note: Coefficient (T-statistic);
Model $\chi^2 = 366.23$ (45 df), $p < 0.05$; ~$R^2 = 0.12$
Note: Plan "A": Formulary, Mail Order, copay = $5, premium = $45.00; Plan "B": Formulary, copay = $10, premium = $41.50, Plan "C": Mail-Order, copay = $10.00, premium = $47.00, ; Plan D: copay = $5.00, premium = $60.00.
a = Health is good, very good, or excellent is reference
b = Less than college education is reference
c = Less than $35,000/yr is reference
d = Less than $50,000/yr is reference
e = Married male is reference
* = $p < 0.05$ (one-tailed)
** = $p < 0.05$ (two-tailed)

Table 6
Formulary is Qualitative Attribute: Plan A is Excluded
(N = 1086)

| *Variable* | | | |
|---|---|---|---|
| Plan Uses Formulary | | 2.48 (2.68)** | |
| Premium | | 0.05 (0.92) | |
| Expected Out-of-Pocket Expenses | | -0.01 (1.94)* | |
| | *Plan B vs. Plan A* | *Plan C vs. Plan A* | *Plan D vs. Plan A* |
| Health is Fair or Poor[a] | 0.56 (2.33)** | 0.41 (1.33) | 0.45 (1.85)* |
| Number of Chronic Diseases | 0.01 (0.24) | 0.07 (0.97) | 0.15 (2.99)** |
| Any ADLs Present | -0.58 (2.34)** | -0.64 (1.88) | -0.50 (2.05)** |
| Med. Care Preferences Score | -0.01 (0.44) | 0.02 (0.80) | 0.01 (0.51) |
| Health Concern Score | 0.04 (0.91) | 0.03 (0.42) | 0.01 (0.11) |
| College Education or More[b] | 0.46 (1.42) | 0.99 (2.57)** | 0.92 (2.95)** |
| Income is $35,000 or more per year[c] | -0.001 (0.01) | -0.21 (0.66) | 0.35 (1.45) |
| Assets are $50,000 or more[d] | 0.30 (1.42) | 0.38 (1.37) | 0.45 (2.12)** |
| Single Male[e] | -0.13 (0.37) | -0.29 (0.64) | 0.40 (1.25) |
| Single Woman[e] | 0.49 (2.11)** | 0.30 (1.00) | 0.48 (2.00)** |
| Married Woman[e] | 0.50 (2.28)** | -0.02 (0.07) | 0.45 (1.99)** |

Table 6 (cont.)
(N = 1086)

| | *Plan A vs. Plan B* | *Plan C vs. Plan B* | *Plan D vs. Plan B* |
|---|---|---|---|
| Currently Uses Mail Order | -1.40 (4.63)** | 0.78 (2.67)** | -0.87 (3.29)** |
| Possibly Exposed to Formulary | -0.16 (0.82) | -0.17 (0.66) | 0.06 (0.34) |
| Pharmacist Commitment Score | 0.05 (1.54) | 0.08 (1.39) | 0.08 (2.19)** |

Note: Coefficient (T-statistic);
Model $\chi^2 = 366.23$ (45 df), $p < 0.05$; $\sim R^2 = 0.12$
Note: Plan "A": Formulary, Mail Order, copay = $5, premium = $45.00; Plan "B": Formulary, copay = $10, premium = $41.50, Plan "C": Mail-Order, copay = $10.00, premium = $47.00, ; Plan D: copay = $5.00, premium = $60.00.
a = Health is good, very good, or excellent is reference
b = Less than college education is reference
c = Less than $35,000/yr is reference
d = Less than $50,000/yr is reference
e = Married male is reference
* = $p < 0.05$ (one-tailed)
** = $p < 0.05$ (two-tailed)