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Adverse Selection in Retiree Prescription Drug Plans

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Abstract

We used claims data from a large U.S. employer that introduced changes in its medical and drug coverage offerings in 2002 for non-Medicare eligible retirees. In addition to the existing plans, the employer introduced two new plans in 2002 that were less generous both in terms of medical and drug coverage. Further, one of the new plans had an annual benefit limit of \$2,500 on prescription drugs, similar to the “doughnut hole” in the standard Medicare Part D benefit. We examined beneficiaries switching behavior in response to the new choice set and estimated the independent effects of medical and drug benefits on plan selection. We found that beneficiaries in better health were more likely to switch to the new, less generous plans. While the generosity of the medical benefit played a more important role in choosing a plan, choices did not vary significantly by health status. In contrast, sicker individuals were more likely to enroll in plans with generous drug benefits. This suggests that drug coverage may be more susceptible to adverse selection than medical insurance.

KEYWORDS: adverse selection, prescription drugs, insurance, benefit design

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I. Introduction

The seminal work of Rothschild and Stiglitz (1976) showed that competitive insurance markets can fail when consumers know more about their risk than insurers do. Since that paper was published, adverse selection has received significant attention in the economics literature as an important form of asymmetric information between consumers and insurers. We briefly summarize that evidence below, paying particular attention to the role of drug coverage in the selection of health plans. Recent evidence suggests that adverse selection may be a greater concern for drug coverage, since demand is more persistent. This issue has come to the forefront with the introduction of the Medicare drug benefit (Part D) that allows beneficiaries to select from a wide array of plan options which could facilitate adverse selection and undermine the stability of the market.

II. Adverse Selection in the Choice of Medical Plan

Although there is an extensive body of work on adverse selection in health insurance markets, empirical results are inconclusive. Marquis and Phelps (1987) find evidence for adverse selection based on responses to hypothetical purchases of supplemental insurance. Hellinger (1995) and Newhouse (1996) find that riskier individuals select HMOs as opposed to conventional insurance plans. Ettner (1997) linked Medicare claims to the 1991 Medicare Current Beneficiary Survey (MCBS) to examine the extent of selection in the supplemental insurance market. She found that beneficiaries with individually purchased policies had higher total, part B and physician expenditures than those with employer-provided policies, even after controlling for observable differences, suggesting adverse selection. Cutler and Reber (1998) documented the experience of Harvard University when it moved from a system of subsidizing generous insurance to a system of paying fixed contributions independent of plan choice. They found that adverse selection eliminated the market for more generous insurance within three years, consistent with findings from a similar change undertaken at the University of California (Buchmueller et al, 1996).

Buntin's (2003) analysis of the Medicare HMO market found that risk selection was driven by copayments, network size, and perceived plan quality. In particular, healthy beneficiaries tended to join plans with low copayments for primary care services, while sicker beneficiaries were more likely to enroll in plans with low specialty care copayments. Further, healthier enrollees preferred plans with larger networks of primary care physicians while sicker enrollees preferred plans with larger panels of specialty care providers.

In contrast to this work, other studies found little evidence of adverse selection in health insurance markets. Cardon and Hendel (2001) argued that adverse selection is present only if consumers have private or unobservable information about their health that affects their choice of insurance. However, their empirical analyses revealed that health insurance choices were largely explained by observed characteristics rather than unobserved health status. Earlier work by Phelps (1976) also failed to find an association between predicted illness and insurance choice. Other studies examining persistence in the choice of health plans suggested that adverse selection was not a major driver of plan choice (Neipp and Zeckhauser, 1986; Madrian, 1994; Royalty and Solomon, 1999).

A third group of studies found mixed evidence of adverse selection. For example, Wolfe and Goddeeris (1991) found evidence of adverse selection in the Medigap market, but concluded it was not economically significant. Similarly, Hurd and McGarry (1995) showed that Medicare beneficiaries with supplemental insurance used more health care services than those without supplemental coverage, but differences in utilization primarily reflected moral hazard rather than selection since Medigap coverage was largely determined by wealth instead of health status.

III. Adverse Selection in the Choice of Drug Plan

The introduction of drug coverage in Medicare has renewed debate on the role of pharmacy benefits in health plan choice. Under Medicare Part D, beneficiaries can enroll in either a Medicare Advantage plan that bundles prescription drug coverage with medical insurance (MA-PD) or a stand-alone prescription drug plan (PDP). An outstanding issue is the degree to which health plans -- and especially PDPs -- might experience adverse selection.

The design of Part D relies on competition among private plans to expand benefit options and lower drug prices. However, because beneficiaries have some information about their expected utilization that is unknown to insurers, those who expect to use more medications may be more likely to enroll in generous plans. Since Part D plans cannot discriminate among individuals, adverse selection could be a serious concern for the economic viability of the market.

Pauly and Zeng (2004) argue that it is easier for individuals to engage in adverse selection if use is predictable and they can select specific types of coverage rather than choosing between broad-based policies. Pauly and Zeng examined persistence in drug spending among more than 140,000 individuals between the ages of 22 and 64 who had employer provided coverage from 1994 to 1998. They found that 60 percent of those in the top quantile of drug spending in 1994 remained in the top quantile in 1998, while only 40 percent of those in the

top quantile for non-drug spending in 1994 stayed in the top quantile four years later. Earlier work by Coulson and Stuart (1992) also found considerable persistence in drug spending among enrollees in the Pennsylvania Pharmaceutical Assistance Contract for the Elderly (PACE). The persistence of high drug spending appears to be greater than for other types of care and provides indirect evidence that drug coverage may be more susceptible to adverse selection than other types of medical insurance. Pauly and Zeng question whether drug-only coverage can be sold in competitive insurance markets, although all-inclusive plans such as MA-PDs can help mitigate selection.

Other research has found evidence of adverse selection in both the selection of Medigap plans with prescription drug coverage and in the selection of Medicare HMOs. Long (1994) studied prescription drug expenditures in the 1987 National Medical Expenditure Survey and found that annual drug spending was 29 percent higher among those with Medigap drug coverage than for without it. Similarly, Lillard et al (1999) used data from the 1990 Panel Study of Income Dynamics (PSID) to estimate the demand for prescription drugs among the elderly. Controlling for the potential endogeneity of private insurance, they found that coverage for prescription drugs increased the probability of use, but did not affect total drug spending conditional upon filling at least one prescription in the year. Huskamp et al. (2000) examined premium differences in Medigap plans that covered prescription medications (Plans H, I, and J) to assess the role of selection. They found that in the most generous plan, the premium was more than twice as high as it would have been with a representative sample of Medicare beneficiaries. They concluded from this that Part D plans should compete to serve a region instead of competing for enrollees within a region.

Atherly, Dowd and Feldman (2004) examined the relation between drug benefits and adverse selection in the Medicare + Choice (M+C) market. They found that patients with chronic conditions were more likely to enroll in plans with prescription drug coverage and that M+C plans that offered drug benefits enrolled less healthy beneficiaries on average. They concluded that adding a prescription drug benefit to standard Medicare (FFS) would increase traditional Medicare costs beyond current projections by diverting high cost beneficiaries with chronic illnesses away from the M+C sector.

In a stated preference experiment prior to the introduction of Medicare Part D, Cline and Mott (2003) asked individuals to choose from four hypothetical plans that varied on a number of domains, including copayments, use of formularies, mail order requirements, and monthly premiums. They found that respondents with increased chronic conditions were more likely to choose the plan with the highest premium and no administrative restrictions, providing evidence of adverse selection.

In this study, we examined the plan choices of retirees from a large private employer after it changed its health plan offerings in 2002. We estimated the independent effects of medical and drug benefits on health plan choice and how choices varied by health status. We found that the generosity of both medical and drug benefits affect plan choice, but selection based on health status is more sensitive to the generosity of drug benefits.

IV. Methods

In order for adverse selection to exist in health insurance markets, consumers must have prior information about their expected demand for health care services and choose a plan accordingly. Therefore, as a first step, we examined which individual level factors determined health care expenditures. In particular, we were interested in investigating whether previous health conditions were accurate predictors of medical and drug spending. We then estimated models of health plan choice. We estimated multinomial logit models of plan choice for the entire sample and logit models for those enrolled in the PPO and POS plans in 2001, separately. We also used conditional logit models to estimate the relative importance of medical and pharmacy benefits on health plan choice. We then predict how plan choices would change in response to changes in the generosity of the medical and drug benefits separately.

Data and Study Sample

We used claims data from a single employer to examine the impact of medical and pharmacy benefits on health plan choices. The firm offered non-Medicare eligible retirees a choice of two plans in 2001: a Point of Service (POS) option and a Preferred Provider Organization (PPO) option. In 2002, the employer kept the POS and the low deductible PPO options and added two new alternatives: a medium and a high deductible PPO. The medical benefits of the existing plans did not change, but the drug coverage became less generous through increased cost sharing (coinsurance). The two new plans had the same inpatient and outpatient cost sharing arrangements as the low deductible PPO plan, but had significantly higher deductibles and out of pocket maximums. In addition, the two new PPOs had higher cost sharing for prescription drugs and the high deductible PPO introduced an annual benefit limit of \$2,500 for outpatient prescription drugs. The key benefits of each plan are summarized in Table 1.

Table 1: Features of Non-Medicare Eligible Retiree Plans

Plan Type	Number of beneficiaries	% in plan	MEDICAL BENEFITS				RX BENEFITS		
			Annual Individual Deductible (in network)	Annual Individual Medical OOP Max (in network)	Inpatient cost-sharing (in network)	Outpatient cost-sharing (in network)	Rx- Cost Sharing at Participating Pharmacies (generic/brand)	Rx- Cost Sharing at Mail Order Pharmacies (generic/brand)	Rx Benefit Max
2001									
POS	7734	46%	0	\$1500	10%	\$15	\$5/\$10	\$10/\$20	none
PPO	9211	54%	\$250	\$2000	20%	20%	20%	\$10/\$20	none
2002									
POS	7302	43%	\$0	\$1500	10%	\$15	20%/45%	20%/45%	none
PPO-Low-Ded	8383	49%	\$250	\$2000	20%	20%	20%/45%	20%/45%	none
PPO-Med-Ded	761	5%	\$750	\$2750	20%	20%	35%/60%	35%/60%	none
PPO-High-Ded	499	3%	\$1000	\$3000	20%	20%	35%/60%	35%/60%	\$2,500

Notes:

1. The statistics above are for the 16553 primary beneficiaries enrolled both in 2001 and 2002
2. Through Mail Order, patient can purchase a 90 day supply instead of a 30 day supply at retail
3. The individual deductible is not applicable for RX expenses

The sample included 16,553 primary beneficiaries under age 65 who were continuously enrolled in one of the firm's retiree health plans in 2001 and 2002. The claims data captured all health care claims and encounters, including prescription drugs, inpatient, emergency, and ambulatory services. Most drug claims included information on the type of drug, drug name, national drug code (NDC), dosage, days supplied, and place of purchase (retail or mail-order). The medical claims included the date of service, diagnosis and procedure codes, type of facility and provider.

The claims data were linked with information about plan benefits. For each plan, we abstracted the benefit information. The medical plan characteristics included deductibles and patient cost sharing arrangements for inpatient and ambulatory settings, as well as details about the plan type and network arrangements. The drug benefit design features included copayments or coinsurance rates at both retail and mail-order pharmacies, generic substitution rules and annual limits on benefits.

Measuring Plan Generosity

The increasing complexity of health insurance coverage makes it difficult to translate the stated benefits into actual prices that consumers face. Deductibles, out-of-pocket maximums, and multi-tier formularies are the standard for most private plans, and they also offer discounts for purchases through in-network providers or mail-order pharmacies. These added complexities mean that the price a consumer will pay for a given service depends on when and where it is provided. To address this issue, we computed the effective coinsurance rate for each medical and drug benefit. Since the effective coinsurance rate for a healthy person can be quite different than for an individual with a serious chronic condition, we computed separate coinsurance rates for each plan depending on individual health status, as measured by a count of major chronic conditions (0, 1 and 2 or more).

More formally, we computed the effective medical coinsurance rate for individual i , with k chronic conditions ($k=0,1,2$), in plan j as:

$$MedicalCoins_{jk} = \frac{1}{N_{jk}} \sum_{i=1}^{N_{jk}} \frac{OOP_nondrug_{i,k}}{TotalExp_nondrug_{i,k}}$$

where N_{jk} denotes the total number of enrollees with k chronic conditions in plan j ; $OOP_nondrug$ denotes out of pocket expenses for non-pharmacy expenditures; and $TotalExp_nondrug$ denotes total non-drug expenditures (plan

payments and patient payments). For the remainder of the paper, the term “medical expenditures” refers to expenditures for non-pharmacy medical services.

Similarly, we computed the effective coinsurance rate of each pharmacy benefit as

$$RxCoins_{jk} = \frac{1}{N_{jk}} \sum_{i=1}^{N_{jk}} \frac{OOP_Rx_{i,k}}{TotalExp_Rx_{i,k}}$$

where OOP_Rx is the out of pocket expenditures on drug purchases and $TotalExp_Rx$ is the total drug expenditures in the plan.

In addition to our measures of plan generosity, other independent variables in our models included demographic characteristics (age, gender, marital status), area characteristics (urban/rural location, median household income in the Zip Code of residence), and previous health conditions. We controlled for co-morbid conditions using a set of disease indicators identified in the medical claims based on ICD-9 diagnoses.

Estimating the Impact of Medical and Drug Benefits on Plan Choice

We were interested in estimating the relative importance of medical generosity and drug generosity on plan choice. In particular, the utility that individual i with k major chronic conditions receives from health plan j is specified as

$$U_{ikj} = v_{ij} - \beta_k^{Med} MedicalCoins_{jk} - \beta_k^{Rx} RxCoins_{jk} + \varepsilon_{ij} \quad (1)$$

where v_{ij} reflects individual taste for the plan, and ε_{ij} is unobserved individual heterogeneity assumed to be independently and identically distributed. We model

$$v_{ij} = \lambda PPO_j + Z_i \alpha_j + \phi Inertia_{ij} \quad (2)$$

where λ reflects average taste for the PPO plans and PPO_j is an indicator variable for whether the plan j is a PPO. The vector Z_i captures individual specific characteristics such as age, gender, income (at the zip-code level), residential location (urban/rural) and marital status. The variable $Inertia_{ij}$ takes on value “1” if individual i ’s plan in the previous year is the same type (POS vs PPO) as plan j . In this sense, this variable captures unobserved preferences for a plan type. Ideally, we would like to separately estimate the role of premia in v_{ij} ,

but unfortunately data on premia are not available, and thus the $Z_i\alpha_j$ term in (2) captures premium sensitivity that could potentially vary across individuals.

As we discussed earlier, we allowed the effective medical and drug coinsurance rates to vary across individuals based on the number of prior conditions (0, 1, 2 or more), as sicker patients might be more sensitive to plan features than healthier members. Therefore, our estimating equation becomes

$$U_{ikj} = \lambda PPO_j + Z_i\alpha_j + \phi Inertia_{ij} - \sum_{k=0}^{2plus} \beta_k^{Med} MedicalCoins_{jk} d_{ik} - \sum_{k=0}^{2plus} \beta_k^{Rx} RxCoins_{jk} d_{ik} + \varepsilon_{ij} \quad (3)$$

where variables d_{ik} take on value “1” if individual i has k major previous chronic conditions.

IV. Results

Descriptive Statistics

Table 1 above summarizes the key characteristics of each plan in 2001 and 2002. The POS option was the most generous: it has no deductible and a maximum out of pocket limit of \$1,500, whereas the PPO had a \$250 deductible and a \$2,000 maximum. The POS plan had lower cost-sharing than the PPO for inpatient and outpatient services and more generous drug benefits in 2001.

Table 2 describes the characteristics of the enrollees in each plan. In 2001, the average age of enrollees and the prevalence of chronic illness were similar in the two plans. However in 2002, the more generous plans, namely the POS and the low deductible PPO enrolled sicker members based on counts of chronic disease. Approximately 40% of enrollees who chose these alternatives suffered from at least one chronic condition compared with 34% and 27%, respectively, in the medium and high deductible PPOs. Moreover, those who chose the more generous plans had higher average medical and drug expenditures in the previous year. For example, an average enrollee in the low deductible PPO in 2002 incurred total medical expenditures of \$4,850 in 2001 and \$1,360 in annual drug expenditures. In contrast, the average enrollee in the high deductible PPO plan in 2002 had annual medical and drug expenses of \$1,733 and \$603, respectively, in 2001. These descriptive statistics seem to suggest that the introduction of less generous plans in 2002 might have resulted in their favorable selection, leaving a sicker pool of individuals in the two existing, more generous plans.

Table 2: Characteristics of enrollees by plan and year

Plan #	Avg age of enrollees	% with any major chronic condition	Avg # major chronic condition	Avg Medical Exp in Previous Year	Avg RX Exp in Previous Year	Avg Medical Exp in Current Year	Avg RX Exp in Current Year	% Exceed out of pocket maximum	% Under Deductible
2001									
POS (n=7734)	58	32	0.38	--	--	3650	1291	40	--
PPO (n=9211)	59	34	0.41	--	--	4626	1308	38	24
2002									
POS (n=7302)	59	40	0.49	3742	1322	3103	1278	35	--
PPO-Low-Ded (n=8383)	60	40	0.52	4850	1360	4157	1227	32	28
PPO-Med-Ded (n=761)	60	34	0.42	2625	884	2762	727	18	60
PPO-High-Ded (n=499)	60	27	0.34	1733	603	2440	465	12	76

Notes

1. Major conditions we consider are hypertension, diabetes, asthma, lipid disorder, gastric acid disorder, thyroid disorder or heart disease where heart disease is characterized as having either one of cardiac disease, CHF, angina or vascular disease

Table 3 reports the effective coinsurance rates for each medical and drug benefit in 2002, by level of chronic conditions. The POS option is the most generous in terms of medical benefits, with an effective coinsurance rate of 9 to 12 percent. Among the PPO alternatives, the generosity of the medical benefit tends to decrease as the deductible increases for any given number of chronic conditions. However for the medium deductible PPO, the effective medical coinsurance rate for an enrollee with two or more major chronic conditions is substantially lower than for those with fewer chronic illnesses. This pattern indicates that sicker enrollees are more likely to exceed their deductible and/or reach their out of pocket maximum, thus facing lower effective medical coinsurance rates on average. For the high deductible PPO, the decline in the effective medical coinsurance rate associated with the addition of a major chronic condition is very small, which may reflect a lower likelihood of exceeding the deductible or reaching the out-of-pocket maximum compared with the medium deductible plan.

Table 3: Effective Coinsurance of Non-Medicare Eligible Retiree Plans

	Effective medical coinsurance			Effective Rx coinsurance		
	number of major chronic conditions					
	0	1	2 plus	0	1	2 plus
POS	0.12	0.11	0.09	0.16	0.17	0.17
PPO-Low-Ded	0.25	0.25	0.26	0.19	0.2	0.19
PPO-Med-Ded	0.39	0.37	0.27	0.3	0.32	0.32
PPO-High-Ded	0.44	0.44	0.43	0.34	0.34	0.34

Notes:

1. Effective Medical Coinsurance equals the ratio of "mean patient OOP for medical services" and "mean medical expenditures".
2. Effective Rx Coinsurance equals the ratio of "mean patient OOP for Rx purchases" and "mean Rx expenditures".

A basic descriptive analysis of the transitions between health plans in 2001 and 2002 is shown in Table 4. Panel (A) presents unadjusted transitions for all primary beneficiaries. About 89.7% of the PPO enrollees in 2001 stayed with the low deductible PPO; 6.2% switched to the medium deductible PPO; 2.7% switched to the high deductible PPO; and just 1.4% switched to the POS plan. Among POS enrollees in 2001, 92.8% remained in the plan, and 1.5%, 2.4% and 3.3% of enrollees switched to the low-, medium- and high-deductible PPOs, respectively. Panel (B) shows the unadjusted transitions between plans only

among primary enrollees with two or more major chronic conditions. There is more inertia in plan choice among the chronically ill, with 93.3% remaining in the low deductible PPO in 2002 and 95.3% remaining in the POS plan in 2002.

Table 4: Plan Switching

(A) All Primary Beneficiaries					
		2002			
		POS	PPO-Low-Ded	PPO-Med-Ded	PPO-High-Ded
2001					
POS (n=7734)		92.8%	1.5%	2.4%	3.3%
PPO (n=9211)		1.4%	89.7%	6.2%	2.7%
(B) Primary Beneficiaries with at least 2 chronic conditions					
		2002			
		POS	PPO-Low-Ded	PPO-Med-Ded	PPO-High-Ded
2001					
POS (n=406)		95.3%	2.2%	1%	1.5%
PPO (n=608)		1.3%	93.3%	3.8%	1.6%

Multivariate Analyses

Table 5 reports ordinary least squares estimates of medical and drug spending in 2002. Factors that significantly affected both medical and drug expenditures included age and previous conditions, such as hypertension, diabetes, asthma, and heart disease.¹ Treatment in 2001 for hyperlipidemia or gastric acid disorder was significantly correlated with higher drug expenditures, but uncorrelated with medical expenditures in 2002.

¹ Heart disease is characterized as having either one of cardiac disease, coronary heart failure (CHF), angina or vascular disease.

Table 5: Determinants of Expenditures in 2002

	Rx Expenditures in 2002 (OLS)	Medical Expenditures in 2002 (OLS)
Demographics in 2002		
Age	16*** (6)	131*** (33)
Male	-202*** (47)	200 (263)
Urban	-10 (158)	360 (888)
Income	-12 (18)	278*** (102)
Married	25 (41)	-521** (228)
Health Status in 2001		
Hypertension	540*** (51)	762*** (287)
Diabetes	1,652*** (73)	3,219*** (406)
Asthma	1,080*** (164)	2,106** (917)
lipid disorder	394*** (74)	132 (413)
gastric acid disorder	795*** (148)	1089 (828)
thyroid disorder	51 (147)	1251 (825)
heart disease	1,037*** (69)	4,123*** (384)

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes:

1. The sample include 16553 primary beneficiaries enrolled both in 2001 and 2002
2. Heart disease is characterized as having either one of cardiac disease, CHF, angina or vascular disease

Having shown that most prior health conditions are positively correlated with current health expenditures, we estimated a model of health plan choice to study which individual level factors affect plan selection. Table 6 reports estimates obtained using a multinomial logit of plan choice in 2002 as a function of individual characteristics in 2002 and health conditions in 2001. The first specification (Panel A) summarizes previous health status based on the total number of chronic conditions, while the second specification (Panel B) includes binary indicators for each major condition. In both specifications, we found that individuals with worse previous health were less likely to choose the medium and high deductible PPOs relative to the low deductible PPO. In terms of specific chronic conditions, hypertension, diabetes and heart disease tended to play a more significant role in plan choice. The results in Table 6 also suggest that sicker individuals were less likely to select the POS option relative to the low deductible PPO.

To understand plan choices of PPO enrollees, we restricted our sample only to those enrolled in a PPO plan in both years. We constructed a binary dependent variable that takes on the value “1” if the enrollee switched to a less generous PPO in 2002, and “0” if the enrollee stayed with the more generous (low deductible) PPO in 2002. Table 7 reports the estimates obtained from three separate logistic regressions that vary in the treatment of prior health status. Panel (A) includes a summary count of chronic conditions in 2001; Panel B includes binary indicators for each major chronic condition, and Panel (C) includes the level of medical and drug expenditures in the previous year.

Regardless of the specification, we find that sicker individuals in 2001 are less likely to switch to a less generous PPO in 2002. However, the effects vary by the type of prior spending. The estimated coefficients in Panel (C) suggest that doubling prior medical expenditures would reduce the probability of switching to a less generous PPO plan from 0.089 to 0.085, a modest 4.5 percent decrease. In contrast, doubling previous drug spending would decrease the probability of switching to a less generous PPO by 13.5 percent.² The results imply that conditional on enrollment in a PPO in 2001 and 2002, the elasticity of switching to a less generous plan with respect to previous drug spending is greater than the corresponding elasticity with respect to prior medical spending.

² In the PPO sample on which the results are based, individuals without chronic conditions have medical spending of \$3,761 and drug spending of \$991 on average, in 2001. As expected, both medical and drug spending increases with the number of chronic conditions. For example, those with one chronic condition in 2001 spend \$6,368 on medical services and \$1,992 on outpatient prescription drugs, and those with two or more chronic conditions have medical and drug spending of \$9,630 and \$2,752 respectively, in 2001. In this sense, doubling medical and drug spending is somewhat similar to the addition of a chronic condition.

Table 6: Multinomial Logit Estimation of Plan Choice in 2002

	(A)			(B)		
	multinomial logit			multinomial logit		
	POS	PPO-Med- Ded	PPO- High-Ded	POS	PPO-Med- Ded	PPO- High-Ded
	(base category is PPO-Low-Ded)			(base category is PPO-Low-Ded)		
Demographics in 2002						
Age	-0.091*** [0.005]	-0.016 [0.013]	0.025 [0.017]	-0.091*** [0.006]	-0.016 [0.013]	0.025 [0.017]
Male	0.338*** [0.043]	0.200* [0.113]	0.408*** [0.146]	0.334*** [0.043]	0.212* [0.114]	0.437*** [0.147]
Urban	0.480*** [0.150]	-0.011 [0.299]	0.202 [0.396]	0.483*** [0.151]	-0.008 [0.299]	0.219 [0.396]
Income	-0.160*** [0.017]	-0.198*** [0.041]	-0.250*** [0.052]	-0.159*** [0.017]	-0.200*** [0.041]	-0.252*** [0.052]
Married	0.455*** [0.037]	1.510*** [0.114]	1.307*** [0.135]	0.459*** [0.037]	1.515*** [0.114]	1.313*** [0.135]
Health Status in 2001						
Hypertension	--	--	--	-0.029 [0.047]	-0.273** [0.118]	-0.416*** [0.152]
Diabetes	--	--	--	-0.315*** [0.067]	-0.578*** [0.178]	-0.897*** [0.252]
Asthma	--	--	--	-0.466*** [0.158]	-0.223 [0.371]	-0.246 [0.463]
lipid disorder	--	--	--	0.243*** [0.067]	-0.107 [0.169]	-0.423* [0.235]
gastric acid disorder	--	--	--	-0.297** [0.136]	-0.677* [0.391]	-0.383 [0.422]
thyroid disorder	--	--	--	-0.058 [0.136]	-0.01 [0.352]	-0.15 [0.463]
heart disease	--	--	--	-0.113* [0.062]	-0.390** [0.160]	-1.206*** [0.276]
# major chronic conditions	-0.080*** [0.027]	-0.333*** [0.069]	-0.622*** [0.096]			

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes:

1. The sample include 16553 primary beneficiaries enrolled both in 2001 and 2002
2. Heart disease is characterized as having either one of cardiac disease, CHF, angina or vascular disease
3. Major chronic conditions include hypertension, diabetes, asthma, lipid disorder, gastric acid disorder, thyroid disorder or heart disease.

Table 7: Logit Estimation of Plan Choice in 2002 for PPO members in 2001 and 2002

		Dependent variable: "1" if switch to a less generous PPO in 2002, "0" if stay in the same PPO as in 2001		
		(A)	(B)	(C)
		(logit)		
Demographics in 2002				
	Age	-0.019 [0.012]	-0.019 [0.012]	-0.013 (0.012)
	Male	0.135 [0.105]	0.158 [0.106]	0.094 (0.106)
	Urban	-0.119 [0.282]	-0.111 [0.283]	-0.126 (0.284)
	Income	-0.158*** [0.039]	-0.160*** [0.039]	-0.171*** (0.039)
	Married	1.284*** [0.103]	1.291*** [0.103]	1.309*** (0.103)
Health Status in 2001				
	Hypertension	--	-0.192* [0.113]	--
	Diabetes	--	-0.564*** [0.171]	--
	Asthma	--	-0.137 [0.353]	--
	lipid disorder	--	-0.226 [0.175]	--
	gastric acid disorder	--	-0.653* [0.369]	--
	thyroid disorder	--	0.202 [0.311]	--
	heart disease	--	-0.380** [0.157]	--
	# major chronic conditions	-0.303*** [0.067]	--	--
	medical expenditures			-0.021*** [0.006]
	drug expenditures			-0.216*** [0.033]

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes:

1. The sample includes 8815 primary beneficiaries enrolled in a PPO during 2001 and 2002
2. Heart disease is characterized as having either one of cardiac disease, CHF, angina or vascular disease.
3. Major chronic conditions include hypertension, diabetes, asthma, lipid disorder, gastric acid disorder, thyroid disorder or heart disease.

We also studied the plan choices of the 2001 POS enrollees. We restricted our analysis to primary beneficiaries only and defined the dependent variable as “1” if the enrollee switched to a PPO plan in 2002 and “0” if the enrollee remained in the POS plan (Table 8).

Table 8: Logit Estimation of Plan Choice in 2002 for POS members in 2001

Dependent variable: 1 if switch to a PPO in 2002, 0 if stay in the POS		(A)	(B)	(C)
		(logit)		
Demographics in 2002				
Age		0.184*** [0.018]	0.184*** [0.018]	0.187*** [0.018]
Male		0.154 [0.146]	0.182 [0.147]	0.093 [0.146]
Urban		0.342 [0.471]	0.356 [0.471]	0.361 [0.472]
Income		-0.180*** [0.054]	-0.181*** [0.054]	-0.177*** [0.054]
Married		0.801*** [0.128]	0.801*** [0.128]	0.801*** [0.128]
Health Status in 2001				
Hypertension		--	-0.333** [0.141]	--
Diabetes		--	-0.537** [0.231]	--
Asthma		--	0.569 [0.390]	--
lipid disorder		--	-0.332* [0.185]	--
gastric acid disorder		--	0.038 [0.402]	--
thyroid disorder		--	-0.3 [0.469]	--
heart disease		--	-0.668*** [0.213]	--
# major chronic conditions		-0.384*** [0.083]	--	--
medical expenditures				-0.011 [0.008]
drug expenditures				-0.235*** [0.043]

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

The sample includes 7612 primary beneficiaries enrolled in the POS during 2001

The results suggest that sicker individuals are less likely to switch from the POS to a PPO, regardless of how health status is measured. Further, as in Table 7, the results suggest that switching behavior is more sensitive to previous drug spending than previous medical spending (Panel C). Translated into elasticity terms, doubling prior medical spending decreases the probability of switching from 0.073 to 0.071, or just 2.7 percent, while doubling prior drug expenses decreases the probability of switching by 18 percent, to 0.06.³

Separating the Impact on Medical vs. Drug Generosity

Table 9 presents estimates from the conditional logit model of plan choice in 2002. The generosity of the medical and drug benefits influences plan choices for all individuals, even for those with no chronic conditions. The higher the effective coinsurance rate (medical and drug), the lower the probability that the plan will be chosen. Further, the impact of medical plan generosity on plan choice does not seem to vary with the number of chronic conditions. However, that's not the case for drug benefits. Beneficiaries with chronic conditions are more sensitive to the effective coinsurance rate of the drug benefit.

The Wald test statistic for the joint equality of the coefficients on medical coinsurance rate for the three chronic condition groups has a p-value of 0.61; thus we cannot reject the null hypothesis that the coefficients are equal. The corresponding test statistic for the coefficients on effective drug coinsurance rate has a p-value of 0.003; thus we can reject the null that the coefficients are equal. When we conduct only pair-wise comparisons of the corresponding coefficients on medical coinsurance rates (i.e. medical coinsurance rate interacted with zero chronic condition versus one chronic condition), all pair-wise comparisons fail to reject that the equality of coefficients are equal. On the other hand, we reject the equality on the coefficients of drug coinsurance rate for each pair-wise comparison.

Individual characteristics other than health status also seem to influence plan choice overall, although these are most likely capturing differences in premia across plans and differences in premium sensitivity across individuals. For example, members who are older, married, or from poorer areas (as measured by the median household income in the Zip-code of residence) seem more likely to choose a PPO plan as opposed to the POS plan. Also, there is significant inertia in plan choice. Individuals who chose the POS option in 2001 tended to stay with the POS option in 2002, and similarly for those enrolled in the PPO plan in 2001.

³ The POS enrollees in 2001 with 0 chronic conditions have medical expenses of \$2,995 and drug spending of \$1,016 on average. On the other hand, those with one chronic condition spent \$5,223 on medical care and \$1,914 on outpatient prescription drugs in 2001. Similar to the PPO sample, doubling medical or drug spending is analogous to adding a chronic condition.

Table 9: Conditional Logit Estimation of Plan Choice in 2002

Dependent Variable: Choice of one of the 4 Plans

	(A)		
	conditional logit		
Medical Coinsurance and Interactions with Previous Conditions			
MedCoins x No chronic condition	-7.716**		
	[3.447]		
MedCoins x 1 chronic condition	-8.222***		
	[2.966]		
MedCoins x 2 or more chronic conditions	-6.789***		
	[2.208]		
Rx Coinsurance and Interactions with Previous Conditions			
RxCoins x No chronic condition	-10.917**		
	[5.247]		
RxCoins x 1 chronic condition	-15.272***		
	[5.249]		
RxCoins x 2 or more chronic conditions	-23.122***		
	[4.693]		
Inertia	3.558***		
	[0.056]		
Plan is a PPO	-7.625***		
	[1.057]		
Demographics			
	PPO	PPO	PPO
	Low-Ded	Med-Ded	High-Ded
	(relative to POS)		
Age	0.162***	0.153***	0.163***
	[0.015]	[0.017]	[0.018]
Male	-0.015	0.203	0.403**
	[0.113]	[0.155]	[0.179]
Income	-0.099**	-0.285***	-0.351***
	[0.044]	[0.057]	[0.065]
Urban	0.233	0.254	0.226
	[0.380]	[0.464]	[0.502]
Married	0.344***	1.864***	1.655***
	[0.101]	[0.148]	[0.164]

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Inertia variable is an indicator for whether the Plan is the same type (PPO or POS) as beneficiary's plan in 2001

The sample includes 16553 primary beneficiaries enrolled both in 2001 and 2002

V. Predictions

To highlight the economic significance of our estimates, we predicted the impact on plan choice of changes in the generosity of the medical and drug benefits. First, we predicted choice probabilities under the status quo. Under alternate scenarios, we then decreased (1) the medical coinsurance rate by 10 percent; and (2) the drug coinsurance rate by 10%, holding all other plan attributes constant. The results are summarized in Table 10 and show the predicted probabilities of choosing the medium deductible PPO (Column A) and the high deductible PPO (Column B) under each scenario.

Under scenario 1, a 10% decrease in medical coinsurance rate increases the probability of choosing the medium deductible PPO by 31 to 32% for those with zero or one chronic condition and 16% for those with two or more chronic conditions. Similarly, a 10% decrease in the medical coinsurance rate of the high deductible PPO increases its probability of choice by 35 to 36% for those with 0 or 1 chronic condition and by 27% for those with two or more chronic conditions. Thus, it seems that plan choices of those with fewer chronic conditions are somewhat more responsive to changes in medical benefits. In contrast, changes in the drug coinsurance rate (scenario 2) lead to larger changes in plan choice for those with two or more chronic conditions. For example, a 10 percent decrease in the average drug coinsurance rate increases the probability of choosing the medium deductible PPO by 33% and the high deductible PPO by 38% among those with no chronic conditions. These effects are very similar to the elasticities with respect to the medical coinsurance rate. However, for those with two or more chronic conditions, a 10% decrease in the drug coinsurance rate leads to a 94% and 109% increase in plan choice probabilities for the medium and high deductible PPOs. These results clearly suggest that the plan choices of those in poor health are significantly more elastic to the generosity of the drug benefit than those in better health.

Table 10: Plan Choice Sensitivity to Medical Coinsurance and Rx Coinsurance

		Mean Probabilities of Plan Choice of Individuals with Different Number of Chronic Conditions					
		(A) Medium Deductible PPO Plan			(B) High Deductible PPO Plan		
		No Chronic Conditions	One Chronic Condition	At Least Two Chronic Conditions	No Chronic Conditions	One Chronic Condition	At Least Two Chronic Conditions
Status Quo		0.049	0.037	0.032	0.034	0.022	0.011
Scenario 1	Plan's own medical coinsurance decreases by 10% (holding benefit design of other plans constant)	0.064	0.049	0.037	0.046	0.03	0.014
	% Change from Status Quo	31	32	16	35	36	27
Scenario 2	Plan's own Rx coinsurance decreases by 10% (holding benefit design of other plans constant)	0.065	0.057	0.062	0.047	0.035	0.023
	% Change from Status Quo	33	54	94	38	59	109

To address this issue from a slightly different approach, we computed the relative effects of changes in drug and medical plan generosity, holding utility constant. As the medical coinsurance rate decreases, the drug coinsurance would have to increase to keep an individual at the same level utility level, holding all other factors constant. We totally differentiated equation (1), set $dU_{ij} = 0$, $dv_{ij} = 0$, and expressed the relationship between the *MedicalCoins* and *RxCoins* as

$$\frac{dRxCoins_{jk}}{dMedicalCoins_{jk}} = -\frac{\beta_k^{Med}}{\beta_k^{Rx}}.$$

We estimated that for an individual with no chronic conditions, a 10% decrease in the medical coinsurance rate in the high deductible PPO (from 0.44 to 0.40) would necessitate an 8.2% increase in the drug coinsurance rate (from 0.34 to 0.37) to keep plan choice probabilities constant. Further, the required increase in the drug coinsurance rate decreases as the number of chronic conditions increases. For example, the required increases (from 0.34) are 0.022 (6.5%) and 0.012 (3.5%) for individuals with one, and two or more chronic conditions, respectively. The results for the medium deductible PPO are qualitatively similar. These patterns suggest the generosity of the drug benefit is relatively more important than the generosity of the medical benefit for those in worse health and thus more susceptible to adverse selection.

VI. Conclusion

Consistent with most prior studies, we find that beneficiaries in better health are more likely to switch to less generous plans. However, our research differs from the current literature in that we attempt to separate the effects of medical and drug plan generosity on individual's choice of health plans. We find that while the generosity of the medical benefit is important in plan choice, it doesn't vary significantly by health risk. As such, it is unlikely to cause adverse selection. On the other hand, sicker individuals are more sensitive to the generosity of drug benefits and thus are more likely to choose plans with more generous drug coverage. This raises concerns for the viability of the new Medicare drug benefit (Part D), in which most beneficiaries can choose from 40 to 70 different plan options. Allowing beneficiaries to select from an array of plan options tailored to their expected demand could lead to adverse selection and undermine the stability of the program.

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