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## **Should Medicare Adopt the Veterans Health Administration Formulary?**

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**Abstract:** Since January 2006 all Medicare beneficiaries have been eligible to obtain outpatient prescription drug coverage through private stand-alone drug plans (PDPs). We estimate a model of beneficiary demand for PDPs and use it to compute the loss of consumer surplus due to tightening PDP formularies to the level found in the Veterans Health Administration (VA). Under a generous assumption of cost savings attributed to increased bargaining leverage associated with exclusion of more drugs from formularies, we find the loss in consumer surplus to be smaller than the financial savings that could be shared between Medicare and beneficiaries. According to our estimates, Medicare beneficiaries could be compensated for the loss in consumer surplus associated with tighter PDP formularies with the savings generated by such formularies.

## **I. Introduction**

Since January 2006 all Medicare beneficiaries have been eligible to obtain outpatient prescription drug coverage through private health plans. The drug program, known as Medicare Part D, made benefits available through HMOs and PPOs under the Medicare Advantage program (MA-PD plans). In addition, it includes new prescription drug plans (PDPs), which offer stand-alone drug coverage in multi-state regions. We estimate a model of beneficiary demand for PDPs and use it to compute the loss of consumer surplus due to tightening PDP formularies to the level found in the Veterans Health Administration (VA). Under a generous assumption of cost savings attributable to increased bargaining leverage associated with exclusion of more drugs from formularies, we find the welfare loss to be smaller than the savings that could be shared by Medicare and beneficiaries.

Our results are relevant to the debate over the rules that govern how Medicare plans purchase drugs. Medicare relies on private Part D plans not just to administer the drug benefit, but to negotiate drug prices with manufacturers, subject to a set of formulary design rules. A minimum of two drugs in each class must be included on formularies and six classes must include “all or substantially all” drugs on the market (CMS 2005a and 2005b).<sup>1</sup> Critics argue that Medicare’s reliance on private plans to negotiate drug prices leads to higher expenditures for beneficiaries and Medicare (Montgomery and Lee 2006, Families USA 2005). Others have pointed out that providing Medicare the authority to negotiate directly with manufacturers would not lead to price reductions on its own. To achieve savings, Medicare would also need the ability

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<sup>1</sup> Donohue, Huskamp, and Zuvekas (2009) reference a 2009 rule in the Federal Register (US Dept. of Health and Human Services 2009) that permits federal regulators to exempt Part D plans from the “all or substantially all” inclusion requirement.

to exclude drugs from its formulary (Congressional Budget Office 2007). This ability to tighten the formulary would provide the leverage to bargain for lower prices.

Medicare's inability to negotiate program-wide prices and tighten plan formularies is in stark contrast to another large public provider of prescription drug benefits, the Veterans Health Administration (VA), which negotiates directly with drug manufacturers. The VA has implemented a national formulary more restrictive than those of Medicare plans and obtains lower drug prices (Frakt, Pizer, Hendricks 2008).<sup>2</sup> Some have pointed to the VA's pharmacy benefit as a meritorious model, offering low cost and achieving high levels of adherence to drug therapies (Neuman et al. 2007).<sup>3</sup> Others have argued that the VA formulary is too restrictive (Chester and Valentino 2007), denying beneficiaries' access to potentially life-enhancing and life-extending drugs (Lichtenberg 2005). We take an empirical approach to this issue. Treating the observed beneficiary choices as accurate indications of the underlying utility of plan characteristics, we seek to answer the questions: If Medicare plans could implement VA-like formularies and obtain commensurately lower prices, how much could Medicare save? How much consumer surplus would beneficiaries lose from having fewer covered drug options? We apply a market-level discrete choice model introduced by Berry (1994) to estimate beneficiary demand for PDPs in 2007-2009 and the loss in consumer surplus associated with tightening PDP formularies to the VA level. Then, assuming PDPs could obtain the same drug price discounts as the VA, we compare the loss in consumer surplus to the savings to Medicare

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<sup>2</sup> The VA has access to discounted drug prices through: (1) the federal supply schedule, managed by the VA and available to all agencies; (2) a federal ceiling price (a.k.a. the "Big-4 Price"), mandated by law to be 24 percent lower than the nonfederal average price; (3) a restricted federal supply schedule available only to the VA; and (4) national contract prices that reflect further negotiated discounts from manufacturers. Finally, the VA may negotiate for additional discounts (United States Government Accountability Office 2005, Families USA 2005).

<sup>3</sup> Though there is considerable work relating drug adherence to out-of-pocket costs and other pharmacy benefits policies (e.g. Huskamp et al. 2003), we note that, to our knowledge, there is no published, empirical study on the relationship between adherence rates and degree of formulary restrictiveness.

and beneficiaries. We conclude that beneficiaries would lose less consumer surplus than the amount that could be saved, although the comparison is close enough to be sensitive to details of the calculation of potential savings.

The remainder of the paper is organized as follows. Section II reviews the relevant structure and characteristics of the PDP market, which justify some of our sampling and modeling choices. Section III develops the conceptual framework for our empirical model. Section IV describes the data and sample. Results are presented in Section V and a concluding discussion is found in Section VI.

## **II. Background**

PDPs are popular. The bulk (72 percent) of beneficiary enrollment in Part D plans is in PDPs (Cubanski and Neuman 2007). PDPs also have distinct features not shared by other Medicare plan types that dictate how demand for them should be estimated. This background section briefly describes the relevant features, beginning with the regional and organizational structure of the PDP market. Additional details can be found in Frakt and Pizer (2010).

PDPs operate in 34 multi-state regions and are offered by about 60 organizations. A company may offer up to three PDPs per region with varying benefit designs under a single contract with the Centers for Medicare and Medicaid Services (CMS). A single contract can serve one region or many. Thus, the PDP market has two principal dimensions of organization at the highest level: region and company. Within region or company or both, plans are organized by contracts. We will rely on the distinctions among the different levels of the PDP market hierarchy by region, company, contract, and plan to define the observations for the demand model.

Part D plans' benefits are highly subsidized. Most beneficiaries pay about 25 percent of the cost of coverage (Hoadley et al. 2007). The statutory minimum coverage includes a \$275 deductible

and a “coverage gap” (or “donut hole”), i.e., no coverage for drug spending between \$2,510 and \$5,726. Medicare beneficiaries who qualify for the low-income subsidy (LIS) program receive additional subsidies beyond those just described. In 2008 and 9.4 million beneficiaries enrolled in the LIS program (Hoadley, Hargrave, and Cubanski 2008) and paid little to no Part D premium or cost sharing. For this reason, we removed them by subtracting the number of LIS enrollees in each plan.

Medicare drug plan formularies have inclusion requirements. In particular, at least prior to 2009 they must include “all or substantially all” drugs in six categories,<sup>4</sup> making these categories open classes (CMS 2005a and 2005b). Since 2009 CMS can waive such requirements on a plan-by-plan basis (US Dept. of Health and Human Services 2009). Such open class requirements weaken the bargaining position of Part D plans with respect to drug manufacturers (McAdams and Schwartz 2007) and result in increased drug prices (Outtersson and Kesselheim 2009).

In contrast, the VA has no such requirement. Consequently, it has been argued that the VA’s formulary is more restrictive than those of Medicare drug plans (Yong 2007, The Galen Institute 2007), which we empirically verify. VA’s formulary policies are effective in driving prescribing patterns, achieving substantial price reductions from manufacturers, and dramatically decreasing drug spending (Huskamp et al. 2003).

VA drug prices have been estimated to be between 56 and 63 percent of those paid by Medicare, depending on methodology (Families USA 2007, Sikora and Shrivastava 2006, Shearer 2007, Nugent et al. 2004). In what follows we assume VA drug prices are 60 percent of those paid by Medicare plans. We also make the additional simplifying assumption that this discount applies to all costs (e.g. administration, advertising, and management of the benefit), not just to drug costs.

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<sup>4</sup> The six categories that must include “all or substantially all” drugs are antidepressant, antipsychotic, anticonvulsant, anticancer, immunosuppressant, and HIV/AIDS (McAdams and Schwartz 2007).

We acknowledge that this is a generous estimate of the savings associated with tightening Part D formularies to the level that exists in the VA, depending on how the policy change would be implemented.

### **III. Conceptual Framework**

Our conceptual model is the same as presented in Frakt and Pizer (2010). We assume that PDPs compete within regional markets for enrollees who do not have access to an employer-sponsored Medicare plan. We also assume that PDPs do not compete with MA plans. We believe this assumption is reasonable because MA plans are more highly subsidized than PDPs (Pizer, Frakt, and Feldman 2009). Thus, beneficiaries not averse to the network restrictions imposed by managed care organizations can obtain greater benefits (including drug benefits) at lower cost through an MA plan and are not likely to consider a PDP (Frakt and Pizer 2006).

Berry (1994) developed a framework to estimate market-level demand equations under imperfect competition in markets with product differentiation and (potentially) endogenous prices. The approaches under that framework include the mean utility logit model, the mean utility nested logit model, and the full random coefficients model (Berry, Levinsohn, and Pakes 1995). Of the three approaches, the random coefficients model is most flexible and permits the estimation of substitution effects sensitive to all observable product characteristics. The price for this flexibility is computational intensity. The nested logit model is computationally simpler but more restrictive than the random coefficients model, allowing substitution effects to be sensitive only to product characteristics that define nests or groups of products. Though the mean utility logit model is the most restrictive, modeling cross-price elasticities as functions of overall market shares, Frakt and Pizer (2010) showed empirically that this model is suitable for the PDP market. Following Berry (1994) and Frakt and Pizer (2010), we estimate the model:

$$\ln(s_{jr}/s_{0r}) = \alpha p_{jr} + \beta x_{jr} + \xi_{jr} . \quad (1)$$

where  $r$  indexes markets<sup>5</sup> and  $j$  indexes plans within markets;  $s_{jr}$  is the market share of plan  $j$  in market  $r$ ;  $s_{0r}$  is the market share for the composite “outside good,” purchased by those not enrolling in any plan;  $p_{jr}$  is plan out-of-pocket (OOP) premium;  $x_{jr}$  are observable plan characteristics; and  $\xi_{jr}$  are unobservable plan characteristics. If plan characteristics and premiums are exogenous then unbiased estimates of  $\alpha$  and  $\beta$  can be obtained by ordinary least squares (OLS) estimation of Equation (1). It is standard to assume plan characteristics,  $x_{jr}$ , are exogenous leaving only the possibility that premium is endogenous due to correlation with unobservable plan characteristics,  $\xi_{jr}$ . Recent market-level studies of demand for automobiles (Bresnahan 1987, Berry, Levinsohn and Pakes 1995), computers (Bresnahan et al. 1997), breakfast cereals (Nevo 2001), and Medicare HMOs (Town and Liu 2003) all assume exogenous product characteristics and endogenous prices and apply some form of instrumental variables approach.

Following the same reasoning, we tested for endogeneity of premiums in the PDP market but found that an instrumental variable approach was not required. Durbin and Wu-Hausman tests did not reject the hypothesis that premiums are exogenous. In conducting these tests we followed the methods of Hausman et al. (1994), Nevo (2001), and Town and Liu (2003) by including parent company fixed effects in the model and using premiums for products sold by the same company in other markets as instruments (see Frakt and Pizer 2010 for details).

Exogenous premiums are plausible given the relative simplicity of the PDP drug benefit. Our model includes the deductible, out-of-pocket costs per prescription fill, formulary generosity, the spending level that defines the boundary between pre-gap and gap coverage, as well as year,

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<sup>5</sup> In our data a market is defined by a unique year-PDP region pair.

company, and year-market fixed effects. That we cannot reject a test of premium exogeneity suggests that these factors sufficiently control for characteristics relevant to demand.

We assume that unobserved factors  $\epsilon_{rj}$  are independent across choices (also known as the independence of irrelevant alternatives or IIA assumption). The IIA assumption can be tested as suggested by Hausman and McFadden (1984), and, if IIA is rejected, more complex choice models like the nested logit or the random coefficients logit can be used (see Nevo 2000, Town and Liu 2003, Lucarelli, Prince, and Simon 2008). With a model that is similar to the one we present (though without formulary generosity variables and estimated with only one year of data), Frakt and Pizer (2010) showed that IIA holds for the PDP market so a more complex model is not warranted. As further described in the Results section below, we independently test our specification as well and also find that the IIA assumption cannot be rejected.

The estimated coefficients on premium ( $\alpha$ ) can be transformed into estimates of own-price elasticity,  $\eta_{jr}$  (Nevo 2000):

$$\eta_{jr} = \frac{\partial s_{jr}}{\partial p_{jr}} \frac{p_{jr}}{s_{jr}} = \alpha p_{jr} (1 - s_{jr}) . \quad (2)$$

A firm's own-price elasticity is related to its markup over marginal costs. However, in considering the markup it is important to distinguish between the price faced by the consumer (the OOP premium) and the total price of the product (which includes the government's payment). The markup relative to OOP price is the Lerner index,  $L_{jr}$  which is inversely proportional to own-price elasticity (Tirole 1995):

$$L_{jr} = \frac{p_{jr} + g_{jr} - c_{jr}}{p_{jr}} = -\frac{1}{\eta_{jr}} , \quad (3)$$

where  $g_{jr}$  and  $c_{jr}$  are the government payment to the plan and marginal cost incurred by the plan, respectively. Since the denominator of Equation (3) includes only the OOP premium and not the

full price of the product—which for PDPs is nearly four times the OOP premium—it inflates the plan’s markup relative to full price by a factor of about four. (As described in Section II, premiums are subsidized so that the government pays about three times that of the beneficiary.) Finally, estimated coefficients can be used to estimate changes in consumer surplus. As shown by McFadden (1981) (see also Town and Liu 2003, Lucarelli, Prince, and Simon 2008, Trajtenberg 1989, Small and Rosen 1981), annualized consumer surplus in market  $r$ ,  $CS_r$ , is given by:

$$CS_r = -\frac{12}{\alpha} \ln \left( \sum_j \exp(\alpha p_{jr} + \beta x_{jr} + \xi_{jr}) \right). \quad (4)$$

The number 12 in Equation (4) reflects the fact that we use a monthly premium. We use Equation (4) to compute baseline consumer surplus and consumer surplus under a policy change. That change is a reduction in PDP formulary generosity, which is operationalized as a change in the data for one of the variables in the model that characterizes that generosity (proportion of top 200 drugs covered by the formulary). The following expression makes explicit how we compute consumer surplus under a different policy regime (tildes ( $\sim$ ) represent changed values):

$$\widetilde{CS}_r = -\frac{12}{\alpha} \ln \left( \sum_j \exp(\alpha p_{jr} + \beta \widetilde{x}_{jr} + \xi_{jr}) \right). \quad (5)$$

Notice that the only change is to the plan characteristics,  $x_{jr}$ . In particular, the term  $\xi_{jr}$ , the residual from estimating Equation (1), is included in Equation (5) and is unchanged from Equation (4).

#### **IV. Data and Sample**

Our study focused on PDPs offered within the continental United States and the District of Columbia in 2007-2009. Since PDPs operate in multi-state regions, our unit of analysis is a year-region-plan. A “plan” is a unique product offered by a firm under a contract. Data were

obtained from CMS public use files and other public sources. Additional data necessary for the policy simulation were obtained from the Department of Veterans Affairs Pharmacy Benefits Management service.

Our starting point was the Prescription Drug Plan Formulary and Pharmacy Network Files (hereafter called the PHARM files) available from CMS.<sup>6</sup> These files include service area and benefits data for all Part D plans, and we restricted it to PDPs. As described in Section III, the potential market for PDP plans is all Medicare beneficiaries, less those with employer coverage, enrolled in an MA plan, or receiving LIS benefits. Counts of beneficiaries by state and those with employer coverage were obtained from CMS and aggregated to region.<sup>7</sup> We also obtained year-region-plan counts of LIS PDP enrollees and year-region counts of beneficiaries in MA plans from the CMS website.<sup>8</sup> We removed LIS enrollment from total enrollment in each plan.

Our specification uses year, company, and year-market fixed effects. Some companies offer so few region-plans that there is insufficient variation to include in the analysis. Such companies are dropped, as are a small number of observations for which a complete set of consistent data are not available and those for which enrollment is below 0.5% of the market.<sup>9</sup> Our final sample size is 4,207 year-region-plan observations or about 1,400 region-plans per year.

Three of our independent variables pertain to plan formulary and drug costs. The first is a formulary generosity measure: the logarithm of the proportion of the top 200 drugs included on each formulary. The proportion of the top 200 drugs covered was constructed by associating all

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<sup>6</sup> See [www.cms.gov/NonIdentifiableDataFiles/09\\_PrescriptionDrugPlanFormulary,PharmacyNetwork,andPricingInformationFiles.asp](http://www.cms.gov/NonIdentifiableDataFiles/09_PrescriptionDrugPlanFormulary,PharmacyNetwork,andPricingInformationFiles.asp).

<sup>7</sup> Enrollees in any plan receiving an employer subsidy, the Federal Employee Health Benefits program, or TRICARE (military health benefits) were considered covered by an employer-sponsored plan. Data were obtained from [www.cms.hhs.gov/PrescriptionDrugCovGenIn/](http://www.cms.hhs.gov/PrescriptionDrugCovGenIn/).

<sup>8</sup> See <http://www.cms.hhs.gov/MCRAdvPartDEnrolData/>.

<sup>9</sup> Plans with very small enrollment are not in the market in the same sense as larger plans. It has been customary in the literature to remove such small plans (Cawley, Chernew, and McLaughlin 2005). Results are not sensitive to this data cleaning step.

applicable national drug code (NDC) identifiers with each drug included in Pharmacy Times' list of the top 200 drugs by sales volume.<sup>10</sup> The NDCs were then matched to Part D and VA formulary data to determine which of those 200 drugs were included in each plan's formulary. Since there is no reason to believe that the relationship between formulary generosity and demand is uniform, we experimented with different functional forms of the top 200 drugs covered measure to find one that was robust to discrete segmentation specifications. For estimation, we could have used a discretely segmented function, but for the policy simulation it is convenient to have a continuous variable. Thus, if  $z$  is "proportion of top 200 drugs covered," we tested various  $f(z)$  to find one that did not produce significantly different coefficients when broken into segments. The logarithmic function satisfied this criterion. A linear function was not robust to segmentation but yielded qualitatively similar simulation results.

The two drug cost variables measure beneficiary out-of-pocket (OOP) costs for brand and generic drugs covered by each plan. The first is the mean cost sharing (prior to entering the donut hole), weighted by prescription volume, for the subset of the top 20 brand drugs covered by each plan (included in a plan's formulary). The second is the mean cost sharing (prior to entering the donut hole), again weighted by prescription volume of the top 10 generic drugs covered by each plan. These subsets of top brand and generic drugs were gleaned from the Pharmacy Times top drugs lists. Other variables are self-explanatory. Table 1 includes summary statistics for all variables included in the study. All dollar values were inflated to 2009 values using the CPI-U.

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<sup>10</sup> See <http://www.pharmacytimes.com/issue/pharmacy/2009/2009-05/RxFocusTop200Drugs-0509> .

<b>Table 1: Summary Statistics</b>				
Variable	Mean	Std. Dev.	Min.	Max.
Plan-level market share, $s_{jr}$ <sup>(a)</sup>	0.011	0.025	0.00	0.31
PDP-sector market share <sup>(a)</sup>	0.47	0.089	0.27	0.69
Monthly OOP premium	40.85	19.24	9.77	136.80
$\ln(s_{jr} / s_{0r})$ , the dependent variable	-5.53	2.11	-15.38	-0.21
Deductible	97.35	128.30	0.00	295.00
Initial coverage limit <sup>(b)</sup>	2550.14	120.67	2069.40	2700.00
Mean OOP cost of covered brand drugs	135.57	48.67	26.84	344.91
Mean OOP cost of covered generic drugs	4.82	2.71	0.00	11.96
$\ln(\text{proportion top 200 drugs covered})$	-0.16	0.078	-0.38	-0.072

Source: Authors' analysis of study data. N = 4,207 year-region-plan observations. Firm, year, and year-market fixed effects not shown. Dollars in 2009 constant dollars.

(a) The plan-level market share is year-region-plan's enrollment as a proportion of the total number of eligible beneficiaries in the year-region market. For a given year it is  $s_{jr}$  of Equation (1). The PDP-sector market share is the sum of all plan-level market shares within a year-region.

(b) The initial coverage limit is the total drug spending that defines the lower bound of the donut hole.

In our policy simulation, we reduced PDP formulary generosity (the proportion of the top 200 drugs covered) from current levels to that of the VA national formulary. We obtained the National Drug File from the VA website<sup>11</sup> and computed the proportion of top 200 drugs covered on the national VA formulary. In contrast to a mean percent covered of 85% for PDPs, the VA national formulary covers only 59% of the top 200 drugs. This is less generous than the minimum PDP coverage level of 68% (see Table 1). No other variables were adjusted in simulating the effect of implementing a VA-like formulary in Medicare Part D.

## V. Results

We estimated an OLS model of Equation (1) with year, company, and year-market fixed effects using Stata version 10. As noted in Section III above, we performed an IIA test with this

<sup>11</sup> <http://www.pbm.va.gov/NationalFormulary.aspx>

specification by dropping a plan that is available in all markets, similar to the test performed in Frakt and Pizer (2010) on a similar model. As did that of Frakt and Pizer (2010), our test overwhelmingly failed to reject IIA ( $\chi^2(118) = 111$ ; p-value = 0.67).

Estimated coefficients and related statistics are presented in Table 2. Signs on all coefficients are as one would expect: more generous coverage or lower cost sharing increases market share.

Other than for the mean brand OOP cost, all coefficients are statistically significant.

<b>Table 2: OLS Results, Dependent Variable <math>\ln(s_{jr} / s_{or})</math></b>				
Variable	Coef.	St. Err.	t	P >  t
Monthly OOP premium	-0.037	0.0019	-19.97	0.000
Deductible	-0.0033	0.00030	-11.07	0.000
Initial coverage limit	0.0014	0.00048	2.85	0.004
Mean OOP cost of covered brand drugs	-0.00082	0.0097	-0.85	0.395
Mean OOP cost of covered generic drugs	-0.16	0.015	-10.21	0.000
Ln(proportion top 200 drugs covered)	7.08	0.53	13.40	0.000
Source: Authors' analysis of study data. N = 4,207 year-region-plan observations. $R^2 = 0.40$ . Firm, year, and year-market fixed effects not shown. Durbin and Wu-Hausman tests do not reject exogenous premium hypothesis. Elasticity: -1.51 (2007: -1.41, 2008: -1.45, 2009: -1.67).				

Several other features are worth emphasizing. The first is that premium is exogenous so the OLS premium coefficient and associated elasticity estimates are unbiased. All are very similar to the results of Frakt and Pizer (2010), who estimated a similar model but with different independent variables and data for only 2007. In particular, their model did not include a measure of the proportion of drugs covered. In sensitivity tests we found that omitting that variable caused a rejection of the hypothesis that premium is exogenous.

We find a mean firm-level premium elasticity of -1.51 and within-year elasticities of -1.41 for 2007, -1.45 for 2008, and -1.67 for 2009. These are similar to the -1.45 value obtained in other work (Frakt and Pizer 2010). Our estimated elasticity is larger in absolute value than price elasticities estimated in other Medicare markets. In a welfare analysis of Medicare HMOs

offered between 1993 and 2000, Town and Liu (2003) estimated a firm-level premium elasticity of demand of -0.33. Atherly, Dowd, and Feldman (2004) estimated the Medicare HMO market premium elasticity of -0.12 using 1998 beneficiary-level data. Dowd, Feldman, and Coulam (2003) estimated a premium elasticity of -0.13 in the Medicare HMO market circa 1999 using county-level data.

That our premium elasticity is larger in magnitude than those estimated previously in the Medicare HMO market is not surprising. The PDP market has many firms due to the low fixed costs of entry. PDPs do not have to establish provider networks as Medicare HMOs or employer-sponsored plans do. Consequently, it is more likely that a beneficiary can find products suitable to his needs in the PDP market than in other health insurance markets (i.e., a lower degree of differentiation). Therefore, such a beneficiary is naturally more sensitive to price. In addition, PDPs are relatively new products, whereas HMOs have existed in Medicare for many years. If Medicare beneficiaries do not readily switch insurance products (i.e., demand is “sticky”) then one would expect greater price sensitivity for new products than for established ones.

We can translate our premium elasticity into a markup using Equation (3). However, as noted in Section III, Equation (3) inflates the markup by a factor of about four since PDPs receive roughly three-quarters of their revenue from Medicare and one-quarter from OOP premiums (as explained in Section II). Using our average elasticity estimate of -1.51 and Equation (3) and dividing by four, we compute the average markup to be 16.6% of the average total PDP premium revenue.

Focusing on the 2009 data only, we can compute consumer surplus from Equation (4) with the original data and with that data changed in some way via Equation (5). The change we consider is reducing the proportion of the top 200 drugs covered to the value in the VA, 0.59. Doing so

produces the consumer surplus per enrolled beneficiary shown in Table 3. The table also shows the total cost savings (to Medicare and beneficiaries) associated with the two regimes on a per-enrollee basis.

<b>Table 3: Annual Consumer Surplus and Costs Per Enrollee Under Two Policy Regimes (Standard Errors in Parentheses)</b>		
Baseline	VA Formulary	Difference
Consumer surplus: \$447 (\$5)	Consumer surplus: \$42 (\$0.44)	$\Delta$ Consumer Surplus: -\$405 (\$5)
Savings: \$0 (\$0)	Savings: \$510 (\$0)	$\Delta$ Savings: \$510 (\$0)
		Net (= $\Delta$ CS + $\Delta$ Savings): \$105 (\$5)
Source: Authors' analysis of study data. The VA formulary covers 59% of the top 200 drugs. Standard errors in parentheses computed by the delta method (Oehlert 1992).		

The savings associated with the VA formulary were computed as follows. VA drug costs are 40% below those of Medicare PDPs (Frakt, Pizer, Hendricks 2008). From the 2009 Medicare Trustees Report,<sup>12</sup> PDPs cost Medicare \$950 per non-LIS beneficiary in 2009 (including costs of subsidization, reinsurance, and risk-sharing). Because the benefit is subsidized by the government at a 74.5% rate, the total cost (Medicare + beneficiary) per non-LIS beneficiary is \$1,275 (= \$950/74.5%). Thus, assuming that Medicare plans could reduce all costs by 40% by switching to VA-like formularies, the program could save as much as  $0.4 \times \$1,275 = \$510$  per non-LIS enrollee per year. Our estimate is very similar to the median \$484 per person one obtained by Gellad et al. (2008) who considered a shift from current Part D drug prices to the lower ones available through the Federal Supply Schedule.<sup>13</sup> If such savings could be achieved for all 27 million Part D enrollees, the total savings would be about \$14 billion per year. Since the change in consumer surplus (\$405) is less than the potential savings (\$510), beneficiaries could be made whole after the policy change by distributing the savings back to them as an income transfer. There are, of course, other ways to use the savings (paying down the

<sup>12</sup> <https://www.cms.gov/ReportsTrustFunds/downloads/tr2009.pdf>

<sup>13</sup> The Federal Supply Schedule is a price list applicable for drug purchases by federal agencies, including the VA.

national debt and broad tax cuts, among others). If the government contribution to PDP plan premiums was held constant then one would expect the OOP premium for the  $j$ -th plan in the  $r$ -th market to fall by  $(1 - L_{jr})^{-1}$  for a unit change in cost where  $L_{jr}$  is the Lerner index given by Equation (3). However, if the government contribution was cut by an amount equal to the savings in costs then premiums would not change.

Another option is that the government could mandate lower copayments and subsidize plans further to compensate. One consequence is that fewer enrollees would enter the coverage gap, which itself could increase consumer surplus. We note that there is already a direct effect on consumer surplus from the way in which formulary generosity interacts with donut hole coverage. In our approach, differences in PDP formulary generosity shift demand, reflecting preferences for more choices combined with effects of formulary design on donut hole timing and perhaps other effects. In other words, donut hole entry timing is already incorporated in the model but the effect cannot be separated from other demand effects of formulary design.

## **VI. Discussion**

This study builds on earlier work on beneficiary price sensitivity in the market for stand-alone Medicare prescription drug plans (Frakt and Pizer 2010). Compared with that work, we expanded the range of years studied, improved the set of control variables, and computed the change in consumer surplus and cost associated with a reduction in plan formulary generosity. Whereas prior work in this area required an IV estimate of the OOP premium, in this paper our set of control variables proved rich enough that, conditioning on them, premiums were exogenous. The key variable that made the difference was formulary generosity (proportion of top 200 drugs covered). We estimated a premium elasticity estimate of -1.51, close to previous ones estimated for PDPs (Frakt and Pizer 2010) and larger than other estimates found in the

literature for enrollment in Medicare HMOs, which are in the  $[-0.33, -0.12]$  range. This value for the premium elasticity is consistent with the nature of the PDP market. Specifically, fixed costs of entry and product differentiation are lower than in the market for comprehensive insurance, and beneficiaries have a choice among approximately 55 plans (depending on region).

Additionally, PDPs are relatively new products, and beneficiaries may not have yet established strong ties to specific plans. Hence, beneficiaries are more sensitive to PDP premiums than to premiums for other private Medicare plans.

In a welfare analysis of reducing the generosity of PDP formularies to the level offered in the VA (and assuming the same rate of savings), we found that the savings were slightly larger than the loss of consumer surplus. The difference is small enough that we interpret the results with caution. They do not necessarily indicate that implementation of a VA-like formulary in Part D would be beneficial. First, if Medicare could not achieve cost savings as high as our estimates the loss of consumer surplus could outweigh the savings. Whether Medicare plans could receive a 40% discount over current prices, as the VA does, depends on the details of the policy change. Politics aside, there is nothing to prevent a change in the law that would permit Medicare to receive the same discounts the VA does. More realistically, such a deep discount in Medicare drug prices is unlikely, and it is possible that consumer surplus loss would exceed the savings. The change in consumer surplus we estimated might be too big if beneficiaries have imperfect information that leads them to believe that their drugs must be on the formulary, perhaps not realizing that substitutes are available. It is possible that beneficiaries value these drugs more highly than their actual health benefits would justify. On the other hand, the change might be too small if beneficiaries don't realize that some drugs should be on the formulary but are not. Newer drugs typically excluded by the VA formulary might have benefits not reflected in beneficiaries'

choices (Lichtenberg 2005). Another reason the welfare loss estimate may be too small is that beneficiaries may not build negative externalities into their demand for PDPs. Our estimates may not capture the cost of a restrictive formulary that spills over to higher utilization of Part A and B services. All in all, our results are a first step in quantifying the welfare effect of a more restrictive Medicare formulary.

As with any study, ours has several limitations. First, we did not account for the possibility of switching to an MA-PD plan. In future work we hope to model enrollment in MA-PD and PDP plans. The major challenge in doing so is that MA-PDs offer non-drug benefits and PDPs do not. Reconciling this substantial difference between the two product types in one model is a significant obstacle. A second limitation is that our model does not include variables that measure cost sharing in the donut hole. We experimented with such variables and found that there was insufficient identifying variation.

Finally, our policy simulation—implementing a VA-like formulary in Part D—is outside the range of our data. Formulary generosity, measured by the top 200 drugs covered, ranges from [0.68, 0.93] in our data with a mean of 0.85. The VA’s formulary has a generosity of 0.59, which is less than the least generous plan in our data. For this reason, cautious interpretation of the estimated welfare change is warranted.

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