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ABSTRACT

Medicare's Part D offers heavily subsidized new drug coverage to 22.5 million seniors to date, of whom 16.5 million are in stand-alone drug plans (Department of Health and Human Services, 2006). The government delegated the delivery of the benefit to private insurance companies arguing that market incentives would lead them to provide coverage at the lowest price possible. The massive entry of plans and the large variety of actuarial designs and formularies offered make it complicated to assess how insurers set premiums during this first year of the program. This paper presents the first econometric evidence on whether premiums in the stand-alone drug plan markets are driven by the relevant factors predicted by insurance theory. Using data gathered from the Centers for Medicare and Medicaid Services, we measure a plan's generosity as the simulated out of pocket payments for different sets of drugs. We also identify the listed full drug prices by each insurer and merge these with other plan and geographical characteristics to test predictions about how insurers set premiums. We find evidence that a) the number of insurers in a market is big enough such that it does not appear to influence premiums, b) the full drug prices listed appear to be reflected to some degree in the premiums charged c) plan characteristics such as the provision of extra coverage are reflected in higher premiums, but overall there is a weak relationship between premiums and simulated out of pocket payments for different sets of drugs d) the institutional setting and regional market characteristics affect the firms' bidding behavior and their resulting premiums. Insurers appear to have responded strongly to program incentives such as the automatic enrollment of dual Medicaid-Medicare beneficiaries into low cost plans. As data for 2007 are made available, it will be important to see if plans follow similar pricing strategies in subsequent years of this program.

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1. Introduction

The 2003 Medicare Modernization Act (MMA) created a new market for prescription drug coverage in which premiums are heavily subsidized. The subsidy was a key feature in attracting private insurers to participate, as it is unlikely that an unsubsidized stand-alone prescription drug benefit for the elderly would survive due to adverse selection (Pauly and Zeng ,2003). Medicare beneficiaries have the option of adding a stand-alone drug plan to their Fee-for-Service Medicare services, or joining a county-level private-sector comprehensive Medicare Advantage plan that includes prescription drug coverage as well as other Medicare services through a managed care insurer. CMS also provides subsidy of 28% of the total drug cost to employers that continue to offer drug coverage to their retirees to discourage "crowd-out".[4]

The market is still in its infancy, but there is much public concern about how it is functioning. This paper focuses on the stand alone plans, which have enrolled 16.5 million of the 22.5 million Part D enrollees. A total of 1,429 different insurance plans owned by approximately 70 different companies are available in 34 regions into which the country is divided. MMA sets standards for plan design and for oversight in a competitive bidding process to determine premiums, but plans have considerable freedom. There is substantial variation in the premiums charged, and in the design of the benefits, but no systematic econometric analysis has investigated how premiums are affected by benefit design or market factors. While certain features of plan design such as the deductible are evident when plans are selected by consumers (and are observable in a summary file released by CMS), plans can differ in other aspects such as prices negotiated with pharmaceutical companies and the co-payments required from the beneficiaries for different drugs. These are attributes researchers and consumers can only observe through web queries and an examination of the plan's formulary (Hoadley et al, 2006).[5] An analysis of the premium setting behavior of Part D plans without taking into

[4] A comprehensive explanation of the implementation of the MMA can be found in Hoadley (2006), Gold (2006a,b) and MedPAC (2005, 2006), and in the H.R. 1 act itself (U.S. Congress, 2003)

[5] There are two important caveats regarding the posted full prices. One is that insurer/PBM negotiations with pharmacies/ manufacturers will be reflected in drug prices as well as rebates, and we are unable to observe rebates. Second, it appears that insurers sometimes did not report a full price of a drug to CMS, and in these cases CMS imputed the prices with average wholesale prices. It is not known to what extent this was done, nor does CMS officially acknowledge this, but to the extent that this happens, one should be cautious in interpreting the results of this variable. (Personal communication with Jack Hoadley, August 2006). A formulary file is available for purchase from CMS, but does not list prices.

account these prices, formulary design and cost-sharing details would be potentially misleading if insurers are relatively more generous in setting visible plan features. We obtained data on less visible plan features (drug prices, formulary design and cost sharing) for each PDP plan by repeatedly querying the plan finder tool implemented by Medicare, for ten sets of drugs. We processed the source code of each resulting web page to create a database of plan attributes to supplement data provided by CMS in data sets.

In addition to the importance of plan characteristics in determining premiums, the institutional setting also created certain incentives that may have influenced plan behavior. For example, insurers were concerned about low enrollment, and knew that being designated by CMS as a "low income subsidy" (LIS) eligible plan would guarantee automatic enrollment of the dual Medicaid-Medicare eligible population. In our analysis we take into account the institutional details as well as the regional attributes that may affect plans' behavior, making this another contribution of our paper.

We proceed by first describing the institutions governing this market and then surveying the budding literature on this topic. We then describe our hypotheses, and the data used to test them. We conclude with a discussion of the results and what they tell us about insurer premium setting in this first year of the program.

2. The Medicare Part D Market

Medicare Part D was signed into law as part of MMA 2003 and went into effect in January 2006. Unlike the Hospital Insurance (Part A) and the Supplemental Medical Insurance (Part B), the delivery of the new benefit has been completely entrusted to the private sector. Private companies can provide the new benefit as either stand-alone plans, called Prescription Drug Plans (PDPs), or they can offer it together with Parts A and B as Medicare Advantage plans (MA-PDs).[6] Medicare beneficiaries can enroll in these plans by paying a subsidized premium. Open enrollment took place from November 15th 2005 to May 15th 2006, during which time the elderly could make decisions about participating in this market. Although MMA specifies a standard drug benefit, the law allows deviations from that design as long as the modified plans are actuarially equivalent to the

[6] Before the enactment of MMA, private plans could also provide the benefits of Parts A and B of Medicare as Part C, later named Medicare+Choice. However, the benefits of Parts A and B have been delivered mainly through the traditional fee-for-service Medicare, with private plans accounting for 15% of the total Medicare enrollees in 2000 and 12% in 2005. (Kaiser Family Foundation, 2005)

standard benefit.[7] Beneficiaries are locked in to their current plan for a full year, but are allowed to switch plans each open enrollment period at a premium that is community rated.

The standard drug benefit design specified in MMA for year 2006 comprises a deductible of $250 and three coverage zones where the fraction of the additional drug dollar covered by the insurer varies substantially. Figure 1 shows how out of pocket drug expenses vary with total drug spending in the different coverage zones of the plan. After the deductible is exhausted, the elderly are covered 75% for the next $2,000 spent in total prescription drug expenditure (initial coverage zone, ICZ), [8] 0% between $2,250 and $5,100 (so the next $2,850) of total drug expenditure, the infamous doughnut hole zone, and 95% after the $5,100 threshold (catastrophic coverage zone). Thus, at the point that catastrophic coverage begins, the beneficiary has spent $3,600 out of pocket ($250 in zone 1, $500 in zone 2, and $2,850 in region 3). Beneficiaries may buy their drugs at pharmacies (the insurer may have a network of preferred pharmacies, outside of which cost sharing is higher), and the plan may also allow the use of mail order purchasing which may often be cheaper. Plans are allowed to use utilization controls such as prior authorization, quantity limits[9] and step therapy for drugs (Hoadley, 2005). Formularies can be closed (allowed to exclude any payment for certain drugs) or open in the sense that all drugs are covered by not on the same terms. Formularies are reviewed by CMS to ensure that there are no egregious attempts to discriminate against certain illnesses, that all drugs in certain classes are covered, and to make sure that at least two drugs from each class are included on the formulary, but it is not known to what extent these rules were enforced.[10]

Insurance companies can deviate in plan design from the standard benefit described above and offer a variety of plans as long as they satisfy certain requirements.[11] For example, an insurer can offer plans with lower or no deductibles and higher

[7] To the extent that the plan is more generous in actuarial terms than the standard benefit, the additional premium associated with the extra coverage is not subsidized by CMS.
[8] Recall that spending on drugs not on the formulary does not count towards this $2,000 or any other amounts.
[9] To clarify, a quantity limit does not mean that there is a maximum amount of the drug that can be dispensed for the year. A quantity limit is the maximum amount that can be dispensed at one time.
[10] CMS asked US Pharmacopeia to develop a new set of classes for this specific purpose (Hoadley, 2005).
[11] These are a) they should provide the same catastrophic coverage as the standard benefit (same cost sharing rule of 5% and same threshold of $3,600 in true out of pocket expenses) b) the deductible should not be higher than the standard benefit's deductible of $250 c) assure actuarial equivalency of i) the value of total coverage (eg if they remove the deductible, the cost sharing in the initial coverage zone should be set higher than 25%), ii) cannot increase the threshold at which the 3rd coverage zone ends (the end of the donut hole) and iii) cannot change the threshold at which the 3rd coverage zone starts (start of the donut hole). These details are contained in the 2003 MMA

coinsurance rates for the initial coverage zone, or offer plans with tiered cost sharing in the initial coverage level as long as the tiered structure is equivalent to the standard 25% coinsurance rate.[12] Private insurers have taken advantage of the ability to offer modified plans and only nine percent of the 2006 plans have the standard benefit design. In addition to benefit designs that are identical or actuarially equivalent to the standard benefit, insurance companies can also offer enhanced plans, i.e., coverage that is more generous than the standard benefit. In fact, firms could design up to three benefit packages per region, as long as one of them was standard or actuarially equivalent to a standard plan (Hoadley et al, 2006).[13]

To implement the new Medicare benefit, the country was divided into 34 regions in the case of PDPs and 26 regions in the case of MA-PDs (see Figure 1 from CMS for a map of the PDP regions).[14] To participate in these markets, the insurance companies submit bids (separate bids for each region, even if they design just one plan to be offered nationally) stating their expected cost per beneficiary of providing the basic drug coverage. The expected cost is calculated with the understanding that CMS (and not the individual insurer) is responsible for 80% of drug costs that are incurred in the catastrophic zone.[15] This is required by MMA 2003, and is referred to as the reinsurance feature of Part D which lessens fears of adverse selection among private insurers.[16] CMS will also ask plans to separately inform them of the cost of covering an individual if CMS were to not provide this reinsurance, in order to asses the total amount by which CMS subsidizes the coverage. This reporting is also required by MMA to make sure that CMS's total subsidy to Part D (which includes the subsidy through reinsurance and the 'direct subsidy' paid prospectively to the insurer) on average comes to 74.5% of the total cost of providing this new coverage.

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[12] For example, a company cannot offer a plan with higher initial coverage limit higher than $2,250 (in 2006) that has a higher co-insurance rate above the deductible since this would violate condition iii) in footnote 11.

[13] However, the costs of the extra benefit will not be subsidized by the government, and therefore, the beneficiaries will have to pay an additional premium at the market rate. Enhanced plans must submit separate bids, in which it is made clear what portion of the plan is standard and what part is additional. On average, the monthly premium for enhanced benefits is $10 higher per month than the premium for basic coverage (standard or modified). An example of enhanced benefits would be provision of coverage within the doughnut hole. It is also important to note that such coverage is considered additional to the standard Part D benefit and will not count towards reaching the catastrophic coverage threshold.

[14] The regions are composed of one or more states, and were set by the government at the beginning of year 2005. The regions were established to meet the MMA requirement of having no fewer than 10 and no more than 50 regions in all, and to maximize the availability of plans to eligible individuals regardless of health status, with particular attention to rural areas. Most (25) PDP regions consist of one state, six consist of two states pooled together, one consists of three states, one consists of four states, and one consists of seven states.

[15] This means that only 15% of the catastrophic cost will be paid by the insurance company as the remaining 5% is the beneficiary's liability by the plan design.

[16] MMA also calls for 'risk corridors' (which will be explained later) to further reduce adverse selection fears and incentives to cream skim.

The bidding process was such that CMS set a plan's premium according to how much that plan's bid was above or below the national average bid. Under certain assumptions, the plan's bid is simply a constant dollar amount above their premium so that analyzing premiums is tantamount to analyzing bids. Plans were also insulated to a large degree from losses (and profits) by reinsurance (CMS would pay for 80% of the catastrophic costs), rate adjustment based on observed risk characteristics of those who enrolled, and risk corridors (CMS guaranteed protection from losses and denied plans the ability to keep substantial profits). Appendix 1 contains a discussion regarding the mechanical setting of plan premiums and these risk reduction mechanisms. Plans also understood the subsidies to low-income beneficiaries (which would reduce price elasticity of demand) and that dual Medicaid-Medicare beneficiaries would automatically be enrolled in plans that met a certain threshold for premiums regionally. Appendix 2 details these special provisions for low-income beneficiaries.

3. Hypotheses

Premium setting of PDP plans during the first year is worth studying for several reasons. First, insurers could be testing out the water in this unfamiliar market and may price in idiosyncratic ways that will differ from their long run strategy. Humana is the clearest example of this; their Vice President and Chief Actuary has publicly announced that their strategy is to offer generous benefits at a low cost the first year to maximize enrollment and transfer customers to their MA products in the long run (Bertko, 2005). Thus, we expect to find a strong insurer specific component to the bids even after controlling for all other observable features.[17]

Second, we test whether the number of competitors in a market influences an insurer's bid. Given that each market had over 10 insurers participating, it is likely that the threshold has passed beyond which the number of competitors will affect the premiums (Bresnahan and Reiss, 1991). However, this assumes that the insurers knew ahead of time how many competitors they would face in a market. Insurers were asked to file intentions to participate in bidding prior to submitting bids, and although CMS revealed the total number of insurers who expressed interest, they did not break it down

[17] Note that empirically we will not be able to disentangle price differences that result from a strategy such as one that deliberately undercut prices from those that result due to unobservable differences such as reputation of the insurer.

by region. Insurers may still have gained good knowledge, eg through press releases from insurers, that they would face a substantial degree of competition in each market.

Other market characteristics we predict will influence bid amounts include the expected usage in a region (with premiums being lower in areas where drug use is relatively lower),[18] the fraction of the population that will receive low-income subsidies above the Medicaid level (expecting that premiums will be higher in these regions if this implies lower price elasticity of demand), the fraction of the population on Medicare Advantage plans in 2005, and the size of the market (whose effect is unclear; for plans that are national or near national, the size of the market in a particular region may not be the relevant measure for economies of scale if price negotiations with pharmacies through PBMs happen at a national level. On the other hand, larger markets may mean lower marketing costs per covered life). The share of the market that is in Medicare Advantage is also likely to be relevant to PDP pricing decisions. If higher MA enrollment suggests that the remaining market is negatively selected on health,[19] we expect premiums to rise with MA market share. On the other hand, to the extent that the same insurers are present in the MA market, they may price lower to attract beneficiaries they hope to later enroll in their MMA products which they may consider more profitable, and also may have lower prices because of lowered marketing costs.[20] Thus, our theoretical prediction of the effect of MA market share is ambiguous.[21]

Third, we test the extent to which the premiums reflect plan features related to their generosity. The main factor that should drive premiums in a competitive insurance

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[18] Average monthly premiums in 2006 varied from $31.76 in Region 32 (California) to $41.62 in Region 21 (Louisiana) (See Appendix Table A4). At the same time, geographical variation in health care use in general is large (e.g. Wennberg, Fisher, and Skinner, 2002). Although the Pharmaceutical Care Management Association (PCMA, the trade association for Pharmacy Benefit Managers {PBMs} who help insurers implement formularies) argues that eliminating unnecessary geographical variation in utilization is one of the goals of including cost-control measures in Part D formularies,[18] we expect that at least in the short run, these geographical differences will persist and be built into premiums. (The President of PCMA is reported saying this in a news release May 15th 2006 in response to a Dartmouth Atlas report (http://releases.usnewswire.com/GetRelease.asp?id=65876)) The Dartmouth Atlas of Health Care in Michigan finds substantial small-area variation in prescription drug use among a population enrolled in the Michigan Blue Cross Blue Shield Plan (Wennberg and Wennberg, 2006). Under the assumption that similar variation exists across states and regions, we expect that regions with higher utilization of drugs will see higher premiums. To the extent that seniors are constrained in their drug use because of the lack of drug coverage prior to MMA 2003, this would be an underestimate of the differences in regional utilization that would surface under Part D. In that case, measures of the health status of different regions would be more indicative of the differences in usage that would occur once MMA covered drugs. Insurers used sophisticated models and expert actuarial services to forecast costs in the bidding process, thus the measures used here to test theories should only be considered approximations to shed light on pricing strategies.

[19] See for example Riley et al. (1994), Morgan et al. (1997), Brown et al. (1993) who find evidence of favorable selection; however other papers such as Dowd et al (1995) and Rogers and Smith (1995) do not.

[20] If Part D is marketed through the same channels as Medigap plans, the insurer's presence in the Medigap market may be the most important variable for the marketing costs story.

[21] We do have access to a 2006 MA market share measure, which is measured at the parent organization level and nationally. Ideally, we would have liked to use a measure that is predetermined (i.e. not from 2006) and which varies by region too. We use the 2006 MA market share variable in some specification to see if pricing differed by MA market share of the PDP insurers.

market is the expected payout, which is the risk of a claim multiplied by the amount of coverage in the event of a claim, plus some loading cost. Medicare Part D could be viewed partly as an insurance plan and partly as a simple subsidy as customers are asked to select plans based on drugs they already take, and because of the high persistence of drug use in this population (Coulson and Stuart, 1992). Thus, our first prediction from a textbook model of premium determination is that increases in the generosity of the plan will increase the premium.[22] This includes the extent to which plan formularies are inclusive, the extent to which they apply tools of utilization management such as prior authorization,[23] whether they cover drugs during the doughnut hole zone. We also measure the generosity of a plan as the total out of pocket costs associated with certain sets of drugs. We aim to create a full picture of the plan's formulary and cost sharing structure in parsimonious ways.

Fourth, we test whether incentives created by program rules, such as the reward for low-premium plans in terms of automatic conferment of dual Medicaid-Medicare enrollees with no marketing costs incurred, influenced the design of plans. This assumes that plans used a strategy of deciding ahead of time whether (and which plan) they would pitch as a low premium plan that would qualify for LIS status (by equation A.3. in the appendix) and that they knew what approximate benchmarks to anticipate. To the extent there is uncertainty on the part of plans as to the premium needed to qualify for LIS status, these estimates should be viewed with caution as this may simply capture the fact that this plan has a negative residual.

Thus, premiums are expected to be a function of plan characteristics, some of which are observable to the econometrician (X_i) unobservable plan characteristics (ε) and region-specific attributes (X_j)

[1] $$Pij = f(Xi, Xj, \varepsilon)$$

There are many other unobservable firm characteristics that remain unmeasured. Some firms are likely to have a competitive edge, because of experience and data gathered from offering a drug discount card prior to 2006 (Gold, 2006). Prior experience in the MA market should also have helped, as would having strategic partnerships with

[22] This abstracts from possible moral hazard and adverse selection that could occur as plans are more or less generous. MMA's risk adjustment reduces the fear of adverse selection in theory, but it nevertheless possible that part of the reason that premiums would rise with generosity is due to adverse selection and moral hazard.

[23] But this does not tell us the extent to which these utilization tools were enforced. We cautiously use a measure of complaints about the plan as indicative of how much these measures were used.

marketing channels, advertising direct to consumers, or negotiating power with pharmacy networks through PBMs. If the different firms and plans owned by the same parent companies have access to the same marketing channels etc, the error structure may be correlated across these observations. We account for this by seeing if our results are robust to clustering the standard errors at the parent organization level. We also see if our results are sensitive to clustering at the formulary level or the plan name level. Some insurers use the same formulary across all their products, while others vary them over products and regions. A formulary (list of drugs for which insurer will cover expenses at all) does not imply the same cost sharing necessarily- for example we found instances of differences in cost sharing amounts for the same drugs even when plans shared the same formulary. A unique plan name that appears in different regions could also share unmeasured characteristics (in addition to measured characteristics which we include in the regression). Last, we use parent-organization fixed effects to capture all unobservable parent organization characteristics and inform us about how insurers set premiums among their different plan options. This also tests our first hypothesis about the existence of large fixed insurer components to the bids.

4. Literature Review

The deep interest in this topic has produced a number of descriptive papers already taking advantage of data available through CMS. MedPAC (2005, 2006) contain excellent chapters that together with the original legislation (US Congress, 2003) provide a thorough background on Medicare Part D's introduction. Several papers present a first look at the premiums and plan features by region. Among these are Frakt and Pizer (2006), Gold (2006b), and MedPAC (2005 and 2006). Gold (2006a) also considers the history and strategic positions of the participating insurers. Gold (2006a) and Hoadley et al (2006) point out that of all PDP plans, most are being offered by 10 national parent entities (they have a plan in each of the 34 regions) and four near-national ones (they have a plan in at least 30 but fewer than 34 regions), so the market is more concentrated in terms of the players than it first seems.

Hoadley et al (2006) provide a very detailed comparison of the formularies and out of pocket medication costs of the largest 14 insurers at the drug level for the lowest premium plan they offer. They consider the formulary treatment of a large number of

brand name and generic drugs by different insurers and plans. They find that across plans, there are substantial differences in whether drugs are placed on the formulary at all, and in the treatment given to ones on the formulary (eg in terms of cost sharing, and whether utilization management tools are used). They find that the most commonly used cost sharing arrangement among the plans studied is a three- tier system with copays around $5/$25/$53 for generic, preferred brand and non preferred brand. Some plans also have a separate tier for 'specialty drugs' which are biotechnical drugs etc. CMS issued guidelines stating that plans must cover two drugs in each drug category, at least one of each key drug type, and required all drugs be on the formulary in 6 specific classes (anticonvulsants, antidepressants, antineoplastics, antipsychotics, antiretrovirals, and immune suppressants) (Hoadley et al 2006). But this does not restrict the prices charged. Plans were also allowed to design a classification system that differed from the one CMS used and were allowed to request exceptions to these coverage requirements; it is not known how much these were used.

One point to keep in mind here and in the out of pocket simulations conducted in this paper is that the true impact of differences in drug prices and cost sharing across plans may be smaller than measured to the extent that beneficiaries work with their physicians to find drugs that are cheaper on their plan's terms but are just as effective in treating their condition-or to the extent that patients succeed in requesting that drugs they take be covered or moved to a lower cost sharing tier. Similarly, the actual stringency of step therapy approvals and prior authorization requests are not known, and would tend to reduce the generosity of the plan.

Some organizations have issued additional reports recently, including the Kaiser Foundation in July 2006 on the extent to which Medicare Part D plans covers HIV medications (Kaiser Family Foundation, 2006),[24] and the Lewin Group in April 2006 on the coverage of chronic conditions medications in different PDP plans (Lewin, 2006).

There are several relevant papers that have anticipated the effects of Part D, e.g. Stuart et al (2005) looks at how the benefit structure creates a 'rollercoaster' in drug coverage during a year, Yang et.al (2004), Lucarelli (2006), Shang (2006) and Pizer et al (2006) study how beneficiaries' behavior and outcomes are likely to change in response

[24] The Kaiser Foundation website also contains a tool that allows one to look at the distribution of premiums within a region, among other things.

to the enhanced availability of drug coverage. But, to our knowledge, there is no systematic analysis yet of actual Part D plan premiums.

5. Methods and Data

Our paper will test the hypotheses above using data on premiums and plan characteristics of plans offered during 2006. The CMS Landscape file contains basic characteristics of each plan (premium, deductible, coverage during the gap, number of top 100 drugs that are on the plan's formulary or not etc), [25] but there are many other ways in which plans may differ in generosity. Notably, the Landscape file does not tell us about the prices of drugs faced by consumers under different plans. There is wide variation in this regard as already shown in Hoadley et al (2006). These are the characteristics of plans that are likely to be most relevant to consumers as they determine out of pocket expenses.

Our strategy in measuring plan generosity is to simulate out of pocket drug expenses (not counting the premium) annually, as well as just under the initial coverage zone (ICZ), for beneficiaries taking 10 hypothetical sets of drugs. They are not meant to be representative of what any given beneficiary actually consumes, but rather these lists contain the most widely used drugs, as well as drugs that are important for other reasons explained in Hoadley et al (2006), thus would give us a good sense of the generosity of a certain plan relative to others. We conduct this exercise for each of the 1,429 plans using the plan finder tool on the CMS website.[26] Ideally, we would want to see how the plan treated the universe of all drugs. This is not feasible (the CMS plan finder tools allows a maximum of 25 drugs at one time, and there tens of thousands of different drugs available through Part D), nor would that be desirable, as simulating the out of pocket costs involves pushing the person into the catastrophic region when the number of drugs taken is large. Thus, to balance the desire to include as many drugs as possible but not to give undue weight to catastrophic coverage features of a plan, we created different drug lists that contained all the top 100 drugs among seniors as defined by CMS, [27] all the top

[25] This is available for download from [http://www.medicare.gov/medicarereform/map.asp] {access date May 2006}.

[26] http://www.medicare.gov/MPDPF/Public/Include/DataSection/Questions/MPDPFIntro.asp?dest=NAV|Home|Questions|Welcome#TabTop. We use Network Query Language to read directly from source pages to avoid any transcribing errors.

[27] Although CMS refers to there being a list of top 100 drugs (eg in saying that certain plans cover x/100 of the top 100 drugs), this list was not made publicly available (MedPAC, 2006). We obtained this list from a participating insurer and verified it against a list used by a state publicly in its consumer information.

200 drugs by sales in 2004, and all the disease specific drugs identified in Hoadley et al (2006). These fit into 8 lists of 25 drugs each. We then created two additional drug lists which consisted of the top 5, and a random set of 5 drugs, from the top 100 drugs in order to give weight to the initial coverage zones of the plans. These 10 lists can be seen in Appendix Table A3. For all 10 lists, we also specifically measured the monthly out of pocket costs under just the initial coverage zone of the plan. Together, the simulated generosity measures generated by these lists should represent a comprehensive way to gauge the plan, rather than entering each drug price under each coverage region separately. We also create an average of the 10 simulated measures for the annual and the ICZ measures, as we find high correlation between the different measures.

With additional queries on the plan finder tool, we also recovered the full price of a drug listed by an insurer, as well as the prices under the different coverage zones for each plan for each of the 200 or so drug.[28] In Appendix Table A3, we also show the average full price for the top 25 drugs.[29]As the CMS drug tool requests dosage and monthly quantities when creating drug lists, we consulted with an academic-hospital based pharmacist and a practicing pharmacist to ensure that we entered the most common dosages of the drugs.

As noted already, these measures will differ from actual simulated costs to the extent that patients are able to switch to different drugs that are covered. If the degree of switching is constant across plans, this should not affect us, but if there is more ability to switch in more generous plans, this is a caveat that should be kept in mind. We are similarly unable to gauge the extent of non-price utilizations measures, such prior authorization. To correct for this, we use a measure of the number of top 100 drugs for which the plan requires prior authorization, which is included in the CMS Landscape file.

We obtain two measures of insurer characteristics from other CMS data sets. We use the recently released Part D enrollment file to calculate the parent organization's market share in the non-PDP market, [30] and we use the Medicare Complaint Tracking

[28] As can be seen from descriptive statistics presented later, we were not able to find prices for all plans for all lists. In most cases, this was due to CMS not including certain plans in certain months-presumably due to insurer failure to include prices. We collected prices in June and July of 2006-and when we returned to re-collect missing data in August, the website format had changed so that the 'drug details' page is no longer available. We use the top 25 list which has all but two insurers included.

[29] The top 25 list of drugs actually translated to only 24 drugs as two drugs on the CMS list only matched to one on the plan finder tool. We nevertheless continue to refer to this as the "top 25" drugs throughout the paper.

[30] This is available at http://www.cms.hhs.gov/prescriptiondrugcovgenin/02_enrollmentdata.asp?

Module for the consumer complaint rate for PDP plans (complaints per 1,000 enrollees) in the general, [31] and the general number excluding the pricing complaints categories.[32]

The last set of variables we add to this database is market (PDP region) characteristics from the Kaiser Foundation's State Health Facts website. These include the total number of Medicare beneficiaries in the region,[33] the percent in Medicare Advantage as of 2005,[34] the percent who are under 150% of FPL in 2004,[35] the percent who are dual eligible in 2003,[36] and the number of prescriptions taken per capita in that region[37]. When data were missing from State Health Facts for population characteristics (% of population over 65 under 150% of poverty), we used March Current Population Survey data to create an average from the three most recent years. Ideally, we would capture the size of the market as those Medicare beneficiaries who do not currently have drug coverage as generous as part D in terms of coverage and premiums. As there is no known measure of this by region, we use the total number of Medicare beneficiaries, conditional on the distribution in Medicare Advantage and in Medicaid. We also include the number of unique insurers in the market which we create from the plan data.

Our data set consists of one observation for each of 1,429 plans that were offered in the PDP market. We test the predictions presented in the Hypotheses section through OLS regressions of the form

(2) $Pij = f(Xi, Xj, \varepsilon)$

where X_i, consists of plan characteristics described above, and X_j consists of region-specific attributes. We first run regressions of the form $Pij = f(Xi, \varepsilon)$ where the only plan measure is the 10 alternative simulated out of pocket expenses, for the annual version as well as just the initial coverage zone (ICZ). These results are presented in Table 2. We next explore whether we can present results from just one average index for

[31] These data are available only for June 2006, and come from http://www.cms.hhs.gov/PrescriptionDrugCovContra/downloads/MemoCompliancePerformance_06.30.06.pdf

[32] We subtract out the pricing section measure as it is not clear whether this refers to pricing of the drugs or the premiums, and because these are determined using 2006 data and could be endogenous to pricing.

[33] The Kaiser Family Foundation, statehealthfacts.org.CMS Statistics: Medicare State Enrollment, Centers for Medicare and Medicaid Services, website at http://www.cms.hhs.gov/MedicareEnRpts/m

[34] The Kaiser Family Foundation, statehealthfacts.org. Mathematica Policy Research, Inc. analysis of CMS Geographic Service Area Files.

[35] The Kaiser Family Foundation, statehealthfacts.org.Kaiser Family Foundation estimates based on the Census Bureau's March 2005 Current Population Survey (CPS: Annual Social and Economic Supplement).

[36] The Kaiser Family Foundation, statehealthfacts.org. Urban Institute estimates based on data from the Medicaid Statistical Information System (MSIS) prepared for the Kaiser Commission on Medicaid and the Uninsured.

[37] The Kaiser Family Foundation, statehealthfacts.org. Calculations based on Vector One(TM):National from Verispan, L.L.C.: Special Data Request, 2005 and U.S. Census Bureau, Annual Population Estimate, http://www.census.gov/popest/datasets.html.
This variable is for the whole population, not just those over age 65. In future versions, we hope to calculate a measure for those over age 65 from the Medicare Current Beneficiary Survey.

brevity, and continue to a regression specification that includes other measures that our discussion suggests may be important. Table 4 contains the results from these regressions, where the set of plan characteristics are: the average index across all drug lists for the annual out of pocket measure; an indicator for whether the plan is LIS-eligible; and the number of top 100 drugs that need prior authorization. The market characteristics are: the per capita number of prescriptions used; the number of dual Medicaid-Medicaid eligible people (in thousands); the percent of the region's seniors who are in Medicare Advantage; the number of Medicare beneficiaries in the region (in thousands); the percent of seniors in the region under 150% FPL; and the number of insurers in the market. We estimate three different specifications; one for all plans, one excluding enhanced plans, and the last excluding LIS eligible plans. In Table 5 we include an alternative set of plan characteristics that excludes the out of pocket measures, but includes the same set of market characteristics. The new plan characteristics are: average negotiated price for the top 25 drugs; the number of top 100 drugs on the formulary; whether the plan covers generics in the gap (brand as well or only generic); whether the plan is actuarially equivalent or enhanced, as opposed to standard; the annual drug deductible; whether the plan is LIS eligible; and the number of top 100 drugs needing prior authorization. In unreported results, we added the out of pocket (average across all drug lists) measure, for this top 25 average price list and for a few other drug lists. These results showed that the information contained in the drug list is part of our out of pocket generosity measure, and the inclusion of the out of pocket measure caused the coefficients on the drug price variable to diminish to be statistically insignificantly different from zero. Thus, our last table, Table 6, goes back to using our comprehensive out of pocket measure (instead of the drug price variable) and includes all the plan characteristics and region characteristics included thus far. It shows the effects of accounting for parent organization fixed effects as well as different levels (parent organization, formulary and plan name) clustering of standard errors.

6. Descriptive Statistics

A high degree of price dispersion characterizes the Medicare PDP market, as can be seen from the first histograms in Figure 3 of monthly premiums for all 1,429 plans. The second histogram in Figure 3 shows the distributions once we remove enhanced

plans, which have an unsubsidized component. This reduces the right tail of the distribution as enhances plans are on average $10 more a month. The next set of histograms show the distribution of the simulated out of pocket measures of the plans (just the annual measures, which we divide by 12 to make comparable with monthly premiums). There are 11 shown; the first is the average of the 10 lists. This shows a fair degree of variation that is less normally distributed relative to premiums. Most of the indices have a set of plans closely situated together in a somewhat normal distribution, with some plans always being outliers. Inspecting the data revealed that the plans that were outliers in one index tended to also be outliers in all indices.

As these indices reflect plan differences in prices negotiated with pharmacy networks, in the formulary, in how drugs are 'tiered' as well as in copays attached to different tiers in different coverage zones, we separate out the portion that resulted from price negotiations by showing the histograms in Figure 5. The distribution of negotiated drug prices is similar in that there are some plans that are consistent outliers; moreover, these tended to be the same insurers who were outliers in Figure 5. This suggests that variation in negotiated prices may be responsible for a large part of variation in the simulated out of pocket costs across plans.

Table 1 shows the sample statistics of our data set. For most variables, we have information on the universe of plans-notable exceptions are prices of certain drug lists as explained above. Overall, this is a market where average premiums are $37.43 a month, with a standard deviation of $12.86.

7. Regression Results

The first regression results we present test the theory that premiums should reflect the generosity (OOP) of the plan. In Table 2, each coefficient represents a different regression where monthly premiums are regressed on just one generosity index. In the first column, there are 10 different indices showing a plan's annual OOP divided by 12, and in the second the index measures the OOP per month in the first coverage zone. The sign on all the different drug lists used in both ways of measuring generosity indicate that premiums rise with the out of pocket payments of the plan, contrary to a simple set up of competitive insurance markets where premiums reflect only generosity along this measure. A log/log specification (not shown) indicated an elasticity of .13 of the

premium with respect to the annual monthly average of out of pocket expenses for the top 5 drugs.

Our intention in using multiple drug lists was to see whether our results would be sensitive to the types of medications and the coverage zones under consideration. The results so far indicate that the different indices move in similar ways. In Table 3 we show the correlation coefficients between the different indices. These are consistently high, regardless of whether we look at all coverage zones or just the initial one. In unreported results, we also looked at the correlation between the initial and all coverage zones measure for each drug list, and found those also to be high. Those correlation coefficients varied between .91 and .98 with the average being about .95. We also looked at the extent to which the average prices of the drugs on the list were correlated with the generosity measures. The range was between .45 and .93 and was very similar for the annual OOP measure as it was for the ICZ measure. Thus, from here on our regressions mainly use a comprehensive measure that averages between the 10 lists, and only presents the annual index.

The institutional details of the market suggest that certain plan, ownership unit and market characteristics may influence premiums, and our next specification presents those results. Table 4 shows that the out of pocket measure is still positive and statistically significant, although its magnitude is fairly small (0.004 in the first column) as in the earlier set of results. This implies that as the out of pocket expenses rises on average by one dollar (per month), the premium rises by four tenths of one cent (per month). The number of drugs placed on prior authorization is statistically significant in the first and third columns, indicating that placing one more drug on the PA list will increase monthly premiums by 11 to 19 cents. In contrast to the generosity measure, whether the plan is designated LIS-eligible reduces the premium by 16 to 14 dollars a month, about 40% of the average premium of plans. If the plans that were eventually designated LIS eligible are ones that plans anticipated will meet that target because the insurers anticipated the benchmark correctly, this indicates that plans valued this feature substantially, holding plan generosity constant. In terms of market characteristics, plans that have more dual eligible members in the region are priced slightly lower and this is not statistically significantly different from zero in non LIS plans. The percent of Medicare beneficiaries who were in managed care entities in 2005 has an impact on

premiums-having one more percentage point in managed care in 2005 lowers premiums by 16 to 19 cents per month. The total number of Medicare beneficiaries in the region increasing by one thousand increases the premium by two tenths of a cent a month in the first specification, but is not statistically significant in others. Having one more percentage point of the population under 150% FPL (the qualification for the premium subsidy) increases the premiums by 18 to 22 cents a month. This result is consistent with the possibility that plans expected lower price elasticity in these regions because of the premium subsidy. On the other hand, it is surprising if we expected that this also captured general poverty in the region, in which case we could expect insurers to set lower premiums in these regions. The number of insurers in the market does not affect the premium in any statistically significant manner. In unreported results, we added the two questionable market measures-the MA market share and the complaint rate. Both were statistically insignificant when we clustered standard errors at the parent organization level, but when we did not, the complaint rate variable was negative and statistically significant.

Table 5 contains the results from a model that excludes the out of pocket measure but includes alternative plan characteristics. It shows that plans with lower listed drug prices have lower premiums. The magnitude suggests that the average drug price in the top 25 drugs increasing by one dollar increases monthly premiums by 64 cents, which is a substantial pass-through of negotiated prices to gain enrollment through lower premiums. As mentioned, there are two reasons why this should be interpreted cautiously- drug prices do not necessarily reflect the rebates that may be negotiated, and the CMS website may sometimes have shown enrollees imputed prices when plans failed to submit them. In unreported regressions, we included both the out of pocket generosity measures along with the drug prices of 5 lists for which we had prices for over 1,000 plans, and this inclusion always caused the drug price variable to become statistically insignificant, as one would expect because the out of pocket calculation takes drug prices into account. For this reason, we exclude drug prices but include the out of pocket spending variables in later regressions in Table 6.

Table 5 also shows that including more top 100 drugs on the formulary increases premiums by 26 cents per drug, and including coverage in the gap adds $9 (generics) to $23 (generics and brand). Being an actuarially equivalent plan adds $3 relative to a

standard design, indicating that insurers believed that deviating from the standard design would be popular among beneficiaries. Once we account for gap coverage, enhanced plans do not sell for more than standard plans. Premiums fall by almost one cent for every dollar increase in the annual deductible, and being a LIS plan reduces premiums again by a substantial amount; $14. The effect of prior authorization lists and the average Rx use in the region are not statistically significant effects. The number of dual eligibles in the region decreases premiums, as does the percent of beneficiaries in managed care products. The size of the Medicare population in a region and the percent of them who are eligible for a premium subsidy lead to increases in premiums.

We then proceed to include only the average OOP measure in Table 6, where we include all other control variables used so far and explore the sensitivity of our results to various assumptions about the structure of the variance-covariance matrix. The first column of Table 6 shows the same specification as Table 5 except we use the average OOP measure instead of drug prices. The second column clusters the standard errors by parent organization. There are 51 unique parent organizations in the data. The only results that lose statistical significance is the $3 associated with actuarially equivalent plans, and the effect of the annual deductible. The effect of the number of dual eligibles in the region and the size of the Medicare population gain statistical significance. Next, we cluster standard errors at the level of the fomulary behind the plan; there are 101 different formularies used. CMS reports which plans share formularies (recall that this does not necessarily mean that they share the same cost sharing structure). The results are virtually unchanged from column 2, as is the case where we cluster on plan name (there are 361 different plan names). The last column includes parent organization fixed effects. Using variation within an insurer yields results similar in sprit to the other regressions for most of the variables, although the magnitudes vary somewhat. The magnitude of the OOP measure is even smaller than before, but is still positive and statistically significant. The drug deductible again has a negative and statistically significant effect on premiums. Within a plan, premiums are $9 lower for LIS plans, a number that is about $3 smaller than all plans in general. However, this suggests that the LIS variable is not simply capturing random low-prices as even within an insurer, the plan designated as the LIS one is on average 9 dollars cheaper even after controlling for

all else.[38] The adjusted R^2 of this regression is 0.82, as opposed to about .6 when parent fixed effects are not included.

As a final robustness check, we estimated this last column excluding two insurers whose strategies may not be representative of others. UHC-Pacificare and Humana went on to command a large share of eventual enrollment,[39] and while this may be an indication of a successful premium setting strategy, we would like to see if the basic stories told here hold for other insurers too. An inspection of the fixed effect for Humana in the earlier fixed effects specifications shows that relative to Aetna, Humana's coefficient is 25 dollars less (standard error of $1.2), consistent with the strategy announced by Humana (Bertko, 2005). However, the regression results are strikingly similar when the 93 plans belonging to Humana were dropped from the 1429 plans. We next dropped UCH-Pacificare, whose fixed effect was only 3 dollars less (standard error of $1.01) relative to Aetna. After dropping the 174 plans that belonged to this insurer, the results were once again strikingly similar to the results using the full set of plans.

8. Discussion

This paper takes a first look at factors that theory suggests would be important in setting premiums in this highly regulated Medicare PDP market. We create simulated out of pocket measures that capture many features of a plan's generosity that are not easily available for research. We find that simulated out of pocket measurers consistently fail to show a negative relationship with premiums. This is potentially due to the fact that insurers appear to have followed very different strategies as shown by the insurer fixed effect coefficients. We find some evidence that lower drug prices are reflected in lower premiums, but the fact that rebates are not measured and that there is some doubt as to the quality of the data suggest caution in interpretation until CMS clarifies this issue.

Several other factors appear to have been influential in plan premium setting, such as targeting the automatic enrollment of dual Medicaid-Medicare enrollees (although these results have to be interpreted with caution as they assume that insurers had reasonable expectation of the benchmarks they would need to reach). Other regional characteristics such as the share of the Medicare market already in managed care

[38] We also estimated Table 6 without the low-income eligible subsidy indicator and found our results to be qualitatively unchanged, except for the coefficients on the plan type (actuarially equivalent and enhanced) indicators.

[39] The largest PDP parent organization enrolled 27% of the market (UHC-Pacificare), and the second (Humana) enrolled 18%. There are 3 other parent organizations with more than 5% of enrollment each (Wellpoint Inc, Member Health Inc and WelllCare Health Plans Inc) (CMS, 2006).

products appear to matter, although our predictions regarding this variable were ambiguous.

The risk management strategies and community rating used in this market may have encouraged plans to concentrate more on increasing the size of the client base rather than selectively enrolling a few good risks, although this will be known only once detailed enrollment data are available.

Several caveats hold, some of which are stated above. In interpreting these results, it is important to keep in mind that the measures of generosity and PDP market characteristics are only approximations to what is probably included in an insurer's sophisticated actuarial model, and the only intention of this paper is to test certain theories rather than mimic the insurer's model. The factors that drive second and subsequent year pricing are likely to change-for example, if one expects inertia in plan choice, then the incentive may be greatest to enroll customers the first year when they are most elastic in their enrollment decisions. The first year may also represent a shot in the dark, and insurers may refine their strategies as they gain more experience in this market. It will be important to monitor the pricing behavior of plans in future years as new data become available starting October 15th 2006.

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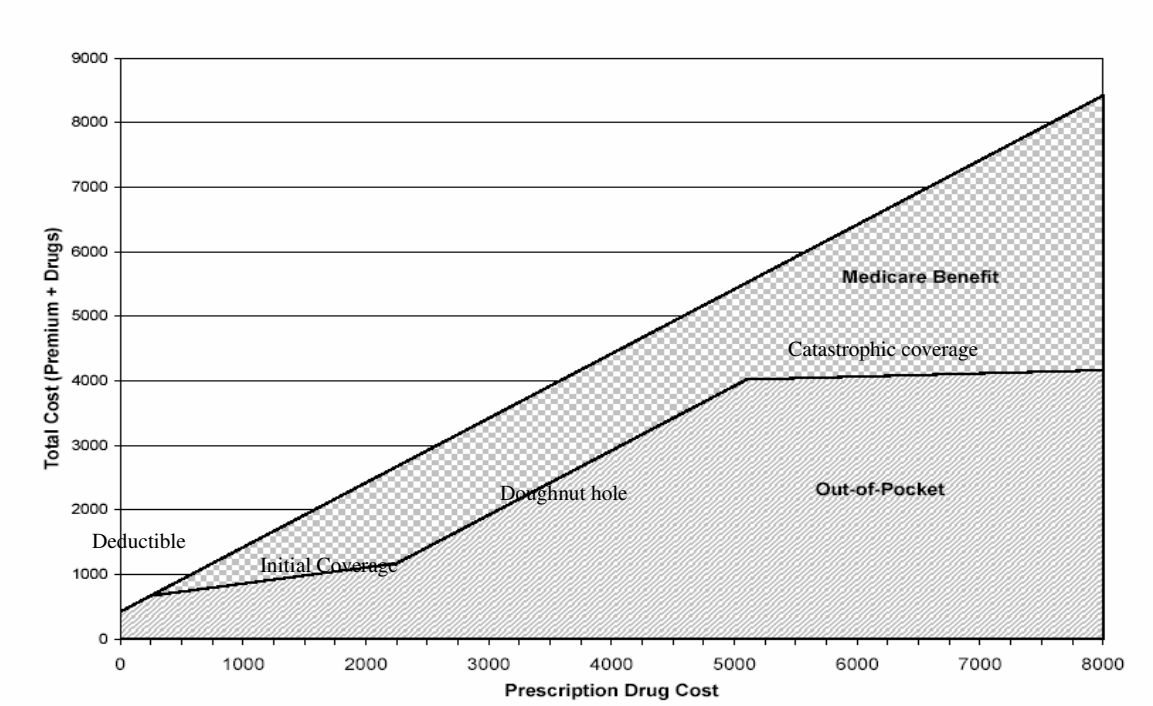
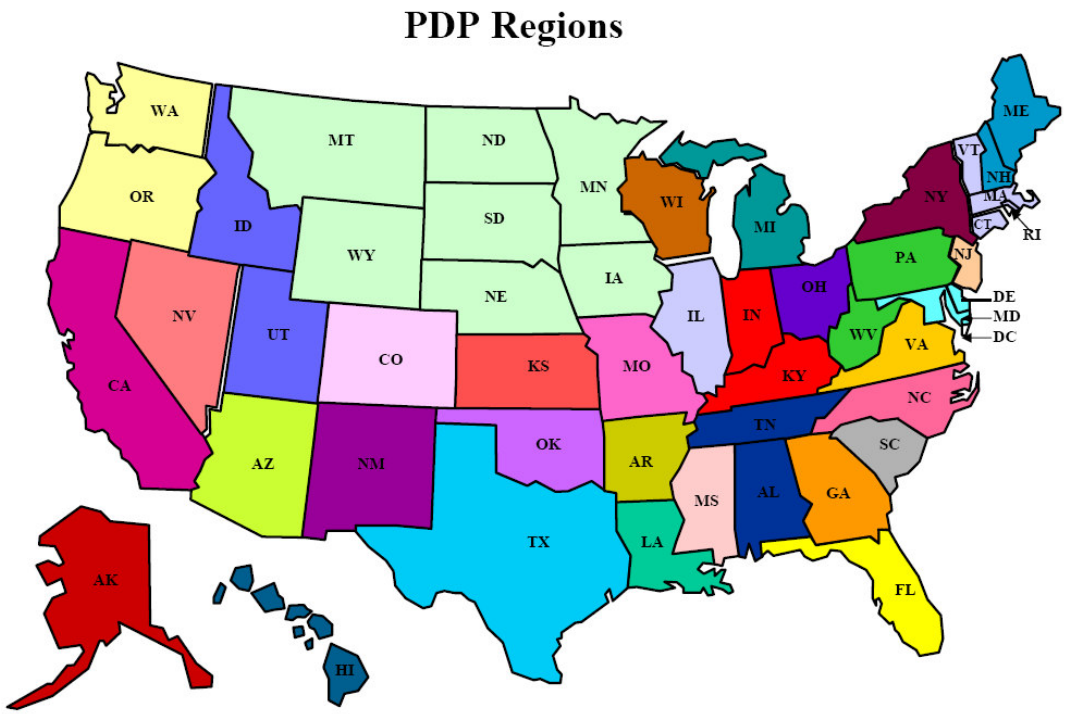
Figure 1: The Design of Part D Drug Coverage



Note:
The graph above shows how the insurance benefit translates total prescription drug costs (x axis) to out of pocket costs for a beneficiary (y axis). Source: Author depiction of standard plan details announced by CMS.

Figure 2:



Note: Each territory is its own PDP region.

Source: CMS (http://www.cms.hhs.gov/PrescriptionDrugCovGenIn/Downloads/PDPRegions.pdf)

Figure 3: Distributions of Premiums

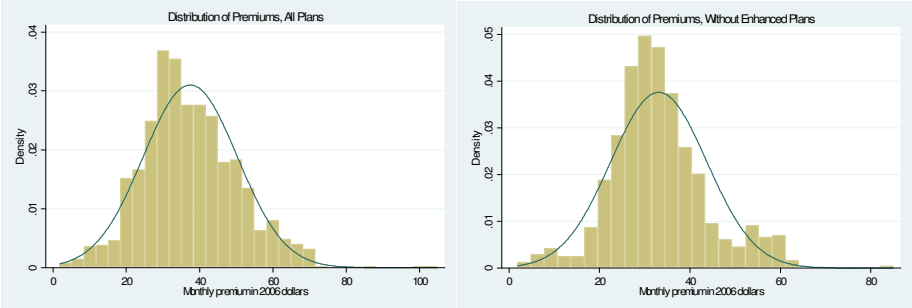


Figure 4: Distribution of Out of Pocket Spending

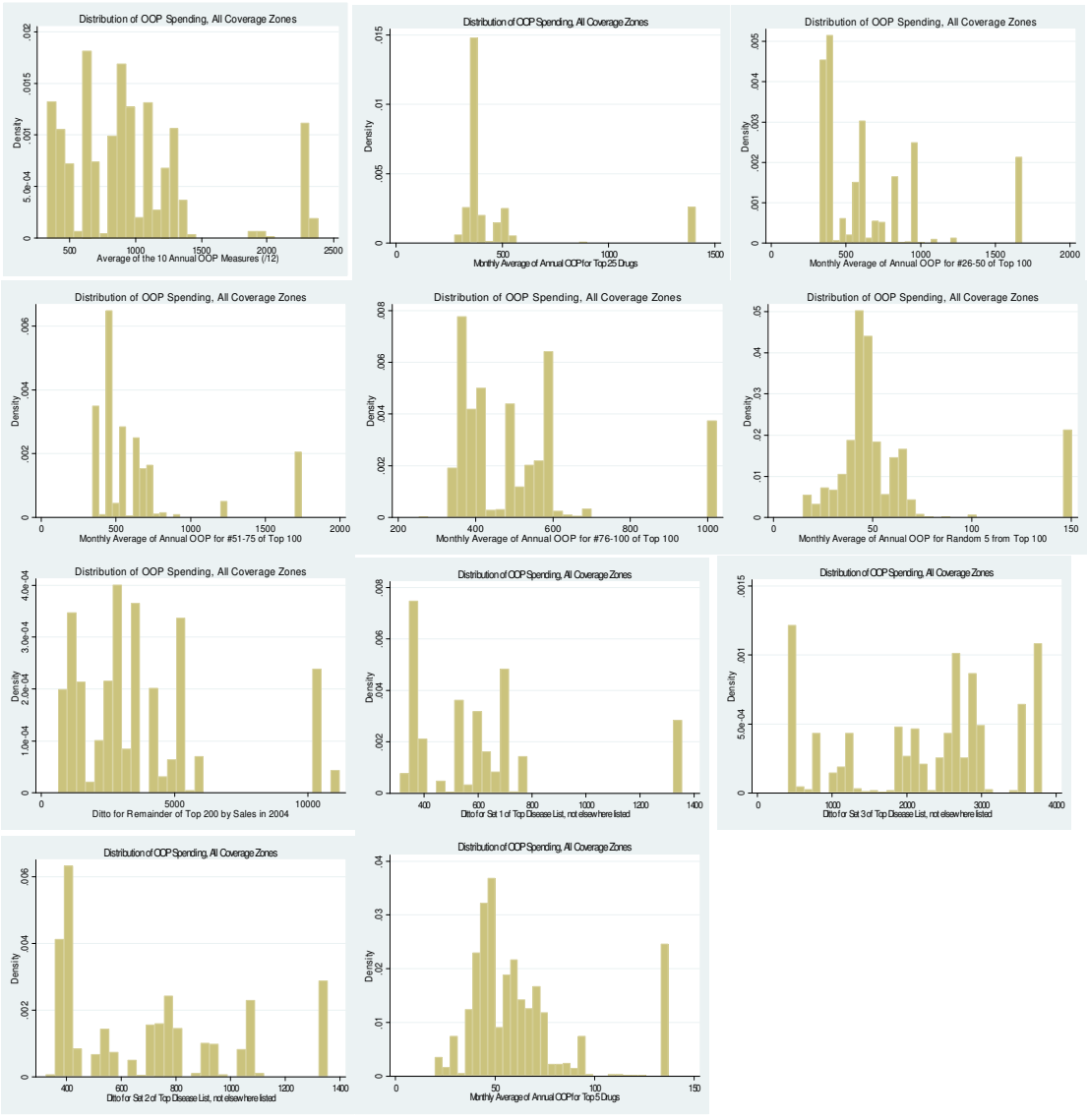
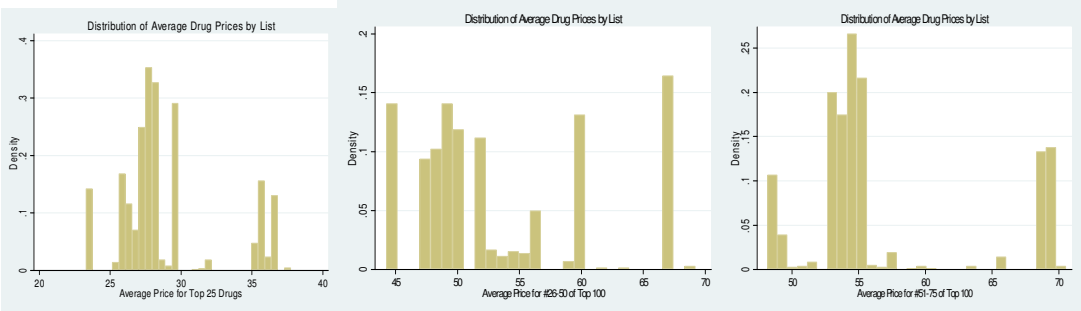


Figure 5: Distribution of Negotiated Drug Prices



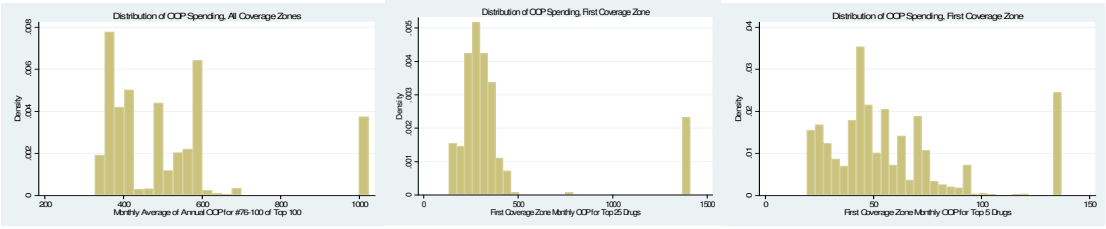


Table 1: Descriptive Statistics

Variable	N	Mean	St. Dev.	Min	Max
Monthly premium	1429	37.43	12.86	1.87	104.89
Indicator for being an LIS eligible plan	1429	0.29	0.45	0.00	1.00
# of top 100 drugs on the formulary	1429	93.44	6.63	75.00	100.00
# of top 100 drugs needing prior authorization	1429	9.56	9.06	0.00	44.00
# of top 100 with copays under $20 in ICZ	1264	61.35	13.15	20.00	95.00
Annual drug deductible	1429	92.25	115.79	0.00	250.00
# Medicare beneficiaries in region (in thousands)	1429	1,256.23	933.07	51.15	4,157.83
Percent of seniors under 150% FPL in 2004 in region	1429	24.22	5.25	15.69	41.00
# Dual eligible in region (in thousands) in 2003	1429	191.00	185.38	9.00	955.00
Average # drugs per capita in region, 2004	1429	10.87	2.17	6.50	15.50
% of Medicare beneficiaries in MMC in region, in 2005	1429	11.09	9.80	0.00	33.36
Average Full price for List 1 (top 25)	1400	28.91	3.63	23.29	37.77
Average Full price for List 2 (26-50)	813	53.33	7.31	44.28	69.25
Average Full price for List 3 (51-75)	1129	56.84	6.67	48.17	70.55
Average Full price for List 4 (76-100)	813	53.33	7.31	44.28	69.25
Average Full price for List 6 (rest of top sales)	1328	419.06	13.01	275.84	446.27
Average Full price for List 7 (first set of remainder of disease specific list)	1127	47.42	3.38	41.97	53.68
Average Full price for List 8 (second set of remainder of disease specific list	615	49.04	3.88	42.16	55.13
Average Full price for List 9 (third set of remainder of disease specific list)	1125	146.27	3.69	137.06	155.13
Average monthly OOP List 10	1429	62.76	28.29	19.96	137.22
Average monthly OOP List 3	1429	660.88	379.86	343.43	1,744.37
Average monthly OOP List 2	1429	668.87	387.12	326.45	1,682.46
Average monthly OOP List 6	1429	3,684.93	2,613.98	644.11	11,207.90
Average monthly OOP List 4	1429	516.23	184.60	253.10	1,024.02
Average monthly OOP List 5	1429	56.08	32.38	14.96	150.54
Average monthly OOP List 8	1429	702.60	311.43	325.10	1,356.82
Average monthly OOP List 9	1429	2,259.54	1,080.52	409.35	3,818.18
Average monthly OOP List 7	1429	603.74	280.19	311.27	1,357.59
Average monthly OOP List 1	1429	484.44	307.31	275.43	1,411.73
Monthly OOP in ICZ, List 10	1429	58.28	31.14	19.31	137.18
Monthly OOP in ICZ, List 3	1429	713.16	368.22	301.04	1,744.33
Monthly OOP in ICZ, List 2	1429	672.84	382.27	264.56	1,682.42
Monthly OOP in ICZ, List 6	1429	5,217.91	2,593.53	1,085.97	11,207.87
Monthly OOP in ICZ, List 4	1429	452.34	196.72	205.46	1,023.98
Monthly OOP in ICZ, List 5	1429	51.54	34.26	15.00	150.50
Monthly OOP in ICZ, List 8	1429	672.91	279.37	263.52	1,356.78
Monthly OOP in ICZ, List 9	1429	2,421.42	939.60	540.93	3,772.43
Monthly OOP in ICZ, List 7	1429	675.96	251.36	262.33	1,357.55
Monthly OOP in ICZ, List 1	1429	398.01	336.70	134.47	1,411.69
Indicator for actuarially equivalent plan	1429	0.48	0.50	0.00	1.00
Indicator for standard plan design	1429	0.09	0.29	0.00	1.00
Indicator for enhanced plan design	1429	0.43	0.49	0.00	1.00
Covers generics in the gap	1429	0.13	0.34	0.00	1.00
Covers generics and brand name drugs in the gap	1429	0.02	0.15	0.00	1.00
Parent co.'s share in 2006 MA market	1429	0.04	0.07	0.00	0.19
Parent co.'s PDP complaint rate in 2006	1294	3.03	1.37	0.3	6.3
Number of unique insurers in the region	1429	15.5	1.89	10	19

Table 2: Effect of Out of Pocket (OOP) Indices on Premiums

Index based on List#	Average monthly OOP	Monthly OOP in ICZ
List 10	0.025**	0.051***
	(0.01)	(0.01)
List 3	0.003***	0.003***
	(0.001)	(0.001)
List 1	0.006***	0.005***
	(0.001)	(0.001)
List 7	0.006***	0.009***
	(0.001)	(0.001)
List 9	0.001***	0.002***
	(0.0003)	(0.0004)
List 8	0.0005	0.003**
	(0.001)	(0.001)
List 5	0.025**	0.048***
	(0.01)	(0.01)
List 4	0.004**	0.008***
	(0.002)	(0.002)
List 6	0.001***	0.0008***
	(0.0001)	(0.0001)
List 2	0.006***	0.007***
	(0.0009)	(0.0009)
Average of all lists	0.005***	0.004***
	(0.0007)	(0.0007)
Observations	1429	1429

Standard errors in parentheses. ICZ stands for initial coverage zone
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: Correlation Coefficients Between Different Out-of-pocket Measures

Average monthly OOP

List	1	2	3	4	5	6	7	8	9	10
1	1.00									
2	0.88	1.00								
3	0.93	0.84	1.00							
4	0.89	0.85	0.93	1.00						
5	0.92	0.84	0.88	0.88	1.00					
6	0.80	0.77	0.83	0.80	0.73	1.00				
7	0.84	0.79	0.83	0.88	0.80	0.89	1.00			
8	0.68	0.68	0.76	0.81	0.65	0.87	0.84	1.00		
9	0.47	0.46	0.56	0.65	0.45	0.74	0.73	0.83	1.00	
10	0.82	0.75	0.83	0.78	0.88	0.71	0.71	0.69	0.45	1

Monthly OOP in ICZ

List	1	2	3	4	5	6	7	8	9	10
1	1.00									
2	0.86	1.00								
3	0.91	0.81	1.00							
4	0.92	0.86	0.93	1.00						
5	0.93	0.86	0.90	0.97	1.00					
6	0.72	0.64	0.74	0.67	0.66	1.00				
7	0.81	0.74	0.85	0.87	0.84	0.79	1.00			
8	0.77	0.67	0.82	0.82	0.77	0.82	0.90	1.00		
9	0.45	0.38	0.55	0.52	0.44	0.78	0.64	0.69	1.00	
10	0.82	0.78	0.88	0.91	0.89	0.60	0.82	0.81	0.43	1

Table 4: Premium Regressions-Basic RHS variables

	All Plans	Non-Enhanced Plans	Non-LIS eligible plans
Average (annual per month) OOP all lists	0.004***	0.006***	0.006***
	(0.0005)	(0.0004)	(0.0008)
LIS eligible plan	-16.25***	-14.138***	-
	(0.60)	(0.46)	-
# of top 100 drugs needing prior authorization	0.115***	-0.034	0.187***
	(0.03)	(0.03)	(0.04)
Average # drugs per capita in region, 2004	0.087	0.131	0.071
	(0.14)	(0.12)	(0.18)
# Dual eligible in region (in thousands) in 2003	-0.009*	-0.006*	-0.009
	(0.005)	(0.004)	(0.01)
% of Medicare beneficiaries in MMC in region, in 2005	-0.164***	-0.195***	-0.159***
	(0.03)	(0.03)	(0.05)
# Medicare beneficiaries in region (in thousands)	0.002*	0.001	0.002
	(0.001)	(0.001)	(0.001)
Percent of seniors under 150% FPL in 2004 in region	0.210***	0.181***	0.222***
	(0.06)	(0.05)	(0.08)
Number of Insurers in the region	-0.044	-0.073	-0.015
	(0.181)	(0.152)	(0.242)
Observations	1429	821	1020
R-squared	0.39	0.64	0.1

Standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Premium Regressions: Including All RHS Variables Except OOP measure

Variable	Coefficient
Average drug price, List 1	0.639***
	(0.07)
# of top 100 drugs on formulary	0.262***
	(0.04)
Covers generics in gap	9.290***
	(0.85)
Covers generics and brands in gap	23.226***
	(1.72)
Actuarially equivalent plan	3.035***
	(0.98)
Enhanced plan	1.001
	(1.32)
Annual drug deductible	-0.008***
	(0.003)
LIS eligible plan	-14.056***
	(0.67)
# of top 100 drugs needing prior authorization	-0.035
	(0.03)
Average # drugs per capita in region, 2004	0.068
	(0.13)
# Dual eligible in region (in thousands) in 2003	-0.009**
	(0.004)
% of Medicare beneficiaries in MMC in region, in 2005	-0.168***
	(0.03)
# Medicare beneficiaries in region (in thousands)	0.002**
	(0.001)
Percent of seniors under 150% FPL in 2004 in region	0.255***
	(0.05)
Number of insurers in the region	-0.045
	(0.167)
Observations	1400
R-squared	0.54

Standard errors in parentheses

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

Table 6: Effect of Clustering Standard Errors and Adding Insurer Fixed Effects

	No cluster or FE	Cluster on P.O.	Cluster on formulary	Cluster on plan name	With P.O. FE
Average OOP all lists	0.008***	0.008***	0.008***	0.008***	0.002***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
# of top 100 drugs on formulary	0.411***	0.411*	0.418**	0.411*	0.511***
	(0.04)	(0.23)	(0.21)	(0.22)	(0.04)
Covers generics in gap	9.504***	9.504**	9.449**	9.504**	6.228***
	(0.81)	(4.40)	(4.17)	(3.99)	(0.65)
Covers generics and brands in gap	22.741***	22.741***	22.740***	22.741***	37.794***
	(1.61)	(5.08)	(3.91)	(5.37)	(1.25)
Actuarially equivalent plan	3.017***	3.017	3.01	3.017	0.268
	(0.93)	(2.36)	(2.54)	(2.89)	(0.78)
Enhanced plan	1.92	1.92	2.046	1.92	1.509
	(1.24)	(4.98)	(3.92)	(4.99)	(1.11)
Annual drug deductible	-0.01***	-0.01	-0.01*	-0.01	-0.022***
	(0.003)	(0.007)	(0.01)	(0.01)	(0.00)
LIS eligible plan	-12.589***	-12.589***	-12.503***	-12.589***	-9.457***
	(0.64)	(1.81)	(1.55)	(1.56)	(0.48)
# of top 100 drugs needing PA	0.014	0.014	0.015	0.014	0.235***
	(0.03)	(0.18)	(0.15)	(0.14)	(0.04)
Average # drugs per capita	0.043	0.043	0.072	0.043	0.128
	(0.12)	(0.09)	(0.07)	(0.07)	(0.08)
# Dual eligible in region	-0.005	-0.005***	-0.006**	-0.005***	-0.005*
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
% of beneficiaries in MMC	-0.145***	-0.145***	-0.139***	-0.145***	-0.134***
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
# Medicare beneficiaries	0.001	0.001**	0.001*	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Percent of seniors under 150% FPL	0.212***	0.212***	0.221***	0.212***	0.204***
	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)
Number of insurers in the region	0.049	0.049	0.017	0.049	-0.029
	(0.157)	(0.176)	(0.133)	(0.114)	(0.105)
Observations	1429	1429	1425	1429	1429
R-squared	0.56	0.56	0.56	0.56	0.82

Standard errors in parentheses. P.O. stands for parent organization (insurer)

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

Appendix 1: Translating Medicare PDP Bids to Premiums

Let B_{ij} represents the bid of plan i in region j for coverage that is reinsured. CMS computes the average (A) of the bids nationally for all the standard and actuarially equivalent plans (thus, $A=1/N[\sum_{j=1,i=1}^{J,I} Bij]$).[40] The premium for plan Pij will then be set at some fraction of the average bid A, plus (or minus) the amount by which plan ij's bid was above (or below) the national average A [Pij=Bij-A+xA]. The base premium, xA, is set to meet CMS's statutory requirement in terms of paying 74.5% of a plan's total cost (assuming no reinsurance). In other words, CMS is required to pay a certain percent (74.5%) of the total private sector cost as subsidy, and they are doing so by taking responsibility for the bulk of the catastrophic cost as well as by paying plans a certain fixed amount prospectively. The average plan will have a total cost of $\overline{TC}$, and a premium $\overline{P}$ (which the customers see) of $0.255*\overline{TC}$. Assuming that the subsidy given in the form of reinsurance is a fraction r of the total costs of coverage, [thus $0.255\overline{TC}$ =xA=x(1-r) $\overline{TC}$ so x=0.255/(1+r)] then we can express the average plan's premium as

[A.1.] $\overline{P}$ =[0.255/(1-r)]A.

Thus, the premium for plan ij is

[A.2.] Pij=Bij-A+ [0.255/(1-r)]A.

If r and A are constants from the firm's perspective (even if A is not known ahead of time), then their premium is just their bid minus a fixed amount. [41]

We illustrate the bidding process with an example in Table A.1., assuming for simplicity that there are only 3 plans in the nation. Following CBO (2004), we assume that plans estimate reinsurance to be worth a constant 27% of the total cost.[42] In this

[40] The national average monthly bid for 2006 was $92.3 per covered life, as reported in a CMS press release (http://www.cms.hhs.gov/MedicareAdvtgSpecRateStats/Downloads/ptcd2006_20050809.pdf) In computing the national average in subsequent years, the bids will be weighted by the plan's average number of enrollees in the most recent reference month with data. In 2006, the stand-alone PDPs were weighted equally, and the MA-PD plans were weighted by their previous year's enrollment.

[41] In practice, the reinsurance amount is calculated and paid out to plans at the end of the year based on actual experience.

[42] This is an estimate used by CBO (2004) but it is surprisingly consistent with the actual reinsurance rate that insurers used. As the average national monthly bid for 2006 was $92.3, and the base beneficiary premium for 2006 was $32.2, we can work backwards through formula [1]. This calculation shows that on average, plans estimated the reinsurance feature accounted for 27% of their total cost. The base beneficiary premium of $32.3 can be found on CMS's website, eg http://www.cms.hhs.gov/apps/media/press/release.asp?Counter=1530

example, the national average A corresponds to $100 per month. Thus, the base premium is $35 per month by [A.1.] and the plans individual premiums are adjusted by Bij-A.

Understanding the premium determination process has two implications. One is that studying the determinants of the premium is equivalent to studying the 'bid', and second that plans have incentives to offer lowest bid possible if they aim to attract beneficiaries with lower premiums (for coverage that is equal in other ways). The direct subsidy is paid prospectively to the firm as a fixed up-front dollar amount, with some risk adjustments along age, sex, disability, and the presence of certain chronic conditions.[43]

The second mechanism used to limit the insurance risk of the firms is the risk corridor system. Under this system, plans that have actual costs that exceeded their expected costs (after accounting for the reinsurance feature) by a sufficiently large amount, may receive additional payments to compensate for those losses. In the same way, if plans make larger than expected profits due to actual costs being lower than the expected ones, the plans would have to return those extra profits to the government. For years 2006 and 2007, the plans will be responsible for all the profits and losses that are within a band of 2.5% from their expected costs. If the actual costs are bigger (smaller) than the expected costs by more than 2.5% but less than 5% the government will pay (receive) 75% of the amount in that range. If the actual costs differ with the expected costs by more than 5% then the government will pay 80% of the amount beyond 5% in the case of losses and receive 80% of the amount beyond 5% in the case of profits. Table A2 illustrates how the risk corridor system works.

In setting up the institutional relationship with insurers, CMS thus includes three features-reinsurance, risk corridors and a risk adjustment of the prospective payment- to reduce fears of adverse selection and incentives to cream skim. We next turn to discussion additional institutional details as they affect beneficiaries.

[43] The exact coefficients that are used in risk adjustment can be found at http://www.cms.hhs.gov/DrugCoverageClaimsData/02_RxClaims_PaymentRiskAdjustment.asp

Appendix 2: Additional Subsidies Received by Low-income Beneficiaries

In additional to the general subsidy of 74.5% of the average plan's cost, MMA also includes provisions regarding the coverage of low-income beneficiaries. The low-income (defined as incomes being below 150% of the poverty level) elderly will receive additional subsidies which will depend on their income and assets in specific ways. The dual eligible population (those eligible for Medicare and Medicaid) will be automatically enrolled by CMS in a low income subsidy (LIS) eligible plan, although they may switch to another LIS eligible plan if they wish and continue to pay no premium, no deductible, and not face a doughnut hole. They will pay no co-payments once they reach catastrophic coverage, but they will face copayments before that point of roughly $1-3 for generics and $2-5 for brand name drugs. The dual eligible population in nursing homes receives their drugs at no charge always. The elderly that are not dual eligible but have incomes below 135% of the federal poverty line will receive the same benefit as someone who is dual eligible (and will be reimbursed a sum equal to the LIS benchmark for that region so they are free to select a non-LIS plan and pay a nominal premium, and are not auto-enrolled for obvious reasons) (Gold, 2006a). The non-dual eligible population that is between 135% and 150% of poverty line will pay a premium that will increase along a sliding scale up to the regular monthly payment for people above 150% of poverty line, they will have a deductible of $50, and they will face a constant 15% coinsurance until catastrophic coverage is reached, after which they will face a regular coinsurance rate of 5%. As the dual eligible population is randomly and equally enrolled in LIS plans, insurance plans were expected to find it attractive to be given this designation to reduce uncertainty in size of enrollment. A plan is LIS eligible if its submitted bid is below the "low-income benchmark premium". The benchmark is computed regionally as the greater of the average premiums of PDPs and MA-PDs, and the lowest PDP premium (in case this first number is lower than the lowest PDP, as only PDP plans will be designated "LIS" eligible). Formally, the benchmark premium for LIS in region j is:

[A.3.] $K_j=\max\{(1/(N^{PDP}+N^{MA\text{-}PD}))(\sum_j P_{ij}^{PDP} + \sum_j P_{ij}^{MA\text{-}PD}), \min_i\{P_{ij}^{PDP}\}\}$

Where N^{PDP} is the number of PDP plans, $N^{MA\text{-}PD}$ is the number of MA-PD plans, P_{ij}^{PDP} is the premium of PDP plan i in region j , and $P_{ij}^{MA\text{-}PD}$ is the premium of MA-PD plan i in region j.

Table A1: Hypothetical Example to Illustrate the Medicare Part D Bidding Process

Average amount in dollars per enrollee per month	Low-cost Plan	Average-cost Plan	High-cost plan
Expected total cost (TCij)	127	137	147
Expected reinsurance payments (27% of line 1, rounded to nearest dollar)= r*TCij	-34	-37	-40
Plan's bid for providing coverage Bij	93	100	107
Base Premium P(bar)	35	35	35
Beneficiary Premium	28	35	42
Premium as a share of Total Cost (%)	22.0	25.5	28.5

Source: Adapted from CBO (2004)

Table A2: Example to illustrate risk reduction strategies used by CMS in the first year (2006)

(Average amount in dollars per enrollee per year)	Plan 1	Plan2	Plan 3
Expected Cost	1,500	1,500	1,500
-Expected reinsurance payments	500	500	500
=Net Expected Cost	1000	1000	1000
Actual Benefit Cost	1,425	1,485	1,650
-Actual Federal Reinsurance Payments	475	495	550
=Net Actual Benefits	950	990	1,100
Initial Profit/loss	50	10	-100
Risk corridor			
Between 2.5% and 5%	-18.75	0	18.75
Above 5%	0	0	40.00
Total	-18.75	0	58.75
Final Profit/loss	31.25	10.00	-41.25
% difference between expected and actual costs	5.0	1.0	-10.0

Source: CBO (2004). Note: The plans will be responsible for all the profits and losses that are within a band of 2.5% from their expected costs. If the actual costs are bigger (smaller) than the expected costs by more than 2.5% but less than 5% the government will pay (receive) 75% of the amount in that range. If the actual costs differ with the expected costs by more than 5% then the government will pay 80% of the amount beyond 5% in the case of losses and receive 80% of the amount beyond 5% in the case of profits.:

Table A3: Drug Lists and Prices

	Drug lists
1	Drugs # 1-25 of top 100 list
2	Drugs # 26-50 of top 100 list
3	Drugs # 51-75 of top 100 list
4	Drugs # 76-100 of top 100 list
5	Random 5 drugs from the top 100 list
6	Of those drugs on top 200 of sales in 2004, ones not collected elsewhere
7	Disease specific lists from Hoadley (2006), list 1
8	Disease specific lists from Hoadley (2006), list 2
9	Disease specific lists from Hoadley (2006), list 3
10	Top 5 drugs (from CMS list of top 100 drugs for seniors)

Drug List and Average Full Prices
(Top 24 drugs)

List 1	Average Price	Standard Deviation
ATENOLOL TAB 50MG	$7.04	$5.50
DIGOXIN TAB 0.125MG	$7.03	$1.77
DILTIAZEM CD CAP 180MG/24	$33.50	$3.18
ENALAPRIL MALEATE TAB 5MG	$13.64	$8.83
FUROSEMIDE TAB 40MG	$4.17	$1.67
FOSAMAX TAB 70MG	$73.53	$4.34
GLIPIZIDE TAB 5MG	$4.92	$2.19
HYDROCHLOROTHIAZIDE TAB 25MG	$3.66	$1.26
HYDROCODONE/ACETAMINOPHEN TAB 5-500MG	$6.09	$4.04
ISOSORBIDE MONONITRATE TAB 20MG	$12.15	$4.25
LEVOTHYROXINE SODIUM TAB 100MCG	$8.21	$1.56
LIPITOR TAB 10MG	$76.16	$3.30
LISINOPRIL TAB 10MG	$11.01	$4.72
LOVASTATIN TAB 20MG	$28.05	$12.18
METFORMIN HCL TAB 500MG	$8.72	$3.38
METOPROLOL TARTRATE TAB 50MG	$4.97	$2.88
NORVASC TAB 10MG	$66.32	$6.31
PLAVIX TAB 75MG	$133.88	$22.20
POTASSIUM CHLORIDE ER TAB 20MEQ ER	$11.11	$3.05
PREDNISONE TAB 5MG	$3.09	$1.37
PROPOXYPHENE/ACETAMINOPHEN TAB 65-650MG	$5.84	$1.45
TRIAMTERENE/HCTZ CAP 37.5-25	$7.78	$1.65
WARFARIN SODIUM TAB 5MG	$12.99	$3.58
ZOCOR TAB 20MG	$140.63	$5.40

Additional Drug Lists

List2	List 3	List 4	List 6	List 7	List 8	List 9
allopurinol tab 300mg	advair diskus mis 250/50	actos tab 15mg	allegra tab 180mg	amoxapine tab 50mg	acebutolol hcl cap 200mg	aceon tab 4mg
altace cap 10mg	alprazolam tab 0.5mg	albuterol sulfate neb 0.083%	aranesp sol 100mcg	bupropion hcl sr tab 150mg sr	altoprev tab 60mg er	aciphex tab 20m
ambien tab 10mg	aricept tab 10mg	avapro tab 300mg	avonex kit	bupropion hcl tab 100mg er	betaxolol hcl tab 10mg	actos tab 30mg
amitriptyline hcl tab 25mg	avandia tab 4mg	benazepril hcl tab 20mg	duragesic dis 25mcg/hr	clomipramine hcl cap 50mg	bisoprolol fumarate tab 5mg	altace cap 10mg
amoxil tab 500mg	captopril tab 25mg	codeine phosphate tab sol 30mg	effexor tab 75mg	cognex cap 10mg	carteolol hcl sol ophth 1%	atacand tab 32m
celebrex cap 200mg	cephalexin monohydrate cap 500mg	crestor tab 10mg	elestat dro 0.05%	desipramine hcl tab 50mg	cholestyramine pow 4gm	benicar tab 20mg
clonidine hcl tab 0.1mg	ciprofloxacin hcl tab 500mg	cyclobenzaprine hcl tab 10mg	enbrel inj 25mg	doxepin hcl cap 50mg	colestid tab 1gm	chlorpropamide t
diovan tab 160mg	coreg tab 6.25mg	folic acid tab 1mg	epogen inj 10000/ml	effexor tab 75mg	dynacirc-cr tab 5mg	didronel tab 400r
glyburide tab 5mg	cozaar tab 50mg	gemfibrozil tab 600mg	gleevec tab 100mg	effexor xr cap 75mg	hydrochlorothiazide tab 25mg	forteo sol 750/3m
lisinopril/hctz tab 20-25mg	detrol tab 2mg	glyburide/metformin hcl tab 2.5/500	lovenox inj 40/0.4ml	ergoloid mesylates tab 1mg oral	hyzaar tab 100-25	fosinopril sodium
lotrel cap 10-20mg	diovan hct tab 160-25mg	humulin 50/50 inj 50/50	neulasta inj 6mg/0.6m	exelon cap 3mg	labetalol hcl tab 200mg	glipizide er tab 1
nexium cap 40mg	doxazosin mesylate tab 4mg	lantus inj 100/ml	neurontin cap 300mg	fluvoxamine maleate tab 100mg	levatol tab 20mg	glipizide tab 5mg
nifedipine cap 20mg	evista tab 60mg	lescol cap 20mg	paxil tab 20mg	imipramine hcl tab 25mg	maprotiline hcl tab 50mg	glyburide micron
oxycodone hcl tab 5mg	flomax cap 0.4mg	lorazepam tab 1mg	pravachol tab 40mg	namenda tab 10mg	mirtazapine tab 15mg	glyset tab 25mg
paroxetine hcl tab 20mg	fluoxetine hcl cap 20mg	meclizine hcl tab 25mg	prilosec cap 40mg cr	nardil tab 15mg	nadolol tab 40mg	inspra tab 25mg
premarin tab 0.625mg	ibuprofen tab 600mg	naproxen tab 500mg	procrit inj 40000/ml	nefazodone hcl tab 200mg	niaspan tab 500mg er	mavik tab 4mg
protonix tab 40mg	levaquin tab 500mg	nitroglycerin dis 0.4mg/hr	remicade inj 100mg	nortriptyline hcl cap 25mg	nicardipine hcl cap 20mg	miacalcin spr 200
ranitidine hcl tab 150mg	lexapro tab 10mg	omeprazole cap 20mg	risperdal tab 1mg	parnate tab 10mg	nimotop cap 30mg	micardis tab 80m
verapamil hcl tab 120mg	prevacid cap 30mg dr	oxybutynin chloride tab 5mg	rituxan inj 100mg	paxil cr tab 25mg	pindolol tab 5mg	pamidronate disc
xalatan sol 0.005%	spironolactone tab 25mg	phenytoin sodium extended cap 100mg	seroquel tab 25mg	prozac weekly cap 90mg	sotalol hcl tab 80mg	prandin tab 2mg
zoloft tab 50mg	sulfamethoxazole/trimethoprim tab 400-80mg	propranolol hcl tab 80mg	taxotere inj 80mg/2ml	surmontil cap 50mg	sular tab 20mg cr	precose tab 50m
gabapentin tab 300mg	tramadol hcl tab 50mg	singulair tab 10mg	topamax tab 25mg	vivactil tab 10mg	welchol tab 625mg	skelid tab 200mg
quinapril hcl tab 10mg	trazodone hcl tab 50mg	terazosin hcl cap 5mg	viagra tab 100mg	cymbalta cap 60mg	wellbutrin xl tab xl 300mg	spironolactone ta
actonel w/ calcium tab	zetia tab 10mg	timolol maleate ophthalmic gel forming sol 0.5% op	zithromax sus 200/5ml	citalopram hydrobromide tab 20mg	tricor tab 145mg	teveten tab 600m
azithromycin tab 500mg	pravastatin sodium tab 40mg	glimepiride tab 2mg	zyprexa tab 5mg	razadyne tab 8mg	felodipine er tab 5mg er	zometa inj 4mg/5

Table A4: Distribution of Plans, Premiums and Generosity Across Regions

Region	# Plans	Monthly Premium	Average OOP All coverage Zones per month, Top 5 drugs
21	40	41.62	739.88
20	39	40.75	732.64
8	39	40.53	746.61
23	43	40.19	765.92
15	43	40.15	787.99
12	42	39.75	683.40
11	44	39.72	696.08
19	41	39.53	728.55
9	46	39.16	797.43
6	53	38.43	757.12
1	42	38.29	830.94
31	45	37.89	730.65
18	42	37.83	796.94
7	42	37.82	788.80
24	41	37.72	806.16
5	48	37.64	717.82
22	48	37.48	658.06
10	43	37.40	774.08
13	41	37.14	773.22
34	28	37.02	829.16
14	44	36.96	785.54
25	42	36.58	739.90
17	43	36.10	719.66
27	44	36.05	731.40
16	46	35.76	717.33
2	45	35.50	719.28
4	45	35.30	760.24
30	46	34.84	784.19
29	45	34.54	726.33
28	44	34.50	744.87
26	44	34.15	769.37
3	47	33.49	648.95
33	30	33.39	787.78
32	48	31.76	730.43