The Value of Coverage in the Medicare Advantage Insurance Market*

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Abstract

This paper examines the impact of coverage on demand for health insurance in the Medicare Advantage (MA) insurance market. Estimating the effects of coverage on demand poses a challenge for researchers who must must consider both the hundreds of benefits that affect out-of-pocket costs (OOPC) to consumers, but also the endogeneity of coverage. These problems are addressed in a discrete choice demand model by employing a unique measure of OOPC that considers a consumer's expected payments for a fixed bundle of health services and applying instrumental variable techniques to address potential endogneity bias. The results of the demand model show that OOPC have a significant effect on consumer surplus and that not instrumenting for OOPC results in a significant underestimate of the value of coverage.

1 Introduction

Both the premium and the level of coverage are fundamental components of all health insurance plans. Consumers pay a fixed premium for a plan and, in return, insurers cover a portion of the medical expenses. Coverage is likely to have a significant effect on consumer surplus since many consumers purchase health insurance to protect against unexpected health events. In addition, from a theoretical perspective, it is widely understood that insurers compete by setting both the premium and insurance benefits.[1] However, few empirical studies focus on the effect of coverage

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[1] The classic theoretical analysis of insurance competition by Rothchschild and Stiglitz (1976) assumes that insurers choose both the premium and level of coverage. This assumption is also made in recent papers that explore the effects of competition in health insurance markets in alternative settings (e.g. Vaithianathan (2006) and Olivella and Vera-Hernandez (2007)).

on health insurance demand. This paper contributes to the literature by estimating the effects of both the premium and the level of coverage on the demand for health insurance.

Understanding the effect of coverage is important for several reasons. First, achieving the goal of many policymakers to provide insurance for the 46 million uninsured in the U.S. is likely to be costly, so it is important to assess the value of insurance benefits provided to consumers. Second, coverage may affect the overall cost of medical care for insurers and consumers by impacting the amount of health services consumed and it may also affect health outcomes. In particular, prior research has shown that when coverage is greater individuals consume more health services and that additional health inputs can lead to improved health outcomes.[2] Third, insurers may respond to competition by adjusting benefits rather than changing premiums. Therefore, measuring the impact of coverage on demand is an essential step in determining the full effect of competition on insurer profits and consumer surplus.

This paper focuses on the demand for Medicare Advantage (MA) insurance products. MA insurance is a private alternative to parts A and B of traditional Medicare that primarily covers individuals over the age of 65 and enrolls approximately 20% of the Medicare eligible population. In contrast to traditional Medicare, the MA program allows private insurers to compete on benefits and price. The level of coverage appears to be important to Medicare beneficiaries, with the Median beneficiary over 65 spending nearly 13% of their income on health care in 2003 compared to just 2.2% for the under 65 population. Around 10% of the Medicare eligible population over 65 spends more than 35% of their income on health care.[3] Out-of-pocket cost (OOPC), that includes the cost of deductibles, copayments, and coinsurance for hospital, physician, and prescription drugs, make up 55% of health care expenditures paid by Medicare beneficiaries.[4] While the level of coverage appears to be important for Medicare beneficiaries in general, it seems especially critical for enrollees in MA plans. Atherly and Thorpe (2005) report that the primary reasons Medicare beneficiaries select MA plans include lower costs and greater benefits. In addition, about 20% of MA enrollees are in zero premium plans, so coverage is a key dimension of competition for many insurers.

Prior studies examining the effect of coverage face two empirical problems. First, they typically include only a few plan benefits such as copayments or coinsurance for specific services that may affect consumer demand.[5]

[2] There are many studies that show that show the amount of health services consumed is associated with the level of coverage. Key evidence is found from the RAND Health Insurance Experiment (See Newhouse et al (1993)). Numerous academic studies have shown links between health care treatments and health outcomes. Although there is evidence that shows that having no insurance is associated with poorer health (See Weissman and Epstein (1994)), there is less direct evidence linking the level of insurance coverage with improved health outcomes.

[3] Desmond et al (2007) calculate these figures using information from the 2003 Current Population Survey.

[4] AARP Data Digest (2004).

[5] For instance, Town and Liu (2003) examine the impact of prescription drug insurance on the demand for MA products using an indicator of whether drug insurance is offered. Atherly, Feldman and Dowd (2003) examine how a variety of plan characteristics affect demand for MA products. Hall (2007) re-examines the value of the prescription drug benefits and a variety of other benefits applying a similar methodology to Town and Liu. Lustig (2008) explores issues of adverse selection in MA markets including particular drug and medical service benefits. There is a long list of studies that examine the demand for health insurance in non-medicare sectors that also introduce benefit information in this manner or exclude benefit information entirely. Some recent examples include Town (2001) and

However, there are potentially hundreds of plan benefits that are important to consumers, but may be difficult to incorporate in a demand framework because of the number of benefits and nonlinearities in benefit packages (e.g. copays, coinsurance, deductibles, OOPC maximums, limits on coverage for specific services among others). Excluding benefit information may understate the impact that an insurer's choice of coverage has on consumer utility and may also cause omitted variable bias. A second problem is that coverage is a major choice variable of insurers who can change many benefits as easily as the premium on the plan, so the level of coverage is likely to be endogenous. The model presented in this paper addresses these two empirical issues.

The effect of coverage on demand is measured by estimating a differentiated product demand model for MA products. The demand model is a nested logit model similar to Berry (1994) where MA plans are included in a nest and the outside option is traditional Medicare. Consumer utility depends on the premium, the level of coverage, and other observed and unobserved plan characteristics. The whole range of benefits are captured using a unique estimate of expected OOPC which is the total amount a typical Medicare eligible individual might expect to pay in copays, coinsurance, and deductibles, holding the amount of medical services fixed across plans. The expected OOPC is a practical measure of coverage that is made publicly available by the Center for Medicare and Medicaid Services (CMS) so that Medicare beneficiaries can compare the benefits of various plans. This is the first paper to use this comprehensive measure of coverage in a demand analysis. In addition, I treat both the plan premiums and OOPC as endogenous variables chosen by the insurer and apply instrumental variable techniques as well as fixed effects to account for any potential bias.

This paper makes two primary contributions to the health insurance demand literature. First, it presents evidence that not instrumenting for OOPC may produce bias demand estimates that would underestimate the value of insurance coverage by more than 600%. This result has implications for studies that examine the effect of health insurance quality on enrollment decisions. If one views coverage as a measure of quality, the findings presented here suggest that not instrumenting for quality may result in an underestimate of the effect of quality on demand, which may partially explain why prior studies have found only small increases in the market share of highly rated plans.[6] The second contribution is that OOPC have a very large impact on consumer surplus in MA markets. The most conservative estimates of the value of coverage show that reducing OOPC by 50% would increase consumer surplus by more than 50%. This is greater than the impact of reducing all MA insurance premiums to zero.

Measuring the effect of OOPC on demand helps explain why Medicare eligible individuals purchase MA plans, but policymakers may also be interested in the overall surplus generated by the MA program relative to the cost of funding the program. This comparison has become increasingly relevant as there has been a substantial increase in payments to MA insurers relative to the cost of traditional Medicare. While the demand estimates imply that

Abraham, Vogt and Gaynor (2007).

[6] See Wedig and Tai-Seale (2002), Beaulieu (2002), Chernew, Gowriskankaran and Scanlon (2006), Jin and Sorensen (2006), and Dafny and Dranove (2008). Unlike several of these papers, my paper does not attempt to distinguish between market based learning about quality and information based learning from the public reporting of the OOPC measure.

consumer surplus generated by the MA program is over $21.0 billion in 2007, in that same year MA insurers received about 12% more for covering similar beneficiaries in traditional Medicare resulting in the government paying roughly $9.2 billion more to MA insurers, resulting in a net surplus of $11.2 billion. Although all types of plans produce net surplus gains, there is a wide disparity in the payments to different plans and the net surplus generated per person across plans. I find that consumer surplus per enrollee in Private Fee-For-Service (PFFS) plans is greater than the surplus generated by Health Maintenance Organization (HMO) plans, but the additional cost to the government of funding the PFFS plans causes the net surplus per additional enrollee to be less than half the amount of the less costly HMO alternatives. The large disparity in net surplus generated per person suggests that policymakers should explore the opportunity cost of additional funding to the more highly paid plans.

The remainder of this paper is organized in the following sections: Section 2 reviews the recent changes in the Medicare Advantage market; Section 3 presents the data and variables; Section 4 describes the demand model; Section 5 shows the results; Section 6 presents the policy analysis; and the last section concludes.

2 An Overview of Changes in the Medicare Advantage Market

Since the early 1970s Medicare beneficiaries have had the option of enrolling in private managed care insurance. The program, now called Medicare Advantage, provides Medicare eligible individuals the option to forgo the traditional fee-for-service Medicare plan and enroll in privately administered managed care alternatives. These private plans cover Medicare (Parts A and B) for a payment made from CMS. The MA program provides consumers with a greater variety of choices and allows private insurers to compete in offering insurance benefits to Medicare beneficiaries that are often greater than what is covered under traditional Medicare.

Medicare primarily covers individuals over the age of 65, but it also covers disabled individuals and those with end-stage renal disease. In counties where MA plans are offered, Medicare beneficiaries may either choose to enroll in an MA plan or remain in traditional Medicare. A vast majority of Medicare beneficiaries remain in traditional Medicare. All Medicare beneficiaries are automatically enrolled in Part A of the program which covers hospital care. Most beneficiaries also pay an additional premium to enroll in medicare Part B which covers physician services and outpatient services with a 20% coinsurance as well as some mental health coverage and lab and diagnostic testing.

MA plans are regulated at the county level. Regulators require that the MA insurers provide the same level of benefits as traditional Medicare and ensure that profits on the MA business do not exceed profits on the companies commercial insurance business. Payments from CMS to MA insurers vary by county and across years. Beneficiaries that wish to enroll in an MA plan are required to also enroll in part B of the plan and pay the part B monthly premium (in 2007 the premium was $93.50).

The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA) changed many aspects of the MA program. The MMA created the prescription drug program (Part D), renamed the program "Medicare

Advantage",[7] introduced the Regional Preferred Provider Organization (PPO) plans that were first offered in 2006,[8] and introduced a bidding system for MA insurers.[9] However, one of the key changes that had an immediate impact on MA markets was a 10.9% increase in rates paid to MA insurers in 2004.[10] Figure 1 shows the average MA rates across counties and changes in enrollment over the 2001 to 2007 time period.[11] The goal of the increase in rates was to encourage participation, which appears to have been successful with a substantial increase in enrollment, from around 5 million enrollees in 2003 to over 8 million in 2007.

FIGURE 1. ENROLLMENT BY PLAN TYPE 2001-07

In addition to an expansion in enrollment after 2003, there has also been an expansion in the number and type of plans offered. In 2003 beneficiaries were primarily enrolled in MA Health Maintenance Organization (HMO) plans, but after 2003 PPO and PFFS plans became more prevalent. There is no sharp distinction between PPO and HMO plans, but the HMO products tend to offer smaller and more restrictive networks where there are limited out-of-network benefits. It is also common for HMO plans to require enrollees to obtain a referral from a primary care physician or gatekeeper to see a specialist. The PFFS plans are distinct from the network based HMO and PPO plans because they do not have a network of providers.[12] In 2003 few people were enrolled in PFFS or PPO plans, but by 2007 about 1.5 million individuals were enrolled in PFFS plans and over 500,000 were enrolled in PPO plans.

The large increase in MA rates accomplished the goal of substantially expanding MA participation, but it has also spurred controversy. The rate increase has resulted in considerably higher cost to the government. The Medicare Payment Advisory Commission (MedPac), which advises congress on issues affecting the Medicare program, estimated that in 2006 it costs Medicare 12% more to cover individuals in the MA program relative to those in traditional Medicare.[13] Similarly high rates were also reported in 2008 and 2009. In contrast, in 2003 the rates were much

[7] The program was previously called "Medicare + Choice".

[8] Regional PPO plans require insurers to offer insurance across a large geographic area, and were introduced to promote penetration of MA plans across a broader area. In 2007 Regional PPOs made up less than 3% of overall enrollment.

[9] Prior to 2006 Medicare reimbursed participating HMOs a fixed amount per enrollee. In 2006 the payments incorporated a bidding mechanism that allows MA insurers to bid against a county benchmark. Insurers submit bids for offering benefits that cover part A and B of traditional Medicare. If the bid is above the benchmark the enrollees must pay for the additional cost in the form of an additional premium. If the plan's bid is below the benchmark, 75% of the difference, is provided to enrollees in the form of cost-sharing. The remaining 25% of that difference is retained by the government. Although the system has added greater flexibility in how rates are paid to insurers, it is not clear whether this change has impacted competition among insurers. Even for a fixed fee, firms have always had the incentive to compete in MA markets to attract enrollees by offering greater benefits than rivals. What has changed is that the governments costs are reduced when insurers bid more aggressively.

[10] Kaiser Family Foundation, (2004), Medicare Advantage Fact Sheet

[11] The HMO category also includes Cost Plus and Demonstration Medicare plans.

[12] Although the PFFS plans and traditional Medicare do not have a network, beneficiaries in these plans are restricted to those doctors that are willing to accept payments from these plans. The Center for Studying Health System for Change found that in the 2004-05 period only about 73% of doctors accept all Medicare patients. In contrast, network based MA products are able to customize a physician network that may include doctors not available under PFFS plans or traditional Medicare.

[13] See Update on Medicare Private Plans, Chapter 4 (2007) Report to the Congress: Medicare Payment Policy. For 2006 and

closer to the cost of covering those in traditional Medicare at only about 3% more on average. MedPac views these expenditures as costly and has advised congress to pay insurers the same amount for enrollees in the MA program as it cost to insure similar individuals in traditional Medicare. However, some have argued that the additional payments may be justified because they lead to additional benefits provided by MA insurers. This study contributes to this debate by comparing the surplus gains from the increased payments to the additional cost to the government.

3 Data and Variables

There are three primary data sets used in this study: OOPC data produced from the out-of-pocket cost calculator, plan characteristics from the plan compare database, and enrollment data from the State-County-Plan (SCP) files.

The OOPC data includes an estimate of the amount an enrollee might expect to pay out-of-pocket for a month for choosing a specific plan. The data is available to the public through the CMS website and provides a method of comparing the relative amounts of coverage for various plans.[14] The expected out-of-pocket estimate is useful to Medicare beneficiaries because plans often have a multitude of benefits, so this figure is a useful indicator of the overall level of coverage. The reported estimate is specific to an individual's age and health condition. For instance, in 2004 the expected OOPC for a man aged 73 that self-reports his health status as poor and selects the insurance plan in Las Vegas, Nevada called "Spectrum HMO" has an estimated monthly out-of-pocket cost of $529.

The OOPC estimates are constructed by using a sample of more than 10,000 individuals from the Medicare Current Beneficiaries Survey (MCBS).[15] Using information on medical services used by individuals in the survey, CMS calculates how much each individual would pay out-of-pocket for each plan, holding the health services used constant for each individual in the sample. By fixing health care consumption for each individual, the contribution of each service to the expected OOPC is weighed in proportion to the amount Medicare beneficiaries actually use each service. In addition, fixing health care consumption allows for a fair comparison of OOPC across plans. The health services covered in the calculation include those services covered by traditional Medicare, but it also considers services not covered by traditional Medicare, such as, drugs, vision and dental. In fact, in calculating the OOPC estimate nearly all health services used by beneficiaries are included in the analysis such as the cost of specialists, inpatient hospital visits, outpatient hospital visits, prosthetics and orthotics, renal dialysis, primary care physician visits, and numerous other services.[16] The wide range of services covered by the OOPC variable makes it a useful

2008 MedPac states that their calculation corrects for both demographic differences and differences in health risk when considering the hypothetical cost of MA enrollees in traditional Medicare. In 2003, the cost differences are adjusted for demographic differences, but they are not adjusted for health risk.

[14] The information is available publicly through the plan compare website so users can look up OOPC values for particular plans (http://www.medicare.gov/MPPF/Include/DataSection/Questions/SearchOptions.asp). However, this paper uses the full database of all OOPC calculations from CMS, which is not available publicly at this time.

[15] The MCBS is a survey of Medicare beneficiaries. The data is available to the public and contains information that links the survey and Medicare administrative bill records. According to CMS, the final cohort chosen each year is sufficient to be nationally representative.

[16] It also includes surgical supplies, emergency room visits, ambulance services, mammography screening, urgent care, pap smears,

and meaningful index of the level of coverage.

There are a number of key assumptions CMS makes in constructing the OOPC estimate. First, where applicable, it is assumed that an enrollee receives in-network services. Therefore, the OOPC measure should be viewed as the cost of in-network services. Second, in cases where coinsurance is used for medical services, the amount paid by the enrollee is calculated based on the observed expenditure in the MCBS survey. For instance, if a plan has 80% coinsurance for doctors visits and total expenditures on visits are observed to be \$600, then the OOPC for doctors services is assumed to be $(100\% - 80\%) \cdot (\$600) = \$120$. Third, in plans with a minimum and maximum cost share, the minimum cost share amount is used.[17] Fourth, while the goal of predicting the amount spent on OOPC remained the same over the sample period, the methodology used to calculate OOPC for prescription drugs changed in 2007. Prior to 2007 CMS reported all drug expenditures, but in 2007 they report only drug expenditures on identifiable prescription drugs. This change causes a shift in the reported level of OOPC drug expenses for non-covered drugs for beneficiaries with and without drug insurance, but has a relatively limited impact on the calculation of OOPC savings relative to having no insurance. Therefore, I will focus on the OOPC savings. Fifth, the sample from the MCBS survey includes individuals enrolled in traditional Medicare and excludes individuals enrolled in MA plans because of insufficient data. Therefore, the OOPC measure should be interpreted as a measure of the relative cost of a typical basket of health services, rather than a precise measure of OOPC for those enrolled in MA plans. Additional assumptions used to construct the estimates are available from CMS.[18]

The rules used to calculate the OOPC estimate are consistently applied across plans. One limitation of the OOPC measurement is that different cohorts are chosen from the MCBS file in different years. For instance, for the 2007 OOPC data the MCBS cohort was from 2001 to 2002, but for the 2004 OOPC data CMS uses the 1999 to 2000 MCBS files. Since every cohort uses a unique set of medical services, the measure of OOPC will change slightly across years in the sample. In other words, the OOPC measurement more precisely identifies the relative cost of plans within a year, rather than the change in the OOPC of a plan across years. This will have implications for the specification of the model discussed later in the paper.

The OOPC data available from the website reports the total OOPC for selecting a particular plan. However, I obtained a more detailed version of the OOPC data that distinguishes between OOPC for different services, such as prescription drugs or other medical services. In analyzing the effects of OOPC on demand, I view the drug coverage as distinct from other medical services for several reasons. First, historically traditional Medicare has not provided drug coverage, so consumers may view the choice of drug coverage as distinct. Second, for prescription

physical therapy, occupational therapy, immunizations, cardiac rehabilitation, theraputic radiation, mental health, diagnostic/lab tests, x-ray and MRIs, hearing exams, substance abuse, inpatient hospital services, inpatient psychiatric services, skilled nursing, psychiatry, chiropractic services, podiatry, eye exams, hearing, dental, and eye wear.

[17] This is true, with the exception of selected high cost X-ray services (CT, MRI, EKG, PET, and EER). For the high cost services the maximum cost share amount was used.

[18] See "CY 2007 Medicare Options Compare Cohort Selection and Out-of-Pocket Cost Estiamtes Methodology".

drugs enrollees can switch to cheaper, generic alternatives or use pill-splitting to save money, so separating out the OOPC expenditures for prescription drugs considers that beneficiaries may be able to shift drug expenditures more easily than other medical expenses. Third, drug purchases are more likely to involve stable payments relative to other medical services, so insurance coverage for prescription drugs may be less valuable than insurance coverage for services that are costly and involve greater uncertainty. For example, estimates from the 2006 Medical Expenditure Panel Survey report that around 91% of individuals over the age of 65 used prescription drugs and for those with expenditures the mean total expenditure (spending by the insurer plus OOPC) was $2,108.[19] In contrast, for inpatient hospital services only 18% of individuals over 65 used inpatient services, but for those that used services the expenditures are high with a mean total expenditure of $18,061. Risk averse enrollees may value medical insurance that covers costly catastrophic events differently than coverage for prescription drugs that tends to have more stable and predictable payments.

Aggregate OOPC estimates for medical services and prescription drugs are constructed by averaging across age and health status categories. For each of these two categories, a single measure of OOPC is estimated by taking a weighted average of the number of individuals in each age and health status category observed in the MCBS file. To correct for the change in methodology in 2007, I normalize the OOPC amount for prescription drugs so that policies with no coverage report OOPC estimates of zero. I do this by subtracting the OOPC for prescription drugs for plans with no drug insurance in that same year. For example, if policy A has drug coverage and a reported OOPC for prescription drugs of $100 and policies with no drug coverage in that year report OOPC of $230, then the reported OOPC amount for policy A is -$130 (=100-230). Therefore, the OOPC for prescription drugs variable is a negative value representing the amount of money saved for an enrollee in that plan relative to the expenditure if the enrollee did not have drug insurance. If a plan does not have drug insurance, then the predicted OOPC for prescription drugs is normalized to $0. This adjustment accounts for the fact that the amount of non-covered drug services for both insured and uninsured individuals shift over time.

Information about plan benefits is obtained from the Medicare Plan Compare database, which provides information on benefit packages for each plan.[20] Benefit information extracted from this database include: the premium, the deductible, the out-of-pocket cost limit (i.e. the maximum an enrollee pays out-of-pocket), an indicator for drug insurance, whether the plan requires a referral to see a specialist, and the size of the physician network. Beneficiaries value the size or breadth of the physician network because they must commit to a provider network at the time of purchasing insurance and a broader network reduces the probability of needing more expensive out-of-network services in the event of an illness.[21] The referral indicates the restrictiveness of the network. In addition to including the referral variable, the physician network size and the referral variable are interacted to capture the effect of the

[19] www.meps.ahr.gov

[20] The information about each plan is available to the public through the medicare options compare website (http://www.medicare.gov/MPPF).

[21] Dranove and White (1996) refer to these markets as "option demand markets".

referral requirement on the value of the network. Requiring a referral increases the time cost of accessing services on a provider network, so one might expect that requiring a referral would reduce the value of the number of physicians in the network.

The SCP data contains enrollment information by insurer and contract for October of each year.[22] Unfortunately there may be multiple "plans" contained under the same "contract". For instance, there may be two plans that have different benefits and different premiums that have the same contract number, so I cannot determine the number of individuals enrolled in each plan. Although many of the characteristics are often the same (e.g. whether the plan is an HMO or PPO and the network size are determined at the contract level); other characteristics are not the same (e.g. the premium and OOPC estimates). To address this issue, I take a similar approach to others in the literature and aggregate plan information to the contract level.[23] To match market shares for a contract to plan characteristics, the plan characteristics are averaged across plans that are listed under the same contract.[24] In addition to using enrollment information, the SCP data also contains information on the number of eligible individuals in each county in each year. A variable indicating the number of plan offerings under the same contract is also constructed, which is an ad hoc variable that accounts for the increased utility from additional plan offerings that arises from consumer's heterogenous taste.[25]

The appendix contains additional details about data used in this study including the age of the contract in a county, the age of the insurer, and other benefit characteristics. Table A1 in the appendix lists the variables used in this study along with a brief description.

3.1 Descriptive Statistics

Table 1.1 shows descriptive statistics for each contract-county observation across all years. The first five rows of the table shows the main variables of interest including the OOPC variables, the premium, and the network size. Recall that the expected OOPC variable for prescription drugs is a negative value, indicating how much one saves in OOPC relative to not having insurance. A more negative value of the OOPC for prescription drugs variable indicates greater coverage. The combined total of OOPC for medical services and the absolute value of OOPC for prescription drugs is greater than the premium, suggesting that OOPC variables may be economically important to beneficiaries. The table also shows that there is not a fixed package of benefits, but rather a considerable variation

[22] October is one month prior to the open enrollment for the following year. October is chosen because it is after all Open Enrollment periods in which consumers may switch plans (lasting from November 15th to March 31st) and enrollment in October is observed for every year of the data.

[23] An insurer may have more than one contract in a single market. (E.g. An HMO and a PFFS contract).

[24] While prior work has selected the plan with the lowest premium (See Town and Liu (2003) and Dafny and Dranove (2008)), arguing that consumers would tend to choose the plan with the lowest premium. I view consumers valuing numerous characteristics, with the premium being just one among many. Therefore, I simply average the plan characteristics and premiums. Results do not change significantly if the plan with the minimum premium is used instead of averaging across product characteristics.

[25] Inclusion of the plan variety variable reduces potential bias that might arise if plan variety is attributed to other product characteristics.

in the OOPC, with a standard deviation above $30 for both prescription drugs and medical services. There is also substantial variation in network size, with the mean network size almost twice the size of the median. The standard deviation for the premium is large at around $57, but it is important to highlight that about 20% of MA enrollees are in contracts charging a monthly premium of zero, so other attributes are likely to be the distinguishing feature of many contracts.[26] While there are large differences in the generosity of benefits across contracts, a demand model is necessary to determine how changes in these variables actually affect consumer demand.

TABLE 1.1. SUMMARY STATISTICS OF CONTRACT CHARACTERISTICS

Table 1.2 shows some county-level descriptive statistics for counties with some MA enrollment for the years 2004 and 2007. While Figure 1 showed that MA enrollment has grown over this period, Table 1.2 highlights how the MA market has expanded both geographically and within each county. First, the table shows a dramatic geographic expansion with over 2,000 additional counties with some MA enrollment. This expansion has led to penetration into much smaller counties with the average county in 2007 having about half the number of eligible individuals and half the number of enrollees than what is observed in 2004. Despite the large expansion into smaller counties, the average county has a larger number of MA insurers competing, increasing from 1.1 to 1.58 and the penetration of MA enrollment in each county has remained stable at around 10-11% of beneficiaries enrolled in MA plans.[27] The number of contracts in each market has increased even more than the number of insurers from 1.8 to about 5.

TABLE 1.2. CHANGES IN MARKET CHARACTERISTICS BY COUNTY

Table 1.3 shows how the different types of contracts have evolved from 2004 to 2007. The three types of plans shown in Table 1.3 include network based contracts that require a "Referral", those that have "No Referral", and the "PFFS" contracts that do not have a network.[28] The most striking change is an expansion in the number of less restrictive contracts. The number of "No Referral" contracts offered in counties increased by 2,825 and the share of enrollment in those contracts grew from just 10% to 27%. In addition, there were almost 8,000 new PFFS contracts introduced in counties, increasing the share of enrollment in PFFS from 0.8% in 2004 to 20% in 2007. The PFFS contracts have been particularly successful in rural areas that previously did not offer MA plans. All contract types experienced a large increase in average MA reimbursement rates that appears correlated with an increase in drug benefits and a reduction in premiums. Even though the change in average OOPC for medical services was relatively flat over this period, in 2007 more beneficiaries were enrolled in broader less restrictive contracts, so the average enrollee had in-network access to a greater number of doctors. The significant changes in premiums, benefits and network size over time are helpful in identifying the impact of changes in these key variables on MA enrollment.

[26] The premium reported in the table excludes the part B premium. Most Medicare eligible individuals pay for the part B premium regardless of choosing an MA product or traditional Medicare. While it is possible for MA plans to charge negative premiums (i.e. pay for a portion of the part B premium), only a small fraction of plans choose to do so..

[27] An insurer had to have at least a 5% share of the MA enrollees to be counted as a competing insurer in the county.

[28] Since it was noted earlier that the definition of a PPO and HMO is somewhat unclear and PPOs are rarely observed in 2003, I focus on changes in contracts that require referrals and those that do not. In 2007 I find that 71% of the "No Referral" plans are PPO plans while only 7% of "Referral" plans are PPO plans.

TABLE 1.3. CHANGES IN CONTRACT AND MARKET CHARACTERISTICS BY CONTRACT TYPE

4 Demand Model

To estimate the impact of OOPC and premiums, I first specify a demand model for MA products. Each Medicare enrollee makes a discrete choice of which option brings the greatest utility from among the MA options available and an outside alternative. Following other studies of MA demand in the literature, including Town and Liu (2003), Hall (2007), and more recently Dranove and Dafny (2008), this paper uses a multinomial logit demand model. The basic approach follows Berry (1994) by specifying a model of consumer demand that uses market-level data to derive a simple linear regression equation that corresponds to a discrete-choice model of consumer demand. The characteristics of the contracts affect the average desirability, but consumers have distinct taste for the different insurance offerings. MA contracts are grouped in a nest to allow for substitution among MA contracts to differ from substitution between MA contracts and the outside alternative.

The utility function of Medicare beneficiary i consuming contract j in market m at time t is:

$$\begin{aligned} u_{ijmt} &= \delta_{jmt} + \varsigma_{iGroup}(\sigma) + (1-\sigma)\varepsilon_{ijmt} \\ &= -\alpha p_{jmt} - \beta_1 OOPC\ Drugs_{jmt} - \beta_2 OOPC\ Medical_{jmt} + \beta_3 X_{jmt} + \xi_{jmt} + \varsigma_{iGroup}(\sigma) + (1-\sigma)\varepsilon_{ijmt} \end{aligned}$$

The indirect utility u_{ijmt} is a function of the mean utility for the product, δ_{jmt}, and an idiosyncratic component unique to each individual, $\varsigma_{iGroup}(\sigma) + (1-\sigma)\varepsilon_{ijmt}$. The mean utility is a comprised of the premium charged, p_{jmt}; the expected out-of-pocket cost for prescription drugs, $OOPC\ Drugs_{jmt}$; and the OOPC for medical services, $OOPC\ Medical_{jmt}$. The OOPC variables enter the model linearly and capture the disutility of greater expected OOPC for enrollees.

If medical expenditures are certain, then one would expect the coefficients on OOPC to be the same as the coefficient on the premium, $\alpha = \beta_1 = \beta_2$. However, risk averse consumers may place a higher value on uncertain medical expenditures, implying that one should expect $\beta_1 > \alpha$ and $\beta_2 > \alpha$. Although this strict interpretation provides some useful insight into the economic meaning to these coefficients, recall that the OOPC estimates are not precisely the amount an individual might expect to pay. In addition, the model presented here does not formally address issues of adverse selection. It is more realistic to view the OOPC variables as indexes used to approximate an expected OOPC amount, so in some cases it is possible that $\beta_1 < \alpha$ or $\beta_2 < \alpha$. For example, the OOPC variables are constructed assuming health care consumption is fixed, but one might find $\beta_1 < \alpha$ or $\beta_2 < \alpha$ if consumers are able to shift medical expenses as OOPC increase. This may be an issue for prescription drugs where splitting pills or shifting to less costly generics can reduce OOPC.

The specification also includes other observable benefit and plan characteristics that enter the vector X_{jmt}. The average value of the unobservable product characteristics is ξ_{jmt}. The unobserved characteristics may include reputation, unique qualities of the provider network, or other unobserved attributes. Differences across beneficiaries and their preferences for contracts in the MA group and the non-MA group are captured by $\varsigma_{iGroup}(\sigma)$ which depends on σ. The parameter σ will range between 0 and 1 with values close to 0 indicating substitution patterns do not differ across the nests and a value closer to 1 indicates that the correlation within the nest is high. The term ε_{ijmt} is the idiosyncratic error term of the beneficiary that is distributed i.i.d. Type I Extreme Value.

The outside good includes non-MA options such as traditional Medicare or a combination of traditional Medicare and Medigap supplementary plans. Medigap plans are a supplement to traditional Medicare that provides additional coverage, while MA plans are actually a replacement for traditional Medicare. Medigap plans are typically more expensive than MA plans and are purchased disproportionately by individuals with higher incomes (Atherly and Thrope (2005)). Medicaid may be an alternative outside option for some low-income beneficiaries.[29] In 2007 the outside good may also include a combination of traditional Medicare and Medicare Part D. The utility of the outside alternative u_{i0mt} is normalized to zero.

The model is well suited for the analysis of MA markets. It is a structural demand model that corrects for changes in the choice set caused by entry and exit, which is important given the rapid expansion of MA insurance over the period studied. The model also captures substitution among MA plans as well as substitution between MA plans and traditional Medicare. The parameters of the structural model are used to measure the effects of the premium, OOPC, and network size on demand and are also used to estimate consumer surplus.

The parameters of the demand model are estimated by applying the method proposed in Berry (1994) and estimating the following linear equation:

$$\begin{aligned}\ln(s_{jmt}) - \ln(s_{0mt}) &= -\alpha p_{jmt} - \beta_1 OOPC\ Drugs_{jmt} - \beta_2 OOPC\ Medical_{jmt} + \\ &\quad + \beta_3 X_{jmt} + \sigma \ln(s_{j|MA}) + \xi_{jmt}\end{aligned}$$

where the share of contract j is denoted s_{jmt} and the market share of the outside good is s_{0mt}. The share $s_{j|MA}$ is the share of contract j conditional on choosing a MA product.

The demand model also includes county fixed effects and state-time dummy variables. The county fixed effect account for all factors that affect the mean utility of the outside good that are unique to the a county and invariant over time. For instance, to the extent that average health or income varies across markets and affects the utility of selecting the outside alternative, these fixed effects account for these factors. State-time dummy variables are included to account for changes in demand that vary over time and are common across the state. The state-time dummy variables are especially important in accounting for changes in the outside options, such as Medigap.

[29] The Medicaid program provides insurance coverage for low income individuals and about 9% of individuals are eligible for both Medicaid and Medicare benefits.

Medigap plans are typically offered on a statewide basis, so the state-time dummy variables account for changes in the mean utility of the Medigap options.[30]

For estimating the demand model, the sample is further limited to the counties with at least 500 eligible beneficiaries and 100 enrollees observed for at least two years of the data. This limited sample is used for two reasons. The county fixed effects included in the model are likely to explain nearly all of the contract shares for smaller counties because there is often only one insurer in smaller counties and no time variation within a county. In addition, the full sample would include a large number of observations from relatively rural counties with little enrollment. The restricted sample contains over 95% of MA enrollment.[31] Although the estimates are performed on a restricted sample, the surplus estimates and elasticities reported are based on the full sample.

Instruments: The unobserved product specific error, ξ_{jmt}, is potentially correlated with the premium, OOPC variables, and conditional market shares included on the right hand side of the regression equation above. Therefore, Ordinary Least Squares (OLS) estimation of the model is likely to be bias. To correct for potential biases in the model I employ a two-stage least squares instrumental variable approach. There are four different sets of instruments applied in the analysis.

First, similar to others in the literature, I use the mean MA reimbursement rate in other counties in which the contract operates. The average payment in the surrounding areas are partly based on the cost of operating in the area and are determined by CMS. Second, characteristics of competing contracts within the county market are used as instruments for within-group share. The assumption is that certain characteristics of rival products are fixed and exogenous to price setting in the current period, which is a reasonable assumption for certain product characteristics. The age of competitor contracts are assumed to be exogenous, so the average age of competing contracts in the market, the average age of competing insurers, and the maximum age of competing contracts in the market are used as instruments. I also include a variable for the average size of competitor networks. The rival network size is unlikely to be endogenous since networks change relatively slowly because insurer contracts with physicians are often fixed for multiple years.

The third set of instruments is based on contract observations in other geographic markets similar to the strategy of Hausman (1997) and Nevo (2001). The basic idea behind selecting premium and OOPC values in other markets as instruments is that common shocks to marginal cost will be reflected in changes in these variables in other counties

[30] The state-time dummy variables and county fixed effects may also help control for changes in the outside alternative due to the introduction of Medicare Part D drug plan or changes in the Medicaid program. In addition, they help control for restrictions in the logit error term that prevent the models from predicting zero market share. Ackerberg and Rysman (2005) propose correcting for the problem by introducing the number of products in the market as an explanatory variable to allow the importance of the logit errors to change as new product are introduced. However, their proposed fix may be problematic if the number of competitors in the market is determined endogenously. As an alternative, the county and state-time dummy variables are an excellent predictor of the number of contracts in each market (with an Adjusted R-squared of 0.94), allowing flexibility in the logit error across markets and over time, without introducing endogeneity.

[31] The estimation results are similar if I include only counties with all three years of data.

that are uncorrelated with unobserved plan characteristics, ξ_{jmt}. Instruments include the minimum of premium, OOPC for drugs, and OOPC for medical services in other counties in which the contract operates. Each instrument is affected uniquely by different costs. For instance, the OOPC variables are likely impacted by the marginal cost of using the respective services (i.e. prescription drugs and medical services), while the premium is more likely to be affected by the marginal cost per enrollee, holding OOPC constant. I only select the minimum as an instrument for a variable if it is different from the value of that variable in the observed market. If the premiums or OOPC are the same across different markets, this indicates that prices in the different geographic markets are set together and are more likely to be invalid instruments.[32] In addition to using the firms own premiums, I also examine the average of the premium, OOPC for drugs, and OOPC for medical services of rivals in other counties in which the contract operates. Rival insurers may share similar costs in other counties, but demand in a each county is specific to that county, so rival premiums and OOPC variables in other counties are uncorrelated with unobserved plan characteristics. Hall (2007) takes a similar strategy in using rival prices in other markets.

For the third set of instruments to be valid, the changes in the premium and OOPC of the contracts in other markets must be correleted through shared marginal costs and uncorrelated with unobserved demand, ξ_{jmt}. Marginal costs are likely to be correlated across markets because many of the decisions made by insurers affect costs across broad geographic areas. Some of the common costs include insurer administrative costs, regional labor market costs for medical professionals, and negotiating with consolidated providers that have a presence across a broad geographic area (E.g. The Health Corporation of America hospital system includes hundreds of hospitals and spans multiple states). The regional differences in medical costs have also been noted in the health literature. Fisher et al (2006) document large differences in medical costs across geographic areas (and differences in medical cost growth), which they largely attribute to differences in physician practices across areas. In contrast, the demand for medical services for consumers tend to be relatively local. For instance, numerous studies have found that consumers tend not to travel far hospital services (e.g. Gaynor and Vogt (2003) and Ho (2006)). While the above arguments suggest that benefits in other geographic markets are valid instruments, it is important to note that if the benefits in other geographic markets are correlated with demand shocks, then the reported estimates are likely to be biased.

As an alternative to assuming independence of demand shocks across geographic markets, which has been applied in previous literature, the fourth set of instruments assumes that unobserved demand shocks are uncorrelated with lagged OOPC and lagged premium. This assumption is particularly appearling post-MMA, when much of the movement in MA demand is caused by policy changes in the MA program, and rates are increasing over this time period. The economic importance of MA rates can be seen by examining broad trends relating enrollment to MA rates (as shown in figure 1 previously), but more detailed statistical analysis has confirmed that MA payment

[32] To examine whether this is an issue in practice, I also estimate the model by selecting all premiums and OOPCs in other markets as instruments, even if they are equal to the observed premiums and OOPC. The results are very similar to OLS regression results demonstrating that excluding markets with identical premiums and OOPCs appears to have a substantial impact on estimation results.

rates are an important determinant of product offerings, even after conditioning on numerous other factors affecting demand (See Abraham et al 2000). Moreover, interviews with MA insurers have confirmed that the MA rate is a critical determinant of product offerings in different counties (See Gold 2006). In addition, it may be difficult for insurers to set benefits in anticipation of future demand because there is uncertainty regarding government policies. For instance, Gold (2006) reports that MA insurers paid close attention to the rates in an area, but insurers also noted the importance of considering the risks associated with the potential for future reduction in MA rates.[33] In contrast to the dramatic shift in demand caused by policy changes, the underlying cost structure of the insurers are likely to shift more slowly, since the duration of agreements with providers are often for multiple years. Therefore, the lagged premium and OOPC variables should be good proxies for the underlying cost in each market, but should be uncorrelated with current demand shocks. This fourth instrument set also includes a dummy variable of whether the contract is observed in the prior period and a lagged indicator of whether the contract offers drug coverage in the prior period.[34] This strategy will produce bias estimates if lagged premiums and OOPC are correlated with the unobserved demand shocks, ξ_{jmt}.

Contrasting estimates that apply either the third or fourth instrument set is a useful check on the robustness of the results under two distinct assumptions regarding the demand unobservables.[35]

5 Consumer Surplus and Insurer Profits

Using the estimates of the demand model, I follow the standard approach to estimating consumer surplus outlined by McFadden (1983). Consumer surplus, CS_{mt}, for a 12 month period may be calculated for a representative person using the following formula.

$$CS_{mt} = \frac{12}{\alpha}\left(\ln(D_{mt}^{(1-\sigma)} + 1)\right)$$

where $D_{mt} = \sum_{j \in m} \exp(\delta_{jmt}/(1-\sigma))$. The consumer surplus is the utility an individual receives above her expected utility from traditional Medicare and other outside options. This value is first estimated for each county

[33] In addition, insurer stock prices appear to be responsive to the announcement of new rates, highlighting market uncertainty about MA rate setting policy. "Insurers to Get Higher Medicare Payments" Article from:AP Online Article date" Associated Press, April 3, 2007

[34] The lagged premium and lagged prescription drug indicator is drawn from 2003 data. These variables help account for missing OOPC information in the year prior to 2004.

[35] Recent work by Lustig (2008) also considers the endogeneity of plan benefits. However, his work does not include the OOPC measure that incorporates more extensive plan information. In addition, his approach to controlling for endogeneity is different from the approach taken in this paper. He assumes that there is an unobserved characteristic for each contract, but there is no unobserved characteristic at the plan level, and uses this assumption to identify the value of plan benefits. My model is inconsistent if the chosen instruments are invalid, while Lustig's model is inconsistent if there are unobserved demand characteristics at the plan level that are correlated with benefit information.

and then surplus for the entire U.S. is estimated by aggregating across counties.

Using the above demand estimates along with assumptions about the pricing behavior of providers I estimate marginal costs and profits, as well as the affect of OOPC on the marginal cost of insurers. I assume a static Bertrand model assuming costs are fixed in the upstream market. This should be viewed as an approximation because CMS regulation potentially affects insurer strategies in all years and the introduction of a bidding mechansim in 2006 could alters how they set benefits and premiums in 2007. Moreover, the assumptions imposed on the behavior of insurers are arguably strong because, in general, it is unclear what type of game insurers are playing (i.e. dynamic vs static; collusive or competitive; Cournot vs Bertrand pricing; maximize profits downstream (one-sided game) vs maximizing profits considering the impact in the upstream and downstream markets (two-sided game)).[36] The relevant equations for a single contract are presented to simplify notation, but the actual calculation accounts for the full ownership matrix of each insurer in each market. The profit in county m for contract j is given by the equation:

$$\pi_{jmt} = (MArate_{mt} + p_{jmt} - mc_{jmt}(OOPC_{jmt}))s_{jmt}M_{mt} - F_{jmt}$$

In the above equation, $MArate_{mt}$, is the amount that Medicare reimburses insurers in market m in year t. The marginal cost, mc_{jmt}, is a function of the out-of-pocket cost, $OOPC_{jmt}$. The fixed cost associated with offering a contract is F_{mt}.[37] Assuming a Nash equilibrium in premiums the first-order condition for contract j is:

$$s_{jmt} + (MArate_{mt} + p_{jmt} - mc_{jmt})\left(\frac{ds_{jmt}}{dp_{jmt}}\right) = 0 \tag{1}$$

An estimate of the elasticity together with the previous equation may be used to estimate marginal cost, $mc_{jmt} = (MArate_{mt} + p_{jmt}) - \left(\frac{ds_{jmt}}{dp_{jmt}}\right)^{-1} s_{jmt}$. I also assume that insurers profit maximize with respect to $OOPC_{jmt}$ by setting $OOPC_{jmt}$ to maximize profits. The derivative of the profit function w.r.t. $OOPC$ is the following:

$$(MArate_{mt} + p_{jmt} - mc_{jmt})\frac{ds_{jmt}}{dOOPC_{jmt}} - \frac{dmc_{jmt}}{dOOPC_{jmt}}s_{jmt} = 0 \tag{2}$$

Next, I solve for the marginal effect of $OOPC$ on marginal cost of insurers, $\frac{dmc_{jmt}}{dOOPC_{jmt}}$.[38] The marginal effect, $\frac{dmc_{jmt}}{dOOPC_{jmt}}$, is of interest for at least two reasons. First, to the extent that $OOPC_{jmt}$ represents the amount a

[36] Strategic decisions of insurers that affect enrollment downstream may also impact upstream costs. (See Sorenson (2003) for an empirical analysis of factors impacting insurer hospital costs. See Ho (2009) for a more formal empirical model of strategic contracting between hospitals and insurers.)

[37] The fixed costs are calculated as in Town and Liu. I assume a free entry equilibirum, so that plans only enter a market if it is profitable. Under this assumption, the plan with the lowest variable profit in a county is set equal to the fixed cost for entering the county, which may be considered an upper bound on the fixed cost from entry. This assumption may be problematic, if it actually takes several years for insurers to become profitable in a county.

[38] I calculate an approximation of the effect of coverage on marginal cost. This paper does not attempt to formally model the costs associated with moral hazard or adverse selection. In particular, consumer heterogeneity in preferences for coverage is an essential feature for modeling adverse selection, which is absent in this empirical model. See Lustig (2008) for a more thorough examination of adverse

beneficiary would actually spend (e.g. the OOPC estimate of \$60 implies that beneficiaries are expected to spend precisely \$60 on average), one might expect this derivative to be equal to 1 because each additional dollar covered by the insurer is an additional dollar spent by the insurer. Therefore, if the value is above 1 it suggests consumers spend more when coverage is greater. In this case, a value above 1 may indicate the presence of adverse selection or moral hazard. However, if the value is below 1 it suggests that other factors may influence insurer costs, so there is an imperfect relationship between $OOPC$ and cost to insurers (e.g. adding benefits for a branded drug may not increase consumption if insurers provide incentives that steer beneficiaries to less costly alternatives as benefits increase). Second, the ability of insurers to influence marginal cost by changing $OOPC$ suggests that coverage should be considered when analyzing the cost function of insurers and measuring economies or diseconomies of scale. If an anticompetitive merger causes a reduction in coverage, rather than a reduction in premiums; then ignoring the impact of coverage on insurers cost may incorrectly lead a researchers to conclude that a merger is efficient, since premiums would stay the same but costs would fall. The value of $\frac{dmc_{jmt}}{dOOPC_{jmt}}$ is useful since it provides a measurement of how much insurer marginal costs are affected by coverage.

To solve for $\frac{dmc_{jmt}}{dOOPC_{jmt}}$ I substitute mc_{jmt} into (2) and solve. The result is $\frac{dmc_{jmt}}{dOOPC_{jmt}} = \left(\frac{ds_{jmt}}{dp_{jmt}}\right)^{-1} \frac{ds_{jmt}}{dOOPC_{jmt}}$. The derivatives $\frac{ds_{jmt}}{dp_{jmt}}$ and $\frac{ds_{jmt}}{dOOPC_{jmt}}$ can both be derived from parameters in the estimated demand equation.[39]

6 Results

The first 5 columns of Table 2 present the estimates of the demand model using the first three sets of instruments which excludes the lagged premium and lagged OOPC instruments. The first column shows the main results from the nested logit demand model. The coefficient on the premium is -0.0054 and statistically significant. The coefficient on the expected OOPC for prescription drugs and medical services are negative and precisely estimated with coefficient values of -0.0028 and -0.0085. Model 1 results are consistent with consumers valuing plans with lower premiums and lower expected OOPC. The nesting parameter that is estimated from the logarithm of the contracts conditional share is highly significant with a coefficient of 0.67. This implies a high degree of within-nest correlation among MA plans, so that consumers purchasing MA products are likely to substitute among MA plans and less likely to select traditional Medicare and other outside alternatives.[40] Model 2 explores the impact of including a drug insurance dummy. The dummy variable in Model 2 accounts for the value of drug insurance that is not captured by the

selection issues and the associated costs. In addition, the coverage choices may be endogenous to unobserved costs which might bias the estimates toward zero.

[39] In 2007 the MA Rate is different than the amount paid to insurers in 2007 because of the bidding system. In calculating profits I adjust this figures to reflect that the payments are typically slightly below the benchmark level.

[40] The appendix presents results from the first-stage regressions on p_{jmt}, $OOPC\ Drugs_{jmt}$, $OOPC\ Medical_{jmt}$, and $\ln(s_{j|MA})$ on the instruments and other exogenous variables. If the chosen instruments are weakly correlated with the endogenous variables, then the IV estimates are likely to perform poorly. The selected instruments are significant and applying an F test the null hypothesis that the instruments are zero is rejected.

OOPC prescription drug variable, but it appears that its inclusion is not statistically significant and it also appears to interfere with the identification of the expected OOPC coefficient (likely caused by multicollinearity), so Model 1 is the preferred specification.

Looking at the results from Model 1, the coefficient on expected OOPC for medical services implies that a one dollar reduction in expected OOPC for medical services in the future is worth about $1.50 in premiums today. As discussed previously, one interpretation is that risk averse beneficiaries value a reduction in uncertain expenditures more than certain expenditure on the contract's premium. In contrast, the coefficient on expected OOPC for drug expenditures is smaller than the premium coefficient. This may be caused by beneficiaries being less sensitive to changes in drug coverage, perhaps due to a greater ability to shift to cheaper prescription drugs as the amount of coverage falls.

The coefficient on the log of network size is positive and statistically significant implying that consumers value insurance networks with more physicians.[41] As theory would predict, the interaction of requiring referral and network size is negative, but the coefficient is statistically insignificant. A negative coefficient implies that requiring consumers to obtain a referral before seeing a physician reduces the value of the network size. A discussion of the coefficients on the other variables included in the model is contained in the appendix.

TABLE 2. DEMAND ESTIMATES

Model 3 explores the impact of including contract fixed effects. The additional fixed effects are appealing because they control for unobserved factors that are invariant over time and across markets, but there are a number of potential econometric problems caused by introducing additional fixed effects. First, the contract fixed effects eliminate potentially exogenous variation in OOPC used to identify key parameters. Second, as noted previously, the effect of OOPC may be more appropriately used to explain differences in enrollment across contracts within a year, rather than changes in a contracts across years because the measurement of the OOPC variables change slightly across years as different individuals are used from the MCBS survey. Third, fixed effects tend to exaggerate "errors-in-variables" biases, which is a bias that arises from not being able to statistically test the influence of an explanatory variable because it is measured with error (See Griliches and Hausman (1986)). This might be a problem for the OOPC variables that change across years and are constructed from an average across plans. Fourth, while the problems of included contract fixed effects may be small if there were additional years of data, the panel is relatively short reducing the amount of variation observed in the sample. Therefore, for many contracts there is

[41] The assumed log functional form was checked by estimating an alternative specification that included the network size and network size squared in the regression. I found a decline in the value of the network as the network size increased that roughly followed the log functional form. Alternatively, one could specify the model as some fraction of available doctors or perhaps of the potential population of eligible beneficiaries, $\log(N_{jmt}/Eligible)$. However, this will have little effect on the model if the total potential market size stays relatively fixed since $\log(N_{jmt}/Eligible) = \log(N_{jmt}) - \log(Eligible)$ and county fixed and state-time fixed effects are included in the model that would absorb the $\log(Eligible)$ term.

little cross-market or time variation in market shares or contract characteristics. Finally, the explanatory power of Model 1 appears to be high, reporting a within R-squared elasticity of 0.89, reducing the possibility of omitted variable bias.

Despite the potential problems with including contract fixed effects, the estimates from such a model provide insight into the source of identification and the robustness of the results. Model 3 reports estimate that includes contract fixed effects. The results show that the coefficients on premiums and OOPC for medical services are negative and statistically significant. This implies that the impact of changes in OOPC for medical services and premiums may be identified through changes in premium and coverage over time and differences across markets. However, the model was unable to precisely identify the coefficient on OOPC for prescription drugs. Other than the inability to precisely identify the OOPC for prescription drugs, the results are qualitatively similar those found in Model 1.

Model 4 is the same as Model 1 but excludes instruments for the OOPC variables to demonstrate the impact of instrumenting for coverage. Model 4 shows that the OOPC for medical services is insignificant and the economic value of coverage is minimal, with each dollar reduction in OOPC for medical services valued at around 25 cents. Model 4 also predicts that OOPC for prescription drugs is valued about 30% less than in Model 1. So, as one might predict, the impact of not instrumenting introduces a significant underestimate of the value of coverage. In particular, one might expect profit maximizing insurers to set lower benefits if unobserved utility is higher, introducing a downward bias on the value of coverage.

To show the impact of instrumenting for premiums, Model 5 is identical to Model 4 but is estimated without instrumenting for the premium. Estimates from Models 5 are consistent with contract premiums being positively correlated with unobserved demand shocks that would cause OLS estimates to have an upward bias on the premium coefficient. A Hausman test rejects the null hypothesis that an OLS estimate of Model 1 is consistent. Moreover, the OLS estimates imply extremely low elasticities and implausibly large profit margins for MA insurers.[42] Applying the instruments has the expected effect on the key model coefficients, which offers additional support for applying this instrumenting strategy.

Next Model 6 shows the results using the alternative instrumenting strategy based on the lagged premium and lagged OOPC variables, and excludes instruments that use the premiums and OOPC in other markets. Similar to Model 1 results, the results from Model 6 predict a higher value of coverage relative to OLS estimates.[43] However, the key difference is that the Model 6 results suggest a much higher value of coverage compared to Model 1. More precisely, each dollar reduction in expected OOPC of drugs is worth about $2 in premiums today and each dollar

[42]The Government Accountability Office found that for a large sample of MA insurers the ratio of medical expenses to revenues in 2005 was around 85.7%. Since this excludes administrative costs, this sets a rough upper bound for profit margins of around 14.3%. The Model 1 estimates imply industry profit margin of 12.7% in 2004, 15.4% in 2005 and 12.8% in 2007. In contrast, the parameters in Model 5 imply profit margins above 60% in every year.

[43]Applying the same robustness checks to Model 6 also produce qualitatively similar results to Model 1 estimates. The appendix reports first stage results of Model 6, which shows that first stage instruments are highly significant.

reduction in expected OOPC of medical services is worth more than \$3 today. Moreover, if one interprets the OOPC variable as an expected payment then Model 6 produces results that are more plausible theoretically because $\beta_1 > \alpha$ and $\beta_2 > \alpha$. Although the estimated value of coverage in Model 1 is smaller than Model 6, the estimates from Model 1 provide an important conservative benchmark and is the preferred specification assuming costs are correlated across geographic markets but demand unobservables are not.

Models 1 and Model 6 differ in their estimated value of coverage, but both the nesting parameter, σ, and α are nearly identical across the two models, which implies that the welfare calculations, premium elasticities, and profit estimates are very close in value. Therefore, I will focus on Model 1 estimates that produce more conservative predictions when examining welfare calculations, premium elasticities, and profit estimates, but when evaluating the impact of coverage I will contrast the more conservative estimates from Model 1 with the results from Model 6.[44]

Prior studies of MA markets typically report a semi-elasiticity, which is calculated as $\frac{ds_{jmt}}{dp_{jmt}}\frac{1}{s_{jmt}}$, because they measure responsiveness to premiums, even when premiums are zero. The average semi-elasticity with respect to the premium from Model 1 is -0.0129, which is a bit higher than prior estimates. Town and Liu find an elasticity of -0.009 and Atherly, Dowd, and Feldman (2003) use individual data from the MCBS and find a semi-elasticity of -0.007.[45] One potential reason for this difference is that Model 1 instruments for benefits, but the other papers do not, which potentially introduces bias. I find that when I do not instrument for OOPC benefit information (Model 4) I obtain a premium elasticity of -0.0105, which is closer in value to the previous literature. For Model 1, the average semi-elasticity with respect to OOPC for medical services is very high, -0.020, suggesting that consumers are very responsive to changes in coverage for medical services, but they appear to be less responsive to changes in prescription drug coverage that has a semi-elasticity of -0.007. Consumers are much more responsive to OOPC based on the Model 6 estimates with respecitve semi-elasticities of -0.046 and -0.026.

The results may also be used to estimate the effect of changes in OOPC on insurer marginal cost. Using equation (2) and Model 1 estimates, I calculate the effect of OOPC variables on the marginal cost of insurers and find that for prescription drugs $\frac{dmc_{jmt}}{dOOPC\ Drug_{jmt}}$ is -.46 and that for other medical services $\frac{dmc_{jmt}}{dOOPC\ Medical_{jmt}}$ is -1.54 based on Model 1 estimates. Using Model 6 estimates the impact of coverage on the marginal cost to consumers is much higher

[44] In addition to the above checks, I also explore adding an additional nest where contracts are grouped into those that offer drug insurance and those that do not. While there is some evidence of correlation among plans within the additional subnest, it is not strong and is not robust across alternative specifications (i.e. I cannot reject they hypothesis of a single nest for MA products). Results reported in Hall (2007) using a similar model also suggest that an additional nest for prescription drugs adds little to the model. More importantly, I find similar statisical significance and economic importance of the OOPC variables using this alternative specification, and there is little impact on the overall welfare estimates.

To check if aggregating plan offerings introduces bias I estimate the above models using only those contracts with a single plan offering. I find qualitatively similar results to those reported in the paper. However, I hesitate to rely on these estimates because the sample size shrinks to 25% of the observations from the full sample and I lose statistical significance on the OOPC for prescription drugs variable.

[45] One potential reason that the results in Town and Liu and this paper show higher elasticities is that we both the use of IV techniques that correct for endogeneity bias.

suggesting moral hazard and adverase selection costs for both forms of coverage are very high. Model 6 estimates imply that for prescription drug coverage $\frac{dmc_{jmt}}{dOOPC\ Drug_{jmt}}$ is -1.91 and for other medical services $\frac{dmc_{jmt}}{dOOPC\ Medical_{jmt}}$ is -3.16. Across both models, the OOPC for medical services have a much greater impact on the marginal cost of insurers than the OOPC for drugs. The difference in the magnitude may be explained by a greater ability of insurers to manage the additional cost of providing increased benefits for drug services relative to medical services where both adverse selection and moral hazard may have a greater impact on insurer costs.

The demand parameters estimated above may be used to estimate consumer surplus and profits. For each year of the sample, Table 3 shows total government expenditure, the percentage cost of MA above traditional Medicare, net cost to the government, estimated profits and consumer surplus. The estimates show that from 2004 to 2007 spending in the program has increased by 80% and consumer surplus has increased almost 60%. By 2007 consumer surplus in the MA program was $21 billion and total government spending was $77.0 billion.[46]

TABLE 3. CONSUMER SURPLUS AND PROFIT ESTIMATES

While the above estimates suggest large gains in consumer surplus and profits from the MA program, policymakers should also consider the additional cost to the government. The net surplus from the MA program has two components: the consumer surplus from the MA program and the cost to the government. The consumer surplus is the total additional surplus from MA products present in the market relative to the surplus attained from all beneficiaries staying in traditional Medicare (i.e. $CS_{MA} - CS_{Traditional\ Medicare}$). The cost to the government is the additional amount the government must pay to reimburse insurers for individuals enrolled in the MA program relative to their cost in traditional Medicare, (i.e. $CMS\ Payments - Expected\ Cost\ Traditional\ Medicare$), which is the net cost of the MA program. Taking these two pieces together, the net welfare formula is the additional consumer surplus minus the additional net cost to the government.[47] It is important to highlight that this definition of net welfare may overstate the efficiency of the program because it does not consider either the cost to society of taxation or the opportunity cost of spending government funds on alternative government programs.

$$\begin{aligned} NetWelfare &= (CS_{MA} - CMS\ Payments) \\ &\quad -(CS_{Traditional\ Medicare} - Expected\ Cost\ Traditional\ Medicare) \end{aligned}$$

The equation above implies that the net welfare may be different from consumer surplus if the cost of the MA program is different from the cost of traditional Medicare. As stated previously, estimates from MedPac suggest

[46] The consumer welfare figure in 2004 of $13.2 billion is only slightly lower than the estimates reported in Hall (2007) for the year 2002 of $14.8. To make this comparison I adjust Hall's reported consumer welfare to 2007 dollars using the Consumer Price Index.

[47] Town and Liu considers net welfare to include MA profits, but this definition of net welfare implicitly assumes that the government run traditional Medicare program has zero profits, which may be a strong assumption. I assume that profits to the government from traditional FFS Medicare are identical to those of MA insurers and so I exclude MA profits in the net welfare calculation. However, estimated profits to private insurers are provided so alternative definitions of net welfare can be derived.

that the MA rates in 2007 were about 12% more than the cost of traditional Medicare, while rates in 2004 were closer to the cost of traditional Medicare at just 7% above traditional Medicare cost.[48] Using 2007 figures, I calculate the spending above cost to be $CMS\ Payments - Expected\ Cost\ Traditional\ Medicare = \$9.2$ billion, so the net welfare in 2007 is a more modest $11.8 billion. For 2004, the additional cost to the government is estimated to be $3.2 billion implying a net welfare figure of $10.2 billion for 2004. Using these estimates, the increase in net welfare from 2004 to 2007 is $1.6 billion. Although the additional cost to the government has increased by 80%, net welfare in the program increased by only 15.7%. Therefore, under these assumptions, the gain in consumer surplus significantly overstates the net gains from the increase in MA payments.[49]

The net surplus generated by the MA program should be of interest to policymakers, but the wide disparity in payments across different plans makes it important to also explore the amount of net surplus generated by the different plan options. The end of the next section looks at the surplus generated by the contracts receiving the largest payments from the government relative to the contracts that are less costly contracts.

7 Policy Analysis

This section conducts a number of counterfactual experiments to examine how adjustments to insurance characteristics affect consumer surplus. For each experiment I will contrast the more conservative results based on Model 1

[48] These figures are from chapter 4 Update on Medicare Private Plans for 2007 page 244 and are based on 2006 estimates. The 2006 estimates appear to be a good approximation to actual payments since the estimates have changed little in 2008 estimates reported in the 2008 MedPac study. In calculating expenditure figures I account for the benchmark rate in counties being different from the actual amount paid to insurers. For instance, the benchmark relative to traditional Medicare expenditures is reported to be 115% (=Benchmark/Cost of Traditional) of traditional Medicare for HMO plans, but the payments were just 110% (=Payment/Cost of Traditional) of FFS expenditures. To calculate the payment from the benchmark I use the ratio of the two figures: Benchmark*(110/115)= Payment. While payments to insurers differ across local markets, this approach should provide an reasonable estimate for aggregate national estimates. I obtain the 2004 figures chapter 4 Update on Medicare Private Plans for 2004 page 210. For 2005 I assume the additional cost is 10%, which is the midpoint between the 2004 and 2007 estimates.

[49] In the prior work of Town and Liu (2003) and Hall (2007) they also calculated net welfare, but they had to account for the fact that more healthy individuals might select MA plans. In particular, if healthier individuals select MA insurers, as several studies suggest, and the government payments do not adjust for health risk; then the government is likely to overpay MA insurers to cover a relatively healthy population. This does not appear to be an issue in 2007 because payments to insurers are fully risk adjusted. In 2007 CMS payments account for both the demographics and health risk of individuals in setting payments to insurers, so the selection of healthier individuals by MA insurers is unlikely to lead to a bias in the estimates of the additional cost to the government. However, in 2004 the payments to insurers only consider the demographic differences of enrollees and may be impacted by selection. If, in fact, MA plans select a healthier population in 2004, this may lead to greater costs to the government than the assumed 7% reported in MedPac (2004). Supposing that costs were 5% greater than MedPac reports, so the additional cost of MA enrollees are 12% above the cost of traditional Medicare, the net welfare gain from 2004 to 2007 would be $3.8 billion. These calculations do not incorporate the possibility of beneficial spillovers. A recent study by Chernew, DeCicca and Town (2008) show that additional penetration in the private Medicare market lead to reduced medical care expenditures incurred by traditional Medicare fee-for-service enrollees. If higher spending leads to reduced expenditures in traditional Medicare market, then net welfare calculations reported here are biased downward.

estimates with results using Model 6 estimates. The consumer surplus in the counterfactual experiments is compared to the benchmark surplus level in 2007 of $21 billion implied by both Model 1 and Model 6. The results are reported in Table 4. The first four experiments demonstrate that OOPC have a significant influence on consumer surplus. Experiment (1) shows that reducing OOPC for both medical and drug services by 50% increases surplus by 51% in Model 1 and 264% in Model 2. In contrast, Experiment (2) sets the maximum premium to zero which increases surplus by 48% in both models. The results from Experiments (1) and (2) show that OOPC can potentially have a very large impact on consumer surplus, and can have more impact than changes in the premium on the plan. While these experiments imply that changes in benefits potentially have a large effect on consumer surplus, it is also important to check whether OOPCs vary sufficiently across contracts to be economically important to consumers. Conducting counterfactual experiments that are far from possible values that insurers might choose could overstate (or understate) the importance of OOPC in practice (e.g. suppose OOPC vary only by a couple of dollars across markets, but my experiments shift OOPC by hundreds of dollars). For Experiment (3) the OOPC variable is increased so that the minimum of the OOPC variables is set to the 90th percentile. In this case, the percent reduction in consumer surplus is 36.3% in Model 1 and 51.5% in Model 6. This value is contrasted with Experiment (4) where the premium is increased by setting the minimum premium to the 90th percentile and welfare falls only 32.5% relative to the benchmark. These experiments suggest that the observed differences in OOPC across contracts have a greater impact on consumer surplus than the observed variation in premiums.

Experiment (5) and (6) examine the impact of different medical and drug components of OOPC on consumer surplus. Experiment (5) looks at removing drug coverage, which is equivalent to setting the OOPC for drug coverage to the 90th percentile. Experiment (5) shows that removing drug insurance reduces consumer surplus in the program by about 12% based on the more conservative estimates and around 35% based on less conservative estimates from Model 6. Both estimates lie between the ranges reported by Town and Liu (2003) who find drug insurance accounts for 45% of consumer surplus in the program in 2000, but larger than the estimates of Hall (2007) who find that drug expenditures account for about 5% of consumer surplus in 2002.[50] Unlike these studies, drug coverage in this paper is a continuous measure that accounts for the large heterogeneity in drug coverage across markets.

While several studies have examined the value of drug coverage, the differences in coverage for other medical services across contracts also have a substantial effect on surplus. Experiment (6) shows that increasing OOPC by setting the minimum of OOPC for medical services to the 90th percentile has nearly as large an impact on consumer surplus as removing drug coverage. Specifically, Model 1 estimates imply a 4% larger impact on consumer surplus relative to removing drug insurance and estimates from Model 6 imply a 6.5% smaller impact on surplus.

Experiments (9), (10) and (11) look at the effect of dropping different types of contracts to evaluate their impact

[50] The fraction of surplus accounted for by drug benefits in 2004, (not shown in the table), are about 5% lower than those reported for 2007 because drug benefits were greater in 2007 relative to 2004. Therefore, the conservative estimates of the value of drug coverage are quite close to the findings of Hall.

on consumer surplus in the program. These experiments show that much of the consumer surplus in the program is generated by the presence of HMO products (9) and that withdrawing these products from the market reduces consumer surplus by around 40%. The impact from withdrawing either the PFFS product or local PPO products is much less.

TABLE 4. POLICY EXPERIMENTS AND SURPLUS CHANGES 2007

While consumer surplus generated by the presence or withdrawal of these contracts indicates the value of these plans to consumers, the wide disparity in the amount paid to different plans makes it important to explore the opportunity cost of funding each type of contract. Average government expenditures by type of plan are reported to be the following: HMOs are paid 110% of traditional Medicare, local PPO plans are paid 117% and PFFS contracts 119%. Therefore, on average, the PFFS contracts are the most costly for the government, while the HMO contracts are the least expensive. Although some contract types are paid more by the government, it may be efficient to offer additional funding if the additional spending increases consumer surplus by enough to generate positive net surplus.

Table 5 explores the relative efficiency of the different contract types by examining how net surplus changes when different contract types are added to the system, while holding benefits and average plan payments constant.[51] I assume that the amount Medicare payments vary is only affected by plan type because this is what is reported in available MedPac reports. This may be a strong assumption because payments to plans vary greatly across geographic markets. Despite the limitations of this approach, applying the assumption that payments vary by plan type captures the general fact that on average HMOs tend to be much cheaper for the government than PFFS plans and Local PPO plans. Column (1) shows the average additional percentage cost to fund MA enrollees for each plan type. Column (2) shows the additional enrollment from adding the specified plan type. For instance, column (2) row (1) shows the number of additional enrollees in the market induced by the introduction of HMO plans, relative to the number of enrollees if HMO plans were removed from the market. Column (3) reports the total consumer surplus gain from inclusion of the plan type in billions of dollars. For instance, the column shows that consumer surplus increases by $8.50 billion dollars because of the existence of HMO plans. Column (4) reports the total additional cost to the government from adding each plan type. It shows that adding HMOs increases government costs by $930 million, but adding PFFS plans increases government costs by $1.37 billion. Column (5) reports the net surplus gain from having the plan in the market (i.e. column (3) minus column (4)). Column (5) shows that each plan type reports a net gain in surplus, with the greatest net surplus generated by HMO plans.

TABLE 5. ADDITIONAL SURPLUS GENERTED BY MAJOR PLAN TYPES

While each plan type produces a net surplus gain, there is wide variation in the amount of surplus and cost per enrollee. Columns (7), (8) and (9) report consumer surplus, additional cost to the government, and net surplus

[51] It is assumed that benefits stay fixed for all remaining plans. Examining the supply response of other plans in the market is outside the scope of the analysis.

generated per additional enrollee in the contract. That is, columns (7), (8) and (9) are estimated from columns (3), (4), and (5) by dividing by the number of additional enrollees in column (2). PFFS plans generate the largest level of consumer surplus per additional enrollee, at around \$289, compared to around \$248 for HMO and PPO plans. Despite the large consumer surplus generated by PFFS plans, PFFS plans generate significantly less net surplus because the additional payments to PFFS plans imply they are much more costly (\$191 more per enrollee) relative to HMO plans (\$26 more per enrollee). The cost of additional HMO enrollees is low because they draw enrollees away from more costly PFFS and PPO alternatives. Therefore, each additional consumer gained from offering a HMO option increases net surplus by \$220, on average, but the net surplus gained per enrolle in a PFFS plans is considerably smaller at just \$97 per enrollee. These counterfactual experiments indicate that although the PFFS plans produce greater consumer surplus per enrollee, the net surplus generated per enrollee is lower because of the additional cost to the government. The disparities in net surplus gains per enrollee suggest that policymakers should explore the opportunity cost of additional funding to MA insurers, especially to the most highly paid PFFS and PPO plans.

8 Conclusion

Insurance plans often contain hundreds of plan characteristics that affect the OOPC to consumers and may be changed as easily as the premium on the plan. These OOPC benefits may be especially important in the MA market, where 20% of beneficiaries are enrolled in zero premium plans and a substantial fraction of beneficiaries income is spent on OOPC. However, estimating the effect of OOPC on demand poses a challenge for researchers who must incorporate a large number of plan benefits in a demand model, but also consider the endogeneity of benefits. I address these problems in a discrete choice demand model by employing a unique measure of OOPC that considers a consumer's expected payments for a fixed bundle of health services and apply IV techniques to address potential endogeneity bias.

The results of the demand model show that OOPC have a significant effect on surplus. Conservative estimates suggest that increasing OOPC to the 90th percentile reduces overall surplus in the program by over 36%, while the less conservative estimates suggest that overall surplus may fall by over 50%. In contrast, increasing the premium to the 90th percentile reduces surplus by around 33% in both models, highlighting the relative importance of OOPC. The large surplus effects from changes in OOPC confirms that coverage is highly valued by consumers. Moreover, I find the OOPC measure to be endogenous, so not instrumenting for OOPC produces bias estimates that significantly underestimate the value of coverage.

In addition to exploring the impact of OOPC on consumer surplus, I use the estimated demand model to examine the overall surplus generated by the MA program. I find that the surplus from the program is substantial with consumer surplus estimated to be \$21.0 billion in 2007. However, the benefit to society is significantly overstated by this figure because the government payments to MA insurers exceed the cost to cover similar beneficiaries in traditional Medicare by $9.2 billion. There appears to be a wide disparity in the amount paid to different plans across the country with HMO plans being paid 10% more than traditional Medicare and PFFS plans being paid 19% more. I find that the net surplus per enrollee on the less costly HMO plans is almost double the net surplus generated by the PFFS plans. These results suggest that policymakers should evaluate the level of payments made to MA insurers and consider reducing payments to the most highly paid plans.

There are a number of directions to extend the research presented here. First, this paper primarily focuses on the demand-side of the market, but the results have implications for the supply-side. Both the economic importance of coverage to consumers and the endogeneity of coverage imply that an important topic of future research is to investigate how both coverage and premiums change with the competitive environment. Second, this paper assumes that consumers do not have heterogenous preferences for coverage, but one might relax this assumption by introducing random-coefficients or micro level data that would allow less healthy individuals to prefer greater coverage. In addition to improving the precision of the value of coverage estimates, this would allow for a more flexible substitution among plans and would also allow one to look at issues of adverse selection (See Lustig (2009)). Third, to the extent that OOPC may be viewed as a measure of quality, the results presented in this paper imply that quality may be endogenous and that controlling for endogeneity may lead to a large increase in the estimated effects of quality on health plan choice. Future research may benefit by taking an IV approach to looking at the effects of certain quality measures on demand in health insurance markets, especially aspects of quality that may be adjusted quickly in response to changes in the competitive environment.

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10 Appendix

10.1 Data and Variables

Some additional variables are formed from the SCP enrollment data. Using historical enrollment data back to 2001 the age of each contract in each county is calculated. The age of the contract is the number of years that the contract has been present in the county since 2001. I also construct a dummy variable indicating whether the contract was present in 2001. The age of the contract may be related to the quality of the product since it may take experience in a market to construct a quality network, develop a reputation in an area, and the contract age may also capture switching costs for enrollees in older plans that would incur a disutility from changing plans.[52] Another related measure, the age of the insurer in the county since 2001, is also created. The age of the insurer is included because the effect of age may not be specific to a contract, but may actually be related to an insurer's experience in the market. Aside from being a useful control variable, the age of the insurer may also be of interest to those concerned with the speed of new entry. In particular, the insurer's age may indicate whether an incumbent insurer has an advantage in launching new products relative to a new entrant.

The above data is supplemented with information about Medicare benchmark rates. These are the amounts MA insurers are reimbursed for each enrollee.[53] The rates are unique to each county and vary across years as methods for determining reimbursements change. All monetary figures in this paper are inflated to 2007 dollars using the Consumer Price Index.

The size of network variable includes a range of the number of "in-network" doctors who typically have lower copays or coinsurance than "out-of-network" doctors. The count of the number of doctors includes primary care physicians and specialists. An example of the type of network range reported in the data is "1501-2000" indicating that the number of doctors covered lies between these values. The number of doctors in a plan is estimated to be the average of this range (e.g. For the range 1501-2000, the size of the network variable equals (1501+2000)/2=1750.5).[54]

Table 1 provides a listing of variables used in the study along with a brief description of each variable:

TABLE A1. DESCRIPTION OF VARIABLES

The full sample selected in this study includes all contracts where there is more than 10 enrollees in the contract.[55]

[52] Strombom et al (2002) show that switching costs in health plan markets may be significant. Reputation may also play an important role. Sorenson (2006) uses employer data and finds that the choice of health insurance plan is influenced by coworkers' decisions. In interviews with large insurers Gold and Peterson (2006) report that establishing a new network may be costly and time consuming because it takes on-the-ground resources to establish a new network. Town and Liu (2003) also control for the age of the contract and find it to be a significant explanatory variable.

[53] In 2007 the amount is adjusted to reflect the fact that, on average, payments are below the county benchmark because of the implementation of the bidding system. I approximate this amount by using the MedPac (2007) reported average difference between the benchmark rate and payments to insurers. The payment rate to insurers is, on average, 97% of the benchmark rate.

[54] The number of providers is observed for most plans, but about 6% of the plans appear to be missing the network size variable.

[55] I also exclude Programs of All-Inclusive Care for Elderly (PACE), which are combination programs with Medicaid, Health Care

The sample is limited to the years 2004, 2005, and 2007 because OOPC data was not produced in 2006.[56]

10.2 First Stage Regression

The table below presents the results from the "first-stage" regression of the demand estimates for Model 1 and Model 6.[57]

TABLE A2. FIRST STAGE REGRESSION - MODEL 1

TABLE A3. FIRST STAGE REGRESSION - MODEL 6

10.3 Discussion of Other Model Parameters

The model includes a number of additional variables as controls. The value of the contract increases with the contract's age in the county. The positive effect of the contract's age on demand suggests that incumbent contracts offer significantly greater value. While the estimates imply that consumers value an incumbent's presence, they do not precisely identify why an incumbent is more highly valued. It is unclear if the increased value is attributable to network quality, reputation, or switching costs. The estimates indicate a high value for incumbent insurers that were in the market in 2001. The interaction between plan age and insurer age is negative, showing that the incumbent insurer's advantage declines over time.

The plan type variables such as PPO, PFFS, Req. Referral and Regional PPO capture average utility for these different types. A priori the expected signs of the plan type dummies are uncertain. The PPO and PFFS plans typically offer broader and less restrictive networks, but they are also relatively new to the MA markets, so potential enrollees may be less familiar with these types of plans. The deductible and OOPC limit variables also included in the model affect the timing of the beneficiary OOPC payments, which may have a different affect on demand than copays and coinsurance. That is, these variables may capture factors affecting the timing or risk associated with a plan that may not be reflected in the OOPC estimates. OOPC limits reduce the expenditure risk to beneficiaries. The deductible must be paid before the plan provides coverage, so higher deductibles are undesirable. The expected sign of these coefficients are not entirely clear, since both the deductibles and OOPC limits are captured in the estimation of the expected OOPC variables. While one might be concerned that OOPC limits and deductibles are endogeneous, I find that the estimates of the model change little when these variables are excluded. Holding OOPC constant, the estimates show that beneficiaries prefer contracts with lower deductibles and contracts that have some type of cost limit. The estimates also show that contracts with a greater number of plan offerings are valued more.

Prepayment Plans (HCPP) plans, which covers only outpatient services. Employer group plans are also excluded.

[56] SCP enrollment data was available in 2006, and is used in the construction of the age variables previously discussed.

[57] In addition to the minimum premium in other markets, I also examined the maximium premium and OOPC as an alternative instrument. I obtain similar results using the maximum in replace of the minimum or using the maximum in place of the instruments using rival prices.

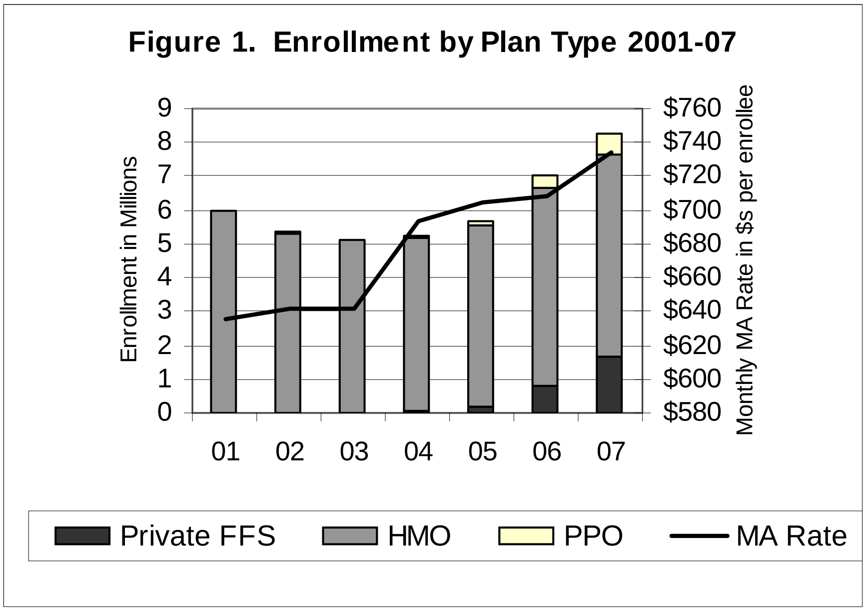

Table 1. 1 Summary Statistics of Contract Characteristics*

	Mean	sd	25th percentile	Median	75 percentile
Key Plan Variables					
Expected OOPC Medical Services	$87.26	$30.69	$69.78	$84.21	$106.25
Expected OOPC Drugs	-$44.26	$33.04	-$77.60	-$47.52	-$8.97
Premium	$49.38	$56.14	$10.00	$40.00	$72.23
Network size (in 1,000 of doctors)**	4.48	5.20	0.75	2.50	5.25
Plan Types					
Referral Required	0.19				
PPO	0.15				
Regional PPO	0.08				
Local FFS	0.56				
Other Plan Characteristics					
Has Drug Insurance	0.76				
Has a Deductible	0.11				
Amount of Deductible	$45.51	$219.47			
Has an OOPC Limit	0.66				
Amount of OOPC Limit	$2,343.63	$2,271.78			
Contract Age in County	1.41	1.74			
Insurer Age in County	1.69	1.90			
# offerings	2.45	1.46			

*Estimates reported in 2007 dollars.

**Average only includes network based plans that are not missing the network variable.

Table 1.2 Changes in Market Characteristics by County

Variable	2004	2007
Number of Counties	1,068	2,932
Avg. Eligible Population	28,423.18	14,615.86
Avg. Enrollment	4,744.00	2,818.15
Avg. Number of Insurers	1.09	1.58
Avg. Number of Contracts	1.80	4.95
Avg. MA Penetration	10.1%	11.2%

Table 1.3 Changes in Contract and Market Characteristics by Contract Type*

	Contract Type					
	Referral		No Referral		Private FFS	
Variable	2004	2007	2004	2007	2004	2007
Plan Type Share	89.1%	52.68%	10.0%	27.0%	0.8%	20.3%
MA Reimbursement Rates	$598.59	$776.39	$608.60	$740.09	$587.90	$715.55
Plan Characteristics						
OOPC Medical Services	$67.63	$79.82	$73.36	$78.24	$108.69	$98.38
OOPC Drugs	-$33.27	-$54.55	-$25.66	-$64.32	-$31.00	-$45.04
Premium	$70.89	$43.88	$71.72	$60.74	$52.88	$42.84
Total OOPC & Premium	$105.25	$69.15	$119.41	$74.66	$130.57	$96.19
Network size	2.59	2.49	2.66	6.47	-	-
PPO	0.01	0.08	0.08	0.71	-	-
Number of Observations	1,042	1,606	526	3,351	574	8,425

*Estimates reported in 2007 dollars.

Table 2. Demand Estimates

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	coef	t	coef	t	coef	t	coef	t	coef	t	coef	t
Premium	-0.0054	-4.25	-0.0047	-4.02	-0.0054	-6.52	-0.0052	-4.03	-0.0014	-1.85	-0.0054	-4.25
Expected OOPC Drugs	-0.0028	-2.02	-0.0020	-0.93	-0.0019	-1.47	-0.0020	-2.21	-0.0014	-1.73	-0.0103	-3.09
Expected OOPC Medical Services	-0.0085	-3.09	-0.0079	-2.89	-0.0097	-4.64	-0.0013	-0.74	-0.0018	-1.46	-0.0180	-3.86
Log(Share_j | MA product)	0.6588	9.22	0.7169	11.01	0.3432	6.19	0.5871	7.13	0.5506	6.32	0.6839	8.06
Drug Insurance			-0.0438	-0.35								
Req. Referral * Log(Network Size)	-0.0518	-1.36	-0.0434	-1.26	-0.0551	-1.72	-0.0739	-1.63	-0.0310	-0.77	-0.0362	-0.77
Log(Network Size)	0.1105	2.97	0.0948	2.86	0.1316	5.17	0.1241	2.96	0.0832	2.15	0.1122	2.77
Req. Referral	0.1722	2.61	0.1558	2.76	0.3280	7.15	0.2562	2.92	0.2770	2.95	0.0389	0.56
Private FFS	0.0634	0.54	0.0480	0.51	-0.0582	-0.88	-0.0695	-0.55	-0.0519	-0.4	0.2709	2.09
PPO	-0.1256	-1.65	-0.1036	-1.65	-0.2838	-2.71	-0.1127	-1.33	-0.0917	-1.12	-0.2384	-2.36
Regional PPO	-0.1042	-0.82	-0.1055	-0.95	-0.2917	-1.73	-0.0895	-0.61	-0.0631	-0.42	-0.0620	-0.44
Has a Deductible	-0.0226	-0.31	-0.0208	-0.33	-0.0435	-0.76	-0.0159	-0.19	-0.0690	-0.83	-0.0440	-0.49
Amount of Deductible	-0.0002	-2.28	-0.0002	-2.42	-0.0001	-2.06	-0.0002	-1.51	-0.0001	-1.02	-0.0002	-2.06
Has an OOPC Limit	0.1522	2.1	0.1190	2.03	0.2094	4.96	0.1932	2.28	0.1903	2.24	0.1976	1.74
Amount of OOPC Limit	0.0000	0.45	0.0000	0.88	0.0000	0.3	0.0000	-0.5	0.0000	-0.54	0.0000	-0.26
# offerings	0.0613	2.65	0.0572	2.49	0.0499	5.55	0.0784	3.14	0.0656	2.63	0.0207	0.8
Log(Plan Age in County)	0.6897	5.14	0.6062	5.01	1.2213	12.61	0.7870	4.74	0.8358	5.11	0.6108	3.5
Log(Insurer Age in County)	-0.0017	-0.03	0.0089	0.17	0.0498	1.65	-0.0751	-1.13	-0.0713	-1.07	0.0702	1.01
Log(Plan Age) * Log(Insurer Age)	-0.1505	-3.42	-0.1474	-3.91	-0.1804	-7.98	-0.1335	-2.77	-0.1133	-2.42	-0.1857	-3.11
Plan in Market in 2001	-0.0103	-0.12	-0.0195	-0.24	0.0453	0.88	-0.0478	-0.44	-0.0210	-0.19	0.1572	1.4
Insurer in Market in 2001	0.2877	3.24	0.2549	3.36	0.2175	4.55	0.3367	3.19	0.2161	2.29	0.2740	2.99
Missing Network Variable	0.2148	1.58	0.1852	1.54	0.3181	4.31	0.2821	1.93	-0.0202	-0.16	0.1834	1.41
Instrument for Premium	Yes		Yes		Yes		Yes		No		Yes	
Instrument for OOPC	Yes		Yes		Yes		No		No		Yes	
County Fixed Effects	Yes		Yes		Yes		Yes		Yes		Yes	
Plan Fixed Effects	No		No		Yes		No		No		No	
State-Time Fixed Effects	Yes		Yes		Yes		Yes		Yes		Yes	
Adjusted R-Squared (Within)	0.893		0.913		0.708		0.880		0.879		0.830	
# of Observations	11,991		11,991		11,944		11,991		11,991		11,991	

Table 3. Consumer Surplus and Profit Estimates*

Year	Total Gov. Spending (in billions)	% MA Cost Above traditional Medicare	Net Cost of MA (=Tot. Spending X % MA Cost)	Net Annual Profit (in billions)	Consumer Surplus (in billions)
2004	$45.52	7%	$3.19	$6.00	$13.22
2005	$42.31	10%	$4.02	$6.53	$14.43
2007	$77.00	12%	$9.24	$9.72	$21.02

*Estimates reported in 2007 dollars.

Table 4. Policy Experiments and Surplus Changes 2007

		Model 1 Consumer Surplus % of Benchmark	Model 6 Consumer Surplus % of Benchmark
	Benchmark Surplus Value	$21.02 Billion 100%	$20.94 Billion 100%
	Market Changes		
1.	All premiums equal to zero	148.83%	149.75%
2.	Reduce OOPC on Drugs & Medical by 50%	151.04%	264.85%
3.	Increase OOPC by Setting the Minimum OOPC to 90th Percentile	73.74%	48.49%
4.	Increase Premium by Set the Minimum Premium to the 90th Percentile	77.48%	77.50%
5.	Take Drug Insurance Away from All	88.32%	65.80%
6.	Increase OOPC by Set the Minimum OOPC for Medical to the 90th Percentile	83.34%	72.23%
7.	Drop all HMO Products	59.55%	61.54%
8.	Drop all PFFS Products	90.17%	90.61%
9.	Drop all Local PPO Products	98.37%	98.48%

Table 5. Additional Surplus Generated by Major Plan Types

Experiment of Removing then Intrudocing Plan Type	% Additional Cost MA	Total Additional Enrollment (in 1000s)	Consumer Surplus Gain From Including Plan (in Billions $)	Government Net Cost of Including Plan (in Billions $)	Net Welfare Chg from Plan Inclusion (in Billions $) =(3)-(4)	Monthly Consmer Surplus Per Additional Enrollee	Monthly Net Cost to the Govt. Per Additional Enrollee	Monthly Net Welfare Per Additional Enrollee
	(1)	(2)	(3)	(4)	(5)	(7)	(8)	(9)
HMO	10%	2,868	$8.50	$0.93	$7.58	$247.14	$26.92	$220.22
PFFS	19%	596	$2.07	$1.37	$0.70	$289.12	$191.65	$97.47
Local PPO	17%	114	$0.34	$0.28	$0.06	$249.51	$207.42	$42.09

Table A1. Description of Variables

Premium	The MA premium on the contract above the part B premium.
Expected OOPC Drugs	The CMS estimated OOPC for prescription drug services only. Negative dollar value that is the amount of OOPC relative to no drug insurance.
Expected OOPC Medical Services	The CMS estimated OOPC for medical services (i.e. All services excluding prescription drugs).
Has Drug Insurance	An indicator that is one if drug insurance is offered and zero otherwise.
Network Size (1,000s)	The estimated number of doctors "in-network" for a contract reported in thousands.
Log(Network Size)	Log of network size in thousands=Log(Network Size).
Missing Network Variable	An indicator that is one if the nework size is missing and zero otherwise.
Req. Referral	An indicator that is one if a referral is required to see a specialist and zero otherwise.
Private FFS	An indicator that is one if the contract is a Private FFS plan and zero otherwise.
PPO	An indicator that is one if the contract is a PPO and zero otherwise.
Regional PPO	An indicator that is one if the contract is a Regional PPO and zero otherwise.
Has a Deductible	An indicator that is one if the contract has a deductible and zero otherwise.
Amount of Deductible	The amount of the deductible.
Has an OOPC Limit	An idicator that is one if the contract has a spending limit where all services above the specified limit are covered and zero otherwise.
Amount of OOPC Limit	The amount of the OOPC limit.
# offerings	# of plan offerings listed under the specified contract.
Contract Age in County	The age of the contract in the county starting in 2001.
Insurer Age in County	The age of the insurer in the county starting in 2001.
Contract in Market in 2001	An indicator that is one if contract was present in the county in 2001 and zero otherwise.
Insurer in Market in 2001	An indicator that is one if the insurer was in the county in 2001 and zero otherwise.
MA Rate	Rate paid to insurers (Benchmark Rate in 2007).

Table A2. First Stage Regression - Model 1

	Premium		OOPC Drugs		OOPC Medical		Log(share of MA)	
	coef	t	coef	t	coef	t	coef	t
Avg Premium Rivals - Other Markets	-0.1383	-0.94	-0.0797	-1.14	0.1092	1.47	-0.0006	-0.23
Avg OOPC Medical Rivals - Other Markets	0.1562	1.24	-0.1694	-1.59	-0.1786	-3.14	0.0045	1.43
Avg OOPC Drugs Rivals - Other Markets	0.3177	1.55	-1.2129	-7.14	0.0658	0.54	0.0107	2.71
Min Premium - Other Markets	0.4806	9.03	-0.0577	-1.29	-0.0466	-1.81	-0.0043	-3.07
Min OOPC Medical - Other Markets	-0.0531	-0.73	0.0948	2.17	0.1558	6.37	-0.0004	-0.31
Min OOPC Drugs - Other Markets	-0.0030	-0.05	0.2584	4.04	0.0623	1.97	-0.0032	-1.76
Avg log(Network Size Rival)	-1.8538	-0.75	-4.7669	-2.77	1.9117	2.13	-0.1631	-2.74
Avg MA Rate - Other Markets	-0.0957	-1.85	-0.0176	-1.12	-0.0108	-0.67	0.0011	1.51
Avg. log(Age Rival Plan+1)	2.5043	1.63	-0.5481	-0.5	0.0697	0.08	-0.0076	-0.14
Avg. log(Age Rival Chain+1)	-1.7083	-1.26	0.2434	0.25	-0.2686	-0.36	-0.0083	-0.19
Minimum log(Age Rival Plan+1)	0.5844	0.2	-3.0922	-1.6	2.1941	1.23	-0.2482	-3.37
Number of Observations	11,991		11,991		11,991		11,991	

Note: Other independent variables include all of the independent variables included in Table 3 and also a dummy variable indicating whether the contract is only observed in a single market and is missing other market variables.

Table A3. First Stage Regression - Model 6

	Premium		OOPC Drugs		OOPC Medical		Log(share of MA)	
	coef	t	coef	t	coef	t	coef	t
Lagged Premium	0.5600	12.19	-0.0396	-1.42	-0.0543	-2.57	-0.0044	-5.27
Lagged Offers Drug Insurance	-9.9611	-2.09	0.5560	0.13	0.1463	0.04	0.4679	2.75
Lagged OOPC Drug	-0.0477	-0.61	0.2479	3.95	-0.0097	-0.26	-0.0067	-4.51
Lagged OOPC Medical	-0.2854	-3.69	-0.0811	-1.72	0.3193	6.6	-0.0063	-4.92
Missing Lagged Value	1.8616	0.23	-7.3871	-0.82	29.8823	7.27	-0.8418	-4.1
Avg log(Network Size Rival)	-2.9422	-1.2	-3.7820	-1.64	2.3273	2.27	-0.1614	-3.17
Avg MA Rate - Other Markets	-0.0893	-1.9	0.0097	0.52	-0.0103	-0.72	0.0006	0.92
Avg. log(Age Rival Plan+1)	2.2574	1.54	2.2511	2.41	0.5293	0.64	-0.0662	-1.17
Avg. log(Age Rival Chain+1)	-1.7186	-1.33	-2.0845	-2.57	-0.7558	-1.02	0.0431	0.99
Minimum log(Age Rival Plan+1)	-0.6487	-0.26	-1.8233	-0.91	1.3572	1.07	-0.2311	-3.36
Number of Observations	11,991		11,991		11,991		11,991	

whether the contract is only observed in a single market and is missing other market variables.