THE EFFECTS OF PRESCRIPTION DRUG COST SHARING: EVIDENCE FROM THE MEDICARE MODERNIZATION ACT

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July 30, 2014

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Abstract

This paper assesses the impact of health insurance cost sharing on enrollees’ preventable hospitalizations and preventive care utilization, among the elderly in the United States. Cost sharing has an important role in health insurance, where it is designed to mitigate moral hazard consumption of medical services. Such overconsumption is detrimental to the pool of enrollees, who finance the care of fellow enrollees, and to society overall, due to allocative inefficiency. A possible consequence of dissuading utilization is that individuals may choose to forego services that are perceived to be nonessential, such as preventive care. In order to evaluate this possibility, I analyze the effects of varying patient cost sharing for prescription drugs on hospitalizations from Ambulatory Care Sensitive Conditions (ACSC), which can represent a failure of preventive and outpatient care. To address endogeneity from selection and sorting of individuals into insurance plans, I aggregate data to the region-year level, and use an instrumental variables strategy. The analysis exploits exogenous variation in prescription drug cost sharing that occurred as a result of the Medicare Modernization Act of 2003, and therefore identifies causal effects of cost sharing. Results show that for the elderly in the United States, reductions in prescription drug cost sharing do not have an effect on hospitalizations related to ambulatory care sensitive conditions, or on specific types of preventive care utilization.

JEL Classification: I12

Key words: cost sharing, prescription drugs, Medicare Part D, preventive care, ambulatory care sensitive conditions

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1 Introduction

This study focuses on the influence of prescription drug cost sharing on ambulatory care sensitive condition (ACSC) hospitalizations and preventive care use by the Medicare-aged population in the United States. These hospitalizations can be avoided with timely and adequate outpatient care, and thus represent a failure of preventive care (1). The endogeneity problem caused by selection and sorting of enrollees into insurance plans is addressed by aggregating individuals to the region-year level, and by exploiting exogenous variation in cost sharing that occurred with the introduction of the Medicare Modernization Act in 2006, thereby plausibly isolating causal effects. I use data from the Medical Expenditure Panel Survey (MEPS), over the period 2000-2009 (2).

The influence of prescription drug cost sharing on preventable hospitalizations and preventive care use among the elderly is an important research area because of the large and increasing level of spending in this sector. Health care utilization among the elderly is higher than the rest of the population; in 2009 United States senior citizens spent an average of $9744 per person, compared to $5511 for people aged 45-64, and $2739 for those aged 25-44 (3). In 2010, prescription drug costs were $259.1 billion, or 10 percent of total U.S. health expenditures (4), and drugs have been one of the fastest growing sectors of health care, with public drug spending averaging 6.1 percent growth over the years 2008-2012 (5). In order to maximize the utility gained from this spending, health insurance must strive to appropriately balance the goals of reducing moral hazard consumption of care, while maintaining appropriate risk protection (6). This research will contribute to the literature and policy debates on the implications of varying cost sharing across a key subpopulation.

Cost sharing has an important role in health insurance, where it is designed to mitigate moral hazard consumption of medical services. Such overconsumption is detrimental to the pool of enrollees, who finance the care of fellow enrollees, and to society overall, due to allocative inefficiency.
A predictable consequence of dissuading plan enrollees from overusing care is that the same enrollees may be deterred from using necessary care. There is a possibility that enrollees facing high out-of-pocket costs will forego care, especially if the medical problem at hand is not perceived to be serious. This could discourage the use of preventive and outpatient care, for which the perceived marginal benefit may be relatively low. The lack of these services may result in more severe and expensive care in the future (7). Therefore, this paper examines the relationship between cost sharing arrangements and hospitalizations from ambulatory care sensitive conditions (ACSCs), which represent a failure of ambulatory care.

Given that perceptions about the value of preventive care can be inaccurate, does cost sharing cause enrollees to forego these services? Do cost sharing responsibilities for one type of care affect the use of other types of care (e.g., prescription drug cost sharing affecting outpatient utilization)? Most importantly, do associated alterations to care utilization have an influence on enrollee health? These questions are difficult to answer in observational settings, due to the endogenous relationship between health insurance plan characteristics and health. External factors, especially health-risk, have a role in the selection and sorting of individuals into insurance plans, and also influence care utilization and health outcomes. In past literature, this problem has been approached with a variety of strategies, most notably with randomized experiments (8, 9). These studies have examined the effects of health insurance, and characteristics thereof, but lack applicability to some modern situations.

While the literature agrees that cost sharing reduces the use of health services, the precise effects of prescription drug cost sharing for the elderly on preventable hospitalizations, and the health consequences of preventive utilization alterations, are less clear. Some empirical evidence exists, with some research indicating that hospitalizations are increased (7, 10, 11), and others indicating no
effect (12). The precise effects of the cost sharing changes that accompanied the Medicare Modern-
ization Act are especially interesting, because they feature an environment where enrollees main-
tained consistently good coverage of outpatient and inpatient services, yet saw dramatic changes
in prescription drug coverage. The results of this study show that in such an environment, there is
no effect of changes in prescription drug cost sharing on ACSC hospitalizations, evidence that at
least one important indicator shows minimal health effects of care alterations in response to cost
sharing. Additionally, results show that Medicare-aged individuals' utilization of routine checkups,
and other preventive care measures, are unaffected by the cost sharing changes that occurred with
the Medicare Modernization Act.

The rest of the paper will proceed as follows: Section II gives background information and a
literature review of research on the effects of health insurance cost sharing on health care utilization
and health. Section III describes the endogenous selection and sorting of enrollees into health
insurance plans, and explains how the Medicare Modernization Act of 2003 introduced exogenous
variation in cost sharing. Section IV describes the methods, Section V the results, and Section
VI provides a discussion of the results and their validity. Section VII concludes, and offers policy
implications.

2 Background And Literature Review

The rising costs of health care have brought attention to the goal of improving the efficiency of
spending in the health sector. In the United States, for example, total health expenditures have
risen to nearly 18 percent of gross domestic product (13). In an effort to reduce costs and incentivize
more efficient utilization of care, health insurance plans use cost sharing for both consumers and
providers of health care. High costs to the consumer at the point of service may, however, have
health consequences.

**Theoretical Effects of Cost Sharing**

Cost sharing in health insurance plans comes as a response to the threat of moral hazard consumption of health care. Insurance allows people to transfer income from when they need it less to when they need it more (14). But, the transfer is not perfect: instead of transferring income, health insurance pays some portion of the costs of medical care use. Because patients do not face the full marginal cost of care when they make decisions about utilization, the medical care subsidy can lead to overuse where the marginal benefit of care is less than its marginal cost. This overuse is known as moral hazard - the overconsumption of purchases for which the consumer faces a price below the true marginal cost (15-20). Insurance requires that others pay nearly the full portion of one’s losses, and the reduced price thus creates an incentive to use additional medical resources (14). Even in the absence of insurance, efficient outcomes are unlikely in the health care market due to the presence of uncertainty and asymmetric information, which cause inaccurate perceptions of marginal costs and benefits (21). With insurance, these incorrect perceptions can increase the consumption of care to a quantity where marginal cost exceeds marginal benefit, and resources are allocated inefficiently.

In order to dissuade moral hazard consumption of health care by insured individuals, insurance plans place some portion of health costs on the enrollee. Theory predicts that in the face of cost sharing, consumers should forego the care that has the lowest perceived value (14). Preventive care might be perceived in such a way, because patients do not actually feel ill at the time when decisions about preventive care are made. Demand for this seemingly less essential care is therefore more price elastic than other types of care (eg: curative, or non-preventive). Perceptions regarding the
need and efficacy of medical care are obscured by imperfect information (21, 22), and preventive care, with smaller short term benefits, is especially likely to be incorrectly valued by consumers.

Modern cost sharing exists with different structures and levels for different types of health care. Since many types of care can complement or substitute for each other, we expect cost sharing in one sector of care to affect demand in other sectors. This cross-price elasticity of demand is negative for complements, and positive for substitutes. This paper focuses primarily on cost sharing for prescription drugs, which are frequently used in conjunction with other types of care, including preventive care. One way in which prescription drug cost sharing could affect preventive care use would be if a patient’s decision to see a doctor is affected by their coverage for the treatments that they are likely to receive. Since these drugs require a prescription, it is clear that they should be complementary to outpatient and preventive care, meaning that the cross-price elasticity of demand would be negative, at least at among initial purchases. This mechanism would be perceptible in the data if, for example, patients deliberately avoid ambulatory care, specifically because they cannot afford the medicines that they think are likely to be prescribed. It is also possible that later in a treatment episode, after a prescription has been received, the drugs could serve as a substitute for outpatient care, and thus show a positive cross-price elasticity of demand. There is a lack of clear evidence on this issue in the literature, and the results from this study help to clarify if the details of this channel.

**Literature Review**

The literature on the effects of cost sharing is extensive, and examines impacts on general utilization, specific services, and health. In this paper, I focus on the relationship between prescription drug cost sharing, and preventive care utilization and preventable hospitalizations among the elderly.
Previous research has examined this issue with varying degrees of specificity, but even among studies with strong methodologies, the results vary, mostly due to the differing approaches to dealing with the selection/sorting problem. Many studies are purely observational and make no attempt to identify anything beyond a correlation. The better research exploits some type of natural experiment, but results from such specific settings lack comparability. The lack of decisive, generalizable results alludes to the complicated nature of health insurance cost sharing.

The most basic literature on cost sharing examines effects on general utilization, and often seeks to identify the price elasticity of medical care demand. Evidence exists from natural experiments, cross-sectional studies, observational comparisons, and most notably from a randomized experiment. While my paper has a much more specific focus, it is important to note the contribution of the RAND Health Insurance Experiment (HIE), which, in the early 1970s, randomized nearly 6000 people to insurance plans that varied by coinsurance rates. This randomized variation in cost sharing makes the HIE’s results particularly robust. Researchers found a price elasticity of -0.2, which was relatively insensitive to differences in income or health status (23). This important result gave a decisive confirmation of the theoretical prediction that cost sharing reduces overall utilization. Such a conclusion begs the question: which services are reduced, and what are the effects on health? A negative own price elasticity of demand reveals that cost sharing for one type of service will reduce its own utilization. As noted above, it is possible that the same cost sharing could affect the use of other types of services, even if those other services are fully insured. If moral hazard consumption is truly excessive care, and cost sharing reduces the consumption of only the least beneficial services, then the health consequences should be minimal.

The HIE also provided strong evidence on the effects of cost sharing on the use of particular services, and on health. Contrary to the hypothesis that the least valued care will be reduced the
most in the presence of cost sharing, the HIE found that with the exception of emergency care, cost sharing reduced all services indiscriminately, regardless of appropriateness or efficacy. This included a reduction in the use of preventive care. Additionally, it was found that for the average person, there was no substantial health benefit of reduced cost sharing, despite a 40 percent increase in services used (8). The study also found no evidence that high coinsurance, by dissuading individuals from using effective preventive care, would increase expenditures later on (for example, by inducing hospitalization) (24).

Despite sound methodology in the health insurance experiment, it is now 30 to 40 years old, and the health care and health insurance markets have changed. As noted by Zweifel and Manning (23), the experiment’s results may not apply to modern situations, with large plans influencing physician decisions and much more common managed care. Also, the HIE did not include senior citizens in its sample, meaning that its conclusions may not apply to the Medicare population used in the sample for this study. A more modern randomized health insurance experiment has been conducted with the 2008 expansion of Oregon’s Medicaid system. Findings showed that in the first two years, Medicaid coverage increased utilization of health care services, raised the rate of diabetes detection and management, reduced depression rates, and reduced financial strain, but caused no significant improvement in measured health outcomes (9). This experiment contributes strong evidence on the effects of providing full insurance to low-income people, but did not test variations in cost sharing.

Of greater relevance is evidence that focuses on the elderly population; Rice and Matsuoka (25) provide a review of studies of cost sharing’s effects on senior citizens. Of the papers that focus on types of cost sharing and outcomes relevant to this study, six papers plausibly address the problem caused by endogenous selection/sorting of enrollees into insurance plans (10, 26-30). All of these results showed that drug cost sharing reduced the appropriate usage of prescription drugs,
while the effects on other services were less definitive. A particularly strong contribution from Tamblyn et al (10) showed that increased cost sharing for prescription drugs among elderly persons and welfare recipients was followed by reductions in the use of both essential and less-essential drugs, and a higher rate of serious adverse events and emergency department visits. Looking specifically at the relationship between cost sharing and preventive care use, Trivedi, Rakowski, and Ayanian (31) showed that the introduction of relatively small copayments caused significantly lower mammography rates for women who should be screening according to clinical guidelines.

This study focuses on the possibility that cost sharing may affect the use of preventive care, which may then in turn affect hospitalizations, or other health outcomes. In many studies, these consequences are referred to as “offset effects,” because the increased cost from other services offsets any savings that may have resulted from reduced utilization at the ambulatory stage. An example of this is Gaynor, Li, and Vogt (32), who showed that for the nonelderly US population, 35 percent of expenditure reductions associated with increased prescription drug cost sharing were offset by increases in other spending. The work of Trivedi, Moloo, and Mor (33) found that increased ambulatory care copayments caused reduced outpatient visits, increased admissions, and increased inpatient days.

Chandra, Gruber, and McKnight (7) studied the effects of increased outpatient and prescription medicine cost sharing imposed by a private supplemental insurer for California’s public sector retirees. While their results confirmed the price elasticities of demand for physician visits and drug use that were found in the HIE, they found substantial offset effects, including increased probability of hospitalization. Interestingly, the savings from increased cost sharing went to the supplemental insurer, while the costs from increased hospitalization fell mostly to Medicare. A later paper by the same authors (34), which assessed exogenous variation in cost sharing among the Massachusetts
poor, again found utilization reductions in outpatient services as an effect of higher cost sharing. This time, however, there was no evidence of increases in hospitalizations or emergency department visits in response to higher copayments. Culler, Parchman, and Przybylski’s study (12), despite its failure to address the endogeneity of insurance coverage type, is relevant because it uses ambulatory care sensitive condition (ACSC) hospitalizations as an outcome variable. This study found no offset effects for Medicare beneficiaries, with potentially preventable hospitalizations not increased by prescription drug cost sharing.

Even among studies with strong causal methods, the range of estimated effects is wide, suggesting that the effects of cost sharing are complex, and may be sensitive to the context and population studied. This paper evaluates the role of prescription drug cost sharing in the care decisions of the elderly in the United States, and assesses its potential impact on hospitalizations from ambulatory care sensitive conditions. It will contribute to the evidence on the nature of cross-price elasticities of demand across sectors of health care, specifically regarding the effects of prescription drug price variations. This question is of particular importance, because of the large portion of health care spending that is consumed by senior citizens, and the large portion that is used on prescription drugs. Finding the financial responsibility plan that induces Medicare enrollees to consume just the right amount of care is the key to balancing the fundamental tradeoff of health insurance (6), and has the potential to increase health spending efficiency.

3 Endogeneity And The Medicare Modernization Act

Investigating the effects of insurance plan characteristics is difficult, due to non-random selection and sorting of individuals into insurance plans. It is likely that individuals with certain health and health care tendencies enroll in plans with particular levels and types of cost sharing. This is effectively
an omitted variables problem, with unobserved heterogeneity influencing relevant dependent and independent variables in the study. More specifically, these unobserved factors, especially health risk, affect an individual’s choice of insurance plan, as well as their health care utilization and health.

The direction of the relationship between health risk and health insurance plan choice is unclear, because of two conflicting forces. On one hand, we expect that high risk individuals, who would be likely to need greater intensity of care, would select more generous insurance plans (lower cost sharing). On the other hand, lower risk (healthier) individuals tend to have higher incomes, and better insurance benefits from their jobs, which makes them more likely have more generous plans. In general, evidence shows that the former effect dominates, with lower risk individuals opting for less expensive, less generous plans (35). The presence of adverse selection requires that analyses seeking to identify causal effects of insurance plan characteristics, such as cost sharing, use exogenous variation in their explanatory variables.

In order to account for unobserved factors that attract individuals to certain types of health insurance plans, the ideal setup for answering this question would be to randomly assign individuals to health insurance plans with varying levels of cost sharing. After tracking these individuals over time, variation in health care utilization and health could be identified as causal effects of the cost sharing differences among insurance plans. In the absence of a randomized experiment, the second best option is to isolate exogenous variation in cost sharing across time. The associated variation in ACSC hospitalizations can then be interpreted as a causal effect of the cost sharing arrangements.
Medicare Modernization Act of 2003: Exogenous Variation in Cost Sharing

The source of exogenous variation in this study is the Medicare Prescription Drug, Improvement, and Modernization Act, more commonly known as the Medicare Modernization Act (MMA), which went into effect on January 1, 2006. This legislation made a number of changes to Medicare, including the expansion of benefits to cover prescription drugs. This program, known as Medicare Part D, covers prescription drugs according to a “standard benefit” cost sharing structure. Prior to the MMA, in 1999, 75 percent of Medicare beneficiaries received drug coverage from a number of sources, including Medicaid (15.9 percent), employment-based plans (29.6 percent), Medigap (11.2 percent), other public sources (4.1 percent), and other HMOs (14.2 percent), leaving 25 percent without any drug coverage (36). In 2006, 53 percent of enrollees joined a Part D plan, and only 10 percent were uninsured for drug costs by 2010 (37).

Figure 1 shows the standard benefit structure for Part D plans in 2006. When millions of Medicare enrollees joined Part D plans in 2006, their prescription drug cost sharing began to follow this structure, or an actuarially equivalent structure. These benefits entailed that the patient was responsible for a $250 deductible, then 25 percent of expenses from $251-2250, 100 percent of expenses from $2251-5100, and five percent of expenses about $5100. Figure 2 depicts the shares of prescription drug spending across sources and time for Medicare enrollees, and demonstrates a clear discontinuity in 2006 when Medicare Part D was enacted. Medicare’s share of expenses shot from less than ten percent in 2005, to nearly 40 percent in 2006. Figure 3 shows a similar graph, with a breakdown of payment sources for all medical expenses across time. Figure 4, showing the interquartile range of the region-level shares of drug spending by self or family across time, depicts the significant variation that existed in rates of drug coverage among the elderly across
geographic regions. As explained above, when these enrollees joined Part D, they did so from a variety of previous plans, including Medicaid, employer-sponsored plans, and a lack of drug coverage. Regardless of their previous situation, the new cost sharing structure was an exogenous change, unassociated with the unobserved heterogeneity that would typically confound an analysis looking at the effects of cost sharing. Therefore, using the variation in cost sharing that stemmed from the differential effects of MMA across time and space, associated changes in utilization and health care can be interpreted as causal effects.

Another effect of the MMA was that it made private Medicare plans more attractive to Medicare enrollees, thus channeling a larger portion of the Medicare market towards those private insurers (38). Prior to 2006, Medicare parts A and B were available privately, in a program then known as Medicare Part C (or “Medicare + Choice”). After Part D was introduced with the MMA, Medicare + Choice was renamed “Medicare Advantage,” which provides parts A, B, and D through private insurance companies. If they so choose, beneficiaries can alternatively receive stand-alone private Part D drug coverage in addition to original Medicare (public A and B).

Medicare options, prior to the Medicare Modernization Act (MMA):

2. Original Medicare (public A and B).

Two additional options to add Part D (prescription drug coverage) became available in 2006, when the MMA was enacted:

After the MMA, the Medicare Advantage (MA) plans became more popular (38). In addition to the lure of drug coverage, many of the MA plans offer incentives related to the cost sharing for important prescription drugs (39). Figure 5 shows the enrollment in private Medicare plans across time, and depicts a discontinuity in 2006, when the MMA was enacted. Private enrollment increased from 5.3 million (12 percent of Medicare beneficiaries) in 2005, to 11.4 million (24 percent of beneficiaries) in 2010. Beneficiaries’ transitions into Medicare Advantage plans are representative of the effects of the MMA, and associated changes in cost sharing can be interpreted as exogenous.

4 Methods

The key independent variable in this analysis is: for some amount of health care utilization, what portion of expenses was paid by the patient or their family? Specifically, I use the share of prescription medicine spending paid for by self or family, because this is the type of spending that responds most directly to the Medicare Modernization Act (MMA). The interquartile range for this variable is displayed across time in Figure 4.

The most important dependent variable in my analysis is the portion of hospitalizations related to ambulatory care sensitive conditions (ACSCs). ACSC hospitalizations are hospital admissions that could be avoided with timely and adequate outpatient care (1). The following 23 hospitalization diagnoses are commonly cited as ACSCs: angina, asthma, bacterial pneumonia, bronchitis, cellulitis, congenital syphilis, congestive heart failure, chronic obstructive pulmonary disease (COPD), dehydration, dental conditions, diabetes, failure to thrive, gastroenteritis, grand mal seizure disorders, hypertension, hypoglycemia, kidney and urinary tract infections, nutritional deficiency, pelvic inflammatory disease (women only), ruptured appendix, severe ENT infection, skin graft with cellulitis, and tuberculosis (40). In short, proper outpatient care and chronic disease management
should prevent patients from being hospitalized for these conditions. As such, they represent an outcome of access to outpatient services, utilization decisions, and the quality of care received. Figure 6 shows the interquartile range of ACSC related hospitalizations across time.

Data

Data for this study comes from the 2000-2009 Medical Expenditure Panel Survey (MEPS), from the Agency for Healthcare Research and Quality (AHRQ) (2). MEPS is a set of surveys of individuals and families in the United States, covering the specific health services that they use, their costs, and how they are paid for. It is a series of two year panels, each consisting of five rounds of interviews, with a new panel beginning every year. This analysis is limited to the sample population age 65 or greater.

Aggregation

I aggregate most of my variables to the region-year level, for two reasons: to create a decade-long panel, and to reduce selection bias. Since MEPS only follows each participant for two years, individual-level panel analysis is not possible over the course of a decade. Even if it was possible, it would still suffer from selection bias, in which individuals choose (or are sorted into) plans according to their riskiness. Identification in a fixed effects model would be driven by those individuals who switched their insurance plan, which could be done for health/risk reasons. Therefore, I aggregate the individual-level variables by geographic units and years. Region-level plan characteristics, such as cost sharing, are not obviously subject to selection, as individual-level plan characteristics are. The regions are designated market areas (DMAs), of which there are 210 in the United States. Through aggregation, I create a decade-long panel of region-years, allowing the exploitation of the
exogenous variation in cost sharing that occurred with the MMA across time and space. Thus, geographic variation in the regional conditions before and after the MMA will drive the variation in cost sharing that I use as my independent variable.

Analysis

I use clustered instrumental variables (Two Stage Least Squares) to identify the causal effects of cost sharing on ACSC hospitalizations:

1st Stage:

\[ SFCost_{rt-1} = \alpha + \beta IV_{rt-1} + \gamma TotCost_{rt-1} + \delta X_{irt-1} + \mu_{irt-1} \]

2nd Stage:

\[ Y_{rt} = \alpha + \beta PredictedSFCost_{rt-1} + \gamma TotCost_{rt-1} + \delta X_{irt} + \epsilon_{irt} \]

Independent variable (SFCost):

The key explanatory variable, represented as SFCost in the above equations, is the share of prescription medicine expenses paid by self or family (lagged). At the aggregate level, this is the mean portion of prescription medicine expenses paid by self or family, among prescription medicine events in a region-year. The movement of this variable across time can be seen in Figure 4.

Outcome variables (Y):

The most important outcome variable is based on an event-level indicator for ambulatory care sensitive condition (ACSC) hospitalizations. At the aggregate level, this is the portion of hospital admissions in a region-year for which the primary diagnosis was an ACSC. The other major outcome I examine is based on an individual-level indicator for having had a routine checkup in the past year. At the aggregate level, this is the share of individuals in a region-year who received a routine checkup in the last 12 months.
Due to non-linear cost sharing schemes that exist in many insurance plans, I restrict the event-based variables to events (such as hospitalizations, outpatient visits, or drug prescriptions) that were the patient’s first of the year. This first event is the most likely to be susceptible to a deductible, and the least likely to be covered by some type of “stop-loss” or maximum expenditure limit that would nullify the effect of cost sharing on care decisions. I use only first time ACSC hospitalizations because in order for a lack of preventive care use to plausibly cause an ACSC hospitalization, there should be no other health care use in the period prior to this hospitalization.

*Controls (X):*

At the individual level, I include controls for age, race, gender, marriage, and income quintiles. There are also region and year fixed effects, and region-year level variables for education and unemployment. Region fixed effects control for features of the regions that may confound the analysis, due to their association with the effects of the MMA and with health and utilization outcomes. More details on these relationships can be found in the description of the instruments, below. As an additional control, I include the total level of spending (lagged) from all payment sources (TotCost). Its inclusion allows me to isolate the effects of out-of-pocket spending, net of the total spending on the episode in question.

*Instruments:*

The instruments are related to changes that occurred as a result of the Medicare Modernization Act (MMA), and exploit the fact that the MMA impacted geographic areas differently. As mentioned above, the MMA introduced coverage for prescription drugs. Prior to 2006, Medicare beneficiaries received drug coverage from a variety of sources, including Medicaid, employer-sponsored plans, and elsewhere, with 25 percent uninsured in 1999 (36). In 2006, 53 percent of Medicare beneficiaries were enrolled in a Part D plan. The figure rose to 60 percent by 2010, with only ten
percent uninsured (37). The MMA not only induced a shock in drug coverage across time, but also across regions. Figure 7 shows the interquartile range for regional levels of drug coverage across time, showing the large variation that exists across regions within each year. Figure 8 shows the same variable, but only for those regions in the bottom 20 percent of drug coverage in the pre-MMA years. The regions in the bottom 20 percent of drug coverage saw an increase in coverage in the post-MMA years. The disparate effects of the policy change across regions is crucial for variables related to the policy to be useful instruments.

The standard benefit structure imposed by the MMA (Figure 1) makes policy-related variables correlated with cost sharing, as is necessary for the variables to be strong instruments. At the same time, these instruments should not be correlated with the outcomes, aside from through cost sharing. The three instruments, which use the effects of the MMA to isolate exogenous variation in cost sharing, are as follows: the portion of the region with Medicare Part D in 2008 interacted with an indicator for the years that the MMA was active (mrx08MMA); and the portions of the region with Medicare Advantage (MA) in 2005 and 2008, interacted with the MMA indicator (madv05MMA and madv08MMA).

The validity of each of these instruments is determined by the nature of the variable’s regional and time variation. The mrx08MMA variable serves a similar role to an indicator variable for MMA, except it is not collinear with the year fixed effects. Therefore the time variation is shaped by the MMA, which became law on January 1, 2006. Regional variation in mrx08MMA is shaped by the portion of the region that took up Medicare prescription drug coverage in the wake of the MMA. The pre-MMA drug coverage was a major determinant of this transition; those regions with the lowest coverage prior to the legislation saw the greatest increases post-legislation. This change is well-illustrated in Figure 8, which depicts a large increase in drug coverage for those regions in the
bottom 20 percent of drug coverage in the pre-MMA years. The main determinant of individuals’ and regional pre-MMA drug coverage was income, with the lowest income people on Medicaid, and the highest income people on employer-based plans. The largest group of seniors without drug coverage prior to 2006 was the middle to low income group, who fell between eligibility for Medicaid and employer-based plans (36).

Income is related to many risk factors that affect the outcomes of interest, meaning that instruments related to income may violate the exclusion restriction. To account for this, I control for income, and use region fixed effects. This will control for regional variation in risk, as long as it is not time-varying.

The second and third instruments are related to the transition of Medicare enrollees into Medicare Advantage (MA) plans. These private Medicare options, explained in Section III, became much more popular after the MMA was enacted, and cost sharing changes associated with beneficiaries’ transitions into MA plans can be interpreted as exogenous.

The second instrument, based on this association, is the portion of the region covered by private Medicare in 2005, interacted with an indicator for the MMA years (madv05MMA). Those regions with lower 2005 levels of private Medicare enrollment will see larger changes in their cost sharing. This is similar to the empirical strategy used by Amy Finkelstein in her assessment of the effects of Medicare’s introduction (41). Time variation stems entirely from the MMA. Regional variation comes from a number of factors that determined private Medicare penetration before the MMA. The most important of these is the urban/rural composition of the region. Private options were less common in rural areas. Other important factors are the insurance market structure, state regulations, prior managed care history, beneficiary characteristics, supplemental coverage patterns, form of provider organization, practice patterns, care expectations, and other market characteristics.
While some of these factors are likely to be correlated with the outcomes, and may thus violate the exclusion restriction, this problem is addressed by including region fixed effects, as long as such factors are time-invariant. Additional support for the exclusion restriction is provided by Kulkarni et al 2012 (44), which showed a lack of association between Medicare Advantage penetration and hospital outcomes.

The third and final instrument is the portion of the region covered by private Medicare in 2008, interacted with a dummy for the MMA years (madv08MMA). Rather than showing the potential for future plan transitions, as with the above 2005 figure, this variable shows the actual penetration of private Medicare two years after the MMA was enacted. Time variation again comes entirely from the MMA. Regional variation will also be similar to the 2005 version of this variable, as described above.

Robustness Checks

To test the robustness of the results, analyses of alternate specifications were performed. In addition to estimating the impact of changes in cost sharing on hospitalizations for each of the ACSCs listed in the methods section, I also examine hospitalizations for other common causes and additional preventive care utilization outcomes. To further assess the influence of the financial responsibility arrangements, I test explanatory variables for portions of medical expenses paid by Medicare, and by private insurance. Additionally, I adjust my sample in order to run analyses with variables that include aggregate variables calculated among all events in a region-year, rather than just the first time events, as is used in the base specification. For details on these other specifications, please see the Robustness Checks section within the Results section.
5 Results

Table 1 shows the results from the OLS and IV regression specifications, of ACSC hospitalizations on the explanatory variable for percent of prescription medicine expenses paid by self or family. Column 1 shows the OLS results, and the rightward progression shows results from the IV regressions, with varying instruments indicated in the last row. The table also reports the first stage F-stats, to show instrument strength, and the results of an AR Wald Test, to test weak instrument robust inference. More information about the first stages of the IV regressions can be found later in this section.

Specification 1 shows that the association between percent of total medical expenses paid by self or family and ACSC hospitalizations under OLS is not significantly different from zero. When the same variables are tested in IV regressions, we see that the effect is still not significantly different from zero. Column 2, with an instrument of mrx08MMA, shows the strongest first stage, and is thus the most robust result. The coefficient on drug spending self/family share, of 0.0033, tells us that a one percentage point increase in the region-year mean percent of prescription medicine spending by self or family is insignificantly associated with a 0.33 percentage point increase in the share of region-year hospitalizations for which the primary diagnosis was an ACSC.

Table 2 shows the results for regressions using the portion of the region-year that had a routine checkup in the past year as their dependent variable. This table follows the same structure as Table 1, explained above. As before, column 1 shows that in OLS, prescription drug cost sharing’s association with recent routine checkups is not significantly different from zero. Specifications 2 through 4, with the IV regression results for the effects of self or family share of prescription drug spending, also show no significant effect. The coefficient in specification 2, which has the strongest first stage, is 0.00145, implying that a one percentage point increase in the region-year mean share of prescription medicine expenses paid by self or family is insignificantly associated with a 0.145
percentage point increase in the portion of the region-year that has received a routine checkup in the last year.

In summary, the results show no statistical significance for the coefficients on the key explanatory variable. Additionally, the magnitudes of the coefficients are quite small. This demonstrates that in the context of this study, there is no significant effect of prescription drug cost sharing on ambulatory care sensitive conditions (Table 1), or on utilization of routine checkups (Table 2). Both dependent variables are regressed on the self/family share of prescription drug spending, which is instrumented with three different instrumental variables. The lack of effect of prescription drug cost sharing on routine checkups suggests inelastic cross price demand.

**First stage regressions**

The first stages of the IV regressions, of the explanatory variable on the instruments, show significant associations between the instruments and the endogenous regressors. As expected, the instruments, based on the MMA, are correlated with the prescription drug cost sharing variable that I use as my key explanatory variable. The associations between instruments and instrumented variables in the first stage show various levels of statistical significance, but have sufficient explanatory power to be used in an instrumental variables analysis.

Some of the specifications, however, have relatively weaker associations between the instruments and the endogenous regressors, as is evidenced by lower 1st stage F-statistics. These F-tests use the null hypothesis that the instruments are weak; in other words, that there is no significant association between the instruments and the instrumented variables. The most commonly used rule for rejecting this null is that the F-statistics must be at least 10 (45).

That said, some of the specifications show strong first stages, especially column 2 in both tables.
The lack of a significant association in these IV specifications provides solid evidence that there is no causal effect of prescription drug cost sharing on either ACSC hospitalizations, or on routine checkup utilization. Even the specifications with only moderately high first stage F-statistics are valuable. Recall that in these regressions, there is only one instrument, and one instrumented variable. In this just-identified case, even with weak instruments, a two-stage least squares estimator is median-unbiased (46). Furthermore, the lower degree of freedom in this test allows an easier rejection of the weak instrument null hypothesis, as evidenced by the p-values, which all show rejections of the weak instrument null at significance levels greater than 95 percent.

To provide further evidence that the results are not driven by the weakness of the instruments, I have provided the results from the weak instrument robust Anderson-Rubin (AR) test (47). This tests the null hypothesis that the coefficients of the endogenous regressors in the structural equation are jointly equal to zero, and, in addition, that the over-identifying restrictions are valid (48). Thus, a failure to reject the AR null confirms the non-rejections of the IV analysis null, that the coefficients on the cost sharing variables are equal to zero. Tables 1 and 2 both show the AR Wald test (Chi-squared (1)) for each IV specification. Every test fails to reject the null.

Reduced form

The results from the reduced form regressions, of the dependent variables on the instruments, are reported in Table 3. Given the lack of significant association seen in the IV results (see Tables 1 and 2), these results conform with our expectations regarding any correlation between the instruments and dependent variables. As with a randomized experiment in which half the sample is given a treatment that has no effect, the randomized variable (the IV) should have no association with the outcomes.
Robustness checks

Given the results above, I fail to reject the null hypothesis that prescription drug cost sharing has no effect among the elderly on ambulatory care sensitive condition (ACSC) hospitalizations, or on the utilization of routine checkups. In order to confirm the validity of these conclusions, I have conducted robustness checks with different dependent and independent variables, as well as different sample restrictions.

The list of hospitalizations defined as sensitive to ambulatory care varies across different sources. In the base specification used above, the conditions were those specified in Bindman et al (40), and are listed in the methods section. Levinton et al (49) uses a stricter definition of ACSCs, which only includes angina, asthma, congestive heart failure, chronic obstructive pulmonary disease (COPD), diabetes, epilepsy, and hypertension. Using this alternate list of ACSCs did not change any results. In addition to using these aggregate lists of conditions, I also checked each condition individually for sensitivity to cost sharing. Again, there was no significant association between these outcomes and the explanatory variable of interest. Finally, to ensure that the classification of the diagnoses that define ACSC hospitalizations did not affect my results, I replaced ICD-9 codes with Clinical Classification Codes (CCC), which are also included in the MEPS data. This caused no change in the results.

Given my consistent finding of no causal effect of prescription drug cost sharing on hospitalizations, I pursued other outcomes that could be susceptible to cost sharing. Specifically, I sought other hospitalizations that could be directly affected by variation in prescription drug cost sharing (the primary source of identifying variation in my analysis), rather than relying on ACSC hospitalizations, which require an effect through outpatient care utilization. Among the elderly population, a wide variety of conditions can be affected by drug use. As such, I tested the most common sources
of elderly hospitalizations. As listed in Russo and Elixhauser (50), the following 15 conditions were the most frequent conditions causing hospitalizations among the elderly in 2003: congestive heart failure; pneumonia; coronary atherosclerosis; cardiac dysrhythmias; acute myocardial infarction; COPD; stroke; osteoarthritis; rehabilitation care, fitting of prostheses, and adjustment of devices; fluid and electrolyte disorders; chest pain; urinary tract infections; hip fracture; complication of medical device, implant, or graft; and septicemia. Among these sources of hospitalizations, the only conditions that are unlikely to be preventable with prescription drugs are rehabilitation care, fitting of prostheses, adjustment of devices, and hip fractures. The analyses showed no evidence of an effect on the hospitalizations from conditions that can be plausibly affected by prescription drugs, except for those stemming from chest pain. A higher portion of prescription drug costs paid out-of-pocket resulted in a slightly decreased portion of hospitalizations in a region-year stemming from chest pain, but no other events showed an effect.

In order to test the robustness of my result of no causal effect of cost sharing on the utilization of routine checkups, I also evaluated the effects of cost sharing on other outcomes related to preventive and outpatient care. Specifically, I ran IV regressions with dependent variables for the portion of the sample in the region-year who (1) recently received a flu shot, (2) recently received a cholesterol check, and (3) reported that they receive preventive care at their usual source of care. I also used the same IV specification to examine dependent variables for the portion of outpatient visits in the region-year that (1) were classified as a checkup, (2) included an immunization, and (3) were with a general practitioner. These other outcomes largely confirmed the lack of effect by the share of prescription drug spending by self or family. The only exception was mixed evidence that increased out-of-pocket spending for prescription drugs may have caused a slight reduction in the portion of a region-year that reported receiving preventive care at their usual source of care. However, the
implied effect is very small, and is not robust to specification variations.

In evaluating whether or not the share of medical expenses borne by the patient influences their health care decisions and health, I am effectively testing if the source of payment is influential. To further validate this approach, I used similar instrumental variables regressions to test for effects by Medicare payment portions, and payment portions from private insurance. These explanatory variables were examined in analyses that used all of the dependent variables described above.

The private insurance share of prescription drug spending showed no significant association with any of the dependent variables. Medicare’s portion of prescription drug spending had no significant association with the vast majority of the outcome variables tested, but a small portion did show an effect. Specifically, the Medicare share of prescription drug payments had a positive relationship with both hospitalizations from chest pain, and with receiving preventive care at a usual source of care.

While the effects for preventive care use match theoretical predictions, the implied effect on chest pain hospitalizations does not. The precise interpretation tells us that the effect is minor: a one percentage point increase in the mean Medicare portion of prescription drug payments in a region-year yields a 0.293 percentage point increase in the share of hospitalizations in a region-year related to chest pain. The implied effect on preventive care utilization is similarly quite small. Regardless of the size and theoretical ramifications, these results raise a question about why Medicare portions of payments would show a significant association with outcomes, which are not associated with my primary explanatory variable (self/family shares of payments). In other words, it appears that there is an effect that exists for Medicare’s role in financing care, which is not reflected in the coinsurance rate. This could be some characteristic of a Medicare’s incentives and coverage, such as differential provider restrictions. It is also possible that these results could arise due to chance; I am examining
many relationships, and five percent of them will be statistically significant, regardless of causality. This seems to be the most likely explanation, due to the lack of effect from the Medicare share of payments on every other dependent variable.

I performed a final robustness check by varying the sample restrictions. As mentioned in the methods section, my variables that used event-based outcomes (hospitalizations, outpatient visits, and prescription medicines) were restricted to those events that were an individual’s first of the year. In the presence of non-linear financial responsibility schemes (eg: deductibles or maximum expenditure limits), such events are the most likely to be influenced by the demand-side consumer cost-sharing that is the focus of this paper. Subsequent analyses were performed with a sample that included all events, and these results showed no meaningful variation from their counterparts in the main results above.

The results of the above robustness checks will be available in the appendix of future versions of the paper. Ensuing analyses will make additional tests, to further ensure the validity of the results. This includes a micro-level analysis, which will test the non-aggregated versions of my variables. Due to the structure of the MEPS data, this analysis will only be for the years 2005 and 2006. Also, I plan to include poverty interactions with my explanatory variables, to see if effects of prescription drug cost sharing could exist among the poor population.

6 Discussion And Limitations

The results show that there is no significant effect of prescription drug cost sharing on certain types of health care utilization and health among the elderly in the United States. Specifically, it was shown that when these costs vary, older adults are not any more or less likely to be hospitalized for ACSCs, which can result from lack of proper outpatient care and disease management. Additionally,
there was no effect of prescription drug cost sharing on the utilization of primary care, indicating that in this case, cross price demand between these two types of service is inelastic.

These two key findings contribute to the literature on how senior citizens adjust their care usage to changes in prescription drug cost sharing. The literature review features four papers that explicitly analyze the effects of prescription drug cost sharing for the elderly on hospitalization outcomes (7, 10-12). Of these, three find offset effects, with hospitalizations sensitive to cost sharing (7, 10, 11). The exception is the work of Culler, Parchman, and Przybylski (12), which is the only one of the four to use ACSC hospitalizations as an outcome; it found no effect of higher prescription drug cost sharing. It should also be noted that the RAND Health Insurance Experiment (HIE) found no evidence that outpatient cost sharing in the nonelderly increases expenditures later on (for example, by inducing hospitalization) (24). The sources of the differential results in the three studies that found offset effects are uncertain, but most likely involve a lack of comparability across study designs. Chandra, Gruber, and McKnight (7) found effects of a policy change that altered outpatient cost sharing, in addition to prescription drug cost sharing, which was the sole cost sharing change featured in my study design. Tamblyn et al (10) used a Quebec policy change in the mid-1990s; the Canadian health care system, and differential drug usage patterns during this time period may explain the offset effects that were found. Finally, Hsu et al (11) found offset effects while exclusively looking at effects of a cap in drug benefits for Medicare beneficiaries. It is plausible that caps have different effects than net coinsurance, and furthermore, it is possible that selection bias may have affected the results of that study.

In consideration of my results showing a lack of effect of prescription drug cost sharing on preventive care utilization, the lack of offset effects in my results is not surprising. It is expected that any effect on ACSC hospitalizations would need to operate through a mechanism that reduces
The lack of effect on preventive care utilization, which would be seemingly necessary for an effect on ACSC hospitalizations to occur, is the most interesting part of my findings. This is inconsistent with theory, which predicts that quantity demanded for a product should increase when the price of a complement product drops. For example, since routine checkups and prescription drug care are complements (at least among initial purchases), we expect that patients may choose not to see a doctor because they worry that they are not covered for the treatments that are likely to be prescribed. The HIE found that increased cost sharing reduced utilization of all types of services, including preventive care such as annual checkups, but this was not a cross-price effect (8). As noted above, more specific evidence on the cross-price effects of prescription drug cost sharing only exists in different settings, and lacks comparability to the situation for the elderly of the United States.

The obvious question is why a cross-price effect would exist in other settings (10), but not in this study. Furthermore, why do my findings conflict with theoretical predictions about complementary products? The possible explanations can be grouped into two broad categories. The first has to do with the fact that my IV analysis identifies a local average treatment effect (LATE). This is the effect of United States Medicare beneficiary cost sharing variations that stemmed from the Medicare Modernization Act of 2003 (MMA). This was a particular group of people, responding to a specific policy change, and the effect for this situation may not be generalizable to other populations, time periods, or cost sharing margins.

The MMA introduced Medicare Part D (prescription drug coverage), meaning that my identification strategy relies on this variation. It is possible that due to good insurance coverage of preventive care outcomes both before and after the policy change, prescription drug cost sharing
did not influence people’s use of preventive care. It should be noted that most Medicare enrollees had good coverage of primary care throughout the study period. Both before and after the policy change, beneficiaries were covered for an annual flu shot, an annual routine checkup, and a cholesterol check every five years. Thus, it is possible that good coverage of preventive care ensured that prescription drug cost sharing variations had minimal effect.

Another possible explanation for why I found the LATE to be insignificantly different from zero is that the presence of limited drug coverage prior to the MMA, either from Medicare Part B, or from supplemental insurance, could have reduced the effect of Part D’s introduction in 2006. In the pre-MMA years, certain drugs, associated with physician services, were covered by Medicare Part B (51). Also, many beneficiaries transitioned into Part D from supplemental insurance plans, which may have covered some of their prescription drug needs. As of 1999, 75 percent of Medicare beneficiaries received drug coverage from a number of sources, including Medicaid, employment-based plans, Medigap, other public sources, and other HMOs (36). Therefore, a possible explanation for the lack of effect in my results is that relatively few patients would have been in a position where an inability to pay for subsequent prescribed treatment would dissuade them from using primary care. Such an explanation would imply that net variations in drug coverage benefits from the MMA were small, and thus had minimal effect. However, given the strength of my first stage regressions, which show a robust association between the MMA and the prescription drug coinsurance rate, such an explanation seems unlikely.

The second broad explanation for the lack of effect is that a limitation of this analysis plan caused a type II error. While the strategy seeks to identify the effects of cost sharing on certain types of care utilization and health, it is possible that the outcome and exposure measures do not vary enough for an effect to be seen. Although aggregation of these variables to the region-year level
reduces selection bias, aggregation also causes some portion of the variation in these variables to be lost. In other words, it is possible that cost sharing does affect individuals’ health care utilization decisions, and in turn their health, but the aggregate measures are not precise enough to capture these effects. Perhaps in the context of prescription drug cost sharing variations from the MMA, care decisions and health effects were only affected in extreme cases that are not captured by my aggregated variables. This concern will be addressed with forthcoming robustness checks, which will examine individual level variables in the years 2005 and 2006.

7 Conclusion

This study assesses the effect of health insurance cost sharing for prescription drugs on health care utilization decisions, and on health outcomes. For the elderly in the United States, I found that variation in out-of-pocket spending for prescription drug services does not affect the use of certain preventive services. Moreover, it does not affect the likelihood that a patient is hospitalized because of an Ambulatory Care Sensitive Condition (ACSC), which are known to be responsive to proper outpatient care and disease management. These findings are especially relevant, given the large and increasing share of health expenditures that are spent on the elderly, and on their use of prescription drugs. The study addresses problems of selection and reverse causality with geographic aggregation, and by exploiting a 2006 policy change that exogenously shocked cost sharing arrangements for millions of United States Medicare enrollees.

The findings imply that for the Medicare population, demand-side cost sharing with certain conditions does not affect preventive care use and preventable hospitalizations. This could mean that these incentives are an effective and relatively safe way to reduce moral hazard consumption of drugs, at least in terms of potential effects on preventable hospitalizations. These conditions
may include good insurance coverage of preventive care, which ensures that patients receive the ambulatory care that is necessary to avoid costly hospitalizations. Prescription drug cost sharing represents one aspect of a complicated solution to the question of how to reduce moral hazard consumption, while maintaining that insurance appropriately protects against risk.
8 References


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<tr>
<td>$251 - $2250</td>
<td>25% coinsurance</td>
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<tr>
<td>$2251 - $5100</td>
<td>100% (“donut hole”)</td>
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<td>&gt; $5100</td>
<td>5% coinsurance, or copays ($2 generics, $5 nongenerics)</td>
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Figure 1: 2006 Standard Benefit Structure for Medicare Part D plans (52)
Figure 2: Shares of Rx Spending (%), Medicare Beneficiaries

Source: MEPS (2)
Figure 3: Shares of Total Medical Expenses (%), Medicare Beneficiaries

Source: MEPS (2)
Figure 4: Interquartile range of regional percentages of prescription medicine expenses paid by self or family

Notes: The vertical axis is the percent of prescription medicine expenses paid by self or family in a region-year, among United States individuals aged 65 and higher. Gray boxes show interquartile range above and below the median. The lines show the 90-10 spread. The circles show the means. Source: MEPS (2).
Notes: Enrollment in millions on left side axis; percent of Medicare beneficiaries on right side axis. Includes HMOs, PSOs, PPOs; regional PPOs; PFFS plans; 1876 cost plans; demos; HCPP; and PACE plans. Source: Kaiser Family Foundation (38)
Figure 6: Interquartile range of portion of hospitalizations in a region-year linked to an ACSC:

**Notes:** The vertical axis is the portion \([0, 1]\) of hospitalizations in region-year for which the primary diagnosis was an ACSC, among United States individuals aged 65 and higher. Gray boxes show interquartile range above and below the median. The lines show the 90-10 spread. The circles show the means. Source: MEPS (2).
Figure 7: Interquartile range of regional rates of prescription drug coverage, for all regions:

Notes: The vertical axis is the portion $[0, 1]$ of people aged 65 and higher in a region that had prescription drug coverage in each year. Gray boxes show interquartile range above and below the median. The lines show the 90-10 spread. The circles show the means. Source: MEPS (2)
Figure 8: Interquartile range of regional rates of prescription drug coverage, for those regions in the bottom 20 percent of drug coverage in the pre-MMA years:

Notes: The vertical axis is the portion \([0, 1]\) of people aged 65 and higher in a region that had prescription drug coverage in each year, for those regions in the bottom 20 percent of drug coverage in the pre-MMA years. Gray boxes show interquartile range above and below the median. The lines show the 90-10 spread. The circles show the means. Source: MEPS (2)
## Table 1: Impacts of Cost Sharing on Ambulatory Care Sensitive Condition (ACSC) Hospitalizations Among U.S. Elderly

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<th>3</th>
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<td>0.0033</td>
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Output for clustered instrumental variables (2SLS) regressions. Dependent variable is portion of hospitalizations in the region-year that were caused by an ambulatory care sensitive condition (ACSC). All regressions feature year and region fixed effects, as well as controls for age, gender, race, marital status, education, income, unemployment, and total level of drug spending. AR Wald Test is the Anderson-Rubin Wald test, distributed as chi-squared (1). The data source is the Medical Expenditure Panel Survey (MEPS). Instrument abbreviation information is in the Methods section. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Table 2: Impacts of Cost Sharing on Recent Routine Checkups Among U.S. Elderly

<table>
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Output for clustered instrumental variables (2SLS) regressions. Dependent variables are the portion of respondents in the region-year that had a routine checkup in the past year. All regressions feature year and region fixed effects, as well as controls for age, gender, race, marital status, education, income, unemployment, and total level of drug spending. AR Wald Test is the Anderson-Rubin Wald test, distributed as chi-squared (1). The data source is the Medical Expenditure Panel Survey (MEPS). Instrument abbreviation information is in the Methods section. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Table 3: Reduced Form Regression Results

<table>
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<th>1 ACSC</th>
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Observations 14,104 14,104 14,104 14,315 14,315 14,315

Output for clustered OLS regressions. Dependent variables are the portion of hospitalizations in the region-year that were caused by an ambulatory care sensitive condition (ACSC), and portion of the respondents in that region-year who received routine check-ups (RRCU) in the last year. All regressions feature year and region fixed effects, as well as controls for age, gender, race, marital status, education, income, and unemployment. The data source is the Medical Expenditure Panel Survey (MEPS). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1