Patient Cost Sharing in Low Income Populations

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Economic theory suggests that a natural tool to control medical costs is increased consumer cost sharing for medical care. While such cost sharing reduces "full insurance" (wherein patients are indifferent between falling sick or remaining healthy), a greater reliance on coinsurance and copayments can, in theory, stem patient and provider incentives to engage in moral hazard. These issues are particularly salient for low income populations who are at the center of current efforts to expand coverage (among the uninsured in 2008, 38 percent had incomes below the federal poverty line (FPL), and 52 percent had incomes between 100 and 299 percent of the FPL (Kaiser Commission on Medicaid and the Uninsured 2009)). As insurance is expanded to these groups, it is important to understand how they respond to greater levels of patient cost sharing. On the one hand, smarter plan design could help reduce the fiscal pressures associated with insurance expansion. But on the other, it is also possible that low income recipients are unable to cut back on utilization wisely and, consequently, experience hospitalization "offsets" as a result of greater levels of patient cost sharing. In particular, there remains a concern among many that higher cost sharing on primary care will lead to less effective use of primary care, worse health, and, consequently, higher downstream costs at hospitals (the so-called "offset effects"). Commentators such as Robert G. Evans et al. (1993) have argued that user fees are the invention of "zombie masters," while others such as Cam Donaldson (2008)

believe that it is "wrong, unfair, and ineffective to try to limit consumer and patient access through user fees, and also to dress up this process as actually enhancing access."

For the nonelderly, the question of the sensitivity of medical consumption to its price was addressed by the famous RAND Health Insurance Experiment (HIE). The HIE randomized individuals across health insurance plans of differing generosity with respect to patient costs. The results showed that higher patient payments significantly reduced medical care utilization, without any adverse health outcomes on average (see Willard Manning et al. 1987 and Joseph P. Newhouse 1993). In the low income population, the HIE found health impacts only for a particular subpopulation (the low income chronically ill). But this evidence is now over 30 years old, and changes in the practice of medicine, including greater reliance on managed care contracts, increased use of prescription drugs, the growth of imaging and diagnostic technology and the development of minimally invasive surgery, may imply a structural change in the elasticity of medical demand and the health impacts of any utilization reductions.

Given the renewed interest in the low income population, we sought to understand the price elasticity of demand in a contemporary setting by focusing on the experience of low income persons in Massachusetts whose copayments for many medical services were changed in July 2008. This paper reports the first set of results from our evaluation of the Massachusetts experience.

I. Institutional Setting

Our analysis focuses on the implications of greater patient cost sharing that was imposed on low income adults (aged 19 to 64) in the Commonwealth of Massachusetts. Many, if not all, of these persons were beneficiaries of Massachusetts' insurance expansion which was signed into law on April 12, 2006. Its goal was to achieve near universal coverage of the

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TABLE 1—COPAYMENT CHANGES BY PERCENT OF FEDERAL POVERTY LINE OF MEMBER

	Plan 1: 0–100% of FPL	Plan 2: 100–200% of FPL	Plan 3: 200–300% of FPL	Plan 4: 200–300% of FPL
Copayment for prescription drugs (generics/formulary/nonformulary retail)				
Oct '06–Jun '08	$1/$3	$5/$10/$30	$10/$20/$40	$5/$10/$30
Jul '08–present	$1/$3	$10/$20/$40	$12.50/$25/$50	
Out of pocket maximum for prescription drugs (annual)				
Oct '06–Jun '08	$200	$250	$500	$250
Jul '08–present	$200	$250	$800	
Copayments for office visits (primary care/specialist)				
Oct '06–Jun '08	$0/$0	$5/$10	$10/$20	$5/$10
Jul '08–present	$0/$0	$10/$18	$15/$22	
Copayments for emergency room visits (without subsequent admission)				
Oct '06–Jun '08	$3	$50	$75	$50
Jul '08–present	$3	$50	$100	
Copayments for hospital inpatient admission				
Oct '06–Jun '08	$0	$50	$250	$50
Jul '08–present	$0	$50	$250	

Notes: Prior to July 2008, there were two plan types for members whose income was between 200 and 300 percent of the FPL (Plans 3 and 4). Plan 4 was discontinued in July 2008, and its members were enrolled in Plan 3.

Source: The Massachusetts Health Insurance Connector Authority (2008).

Massachusetts population, by providing legal residents earning up to 150 percent of the FPL completely subsidized coverage, and large premium subsidies to those earning over 150 percent of the FPL and below 300 percent of the FPL.[1] These programs are offered by a subsidized program known as Commonwealth Care (henceforth, CommCare) to persons who are not offered employer provided health insurance, those who cannot be dependents of another person's family plan, and those who do not qualify for other public health insurance programs such as Medicaid. Premiums for CommCare plans are heavily subsidized: currently, the monthly enrollee premium is $0 if the member's income is below 150 percent of the FPL, $39 for income between 150 and 200 percent of the FPL, $77 for those between 200 and 250 percent of the FPL and $116 for those between 250 and 300 percent of the FPL.

Members are eligible for different plan types based on where their income is relative to FPL, and each plan type offers a different level of patient cost sharing. From October 2006 to June 2008, there were four different plans, each with the same benefits but with different levels of patient cost sharing. The cost sharing provisions, which are described in Table 1, generate discontinuities in cost sharing at 100 percent and 200 percent of the FPL. Note that for members whose incomes were between 200 and 300 percent of the FPL, there were two plan types: Plan 3 features higher cost sharing, but lower monthly premiums, while Plan 4 features lower cost sharing, but higher monthly premiums. Plan 4 was discontinued in July 2008, and its members were placed into Plan 3. Consequently, this group incurred a substantial increase in patient cost sharing as a result of the elimination of Plan 4 (see Table 1).

To understand the effect of patient cost sharing on patient demand, we exploit a series of changes in the discontinuities in the cost sharing provisions of CommCare that occurred in July 2008. These changes, which occurred by type of plan, are reported in Table 1. Of these, the most salient are the increases in copayments for prescription drugs and office visits for members whose incomes exceeded 100 percent of the FPL. Copayments for ER visits increased only for those with incomes over 200 percent of FPL, and copayments for hospital admissions

[1] In 2009, 150 percent of the FPL was $16,620 for an individual; $33,084 for a family of four. 300 percent of FPL was $32,508 for an individual; $66,168 for a family of four. These are national cutoffs (Kaiser Commission on Medicaid and the Uninsured 2009).
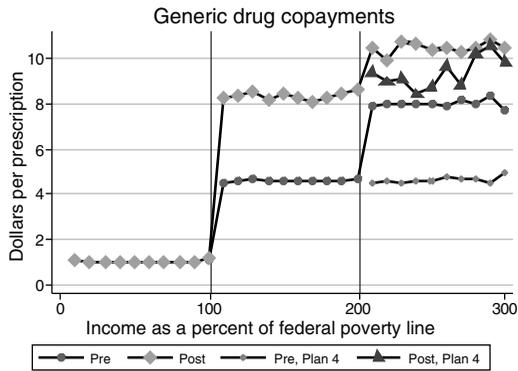
Generic drug copayments

FIGURE 1

were unchanged, except for the Plan 4 members who had to switch to Plan 3. Note that there were no copayment changes for members whose incomes were between 0 and 100 percent of the FPL. In Figure 1, we plot the average copayment for one category of utilization, generic drugs, by income category and by period ("pre" denotes the period before July 2008, and "post" denotes the period after July 2008). This figure graphically illustrates the basis for our formal regression analysis below.

Because a number of cost sharing increases occurred at the same time, we are not able to attribute changes in a specific category of spending, such as the utilization of prescription drugs, to changes in the copayments for these drugs; declines in the use of prescription drugs may, for example, partially reflect a reduction in the use of office visits. For this reason, we are most interested in the reduction in total expenses across all categories of care.

In order to estimate the price elasticity of demand, we need to devise a simple measure of the change in copayments. We calculate this as the weighted average of the copayments for generic drugs, formulary drugs, nonformulary drugs, office visits, ER visits, and hospitalizations. The weights are average monthly utilization of each type of care during the pre-period (July 2007 to June 2008) for the entire sample. Table 2 reports the change in predicted copayments by type of plan.

We estimate our regression models at the level of CommCare members and cluster our standard errors at the level of these members. We estimate a standard regression-discontinuity model, with the natural log of spending as our

dependent variable and a quartic in FPL. We added one dollar to spending in order to avoid having undefined dependent variables for members with zero dollars of spending. The quartic in income is allowed to vary by the pre-post period. We also control for age and age squared, gender, and 26 geographic service areas. In our preferred specifications, we add member fixed effects. In the specifications with these effects, we are identifying the effect of being in a particular plan by identifying off members who switch plans, or more plausibly, who joined CommCare for endogenous reasons. To understand the potential for plan switchers being different from those who did not switch plans, we present results for enrollees for whom we had any information at any point in the analysis, and also for a sample of members that did not switch plans. In this latter sample, the plan fixed effects are perfectly collinear with the individual fixed effects, but we can still identify the effect of changes in copayments on utilization.

II. Results

Table 3 reports regression results from our regression-discontinuity models. Of interest are the coefficients on the FPL-cutoffs × post indicator variables. The first two columns are full sample results where we include data for all members regardless of whether they switch plans or when they joined or exited the CommCare program. The indicator variable for "Over 100 percent of the FPL" is set to one for everyone whose income exceeded this threshold, but that for "Over 200 percent of the FPL" picks up only members in Plan 3 and the indicator labeled "Plan 4" measures the utilization of all members who were in the discontinued plan prior to July 2008. The omitted group is the members who were in Plan 1 and therefore experienced no cost sharing increases in July 2008.

Column 1 of Table 1 demonstrates that utilization fell by 0.37 log points after the July 2008 cost sharing increase for members whose income exceeded 100 percent of the FPL, relative to those with incomes below 100 percent of FPL. Baseline monthly spending was $365 per member for this group. There are further declines for those at higher levels of FPL, but these results are not significantly different from zero. Therefore, we cannot reject the hypothesis that the percentage reduction in utilization was

TABLE 2—AVERAGE MONTHLY COPAYMENTS, BY PLAN TYPE

	Plan 1: 0–100% of FPL	Plan 2: 100–200% of FPL	Plan 3: 200–300% of FPL	Plan 4: 200–300% of FPL
Average copayment (weighted by utilization prior to July 2008)				
Oct '06–Jun '08	$1.07	$ 8.80	$18.62	$ 8.80
Jul '08–present	$1.07	$14.12	$23.17	$23.17
Increase (percent)	0	47	22	97

Notes: Prior to July 2008, there were two plan types for members whose income was between 200 and 300 percent of the FPL (Plans 3 and 4). Plan 4 (with lower copayments) was dicontinued in July 2008, and its members were enrolled in Plan 3. We calculate the percent increase in copayments as the log difference in copayments.

TABLE 3—REGRESSION-DISCONTINUITY ESTIMATES OF THE CHANGE IN TOTAL HEALTH EXPENDITURE

	All members	Members who did not switch plans	Members who were continuously enrolled
Over 100 percent of FPL	−0.032 (0.087)	—	—
Over 200 percent of FPL	−0.077 (0.101)	—	—
Over 200 percent and in Plan 4	0.329 (0.472)	—	—
Post	0.350 (0.127)	0.282 (0.111)	0.912 (0.293)
(Over 100 percent of FPL × Post)	−0.375 (0.064)	−0.315 (0.062)	−0.233 (0.142)
(Over 200 percent of FPL and not in Plan 4) × Post	−0.075 (0.081)	−0.100 (0.085)	−0.127 (0.213)
(Over 200 percent and in Plan 4) × Post	−0.014 (0.109)	−0.124 (0.371)	−0.055 (0.267)
Observations	430,270	249,114	39,840

Notes: Dependent variable is ln(Total Monthly Expenses) per member per month. Standard errors are clustered on member. All regressions include member fixed effects. See text for sample details.

the same across different levels of FPL. The estimates in column 1 are subject to considerable bias if member income or enrollment is a function of health status. Even with member fixed effects we are identifying the effect of copayment increases—in part—off of members who changed plans or joined or left CommCare based on their health status. Our preferred specifications are those in the second and third columns of Table 3. In the second column we restrict our sample to members who did not change plans and were enrolled in June and July of 2008 (members ever in Plan 4 continue to be included in this analysis). For this sample, we see a very similar response of utilization from

increased copayments: 0.315 log points. Finally, in the last column, we use a subsample that is continuously enrolled in both years for July to December. The restriction of balancing the pre- and post-period on the basis of seasonality further ensures that our results are not being driven by variation in utilization stemming from seasonal variation in illness, or when out-of-pocket maximums are exceeded. The drawback of this specification is that our sample size falls considerably and makes many of our key results statistically insignificant (although the point estimates are not very different from those that utilize a broader sample). That the estimates are similar across samples reassures us that our

TABLE 4—PRICE ELASTICITY OF TOTAL HEALTH EXPENDITURES PER MEMBER PER MONTH

	All members	Members who did not switch plans	Members who were continuously enrolled
ln(Copayment)	−0.162 (0.021)	−0.346 (0.047)	−0.272 (0.073)
Observations	430,270	249,114	39,840

Notes: Dependent variable is ln(total monthly expenses) per member per month. Standard errors are clustered on member. All regressions include member fixed effects. See text for sample details.

TABLE 5—PRICE ELASTICITY OF HEALTH CARE EXPENDITURES, BY SERVICE CATEGORY

	Prescription drugs	Office visits	ER visits	Hospital	Outpatient	Labs
ln(Copayment)	−0.137 (0.044)	−0.200 (0.066)	−0.034 (0.058)	−0.034 (0.057)	−0.151 (0.069)	−0.232 (0.072)
Observations	39,840	39,840	39,840	39,840	39,840	39,840

Notes: Dependent variable is ln(spending) per member per month and by category of spending. Sample is restricted to members who did not switch plans. Standard errors are clustered on member. All regressions include member fixed effects. See text for sample details.

results are not, to first-order, the consequence of entry and exit into different plans.

To convert the changes in total health expenditures into elasticities we estimate regressions with the same dependent variable as above, ln(total monthly expenditures), but use ln(weighted average monthly copayment) as the key explanatory variable, where the weighted average monthly copayments are those reported in Table 2. Table 4 reports these results. Regardless of the chosen sample, the estimated elasticities are very similar to each other, with magnitudes ranging from −0.162 to −0.346.

One obvious question that this analysis raises is whether the aggregated elasticities reported in Table 4 vary by class of service (prescription drugs, office visits, ER visits). Relatedly, we would also want to know if there were "offset" effects—that is, did inpatient hospital and ER visits increase, potentially because of excessive reductions in primary care utilization? To answer this question, we estimate regressions analogous to those in Table 4, but where the dependent variable is spending in the specific category. The key explanatory variable, ln(weighted average monthly copayment), is still constructed as above in Table 4. We report these results in Table 5 and focus on our most restrictive sample—members who did not switch plans

and who remained continuously enrolled. We find that the estimated elasticities are strikingly similar across the different categories of spending that were directly affected by substantial copayment increases (prescription drugs and office visits). In addition, we find little evidence of "offset" effects, with statistically insignificant, negative effects on ER and hospital visits.

III. Discussion

Our estimates of the price elasticity of demand in a low income population point to elasticities that are very similar to those obtained in the HIE—a pioneering experiment that was conducted over 30 years ago. That our elasticities are so similar, despite tremendous structural changes in the composition of what accounts for medical care, is remarkable.

In other work which focused on the elderly, a population that was excluded by the HIE, we found that physician visits and prescription drugs had elasticities similar to those noted by the HIE investigators (see Chandra, Gruber, and McKnight 2010). However, in that analysis we also found substantial hospitalization offsets that were concentrated in the chronically sick population (individuals with a diagnosis of hypertension, high cholesterol, diabetes,

asthma, arthritis, affective disorders, and gastritis). In the present analysis, the prima facie case for offsets is weak as we see reductions in the overall use of hospital spending. But our analysis has not explored the possibility of heterogeneity in offsets, and in particular a situation where most members reduce hospital utilization by a small amount, though there are certain subpopulations where the use of ER and hospital services increased substantially. Nor have we studied the extent to which members were more likely to switch to generic drugs because of the increases in the relative price of formulary and retail medications. Understanding these elasticities is a fruitful area for future research.

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