

Appendix A Part D Design and Enrollment

Table A.1: Part D Coverage Arm Spending Thresholds and Coinsurance Rate by Year

Year	(1)	(2)	(3)	(4)
	Spending Threshold		Gap Coinsurance Rate	
	Coverage Gap	Catastrophic	Generic	Branded
2007	\$2,400	\$5,451	100%	100%
2008	\$2,510	\$5,726	100%	100%
2009	\$2,600	\$6,154	100%	100%
2010	\$2,830	\$6,440	100%	100%
2011	\$2,840	\$6,648	93%	50%
2012	\$2,930	\$6,658	86%	50%

Source: *q1medicare.com*

Table A.2: Enrollment Month Balance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	OLS (Feb-Sep)
<i>Demographics</i>										
% Female	0.6	0.59	0.59	0.58	0.59	0.59	0.6	0.59	0.59	0.00058 (0.00036)
% White	0.9	0.9	0.9	0.89	0.89	0.9	0.9	0.9	0.89	0.00004 (0.00022)
<i>Plan Choice</i>										
Premium	36.8	37	36.9	36.6	36.6	36.8	36.9	36.7	36.9	-0.0099 (0.015)
<i>Part D Spending</i>										
First 30 days	116	127	125	126	122	125	122	125	126	-0.16 (0.22)
First 60 days	230	243	241	235	236	236	236	237	242	-0.21 (0.35)
First 90 days	344	361	359	352	351	354	355	358	361	0.19 (0.49)

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes: Columns (1) through (9) present the sample means for demographic, plan choice, and initial Part D spending variables by enrollment month. Column (10) presents the OLS estimate of each of the 7 balance variables on enrollment month, using only February-September enrollees (main sample). The “Plan Choice” panel uses only data from individuals enrolled in non-MA plans, for whom the Part D premium is separate from Parts A and B.

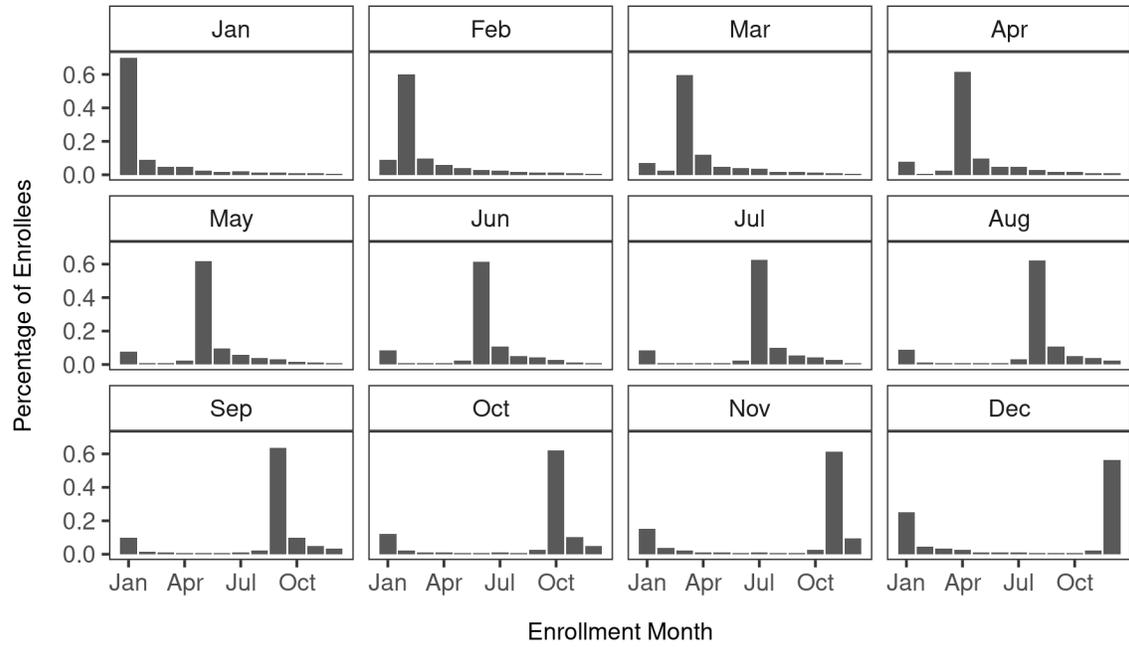


Figure A.1: Enrollment Timing by Birth Month

Notes: Each panel corresponds to a different birth month, and plots the percentage of beneficiaries (from that birth month) enrolling in each of the 12 calendar months during the first year of Part D eligibility.

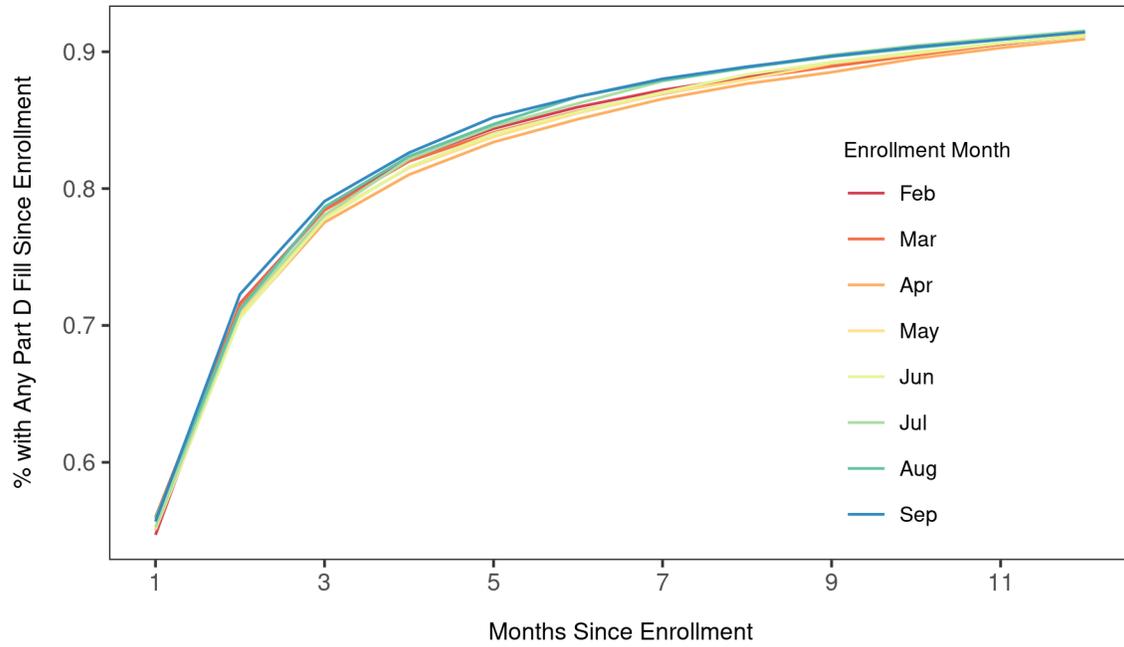


Figure A.2: Utilization Ramp Up

Notes: The figure plots the percentage of beneficiaries in each enrollment month (shaded lines) that have made at least one Part D fill since enrolling, by the number of months since initial enrollment.

Appendix B Machine Learning Predictions on Spending and Risk

Table B.1: Main Sample Spending Prediction Performance: Balance

Term	Estimate
Intercept	174.58** (68.37)
Predicted Spending	0.76366*** (0.040955)
Enrollment Month	-17.958 (11.13)
Predicted Spending \times Enrollment Month	0.0073343 (0.0066388)

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes: Coefficients are from an OLS regression of calendar year two total spending on predicted spending (using 90 days of claims) interacted with enrollment month.

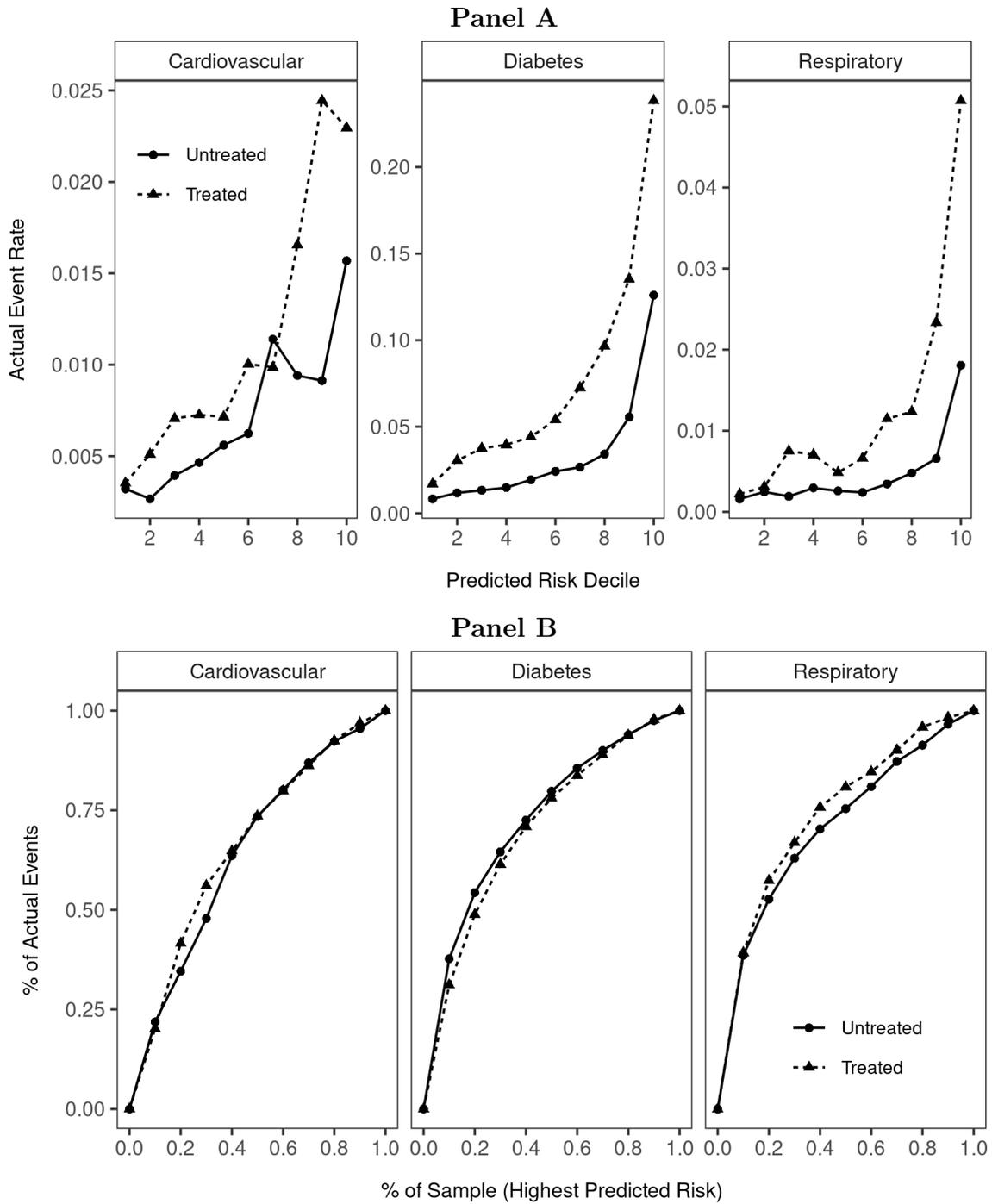


Figure B.1: Acute Event Risk Prediction Calibration and Capture

Notes: Panel A plots the actual event rate (for acute health events in each category, from days 90-360 of enrollment) by decile of predicted risk (using data from the first 90-days) and treatment status. An individual in the sample is considered treated if she fills a claim in the category in the first 90 days of enrollment. Panel B plots the cumulative percent of actual events captured by each successive decile (e.g. 0.1 is top 10 percent of sample in terms of risk) and treatment status. This figure uses only the stand alone PDP (non-MA) subsample for whom we observe Parts A and B claims.

Appendix C Sensitivity Analysis

Table C.1: Year 2 Mortality Estimates

	(1)		(2)
	<i>Monthly Mortality</i>		<i>Monthly Mortality</i>
	<i>2SLS Estimate (p.p.)</i>		<i>2SLS Estimate (p.p.)</i>
<i>Month</i>		<i>Month (cont'd)</i>	
December (Year 1)	0.00435** (0.00209)	June	-0.00220 (0.00135)
January	0.00073 (0.00170)	July	0.00193 (0.00171)
February	0.00057 (0.00163)	August	0.00115 (0.00159)
March	-0.00143 (0.00159)	September	-0.00061 (0.00184)
April	-0.00028 (0.00178)	October	0.00072 (0.00163)
May	0.00006 (0.00162)	November	-0.00190 (0.00177)

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes: The 2SLS estimates presented in columns (1) and (2) follow the same specification as the 2SLS estimate in Table 2, except for the outcome period. For each outcome period regression, individuals that die before the start of that period are excluded from the sample.

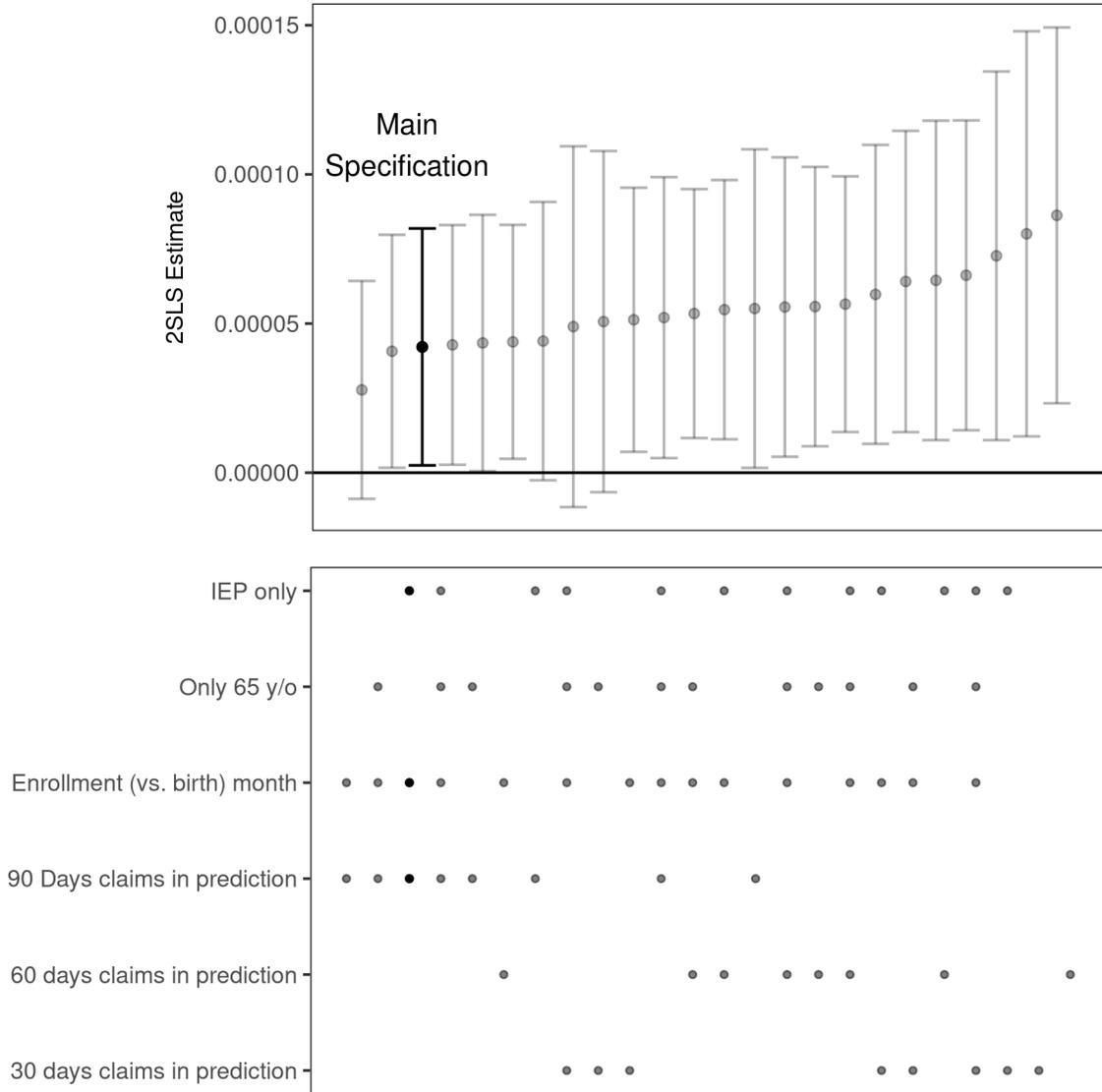


Figure C.1: Specification Chart

Notes: Each point (and 95%, heteroskedasticity-robust confidence interval) is a 2SLS estimate from the regression of December mortality on the December coinsurance rate (instrumented by enrollment month), see equations (4) and (5). The main specification is in bold. The bottom panel describes the exact sample, instrument, and predicted spending specification used in the regression. “IEP only” refers to only including individuals that enroll in the 4-month initial enrollment period; “Only 65 y/o” refers to only including individuals that enroll at age 65 thereby excluding the small proportion of the main sample (1.83%) that are born in either November or December and enroll in the following February or March; “Enrollment (vs. birth) month” refers to the instrument specification (dots indicated enrollment month was used); 90-, 60-, 30- days claims in prediction refer to the number of days of claims that was used to make the spending prediction to interact with enrollment month in the first stage.

Appendix D Demand Response

Table D.1: Drug Class RCT Mortality Effects

	(1)	(2)	(3)	(4)
	ITT Estimate	Compliance in Treatment Group	TOT Estimate	Source
Statins	20%	75%	26.7%	JUPITER (Ridker et al., 2008)
β -blockers	65%	89%	73.0%	CHFS (Packer et al., 1996)
ACE-Inhibitors	33%	85%	38.8%	SOLVD (Group, 1991)
Thiazide Diuretics [†]	-	-	38.3%	ALLHAT (ALLHAT Group, 2002)
ARBs [†]	-	-	38.3%	LIFE (Dahlöf et al., 2002)
CCBs [†]	-	-	38.3%	ALLHAT (ALLHAT Group, 2002)
Diabetes (oral)	32%	75%	42.7%	EMPA-REG OUTCOME (Zinman et al., 2015)
Inhalants	17.5%	66%	26.5%	TORCH (Calverley et al., 2007)

Notes: This table provides the sources for the percentage reduction in mortality estimates from Table 2. Column (1) presents the the intent-to-treat (ITT) estimate for the percentage reduction mortality found in the clinical trial; column (2) presents the compliance in the treatment group reported in the clinical trial; column (3) scales the ITT estimate to a treatment on the treated (TOT) estimate by dividing the ITT estimate by compliance ($(3) = (1) \div (2)$); column (4) gives the clinical trial source. [†] For three classes of antihypertensives (thiazide diuretics, angiotensin ii receptor blockers (ARBs), and calcium channel blockers (CCBs), clinical trials have show mortality effects to be non-different than the effects of ACE inhibitors, so we assign the TOT estimate from ACE inhibitors to all 4 classes.

Table D.2: Demand Response: Comparison to Literature

	(1)	(2)	(3)
	<i>Our Estimate (95% CI)</i> <i>(2SLS, Claims per \$)</i>	<u>Chandra et al.</u>	
		PPO	HMO
<i>Overall</i>			
Number of claims	-0.0377 (-0.0408, -0.0346)	-0.0143	-0.0387
	<i>Our Estimate (95% CI)</i> <i>(2SLS, % with claims per \$)</i>	<u>Choudhry et al.</u>	<u>Einav et al.</u>
<i>By Class</i>			
ACE or ARB	-0.004 (-0.0047, -0.0033)	-0.0043	-
Beta Blockers	-0.0043 (-0.0059, -0.0028)	-0.0032	-0.0038
Statins	-0.0029 (-0.0033, -0.0024)	-0.0022	-0.0031

Notes: Here, we attempt to present demand response estimates on the same scale as three key previous studies. In the main text, we use the December coinsurance rate as the endogenous variable, but in an effort to compare to other studies, here we use the December price in dollars (either overall or class specific) per fill as the endogenous variable. In [Chandra et al. \(2010\)](#), the authors present demand response estimates from two policy changes for different types of plans (HMO and PPO), hence the two columns here. [Einav et al. \(2018\)](#) report elasticities instead of a derivative; we multiply the elasticities reported in their study by $\frac{P}{Q}$ (estimated in our sample) to obtain a comparable derivative to the one we estimate. For [Choudhry et al. \(2011\)](#), we simply divide the quantity change in utilization for a class by the average copayment amount (prior to intervention, which erased copayments).

Table D.3: Potential Alternative Mechanisms for Mortality Effects

	(1)	(2)
	<u>Dec. Mean (Compliers)</u>	<u>2SLS Estimate</u>
<i>Outcome</i>		
Part A Spending	247.20	-1.52 (1.36)
Part B Spending	367.20	-0.424 (0.548)

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes: Effect of December Part D coinsurance rate on December Parts A and B spending. The first/second stage is specified as in equations (4) and (5), but with the outcome as either Part A or B spending in December instead of December mortality. Column (1) reports the sample mean for compliers (those in the top 30% of predicted spending); column (2) presents the 2SLS estimate (in \$). This analysis is restricted to the non-MA subsample for whom we observe Parts A and B claims.

Table D.4: Excess Fills Compared to Simulation

Number of December Fills	(1) Estimated Excess	(2) 95 % Confidence Interval
0-1	0.016 (0.006)	(0.005, 0.028)
2-3	-0.009 (0.006)	(-0.021, 0.003)
4-5	-0.004 (0.006)	(-0.015, 0.007)
6-7	-0.009 (0.004)	(-0.017, -0.001)
8-9	0 (0.003)	(-0.006, 0.005)
10-11	0.004 (0.002)	(0.001, 0.007)
12-13	0.002 (0.001)	(0, 0.004)
14-15	0.001 (0.001)	(-0.001, 0.002)

Notes: Column (1) presents the estimated difference between the actual proportion of February enrollees we observe with a specific amount of December fills and a simulated proportion based on an assumed rule that all patients are equally as likely to drop each of their drugs (column (2) presents a 95% confidence interval of this estimate). To generate the simulated February distribution, we assume that each September enrollee has a 13.6% probability of dropping each of their drugs, which is the empirical percentage difference in the number of drugs that September and February enrollees fill. We run 1,000 Monte Carlo simulations, and calculate the average difference between the resulting and simulated February distributions and the actual one (column (1)), along with the 2.5th and 97.5th percentiles (column (2)).

Table D.5: Filling Zero or One Claims—2SLS Results

	(1)	(2)
Dependent Variable:	Number of December Claims (Indicator)	December Mortality
Endogenous Variable:	Coinsurance Rate	Number of December Claims (Indicator)
<i>Number of December Claims</i>		
0	0.200*** (0.015)	0.622** (0.279)
1	0.170*** (0.014)	0.211 (0.457)
2	0.079*** (0.014)	0.826 (0.563)
3	-0.010 (0.014)	-1.512* (0.817)
4	-0.005 (0.013)	-1.317 (0.844)
≥ 5	-0.433*** (0.020)	-0.389 (0.357)

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes: Column (1) reports 2SLS estimates (in p.p.) where the dependent variable is an indicator for having a specific number of fills in December and the endogenous variable (instrumented by enrollment month) is the December coinsurance rate. Column (2) presents 2SLS estimates (in p.p.) where the dependent variable is December mortality and the endogenous variable (instrumented by enrollment month) is an indicator for having a specific number of fills in December.