Supplementary Online Content

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eSupplement. Statistical Appendix A, Statistical Appendix B, Statistical Appendix C
eTable. Part D Implementation and Associated Differential Changes in A) Self-Reported Prescription Drug Coverage and B) Out-of-Pocket Spending on Prescription Drugs for Medicare Beneficiaries With Limited Prior Drug Coverage

This supplementary material has been provided by the authors to give readers additional information about their work.

eSupplement

Statistical Appendix A. Exclusion of Veterans Likely to Use the VA Health System

Inclusion of military veterans who were likely to receive care in the VA health system could have biased our results because their health-care utilization was unlikely to be captured completely by Medicare claims and because the availability of subsidized drug benefits through Part D might have increased their use of Medicare-reimbursed care. We identified military veterans who were likely to be eligible for full VA health benefits without copayment requirements (high priority enrollment groups) based on income, disability, and Medicaid eligibility.[1] Specifically, we excluded veterans whose household income in 2004 was below VA national income thresholds for eligibility,[2] who were eligible for Medicaid in 2004 based on self-reported coverage or state buy-in indicators in their enrollment files, or who were disabled in 2004 based on their self-reported labor force status, application for or receipt of Supplemental Security Income or Social Security Disability Insurance benefits, or difficulties with activities of daily living (more than 3 difficulties or top 5%). These predictors of eligibility for VA health benefits have been shown to predict use of VA care,[3,4] which would not be captured by Medicare claims data.

Statistical Appendix B. Weighting Adjustments

Weighting for incomplete linkage to Medicare claims

We weighted analyses of non-drug medical spending to adjust for survey non-response that led to missing Medicare identification numbers and thus missing claims data. Among participants otherwise eligible for study inclusion, we fitted a logistic regression model predicting successful linkage to Medicare claims data as a function of baseline sociodemographic characteristics and prescription drug coverage, and weighted this analysis by survey sampling weights. From this

model we derived weights equal to the inverse of the probability of linkage and combined these weights with sampling weights by taking the product of the two sets.

Propensity-score weighting

Among participants with linked claims, we then fitted a logistic regression model predicting drug coverage before 2006 (limited vs. generous) as a function of all characteristics listed in Table 1 and derived weights equal to participants' probabilities of belonging to the opposite coverage group. This propensity-score adjustment balanced the distributions of the variables included in the model across the coverage groups, while effectively downweighting cases in each group who had few or no counterparts with similar characteristics in the opposite group. We verified that the weighted distribution of characteristics was the same in the two comparison groups, with weighted values falling between the unweighted values presented for each group in Table 1. We used the combined sampling and linkage weights described above in fitting the propensity-score model and combined these with propensity-score weights for our main analyses of non-drug spending.

Weighting for enrollment in Medicare Advantage (MA)

Among participants who were linked to their Medicare claims files and enrolled in traditional Medicare in the first quarter of the study period, we then fitted a logistic regression model predicting enrollment in MA in each quarter of the study period after the first as a function of non-drug spending in the preceding quarter, prescription drug coverage in 2004, baseline characteristics listed in Table 1, and interactions specified in our main analyses between non-drug spending, prescription drug coverage, and time. For this model, we censored quarterly observations following initial switches to MA and used combined sampling, linkage, and propensity-score weights. From this model we obtained predicted probabilities of remaining enrolled in traditional Medicare for each participant in each quarter. For each participant, we then derived weights for each quarterly observation equal to the inverse of the cumulative product of these predicted

probabilities up through each quarter,[5,6] and combined these weights with sampling, linkage, and propensity-score weights. Thus, in a sensitivity analysis, these inverse-probability-of-enrollment weights adjusted for key time-varying predictors of MA enrollment by giving greater weight to participants who remained enrolled in traditional Medicare but were more likely to switch to MA based on their baseline characteristics and preceding medical costs, and lesser weight to those who remained enrolled in traditional Medicare and were less likely to switch to MA based on these factors. Because weighted and unweighted estimates were very similar, and because MA enrollment rates did not differentially change by prior drug coverage (see Results), we concluded MA enrollment was not likely to be a source of significant bias in our analysis.

Statistical Appendix C. Supplemental Analyses of Self-Reported Drug Coverage and Out-of-Pocket Drug Spending

We used biennial survey data from 2002 to 2008 and an analytical strategy similar to our main analysis of claims data to assess the associations between Part D implementation and drug coverage and out-of-pocket drug spending for participants with limited prior drug coverage. In each survey, participants reported drug coverage generosity (as described in the Methods) and average monthly out-of-pocket drug spending over the preceding two years.

Compared to analyses of quarterly spending data, analyses of biennial survey data were subject to greater bias from regression to the mean because these intermediate outcomes were closely related to drug coverage and assessed only once before and after Part D's implementation. For example, participants with limited drug coverage were likely to report drug coverage gains even before the availability of Part D benefits.[7] Therefore, we fitted models that compared differential changes by coverage group occurring from 2004 to 2008 with differential changes occurring from 2002 to 2004. We did not use 2006 survey data because retrospective self-reports from this survey

referred to periods both before and after Part D's implementation. We could not use survey data before 2002 because the question assessing drug coverage generosity differed substantially in earlier surveys.

Analyses of survey data were weighted for non-response to follow-up surveys. Specifically, we fitted a logistic regression model predicting response to the 2008 survey among 2004 respondents and to the 2004 survey among 2002 respondents as a function of sociodemographic and health characteristics measured in the baseline surveys. From this model, we derived a non-response weight for each participant equal to the inverse of the probability of responding to the follow-up survey. We then weighted responses to the follow-up surveys by these weights to adjust comparisons for changes in observed characteristics of the sample that were related to non-response.

After exclusions described in the Methods, a cohort of 8,613 participants was available for analysis of survey data from 2004 to 2008 and a cohort of 8,556 participants for analysis of survey data from 2002 to 2004.

As described in the Appendix Table, participants with limited drug coverage in 2004 reported greater differential gains in drug coverage from 2004 to 2008 (20.5 percentage point increase in fraction with generous coverage; $P<0.001$) and greater differential decreases in out-of-pocket drug spending (−$148/month; $P=0.002$) than did participants with limited drug coverage in 2002 from 2002 to 2004.

These findings suggest the implementation of Medicare Part D substantially improved drug coverage and decreased out-of-pocket drug costs for beneficiaries reporting limited drug coverage before 2006. These supplemental analyses also indicate that self-reports reliably measured coverage generosity and strongly predicted gains in drug benefits associated with Part D.

REFERENCES

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eTable. Part D Implementation and Associated Differential Changes in A) Self-Reported Prescription Drug Coverage and B) Out-of-Pocket Spending on Prescription Drugs for Medicare Beneficiaries With Limited Prior Drug Coverage

Prescription drug coverage in baseline year	**Cohort not affected by Part D (2002-2004)** (n=8,613)				**Cohort affected by Part D (2004-2008)** (N=8,556)			
	2002	**2004**	**Change (SE)**	**P value**	**2004**	**2008**	**Change (SE)**	**P value**
	A) Percentage reporting generous prescription drug coverage (%)							
Generous coverage	100.0	68.3	−31.7 (1.2)	<0.001	100.0	76.8	−23.2 (1.1)	<0.001
Limited coverage	0.0	24.4	24.4 (0.8)	<0.001	0.0	53.4	53.4 (1.2)	<0.001
Difference	−100.0	−43.9	56.1 (1.4)	<0.001	−100.0	−23.4	76.6 (1.7)	<0.001
Difference in differential changes	**76.6 − 56.1 = 20.5 (SE: 2.0); P<0.001**							
	B) Monthly out-of-pocket spending on prescription drugs ($)							
Generous coverage	73	109	36 (8)	<0.001	95	56	−39 (9)	<0.001
Limited coverage	174	247	73 (27)	0.008	228	78	−150 (20)	<0.001
Difference	101	138	37 (27)	0.18	133	22	−111 (21)	<0.001
Difference in differential changes	**−111 − 37 = −148 (SE: 46); P=0.002**							