

Appendix A1. Data Sources and Study Population Details

The Medicare Healthcare Effectiveness Data and Information Set (HEDIS) included 605,208 MA enrollees in 525 contracts in 2012 and 623,363 enrollees in 522 contracts in 2013 who were eligible for one or more dichotomous measures of blood pressure control, diabetes control, and/or cholesterol control. We matched 99% of these data to the Medicare Beneficiary Summary File (MBSF) in 2012 (n = 602,433) and 2013 (n = 622,652). From this initial data, we excluded enrollees with nine-digit ZIP Codes of residence outside of the United States (n = 13,215 in 2012 and n = 15,713 in 2013) and enrollees who died during the year of data collection (n = 1,782 in 2012 and n = 1,400 in 2013). Eighty-five percent of these data were matched in 2012 (n = 497,574) and 2013 (n = 512,278) by nine-digit ZIP Code of residence to the Area Deprivation Index (ADI). Over 99.9% of the data in 2012 (n = 587,115) and 2013 (n = 605,308) were matched to the 2013 NCHS Urban-Rural Classification Scheme for Counties.

We subsequently excluded 36 plans in 2013 with fewer than 100 enrollees eligible for blood pressure control (n=1,739), 58 similar plans for diabetes control (n = 2,244), and 104 similar plans for cholesterol control (n = 3,591). The NCQA typically sets minimal sample size threshold at 411 enrollees for public reporting. However, we chose a 100-enrollee threshold to avoid excluding data from small plans below NCQA's threshold. Lastly, we excluded two plans in 2013 with > 100 enrollees but 100% mean blood pressure control (n=5,044). We assumed that larger plans in which 100% of enrollees were controlled or uncontrolled for one outcome reported implausible or potentially unreliable data.

The final 2012 dataset included 177,742 enrollees in 499 plans eligible for blood pressure control, 262,353 enrollees in 512 plans eligible for diabetes control, and 196,521 enrollees in 498 plans eligible for cholesterol control. The 2013 dataset included 175,229 enrollees in 457 plans eligible for blood pressure control, 269,789 enrollees in 453 plans eligible for diabetes control, and 196,765 enrollees in 379 plans eligible for cholesterol control.

Appendix Exhibit A1. Unadjusted and Adjusted Results, 2012 Logistic Regression

Characteristics	Blood Pressure Control (n = 177,742)		Diabetes Control (n = 262,353)		Cholesterol Control (n = 196,521)	
	Unadjusted Difference, % points	Adjusted Difference, % points	Unadjusted Difference, % points	Adjusted Difference, % points	Unadjusted Difference, % points	Adjusted Difference, % points
Sex						
Male	Reference	Reference	Reference	Reference	Reference	Reference
Female	-1.7*	5.1*	0.6*	-11.7*	-10.8*	35.3*
Race/Ethnicity						
Non-Hispanic White	Reference	Reference	Reference	Reference	Reference	Reference
Black/ African American	-10.8*	-43.8*	-7.1*	-26.3*	-12.8*	-26.4*
Hispanic	-3.2*	-14.1*	-3.2*	-8.2*	1.5*	10.5*
Asian/Pacific Islander	-0.3	-4.2	5.5*	16.5*	11.9*	27.6*
American Indian/Alaska Native	0.0	3.9	-12.7*	-38.4*	-10.5*	-21.7*
Other	-2.2	-11.1*	3.6*	4.9	7.1*	12.2*
Unknown	-6.9*	-30.6*	2.1	8.4	5.2*	5.1
Dually Enrolled						
Dual	-3.1*	-3.1*	-12.3*	-43.0*	-14.8*	-33.2*
Not Dual	Reference	Reference	Reference	Reference	Reference	Reference
Original Reason for Medicare						
Old Age	Reference	- ^a	Reference	Reference	Reference	Reference
Disability and/or ESRD	-1.9*	- ^a	-11.9*	-46.1*	-12.3*	-29.8*
Neighborhood Deprivation						
Group 1 (least disadvantaged)	Reference	Reference	Reference	Reference	Reference	Reference
Group 2	-0.6	-1.2	-2.2*	-16.9*	-2.9*	-11.3*
Group 3	0.3	2.5	-3.5*	-23.5*	-5.9*	-23.6*
Group 4	0.3	2.8	-4.1*	-25.5*	-6.9*	-24.7*
Group 5	0.1	1.9	-5.6*	-36.4*	-9.1*	-34.1*

Group 6	-0.2	0.6	-6.5*	-39.8*	-10.5*	-38.4*
Group 7	0.0	2.0	-7.2*	-42.6*	-11.8*	-41.4*
Group 8	1.1	7.6*	-7.8*	-44.4*	-13.7*	-47.4*
Group 9	0.2	3.9	-9.0*	-51.4*	-15.4*	-53.1*
Group 10	-1.3	-1.6	-9.4*	-51.0*	-16.2*	-53.5*
Group 11	-1.7*	-2.3	-10.0*	-52.2*	-18.1*	-58.9*
Group 12	-0.6	2.9	-11.1*	-57.6*	-19.4*	-62.6*
Group 13	-0.9	2.9	-11.8*	-59.0*	-19.4*	-60.5*
Group 14	-2.2*	-2.9	-12.4*	-60.7*	-21.9*	-69.0*
Group 15	-1.9*	-0.3	-13.5*	-63.2*	-23.0*	-70.8*
Group 16	-3.1*	-4.0	-13.9*	-65.1*	-23.8*	-71.0*
Group 17	-5.6*	-11.9*	-17.4*	-78.4*	-25.4*	-73.8*
Group 18	-5.5*	-8.7*	-16.6*	-71.4*	-27.3*	-78.1*
Group 19	-6.7*	-10.2*	-18.5*	-75.9*	-28.0*	-77.9*
Group 20 (most disadvantaged)	-6.1*	-7.5*	-19.6*	-76.6*	-28.4*	-78.6*
Group 21 (missing ADI)	-3.2*	-6.7*	-14.1*	-68.0*	-21.4*	-64.2*
Rurality						
Large Central Metro (Most Urban)	-2.1*	-0.2	-3.2*	-7.5*	3.8*	17.4*
Large Fringe Metro	Reference	Reference	Reference	Reference	Reference	Reference
Medium Metro	-1.0*	-4.8*	-4.5*	-17.9*	-3.0*	-3.5*
Small Metro	-1.9*	-11.4*	-6.1*	-25.4*	-6.8*	-13.7*
Micropolitan	-2.6*	-13.6*	-9.0*	-34.4*	-12.3*	-30.3*
Noncore (Most Rural)	-4.3*	-19.6*	-12.3*	-48.3*	-15.4*	-37.2*

Source Authors' analysis of person-level 2012 Medicare Healthcare Effectiveness & Data Information Set (HEDIS), 2012 Master Beneficiary Summary File (MBSF), 2013 Area Deprivation Index (ADI), and the Urban-Rural Classification Scheme of the National Center for Health Statistics. **Note** Unadjusted results are percentage point differences derived from bivariate logistic regression coefficients. Adjusted results are percentage point differences derived from multivariable logistic regression coefficients. All of the listed variables were included in the adjustment. ^a Disability was not found to be a significant predictor of blood pressure control in the adjusted model and was thus not included in the final model. *p<.05.

**Appendix Exhibit A2. Model Comparison by Akaike Information Criteria (AIC), 2012
Multivariable Logistic Regression**

Model Covariates	AIC for Best Fit Model		
	Blood Pressure	Diabetes	Cholesterol
Dual + Disability		262387	258378
Dual + Disability + Gender		262298	256782
Dual + Disability + Gender + Rurality		261220	254625
Dual + Disability + Gender + Rurality + ADI		259569	252681
Dual + Disability + Gender + Rurality + ADI + Race		259101	252176
Dual + Gender	235633		
Dual + Gender + Rurality	235508		
Dual + Gender + Rurality + ADI	235283		
Dual + Gender + Rurality + ADI + Race	234432		

Source Authors' analysis of 2012 Medicare Healthcare Effectiveness & Data Information Set (HEDIS), 2012 Master Beneficiary Summary File (MBSF), 2013 Area Deprivation Index (ADI), and the Urban-Rural Classification Scheme of the National Center for Health Statistics. **Note** Models were compared using Akaike Information Criteria using a forward selection approach. The best fit model (lowest AIC value) for each outcome is in bold.

Appendix Exhibit A3. Adjusted Results Including and Excluding the Largest Plan, 2012 Logistic Regression

Characteristics	Diabetes Control		Cholesterol Control	
	Including Largest Plan (n = 262,353)	Excluding Largest Plan (n = 205,515)	Including Largest Plan (n = 196,521)	Excluding Largest Plan (n = 155,011)
Sex				
Male	Reference	Reference	Reference	Reference
Female	-11.7*	-13.1*	35.3*	32.4*
Race/Ethnicity				
Non-Hispanic White	Reference	Reference	Reference	Reference
Black/ African American	-26.3*	-25.0*	-26.4*	-30.1*
Hispanic	-8.2*	-11.8*	10.5*	-0.0
Asian/Pacific Islander	16.5*	13.1*	27.6*	26.7*
American Indian/Alaska Native	-38.4*	-39.7*	-21.7*	-19.1*
Other	4.9	4.3	12.2*	7.2
Unknown	8.4	4.4	5.1	7.4
Dually Enrolled				
Dual	-43.0*	-35.9*	-33.2*	-23.5*
Not Dual	Reference	Reference	Reference	Reference
Original Reason for Medicare				
Old Age	Reference	Reference	Reference	Reference
Disability and/or ESRD	-46.1*	-44.2*	-29.8*	-28.9*
Neighborhood Deprivation				
Group 1 (least disadvantaged)	Reference	Reference	Reference	Reference
Group 2	-16.9*	-0.6	-11.3*	-2.6
Group 3	-23.5*	-2.5	-23.6*	-4.3
Group 4	-25.5*	-5.7	-24.7*	-7.1
Group 5	-36.4*	-6.1	-34.1*	-4.1
Group 6	-39.8*	-5.0	-38.4*	-6.9
Group 7	-42.6*	-9.6*	-41.4*	-9.5*
Group 8	-44.4*	-8.7*	-47.4*	-10.9*
Group 9	-51.4*	-13.4*	-53.1*	-11.6*
Group 10	-51.0*	-11.5*	-53.5*	-13.5*
Group 11	-52.2*	-13.0*	-58.9*	-11.9*
Group 12	-57.6*	-13.9*	-62.6*	-17.6*

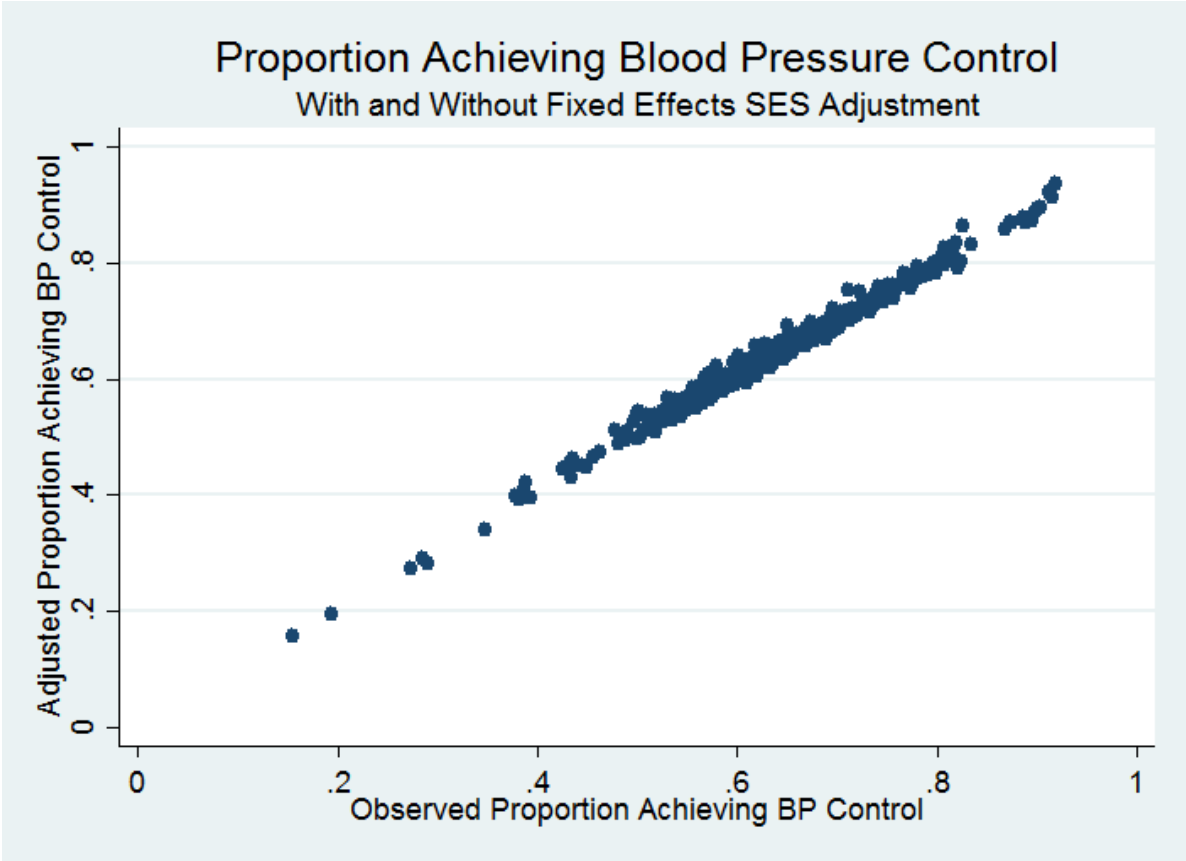
Group 13	-59.0*	-20.6*	-60.5*	-21.5*
Group 14	-60.7*	-15.8*	-69.0*	-20.7*
Group 15	-63.2*	-20.2*	-70.8*	-21.1*
Group 16	-65.1*	-30.4*	-71.0*	-24.3*
Group 17	-78.4*	-28.3*	-73.8*	-24.5*
Group 18	-71.4*	-23.8*	-78.1*	-24.7*
Group 19	-75.9*	-32.8*	-77.9*	-27.9*
Group 20 (most disadvantaged)	-76.6*	-26.1*	-78.6*	-25.8*
Group 21 (missing ADI)	-68.0*	-25.2*	-64.2*	-21.4*
Rurality				
Large Central Metro (Most Urban)	-7.5*	-16.5*	17.4*	4.3*
Large Fringe Metro	Reference	Reference	Reference	Reference
Medium Metro	-17.9*	-26.4*	-3.5*	-4.0*
Small Metro	-25.4*	-24.2*	-13.7*	-7.7*
Micropolitan	-34.4*	-30.6*	-30.3*	-22.1*
Noncore (Most Rural)	-48.3*	-47.3*	-37.2*	-31.2*

Source Authors' analysis of 2012 Medicare Healthcare Effectiveness & Data Information Set (HEDIS), 2012 Master Beneficiary Summary File (MBSF), 2013 Area Deprivation Index (ADI), and the Urban-Rural Classification Scheme of the National Center for Health Statistics. **Note** Adjusted results are percentage point differences derived from multivariable logistic regression coefficients. All of the listed variables were included in the adjustment. The largest plan included 56,838 (21.66%) of enrollees eligible for diabetes control and 41,510 (21.12%) of enrollees eligible for cholesterol control. This plan was not disproportionately large in the blood pressure control cohort (n = 470, 0.26%), so a corresponding sensitivity analysis for this outcome was not included here.

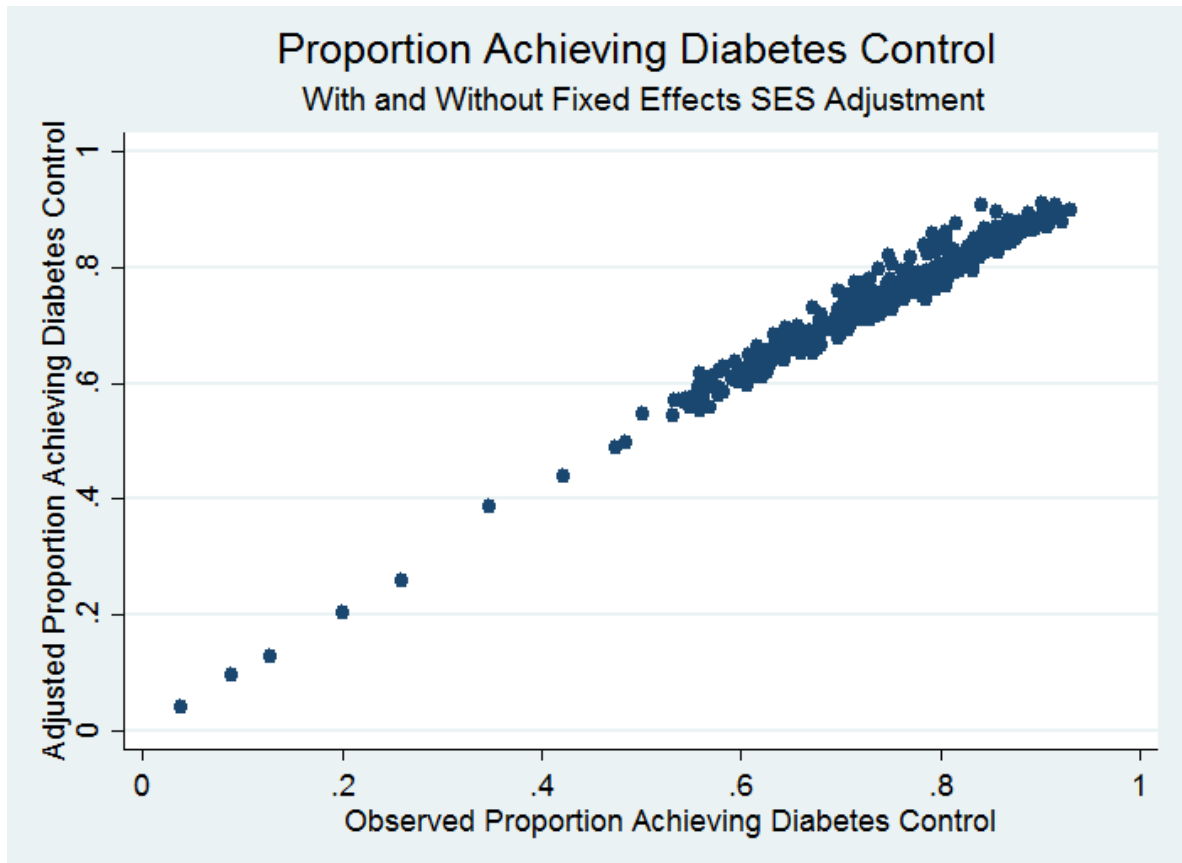
*p<.05.

Appendix Exhibit A4. Comparison of Adjusted and Observed Rates of Blood Pressure, Diabetes, and Cholesterol Control among Medicare Advantage Plans

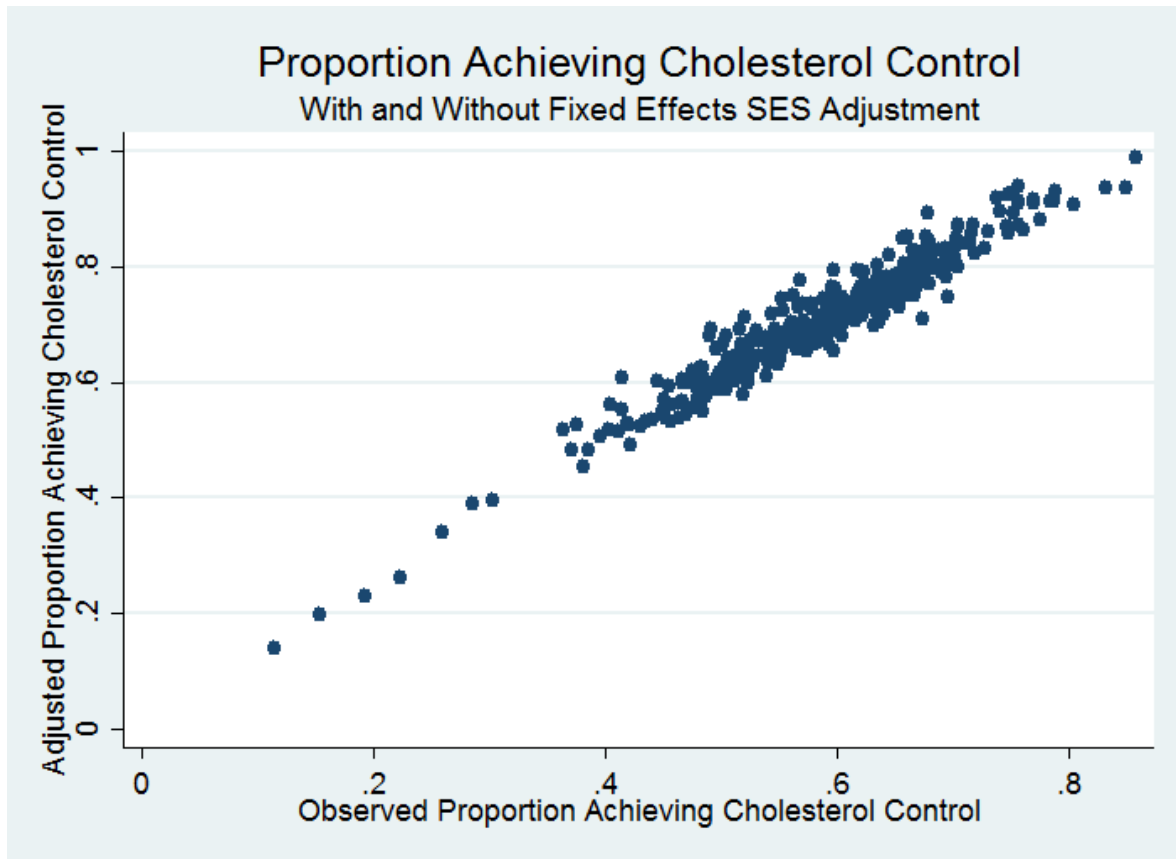
A.



B.



C.



Source Authors' analysis of 2013 Medicare Healthcare Effectiveness & Data Information Set (HEDIS), 2013 Master Beneficiary Summary File (MBSF), 2013 Area Deprivation Index (ADI), and the Urban-Rural Classification Scheme of the National Center for Health Statistics. **Note** Each point represents one plan at the intersection of its observed and adjusted score, where the observed score is the proportion of enrollees in a plan achieving outcome control and the adjusted score is the proportion of enrollees achieving outcome control after adjustment for socioeconomic and other demographic factors. The adjustment was calculated using the ratio of predicted performance score including the plan effect, divided by the predicted performance score without the plan effect, and multiplied by the national mean.

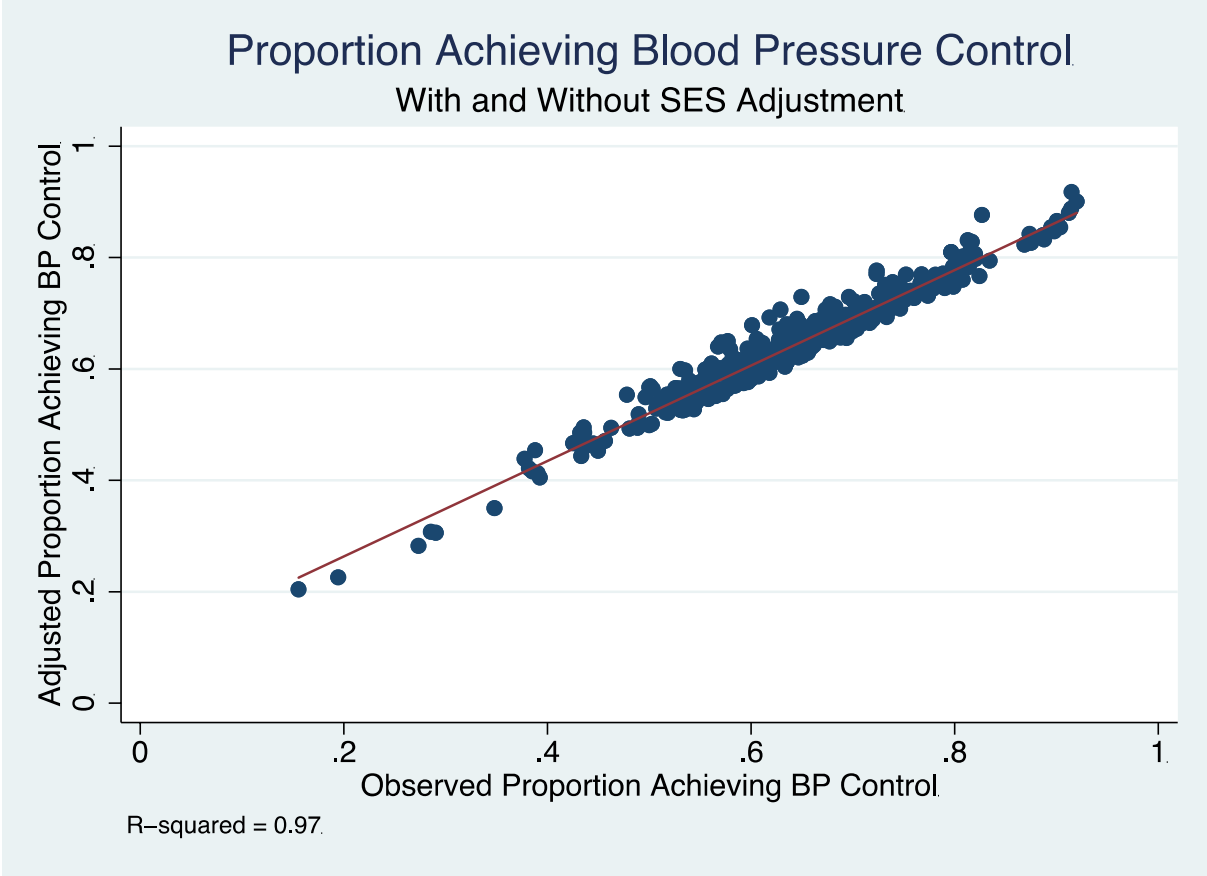
Appendix Exhibit A5. Medicare Advantage Plan Characteristics, 2012

	Percent of Plans (n = 516)
Plan Type	
HMO	65
PPO	29
PFFS	3
1876 Cost	3
Region	
Northeast	20
Midwest	22
West	26
South	32
Plan Size	
<24,999	74
25,000 - 99,999	22
>100,000	4

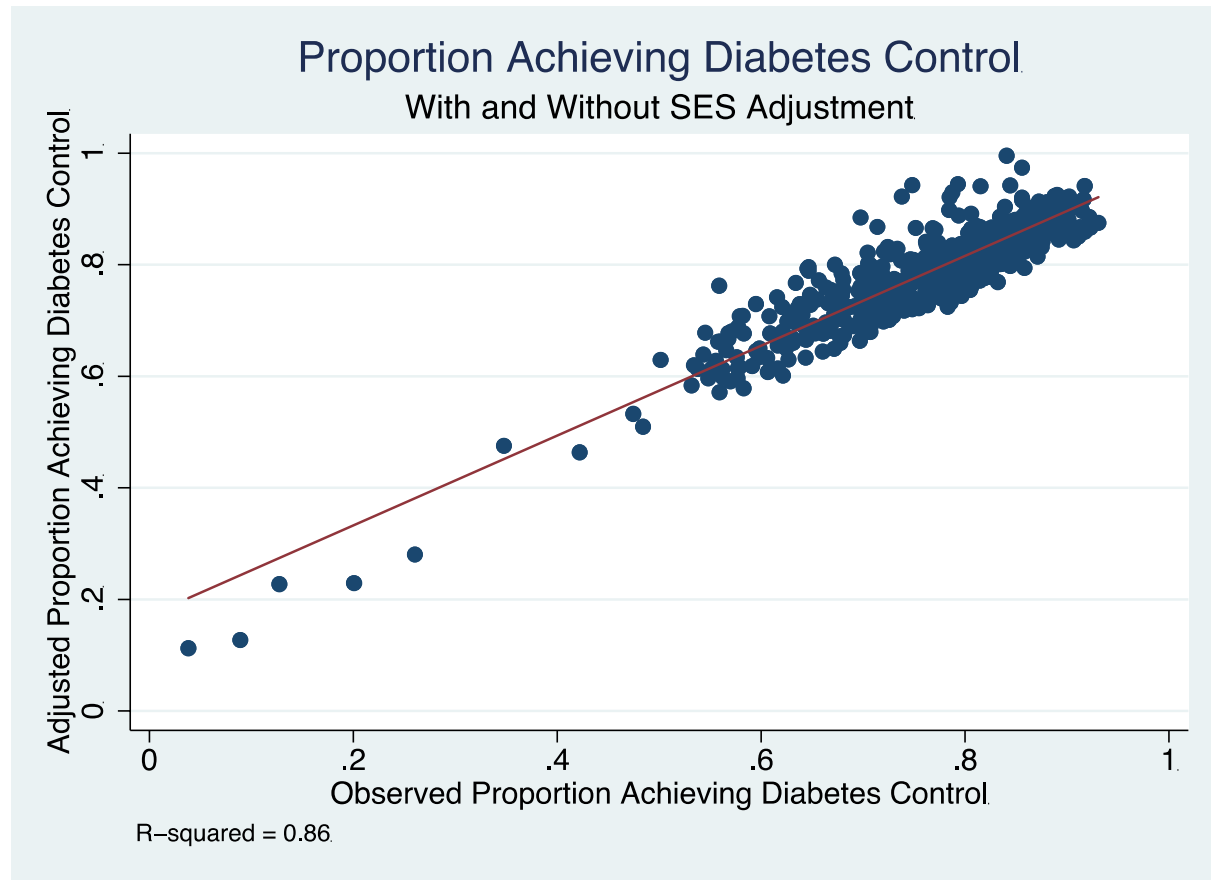
Source Authors' analysis of 2012 Medicare Healthcare Effectiveness & Data Information Set (HEDIS) and 2012 Medicare Beneficiary Summary File (MBSF). **Note** All values are percentages and may not add up to 100 due to rounding. This data represents all plans that were eligible for one or more measures of blood pressure control, diabetes control, or cholesterol control in the final dataset.

Appendix Exhibit A6. Comparison of Adjusted and Observed Rates of Blood Pressure, Diabetes and Cholesterol Control among Medicare Advantage Plans

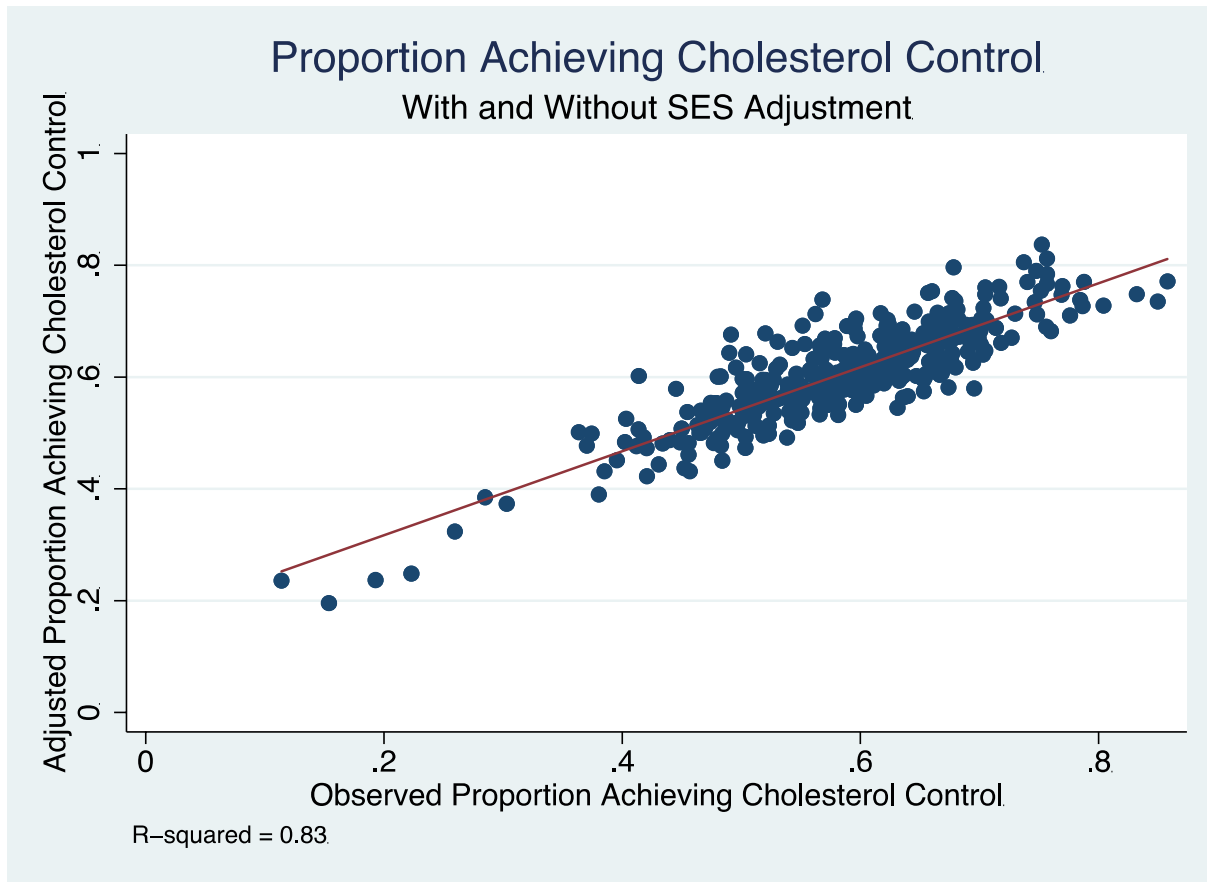
A.



B.



C.



SOURCE Authors' analysis of 2012 Medicare Healthcare Effectiveness & Data Information Set (HEDIS), 2012 Master Beneficiary Summary File (MBSF), 2013 Area Deprivation Index (ADI), and the Urban-Rural Classification Scheme of the National Center for Health Statistics. **NOTES** Each point represents one plan at the intersection of its observed and adjusted score, where the observed score is the proportion of enrollees in a plan achieving outcome control prior to adjustment and the adjusted score is the proportion of enrollees achieving outcome control after adjustment for socioeconomic and other demographic factors. The adjusted score was calculated using the ratio of predicted performance score including the plan effect, divided by the predicted performance score without the plan effect, and multiplied by the national mean.

Appendix Exhibit A7. Medicare Advantage Plan Distribution of Change in Quintile Rank After Adjustment for Socioeconomic and Other Demographic Factors

A.

Blood Pressure Control (n = 457)						
	Observed Score					
Adjusted Score		1	2	3	4	5
	1	81	10			
	2	10	61	20		
	3		17	56	19	
	4		3	14	66	8
	5			2	6	84

B.

Diabetes Control (n = 453)						
	Observed Score					
Adjusted Score		1	2	3	4	5
	1	72	18			
	2	14	45	29	3	
	3	4	19	34	30	3
	4		6	18	39	28
	5		3	9	19	60

C.

Cholesterol Control (n = 379)						
	Observed Score					
Adjusted Score		1	2	3	4	5
	1	57	16	1	1	
	2	9	38	23	4	2
	3	6	12	32	20	6
	4	2	7	13	37	17
	5	1	3	7	14	51

Source Authors' analysis of 2013 Medicare Healthcare Effectiveness & Data Information Set (HEDIS), 2013 Master Beneficiary Summary File (MBSF), 2013 Area Deprivation Index (ADI), and the Urban-Rural Classification Scheme of the National Center for Health Statistics. **Notes** Change in quintile rank was calculated by splitting observed and adjusted scores into five equally sized groups, assigning each group a number from one to five, and subtracting the observed quintile rank from the adjusted quintile rank.