Healthcare Rationing in Public Insurance Programs: Evidence from Medicaid

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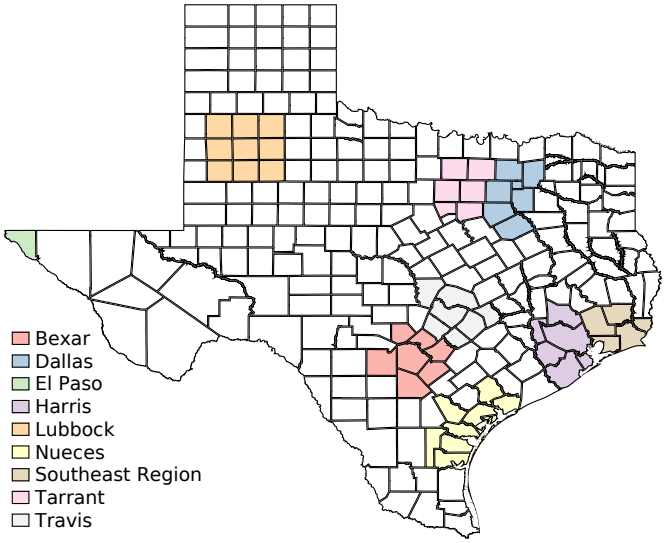
Online Appendix

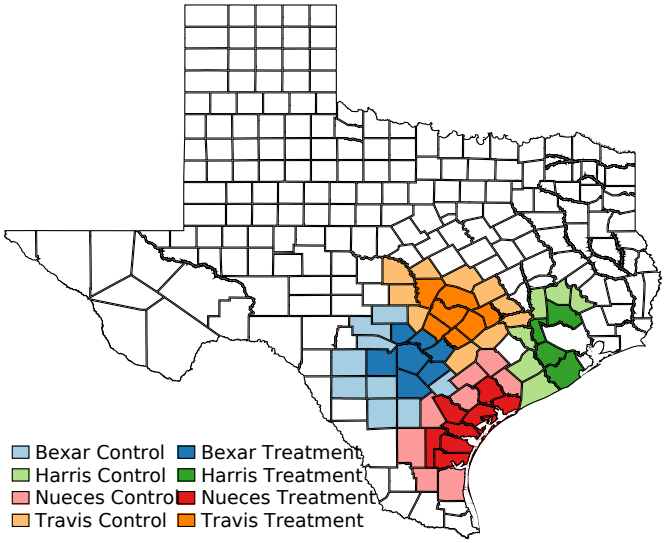
A Additional Figures and Tables

Appendix Figure A1: Texas Counties

(a) Medicaid Service Areas



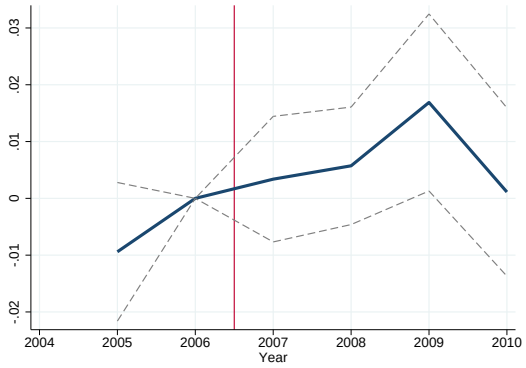
(b) Treatment and Control Counties by Service Area



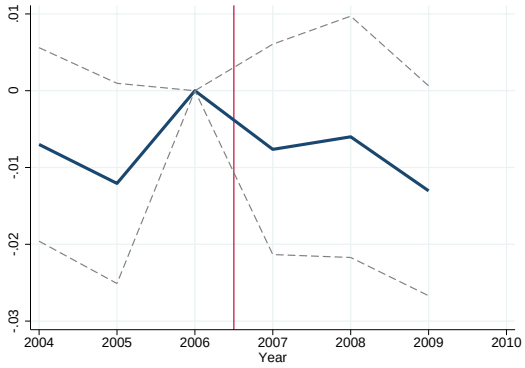
Note: Figure shows Medicaid service areas and the treatment and control counties we define based on these service areas. Panel (a) shows all ten of the Medicaid service areas designated by the Texas Health and Human Services Commission in April 2004. Nine service areas are marked by colors, while the 10th service area comprises much of the state and is shown in white. Panel (b) shows treatment and control counties by service area. For more details, see Section 4.

Appendix Figure A2: Composition

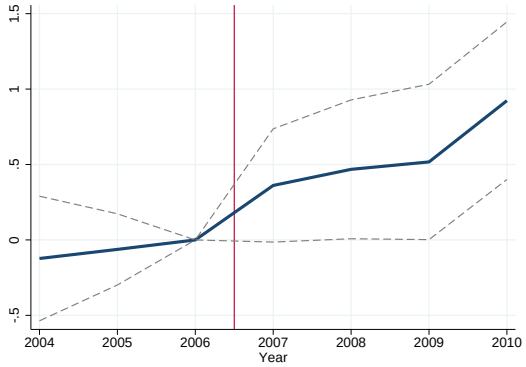
(a) Share Entering Medicaid



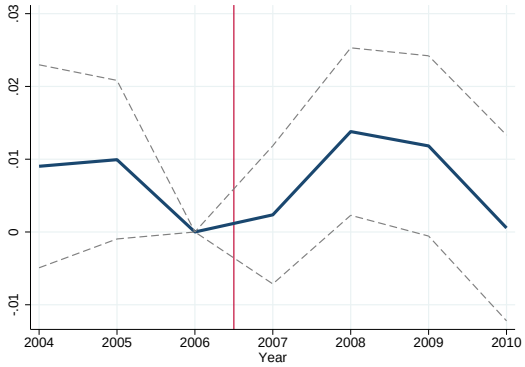
(b) Share Exiting Medicaid



(c) Mean Age



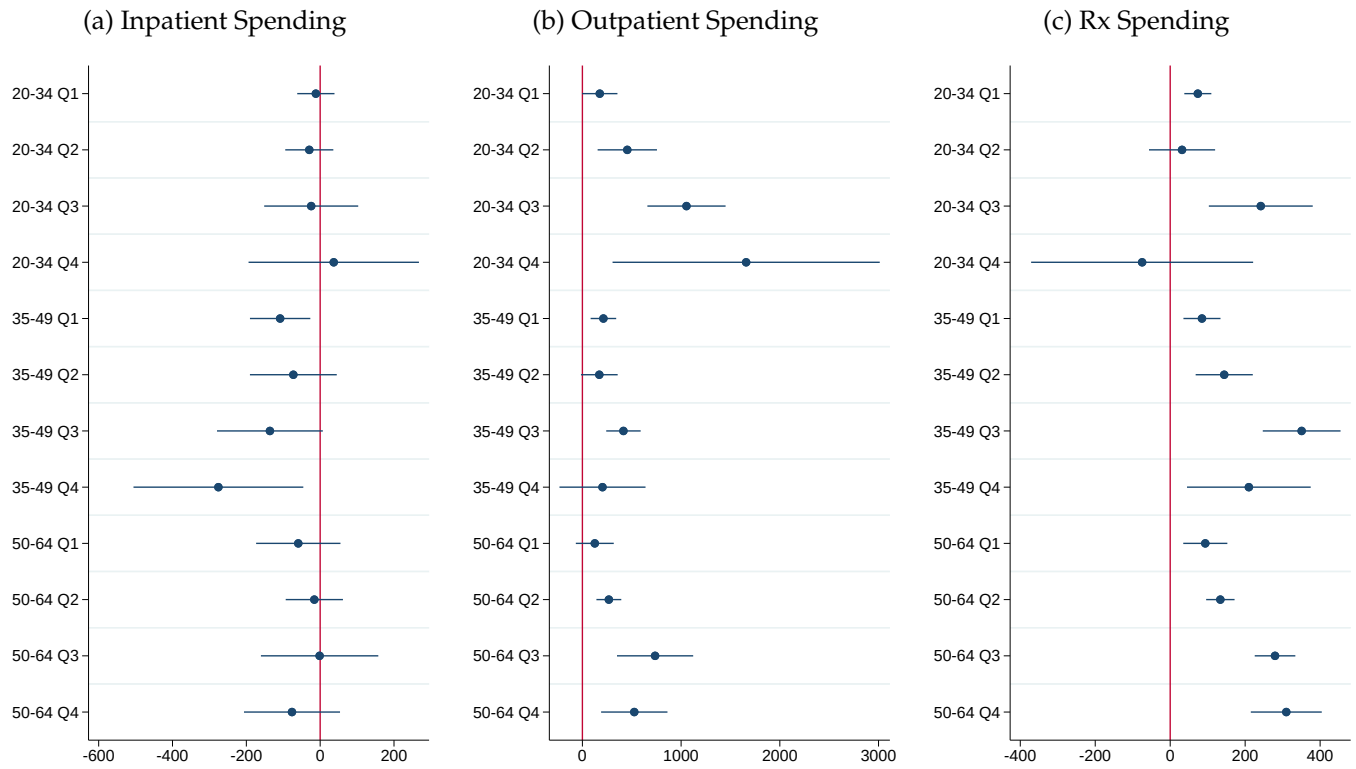
(d) Share White



(e) Share Female

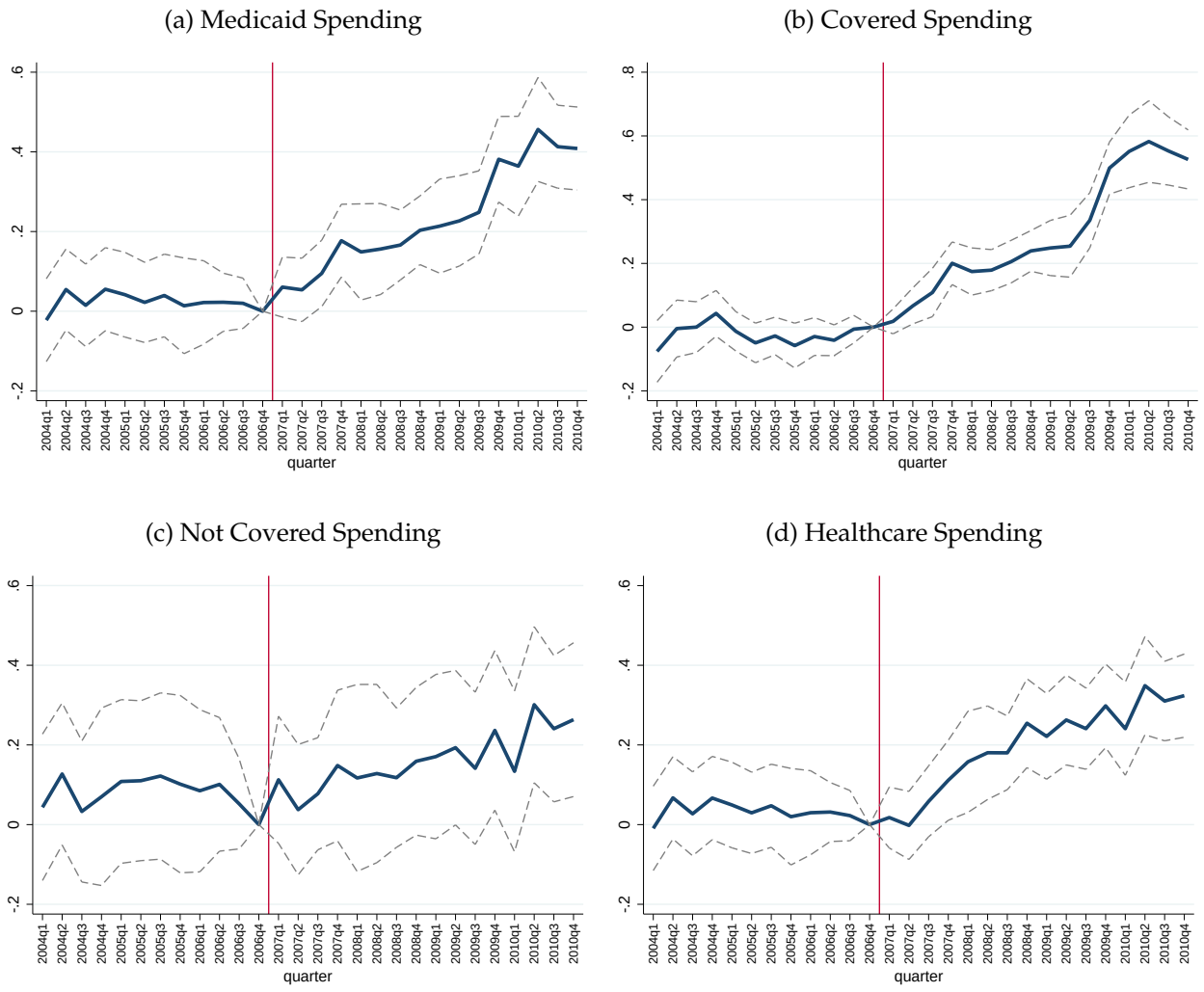
Note: Figure shows the impact of Medicaid managed care on sample composition measures, including Medicaid entry and exit, mean age, share white, and share female. These coefficients are from estimating the event study difference-in-differences specification in Equation (1). For more details, see Section 4. ($N = 168,658$ beneficiary-years.)

Appendix Figure A3: Heterogeneity by Age Health Status (Quartile of Pre-Period Spending)



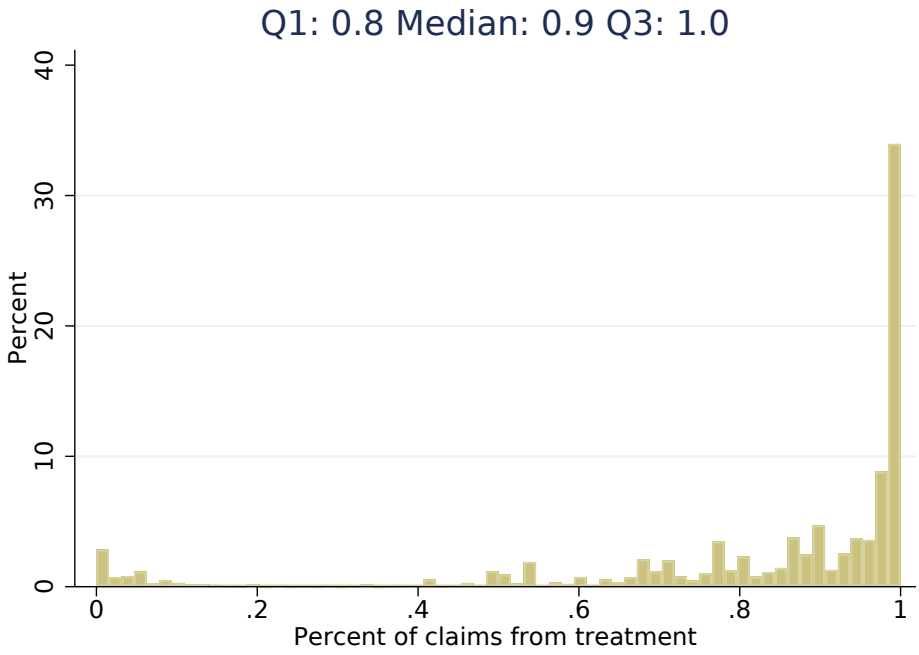
Note: Figure shows the impact of Medicaid managed care on inpatient spending, outpatient spending, and prescription drug spending by age and health status. Health status is measured as quartile of average spending during the pre-period, limiting our sample to beneficiaries for whom this measure can be generated. These coefficients are from estimating our instrumental variable specification separately for each age (20-34, 35-49, 50-64) by quartile of pre-period spending group. For more details, see Section 4. ($N = 478,938$ beneficiary-quarters.)

Appendix Figure A4: Medicaid Spending



Note: Figure shows control-treatment differences in Medicaid spending outcomes in percent terms relative to the treatment mean in the pre-period. These coefficients are from estimating the event study difference-in-differences specification in Equation (1), including individual fixed effects. For more details, see Section 4. ($N = 643,751$ beneficiary-quarters.)

Appendix Figure A5: Provider Overlap



Note: Figure shows the 2004 distribution of the percent of claims at a provider that come from patients who live in treatment counties, weighted by each provider's volume. For more details, see Section 5. ($N = 14,445$ unique provider identifiers.)

Appendix Table A1: Composition

	(1) Enter	(2) Exit	(3) Age	(4) Female	(5) White
Treatment × Post	.011	-.002	.593	.003	.001
	(.004)	(.004)	(.248)	(.006)	(.006)
Baseline Mean	.108	.054	44.3	.521	.441

Note: Table shows estimates for sample composition measures, including Medicaid entry and exit, mean age, share white, and share female from estimating the pooled version of the reduced form specification in Equation (1). We control for service area by year fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 168,658$ beneficiary-years.)

Appendix Table A2: Rx Outcomes

	(1) Spending	(2) Any Prescriptions	(3) Days Supply	(4) Spending Branded Drugs	(5) Days Supply Branded Drugs	(6) Spending Generic Drugs	(7) Days Supply Generic Drugs	(8) Spending High Value Drugs	(9) Days Supply High Value Drugs
Treatment × Post (2007-2008)	80	-.001	38.8	52.7	13.1	23.6	23.5	29.1	11.6
	(15.2)	(.004)	(5.21)	(13.8)	(2.08)	(2.94)	(3.28)	(8.12)	(2.28)
Treatment × Post (2009-2010)	210	.002	78.9	154	25.1	46.3	49.1	67.4	25.1
	(25.3)	(.005)	(8.7)	(20.1)	(3.02)	(6.41)	(5.87)	(10.3)	(3.51)
IV Coefficient	199	.001	79.7	142	25.8	47.3	49.2	65.8	24.9
	(22.3)	(.005)	(6.70)	(19)	(2.64)	(5.11)	(4.46)	(10.3)	(3.01)
Baseline Mean	623	.676	187	524	95	84	84	260	77
Percent Change	.32	.001	.427	.272	.271	.564	.583	.253	.325
	(.036)	(.007)	(.036)	(.036)	(.028)	(.061)	(.053)	(.04)	(.039)
Individual Fixed Effects	X	X	X	X	X	X	X	X	X

Note: Table shows reduced form and instrumental variable estimates for prescription drug outcomes. The first row shows estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and the second row shows estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, when the post-period is broken into two separate periods, 2007-2008 and 2009-2010. We estimate the IV coefficient using the two separate treatment × post interaction terms as instruments. We control for service area by quarter fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 643,751$ beneficiary-quarters.)

Appendix Table A3: Therapeutic Classes

(a) Spending

	(1) Anti-Infective Agents	(2) Anti-neoplastic Agents	(3) Autonomic Drugs	(4) Blood Form/ Coagul Agents	(5) Cardiovascular Agents	(6) Central Nervous System	(7) Gastrointestinal Drugs	(8) Hormones & Synthetic Subst	(9) Immunosuppressants	(10) Misc Therapeutic Agents
Treatment × Post	21.1	2.57	9.61	2.44	20.7	46.1	15.3	9.13	-.948	-4.33
	(5.77)	(3.51)	(2.57)	(7.15)	(2.92)	(9.02)	(3.52)	(4.02)	(4.11)	(4.25)
IV Coefficient	28.1	3.43	12.8	3.26	27.6	61.6	20.4	12.2	-1.27	-5.79
	(7.76)	(4.39)	(2.93)	(8.94)	(3.79)	(11.5)	(4.01)	(4.77)	(5.16)	(5.33)
Baseline Mean	47.8	11.2	18.1	19.5	66.4	305	34.8	52	19.0	10.6
Percent Change	.588	.306	.71	.167	.416	.202	.587	.234	-.067	-.547
	(.162)	(.391)	(.162)	(.459)	(.057)	(.038)	(.115)	(.091)	(.272)	(.504)
Individual Fixed Effects	X	X	X	X	X	X	X	X	X	X

(b) Any Spending

	(1) Anti-Infective Agents	(2) Anti-neoplastic Agents	(3) Autonomic Drugs	(4) Blood Form/ Coagul Agents	(5) Cardiovascular Agents	(6) Central Nervous System	(7) Gastrointestinal Drugs	(8) Hormones & Synthetic Subst	(9) Immunosuppressants	(10) Misc Therapeutic Agents
Treatment × Post	.053	.004	.050	.007	.035	.029	.046	.043	.001	.013
	(.007)	(.001)	(.006)	(.002)	(.007)	(.005)	(.007)	(.007)	(.001)	(.003)
IV Coefficient	.071	.006	.067	.009	.046	.039	.061	.058	.002	.017
	(.007)	(.001)	(.007)	(.003)	(.008)	(.006)	(.008)	(.008)	(.002)	(.003)
Baseline Mean	.213	.013	.156	.05	.266	.504	.144	.231	.008	.026
Percent Change	.332	.457	.426	.184	.174	.077	.423	.251	.201	.646
	(.032)	(.103)	(.044)	(.061)	(.030)	(.011)	(.055)	(.033)	(.189)	(.115)
Individual Fixed Effects	X	X	X	X	X	X	X	X	X	X

Note: Table shows reduced form and instrumental variable estimates for the most common therapeutic classes. The first row shows estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and the second row shows estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. We control for service area by quarter fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 643,751$ beneficiary-quarters.)

Appendix Table A4: Outpatient Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Spending		Number of Outpatient Days		Any Use		ED Visits	
Treatment × Post	366		.310		-.009		-.048	
	(45)		(.247)		(.004)		(.133)	
Treatment × Post (2007-2008)		200		.057		-.013		-.063
		(36.7)		(.214)		(.004)		(.083)
Treatment × Post (2009-2010)		501		.537		-.004		-.193
		(62.9)		(.330)		(.004)		(.223)
IV Coefficient	489	480	.414	.423	-.013	-.010	-.064	-.176
	(54.3)	(57.5)	(.312)	(.333)	(.005)	(.005)	(.168)	(.186)
Baseline Mean	1,551	1,551	8.20	8.20	.717	.717	2.17	2.17
Percent Change	.316	.309	.050	.052	-.018	-.014	-.03	-.081
	(.035)	(.037)	(.038)	(.041)	(.007)	(.007)	(.077)	(.086)
Individual Fixed Effects	X	X	X	X	X	X	X	X

Note: Table shows reduced form and instrumental variable estimates for outpatient outcomes. For each outcome, the first column shows estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. The second column shows reduced form and instrumental variable estimates, when the post-period is broken into two separate periods, 2007-2008 and 2009-2010. In the second and fourth columns we estimate the IV coefficient using the two separate treatment × post interaction terms as instruments. We control for service area by quarter fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 643,751$ beneficiary-quarters.)

Appendix Table A5: Outcomes by Age and Pre-Period Health Status (Number of Comoborbidities)

(a) Age 20-34, No Comorbidities

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.002	342	55.2	-.119
	(.002)	(94.6)	(16.4)	(.107)
IV Coefficient	-.003	496	80.1	-.173
	(.003)	(136)	(22.4)	(.148)
Baseline Mean	.007	760	147	.399
Percent Change	-.369	.653	.544	-.432
	(.432)	(.179)	(.152)	(.371)

(b) Age 20-34, 1-3 Comorbidites

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.006	433	63.7	-.471
	(.003)	(108)	(51.2)	(.217)
IV Coefficient	-.010	714	105	-.776
	(.005)	(195)	(79.1)	(.369)
Baseline Mean	.041	2,385	697	1.63
Percent Change	-.251	.299	.151	-.475
	(.121)	(.082)	(.114)	(.226)

(c) Age 20-34, 4+ Comorbidites

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	.017	1,280	-221	.369
	(.028)	(681)	(366)	(1.29)
IV Coefficient	.033	2,393	-413	.691
	(.049)	(1,235)	(624)	(2.27)
Baseline Mean	.266	4,651	1,347	7.58
Percent Change	.123	.515	-.306	.091
	(.185)	(.265)	(.463)	(.300)

(d) Age 35-49, No Comorbidities

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.008	216	39.1	-.122
	(.006)	(84.4)	(23.2)	(.329)
IV Coefficient	-.012	302	54.5	-.170
	(.008)	(112)	(30.2)	(.429)
Baseline Mean	.006	312	108	.544
Percent Change	-1.95	.966	.507	-.313
	(1.32)	(.360)	(.281)	(.788)

(e) Age 35-49, 1-3 Comorbidites

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.005	186	140	-.150
	(.004)	(54.1)	(32.2)	(.223)
IV Coefficient	-.007	239	181	-.193
	(.005)	(64)	(37.8)	(.275)
Baseline Mean	.05	1,334	708	2.01
Percent Change	-.136	.179	.255	-.096
	(.101)	(.048)	(.053)	(.137)

(f) Age 35-49, 4+ Comorbidites

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.039	432	429	.944
	(.014)	(190)	(121)	(.511)
IV Coefficient	-.050	552	549	1.21
	(.017)	(229)	(140)	(.626)
Baseline Mean	.262	2,923	1,132	6.85
Percent Change	-.189	.189	.485	.176
	(.064)	(.078)	(.124)	(.091)

(g) Age 50-64, No Comorbidities

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.005	119	94.9	.077
	(.005)	(83.5)	(31.4)	(.154)
IV Coefficient	-.006	157	125	.101
	(.006)	(99.7)	(36.6)	(.185)
Baseline Mean	.006	184	98.0	.338
Percent Change	-1.05	.855	1.28	.300
	(1.06)	(.543)	(.374)	(.549)

(h) Age 50-64, 1-3 Comorbidites

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	.002	338	177	.086
	(.004)	(59.5)	(24.8)	(.139)
IV Coefficient	.002	401	210	.102
	(.005)	(66.1)	(27.9)	(.156)
Baseline Mean	.051	1,081	606	1.56
Percent Change	.045	.371	.347	.065
	(.095)	(.061)	(.046)	(.100)

(i) Age 50-64, 4+ Comorbidites

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.010	775	292	.131
	(.009)	(190)	(52.4)	(.302)
IV Coefficient	-.013	996	375	.169
	(.011)	(236)	(63.7)	(.366)
Baseline Mean	.228	2,841	1,118	4.93
Percent Change	-.057	.350	.335	.034
	(.046)	(.083)	(.057)	(.074)

Note: Table shows reduced form and instrumental variable estimates for the main outcomes broken down by age and health status. Health status is measured as the average number of comorbidities during the pre-period, limiting our sample to beneficiaries for whom this measure can be generated. The first row shows estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and the second row shows estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. We control for service area by quarter fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 478,938$ beneficiary-quarters.)

Appendix Table A6: Outcomes by Age and Pre-Period Health Status (Quartile of Pre-Period Spending)

(a) Age 20-34, Quartile 1

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.001	136	57	-.181
	(.002)	(72.9)	(15)	(.106)
IV Coefficient	-.001	176	73.7	-.235
	(.003)	(91.2)	(18.4)	(.130)
Baseline Mean	.001	60.5	32.5	.299
Percent Change	-.819	2.91	2.27	-.785
	(2.88)	(1.51)	(.566)	(.436)

(b) Age 20-34, Quartile 2

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.005	340	23.7	-.401
	(.004)	(111)	(35.4)	(.174)
IV Coefficient	-.006	455	31.7	-.536
	(.005)	(153)	(45)	(.224)
Baseline Mean	.019	343	279	1.15
Percent Change	-.327	1.33	.114	-.464
	(.269)	(.448)	(.161)	(.194)

(c) Age 20-34, Quartile 3

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.005	688	158	-.263
	(.006)	(130)	(46.7)	(.339)
IV Coefficient	-.008	1,055	242	-.404
	(.009)	(202)	(70.7)	(.509)
Baseline Mean	.054	854	819	1.87
Percent Change	-.145	1.24	.295	-.217
	(.175)	(.237)	(.086)	(.273)

(d) Age 20-34, Quartile 4

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	.006	637	-34.7	-.093
	(.009)	(313)	(142)	(.369)
IV Coefficient	.019	1,909	-104	-.277
	(.027)	(924)	(409)	(1.06)
Baseline Mean	.109	6,892	1,262	3.27
Percent Change	.170	.277	-.082	-.085
	(.243)	(.134)	(.324)	(.324)

(e) Age 35-49, Quartile 1

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.004	162	64.6	-.025
	(.003)	(51.7)	(20.1)	(.268)
IV Coefficient	-.005	213	84.8	-.033
	(.004)	(66.1)	(25.2)	(.328)
Baseline Mean	.003	67.7	33.9	.352
Percent Change	-1.67	3.15	2.50	-.095
	(1.25)	(.976)	(.743)	(.933)

(f) Age 35-49, Quartile 2

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.0019	137	115	-.170
	(.00709)	(81)	(33.5)	(.265)
IV Coefficient	-.00238	172	144	-.214
	(.00847)	(94.9)	(38.9)	(.318)
Baseline Mean	.019	339	299	1.35
Percent Change	-.125	.506	.482	-.159
	(.446)	(.280)	(.130)	(.236)

(g) Age 35-49, Quartile 3

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.0137	336	283	.0431
	(.00881)	(76.1)	(49.6)	(.279)
IV Coefficient	-.017	416	351	.0533
	(.0105)	(89)	(52.9)	(.328)
Baseline Mean	.074	845	786	2.692
Percent Change	-.230	.492	.446	.020
	(.141)	(.105)	(.067)	(.122)

(h) Age 35-49, Quartile 4

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Post	-.015	199	118	.234
	(.0107)	(195)	(92.3)	(.423)
IV Coefficient	-.0219	290	172	.340
	(.0148)	(265)	(126)	(.580)
Baseline Mean	.211	4,201	1,455	5.70
Percent Change	-.104	.069	.118	.060
	(.070)	(.063)	(.087)	(.102)

(i) Age 50-64, Quartile 1

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Pos	-.00214	97.9	73	.143
	(.00475)	(82.9)	(25.7)	(.127)
IV Coefficient	-.00274	126	93.7	.184
	(.00565)	(98.1)	(30)	(.148)
Baseline Mean	.003	68.6	35.2	.246
Percent Change	-.914	1.832	2.66	.746
	(1.88)	(1.43)	(.852)	(.602)

(j) Age 50-64, Quartile 2

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Pos	.00243	229	115	-.107
	(.00431)	(59.6)	(18.1)	(.164)
IV Coefficient	.00284	268	134	-.125
	(.00478)	(64.3)	(19.3)	(.183)
Baseline Mean	.017	350	329	1.10
Percent Change	.167	.766	.407	-.114
	(.281)	(.184)	(.059)	(.167)

(k) Age 50-64, Quartile 3

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Pos	-.00142	620	236	.108
	(.00644)	(170)	(25.1)	(.189)
IV Coefficient	-.00168	737	280	.129
	(.00731)	(197)	(27.6)	(.215)
Baseline Mean	.073	877	749	2.04
Percent Change	-.023	.84	.373	.063
	(.100)	(.224)	(.037)	(.105)

(l) Age 50-64, Quartile 4

	(1) Any Inpatient Admissions	(2) Outpatient Spending	(3) Rx Spending	(4) ED Visits
Treatment × Pos	-.00853	555	306	.24
	(.00852)	(201)	(67.5)	(.348)
IV Coefficient	-.0111	724	399	.313
	(.0106)	(235)	(81.2)	(.425)
Baseline Mean	.237	3,726	1,282	4.95
Percent Change	-.047	.194	.311	.063
	(.045)	(.063)	(.063)	(.086)

Note: Table shows reduced form and instrumental variable estimates for the main outcomes broken down by age and health status. Health status is measured as quartile of average spending during the pre-period, limiting our sample to beneficiaries for whom this measure can be generated. The first row shows estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and the second row shows estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. We control for service area by quarter fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 478,938$ beneficiary-quarters.)

Appendix Table A7: Main Outcomes (Balanced Panel)

(a) 2005-2008

	(1) Healthcare Spending	(2) Rx Spending	(3) Outpatient Spending	(4) Inpatient Spending
Treatment × Post	305	100	251	-46
	(67)	(19)	(43)	(27)
IV Coefficient	400	132	329	-61
	(81)	(21)	(54)	(34)
Baseline Mean	2,803	757	1,680	367
Percent Change	.143	.174	.196	-.166
	(.029)	(.028)	(.032)	(.094)
Individual Fixed Effects	X	X	X	X

(b) 2004-2010

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Healthcare Spending		Rx Spending		Outpatient Spending		Inpatient Spending	
Treatment × Post	493		130		395		-32	
	(76)		(25)		(55)		(18)	
Treatment × Post (2007-2008)		271		94		203		-26
		(68)		(20)		(50)		(20)
Treatment × Post (2009-2010)		660		160		522		-21
		(83)		(30)		(65)		(23)
IV Coefficient	643	628	169	169	516	489	-42	-30
	(92)	(89)	(29)	(28)	(71)	(70)	(24)	(23)
Baseline Mean	2,685	2,685	733	733	1,644	1,644	309	309
Percent Change	.240	.234	.231	.231	.314	.297	-.135	-.098
	(.034)	(.033)	(.040)	(.039)	(.043)	(.043)	(.077)	(.073)
Individual Fixed Effects	X	X	X	X	X	X	X	X

Note: Table shows reduced form and instrumental variable estimates for the main outcomes in a balanced panel. Panel (a) shows a shorter panel, for 2005-2008 and Panel (b) shows all years, 2004-2010. In Panel (b), for each outcome, the first and third columns show estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. The second and fourth columns show reduced form and instrumental variable estimates, when the post-period is broken into two separate periods, 2007-2008 and 2009-2010. In the second and fourth columns we estimate the IV coefficient using the two separate treatment × post interaction terms as instruments. We control for service area by quarter fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 172,496$ beneficiary-quarters in Panel (a). $N = 187,684$ beneficiary-quarters in Panel (b).)

Appendix Table A8: Main Outcomes (Bexar Service Area)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Healthcare Spending				Rx Spending				Outpatient Spending				Inpatient Spending			
Treatment × Post	324		444		109		118		255		314		-39.7		11.4	
	(118)		(181)		(47.7)		(70.5)		(87.1)		(91.7)		(84.8)		(90.3)	
Treatment × Post (2007-2008)		236		278		53.2		40.7		184		222		-.541		15.4
		(121)		(127)		(36.7)		(28)		(79.2)		(60.8)		(94.2)		(78.9)
Treatment × Post (2009-2010)		411		566		182		174		269		361		-39.4		31.7
		(115)		(271)		(76.9)		(108)		(101)		(154)		(84.6)		(108)
IV Coefficient	409	407	651	638	137	150	173	167	322	283	461	436	-50.2	-26	16.8	35.7
	(131)	(127)	(274)	(285)	(55.7)	(61.8)	(100)	(97)	(94.6)	(97.1)	(145)	(155)	(98.5)	(95.8)	(129)	(123)
Baseline Mean	2,711	2,711	2,711	2,711	700	700	700	700	1,388	1,388	1,388	1,388	623	623	623	623
Percent Change	.151	.150	.240	.235	.196	.214	.248	.238	.232	.204	.332	.314	-.081	-.042	.027	.057
	(.048)	(.047)	(.101)	(.105)	(.079)	(.088)	(.143)	(.138)	(.068)	(.070)	(.105)	(.112)	(.158)	(.154)	(.206)	(.198)
Individual Fixed Effects	X	X			X	X			X	X			X	X		

Note: Table shows reduced form and instrumental variable estimates for the main outcomes in Texas's Bexar Service Area. For each outcome, the first and third columns show estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. The second and fourth columns show reduced form and instrumental variable estimates, when the post-period is broken into two separate periods, 2007-2008 and 2009-2010. In the second and fourth columns we estimate the IV coefficient using the two separate treatment × post interaction terms as instruments. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 96,678$ beneficiary-quarters.)

Appendix Table A9: Main Outcomes (Harris Service Area)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Healthcare Spending				Rx Spending				Outpatient Spending				Inpatient Spending			
Teatment × Post	502		464		138		146		436		380		-70.9		-62.6	
	(135)		(126)		(29.6)		(41.5)		(89.5)		(79.5)		(50.3)		(50.6)	
Treatment × Post (2007-2008)		203		238		80.7		102		228		220		-105		-83.5
		(119)		(125)		(21.3)		(37.6)		(85.2)		(85)		(58.6)		(57.9)
Treatment × Post (2009-2010)		865		640		211		180		672		499		-17.9		-40
		(165)		(151)		(39.9)		(52.5)		(121)		(91.4)		(73.1)		(59)
IV Coefficient	665	742	736	745	183	198	232	233	577	616	603	604	-93.9	-72.8	-99.4	-91.8
	(175)	(168)	(203)	(209)	(34.6)	(34.3)	(66.5)	(72.1)	(130)	(145)	(132)	(138)	(60.7)	(48)	(76)	(77.3)
Baseline Mean	3,042	3,042	3,042	3,042	637	637	637	637	1,631	1,631	1,631	1,631	773	773	773	773
Percent Change	.219	.244	.242	.245	.286	.311	.365	.366	.354	.378	.369	.37	-.121	-.094	-.129	-.119
	(.057)	(.055)	(.067)	(.069)	(.054)	(.054)	(.104)	(.113)	(.08)	(.089)	(.081)	(.085)	(.079)	(.062)	(.098)	(.100)
Individual Fixed Effects	X	X			X	X			X	X			X	X		

Note: Table shows reduced form and instrumental variable estimates for the main outcomes in Texas's Harris Service Area. For each outcome, the first and third columns show estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. The second and fourth columns show reduced form and instrumental variable estimates, when the post-period is broken into two separate periods, 2007-2008 and 2009-2010. In the second and fourth columns we estimate the IV coefficient using the two separate treatment × post interaction terms as instruments. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 179,623$ beneficiary-quarters.)

Appendix Table A10: Main Outcomes (Nueces Service Area)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Healthcare Spending				Rx Spending				Outpatient Spending				Inpatient Spending			
Treatment × Post	664		534		220		181		499		446		-53.8		-93.3	
	(170)		(151)		(46.9)		(42.8)		(124)		(119)		(42.9)		(51.1)	
Treatment × Post (2007-2008)		342		402		146		114		262		310		-65.7		-21.8
		(155)		(132)		(38.3)		(39.1)		(88.5)		(90)		(66.2)		(51)
Treatment × Post (2009-2010)		917		600		298		225		674		522		-55		-147
		(227)		(183)		(54.9)		(46.2)		(189)		(146)		(39.5)		(70)
IV Coefficient	766	719	715	678	253	253	243	232	575	535	597	565	-62.1	-68.6	-125	-119
	(180)	(184)	(194)	(183)	(49.9)	(47.5)	(54.7)	(53)	(131)	(139)	(153)	(146)	(45.7)	(50.8)	(66.3)	(62.2)
Baseline Mean	2,898	2,898	2,898	2,898	640	640	640	640	1,590	1,590	1,590	1,590	668	668	668	668
Percent Change	.264	.248	.247	.234	.396	.396	.379	.363	.362	.336	.376	.356	-.093	-.103	-.187	-.178
	(.062)	(.064)	(.067)	(.063)	(.078)	(.074)	(.085)	(.083)	(.082)	(.087)	(.096)	(.092)	(.068)	(.076)	(.099)	(.093)
Individual Fixed Effects	X	X			X	X			X	X			X	X		

Note: Table shows reduced form and instrumental variable estimates for the main outcomes in Texas's Nueces Service Area. For each outcome, the first and third columns show estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. The second and fourth columns show reduced form and instrumental variable estimates, when the post-period is broken into two separate periods, 2007-2008 and 2009-2010. In the second and fourth columns we estimate the IV coefficient using the two separate treatment × post interaction terms as instruments. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 115,986$ beneficiary-quarters.)

Appendix Table A11: Main Outcomes (Travis Service Area)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Healthcare Spending				Rx Spending				Outpatient Spending				Inpatient Spending			
Treatment × Post	391		335		119		119		320		208		-48		7.83	
	(87.1)		(65.5)		(22.1)		(19.2)		(55.3)		(36.9)		(36.2)		(22.2)	
Treatment × Post (2007-2008)		223		225		60.7		72.2		162		126		-.0785		27
		(55.2)		(80.8)		(18.3)		(17.8)		(55.6)		(51.5)		(21.6)		(26.4)
Treatment × Post (2009-2010)		550		372		183		149		439		222		-71		.543
		(109)		(85)		(27.3)		(20.9)		(64.1)		(49.2)		(43.1)		(30.8)
IV Coefficient	587	611	587	551	179	195	209	209	480	478	364	324	-72	-62.4	13.7	18.6
	(119)	(103)	(111)	(130)	(29.6)	(29.7)	(32.6)	(32.2)	(76)	(71.3)	(62.2)	(66.4)	(49.4)	(41.3)	(37.6)	(48.4)
Baseline Mean	2,621	2,621	2,621	2,621	573	573	573	573	1,517	1,517	1,517	1,517	530	530	530	530
Percent Change	.224	.233	.224	.21	.312	.34	.365	.365	.316	.315	.24	.213	-.136	-.118	.026	.035
	(.045)	(.039)	(.043)	(.049)	(.052)	(.052)	(.057)	(.056)	(.05)	(.047)	(.041)	(.044)	(.093)	(.078)	(.071)	(.091)
Individual Fixed Effects	X	X			X	X			X	X			X	X		

Note: Table shows reduced form and instrumental variable estimates for the main outcomes in Texas's Travis Service Area. For each outcome, the first and third columns show estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. The second and fourth columns show reduced form and instrumental variable estimates, when the post-period is broken into two separate periods, 2007-2008 and 2009-2010. In the second and fourth columns we estimate the IV coefficient using the two separate treatment × post interaction terms as instruments. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 251,464$ beneficiary-quarters.)

Appendix Table A12: Central Nervous System Classes

(a) Spending

	(1) Analg/ Antipyr, Nonstr/ Antiinflm	(2) Analg/ Antipyr, Opiate Agonists	(3) Analg/ Antipyr, NEC	(4) Anti-convulsant, Benzo-diazepine	(5) Anti-conv, Hydantoin Derivative	(6) Anticonv, Misc	(7) Psych other, Anti-depres-sants	(8) Psychother, Tranq/ Anti-psychotic	(9) ASH, Benzo-diazepines	(10) ASH, NEC
Treatment × Post	2.15	2.62	1.1	.27	.351	7.51	5.72	15.8	1.12	2.91
	(.475)	(4.49)	(.291)	(.0928)	(.2)	(3.33)	(2.55)	(5.23)	(.542)	(.715)
IV Coefficient	2.88	3.5	1.47	.361	.469	10	7.64	21.1	1.5	3.89
	(.612)	(5.62)	(.379)	(.113)	(.252)	(4.34)	(3.05)	(6.66)	(.678)	(.896)
Baseline Mean	9.77	25.1	2.50	1.15	2.64	75.8	39.4	125.1	4.93	8.80
Percent Change	.295	.139	.587	.315	.177	.132	.194	.169	.303	.442
	(.063)	(.224)	(.152)	(.099)	(.095)	(.057)	(.077)	(.053)	(.137)	(.102)

(b) Any Spending

	(1) Analg/ Antipyr, Nonstr/ Antiinflm	(2) Analg/ Antipyr, Opiate Agonists	(3) Analg/ Antipyr, NEC	(4) Anti-convulsant, Benzo-diazepine	(5) Anticonv, Hydantoin Derivative	(6) Anticonv, Misc	(7) Psychother, Anti-depressants	(8) Psychother, Tranq/ Anti-psychotic	(9) ASH, Benzo-diazepines	(10) ASH, NEC
Treatment × Post	.042	.025	.017	.004	.004	.015	.037	.018	.020	.025
	(.005)	(.007)	(.003)	(.001)	(.002)	(.004)	(.005)	(.003)	(.005)	(.002)
IV Coefficient	.056	.034	.023	.006	.006	.020	.049	.023	.027	.034
	(.005)	(.008)	(.004)	(.002)	(.002)	(.005)	(.006)	(.004)	(.005)	(.003)
Baseline Mean	.085	.19	.04	.031	.029	.131	.181	.125	.099	.054
Percent Change	.664	.178	.571	.18	.201	.151	.271	.187	.276	.629
	(.064)	(.043)	(.096)	(.061)	(.079)	(.038)	(.031)	(.030)	(.055)	(.056)

Note: Table shows reduced form and instrumental variable estimates for the most common subclasses of the central nervous system therapeutic class. The first row shows estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and the second row shows estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. We control for service area by quarter fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 643,751$ beneficiary-quarters.)

Appendix Table A13: Cardiovascular Classes

(a) Spending

	(1) NEC	(2) ACE Inhibitors	(3) Cardiac Glycosides	(4) Anti-arrhythmic Agents	(5) Alpha-Beta Blockers	(6) Beta Blockers	(7) Calcium Channel	(8) Anti-hyperlipidemic Drugs, NEC	(9) Hypotensive Agents, NEC	(10) Vasodilating Agents, NEC
Treatment × Post	1.32	1.43	.0957	.101	.0219	1.81	1.43	10.5	.961	3.03
	(.866)	(.295)	(.025)	(.079)	(.033)	(.490)	(.599)	(2.16)	(.371)	(2.17)
IV Coefficient	1.77	1.91	.128	.135	.0293	2.42	1.91	14.1	1.28	4.04
	(1.07)	(.388)	(.031)	(.0991)	(.0416)	(.596)	(.765)	(2.73)	(.45)	(2.75)
Baseline Mean	8.17	4.85	.169	.314	.153	5.79	10.6	30.3	2.02	3.44
Percent Change	.216	.394	.756	.431	.192	.418	.181	.464	.636	1.18
	(.130)	(.080)	(.184)	(.316)	(.272)	(.103)	(.072)	(.090)	(.223)	(.800)

(b) Any Spending

	(1) NEC	(2) ACE Inhibitors	(3) Cardiac Glycosides	(4) Anti-arrhythmic Agents	(5) Alpha-Beta Blockers	(6) Beta Blockers	(7) Calcium Channel	(8) Anti-hyperlipidemic Drugs, NEC	(9) Hypotensive Agents, NEC	(10) Vasodilating Agents, NEC
Treatment × Post	.008	.027	.004	.0002	.0004	.024	.014	.025	.008	.008
	(.004)	(.004)	(.001)	(.0005)	(.0005)	(.004)	(.002)	(.007)	(.002)	(.001)
IV Coefficient	.010	.036	.005	.0003	.0006	.032	.019	.034	.010	.011
	(.004)	(.004)	(.001)	(.0007)	(.0006)	(.005)	(.003)	(.009)	(.002)	(.002)
Baseline Mean	.047	.079	.009	.002	.002	.076	.067	.109	.022	.017
Percent Change	.222	.454	.571	.129	.279	.421	.284	.309	.463	.663
	(.095)	(.056)	(.158)	(.326)	(.310)	(.061)	(.042)	(.080)	(.101)	(.089)

Note: Table shows reduced form and instrumental variable estimates for the most common subclasses of the cardiovascular agents therapeutic class. The first row shows estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and the second row shows estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. We control for service area by quarter fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 643,751$ beneficiary-quarters.)

Appendix Table A14: Hormones Classes

(a) Spending

	(1) Adrenals & Comb, NEC	(2) Contra-ceptive, Oral Comb, NEC	(3) Estrogens & Comb, NEC	(4) Anti-diabetic Agents, Insulins	(5) Anti-diabetic Agents, Sulfo nylureas	(6) Anti-diabetic Agents, Misc	(7) Para-thyroid Hor-mones, NEC	(8) Pituitary Hor-mones, NEC	(9) Pro-gestins, NEC	(10) Thy /Antithy, Thyroid/ Hor-mones
Treatment × Post	5.43	-.0425	.616	-.139	1.21	2.49	.106	-2.11	.0266	.696
	(1.37)	(.168)	(.198)	(2.42)	(.284)	(1.41)	(.098)	(.989)	(.0545)	(.0994)
IV Coefficient	7.26	-.0567	.823	-.185	1.61	3.33	.141	-2.82	.0355	.93
	(1.58)	(.211)	(.246)	(3.03)	(.343)	(1.76)	(.124)	(1.24)	(.0678)	(.116)
Baseline Mean	7.60	1.74	2.00	13.3	4.39	18.5	.356	1.77	.146	1.64
Percent Change	.955	-.033	.411	-.014	.367	.18	.397	-1.594	.243	.566
	(.208)	(.121)	(.123)	(.227)	(.078)	(.095)	(.347)	(.700)	(.465)	(.071)

(b) Any Spending

	(1) Adrenals & Comb, NEC	(2) Contra-ceptive, Oral Comb, NEC	(3) Estrogens & Comb, NEC	(4) Anti-diabetic Agents, Insulins	(5) Anti-diabetic Agents, Sulfo nylureas	(6) Anti-diabetic Agents, Misc	(7) Para-thyroid Hor-mones, NEC	(8) Pituitary Hor-mones, NEC	(9) Pro-gestins, NEC	(10) Thy /Antithy, Thyroid/ Hor-mones
Treatment × Post	.0318	-.0007	.004	.001	.015	.019	.0007	-.0003	.0003	.018
	(.004)	(.001)	(.002)	(.003)	(.003)	(.003)	(.0005)	(.0003)	(.0007)	(.004)
IV Coefficient	.042	-.001	.005	.002	.020	.025	.001	-.0004	.0004	.024
	(.005)	(.002)	(.002)	(.004)	(.004)	(.004)	(.0006)	(.0004)	(.0009)	(.004)
Baseline Mean	.049	.018	.02	.047	.047	.07	.002	.002	.003	.048
Percent Change	.866	-.054	.244	.041	.418	.355	.501	-.191	.141	.503
	(.094)	(.101)	(.099)	(.075)	(.075)	(.056)	(.289)	(.192)	(.307)	(.085)

Note: Table shows reduced form and instrumental variable estimates for the most common subclasses of the hormones and synthetic substances therapeutic class. The first row shows estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and the second row shows estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. We control for service area by quarter fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 643,751$ beneficiary-quarters.)

Appendix Table A15: Inpatient Spending on the Top 10 CCS Categories

(a) Spending

	(1) Infectious and parasitic Diseases	(2) Neo-plasms	(3) Endocrine; nutritional; and metabolic Diseases and immunity disorders	(4) Mental Illness	(5) Diseases of the circu-latory system	(6) Diseases of the respi-ratory system	(7) Diseases of the diges-tive system	(8) Diseases of the genito-urinary system	(9) Diseases of the skin and subcutaneous tissue	(10) In-jury and poiso-ning
Treatment × Post	-9.14	.116	-6.04	-27.9	7.21	-5.89	-4.14	-.17	-1.54	.417
	(5.55)	(5.52)	(2.9)	(6.84)	(8.14)	(8.9)	(5.16)	(3.79)	(2.05)	(11.2)
IV Coefficient	-12.2	.155	-8.07	-37.2	9.64	-7.87	-5.53	-.227	-2.06	.557
	(7.09)	(6.91)	(3.65)	(8.01)	(10.1)	(11.2)	(6.48)	(4.75)	(2.56)	(14)
Baseline Mean	41.5	60.9	31.1	47.2	130.6	79.8	71.7	22.7	19.1	67.6
Percent Change	-.294	.003	-.260	-.789	.074	-.099	-.077	-.01	-.108	.008
	(.171)	(.113)	(.117)	(.170)	(.078)	(.141)	(.090)	(.209)	(.134)	(.207)

(b) Any Spending

	(1) Infectious and parasitic Diseases	(2) Neo-plasms	(3) Endocrine; nutritional; and metabolic Diseases and immunity disorders	(4) Mental Illness	(5) Diseases of the circu-latory system	(6) Diseases of the respi-ratory system	(7) Diseases of the diges-tive system	(8) Diseases of the genito-urinary system	(9) Diseases of the skin and subcutaneous tissue	(10) In-jury and poiso-ning
Treatment × Post	.0001	.0003	-.002	-.004	.0006	-.0007	-.0008	-.00003	-.0004	0.000008
	(.0006)	(.0003)	(.0006)	(.001)	(.0009)	(.001)	(.0006)	(.0005)	(.0004)	(.0006)
IV Coefficient	.0002	.0004	-.002	-.006	.0008	-.001	-.001	-.00004	-.0005	.00001
	(.0007)	(.0003)	(.0007)	(.001)	(.001)	(.001)	(.0008)	(.0007)	(.0005)	(.0008)
Baseline Mean	.004	.005	.006	.009	.016	.01	.01	.005	.004	.007
Percent Change	.047	.086	-.402	-.637	.048	-.098	-.105	-.009	-.134	.002
	(.173)	(.064)	(.123)	(.127)	(.070)	(.122)	(.077)	(.139)	(.126)	(.110)

Note: Table shows reduced form and instrumental variable estimates for the top 10 most common Clinical Classification Software (CCS) groups of diagnoses. The first row shows estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and the second row shows estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. We control for service area by quarter fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 643,751$ beneficiary-quarters.)

Appendix Table A16: Outpatient Spending and Prescriptions

	(1) Adjusted Spending Total	(2) Adjusted Spending Total	(3) Adjusted Spending No Rx Match	(4) Adjusted Spending No Rx Match	(5) Adjusted Spending Rx Match	(6) Adjusted Spending Rx Match
Treatment × Post	265		172		93	
	(43)		(42)		(7)	
Treatment × Post (2007-2008)		123		71		52
		(36)		(34)		(5)
Treatment × Post (2009-2010)		374		240		134
		(60)		(59)		(10)
IV Coefficient	354	343	230	215	124	128
	(53)	(57)	(52)	(56)	(7)	(8)
Baseline Mean	1,549	1,549	1,396	1,396	153	153
Percent Change	.229	.221	.165	.154	.808	.834
Percent Change (SE)	(.034)	(.037)	(.037)	(.04)	(.046)	(.053)
Individual Fixed Effects	X	X	X	X	X	X

Notes: Table shows reduced form and instrumental variable estimates for outpatient spending. Columns (1) and (2) show results for total outpatient days, columns (3) and (4) show results for outpatient days when no prescription is written, and columns (5) and (6) show results for outpatient days when a prescription is written. For each outcome, the first column shows estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. The second column shows reduced form and instrumental variable estimates, when the post-period is broken into two separate periods, 2007-2008 and 2009-2010. In the second and fourth columns we estimate the IV coefficient using the two separate treatment × post interaction terms as instruments. We control for service area by quarter fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 643,751$ beneficiary-quarters.)

B Medicaid and SSI

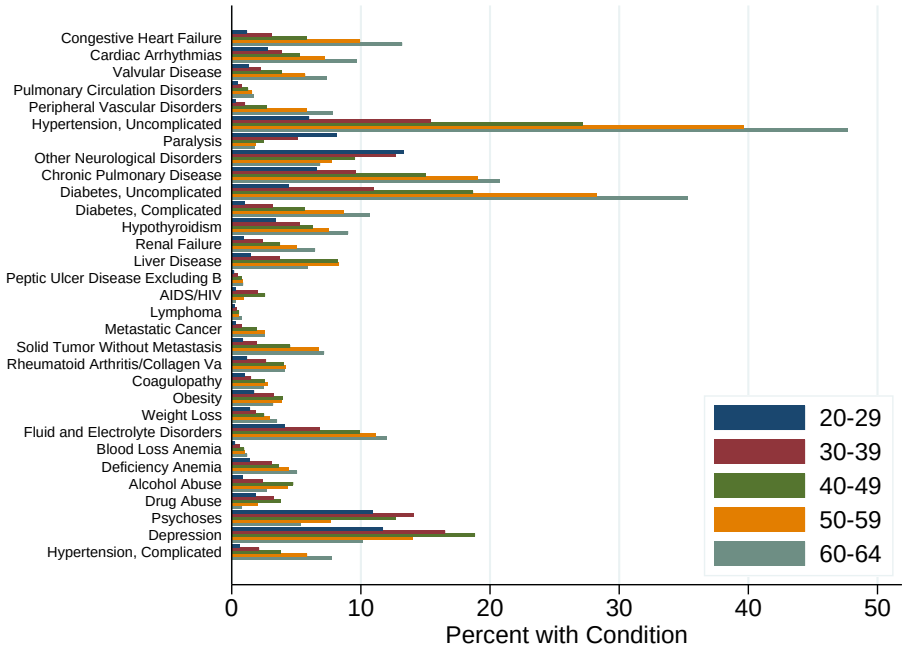
The majority of adults with disabilities enrolled in Medicaid are eligible for Medicaid due to their enrollment in the Supplemental Security Income (SSI) program. The SSI program is one of the largest welfare programs in the United States, providing monthly payments to more than 8.2 million disabled or elderly beneficiaries in December 2017. Of these, 4.8 million were adults with disabilities between the ages of 18 and 64, and the average monthly payment for this group was $564.34 (Social Security Administration, 2018). For the non-elderly, eligibility for SSI is based on medical criteria as well as income and asset tests. SSI has the same medical eligibility criteria for adults as the Social Security Disability Insurance (SSDI) program, but does not share SSDI's work history requirements. Approximately one-third of SSI beneficiaries are also enrolled in the SSDI program because they have sufficient prior work history for SSDI but low enough income to quality for SSI as well.

SSI beneficiaries are categorically eligible for Medicaid in most states, meaning that they can enroll in Medicaid without having to apply separately.[1] SSDI beneficiaries are categorically eligible for Medicare, making those SSI beneficiaries who also qualify for SSDI dually eligible for both Medicaid and Medicare. In Texas (as well as in most other states where private provision has been rolled out to adults with disabilities), dually eligible beneficiaries were excluded from the shift to private managed care plans. Thus, our analysis focuses on the two-thirds of SSI beneficiaries who were not also eligible for SSDI.

Cash benefit payments for disabled SSI beneficiaries quadrupled between 1990 ($12.2 billion) and 2017 ($48.2 billion) (Social Security Administration, 2018); however, these expenditures are dwarfed by Medicaid expenditures for this population— $187 billion in 2014 (Kaiser Family Foundation, 2014*a*). Adults with disabilities are the most expensive group in Medicaid, with per capita spending equal to $16,859 in 2014, almost five times higher than per capita spending for adults without disabilities ($3,278) (Kaiser Family Foundation, 2014*b*). One reason for this higher spending profile is that SSI beneficiaries disproportionately qualify for the program due to mental disorders: 57.4% of SSI beneficiaries qualified for SSI due to a mental disorder, with intellectual disabilities (19% of beneficiaries who qualify due to a mental disorder) being the largest sub-category, followed by mood disorders (16%), and schizophrenic and other psychotic disorders (8.9%). After mental disorders, the next largest categories are musculoskeletal disabilities (13%) and nervous system disabilities (7.7%) (Duggan, Kearney and Rennane, 2015). Thus, this population differs greatly from the average non-disabled Medicaid beneficiary and even from the typical SSDI beneficiary, in its high prevalence of mental illness, indicating a high level of need for mental healthcare. Also contributing to high costs is the fact that individuals in this population suffer from multiple serious health problems. This suggests that (1) the tools of managed care may be particularly effective for this group and (2) strict rationing in public FFS Medicaid programs (such as Texas's three-drug cap) is likely to be binding for this group and could potentially have detrimental (and observable) health effects. In Appendix Figure B1, we present the prevalence of a variety of clinical conditions by age.

[1] 10 states have stricter criteria, while 7 states require a separate application but have no additional criteria. In Texas, Medicaid eligibility is automatic for SSI beneficiaries

Appendix Figure B1: Comorbidites By Age



Note: Figure shows the distribution of the 31 components of the Elixhauser Comorbidity Index by age group. ($N = 189,935$ beneficiary-years.)

C Price Variation Across Managed Care Plan Carriers

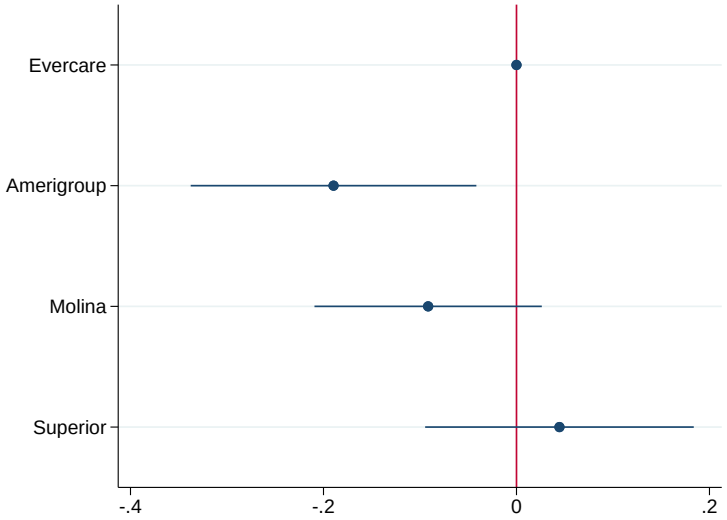
The Texas outpatient data includes information on actual cost amounts for both the public *and the private* programs. Specifically, the data contains the negotiated amounts actually paid to providers by the public or private plans at the claim-line level. These actual provider payment amounts are available for all public Medicaid claims, as well as for about 80% of all private Medicaid plan claims. In this section, we examine the variation in the observed rates across the four carriers (EverCare, Amerigroup, Molina, and Superior HealthPlan) that the state contracted with in 2009 and 2010, the years during which Medicaid managed care was already rolled out and for which we have a crosswalk from plan identifiers in the data to carrier names.

We examine the sample of outpatient managed care claims for 2009 and 2010 for which the payment from plans to providers is available, which comprises 80% of managed care claims. Furthermore, we restrict to the 99.9% of claims that are associated with a plan and carrier that we observe as a plan contracted by the state of Texas in the actuarial reports. To decrease noise in prices, we exclude claims that have a quantity of service provided different from 1 and claims that have a procedure modifier code. On this final sample of outpatient managed care claims, we estimate the following regression:

$$log\left(p_{ichpt}\right) = \gamma_c + \delta_h + \psi_p + \tau_t + \varepsilon_{ichpt} \tag{1}$$

where i indexes individuals, c indexes carriers, h indexes providers, p indexes procedures, and t indexes time; γ_c is a set of carrier fixed effects, δ_h is a set of provider fixed effects, ψ_p is a set of procedure fixed effects, and τ_t is a set of year fixed effects. We define procedures as unique combinations of procedure codes and place of service codes. We cluster standard errors at the carrier level. Figure C1 shows the estimated carrier fixed effects. Relative to the omitted carrier, Evercare, Amerigroup has on average 19% lower prices, Molina has on average 9% lower prices, and Superior has on average 4% higher prices, though these latter two differences are not statistically significant.

Appendix Figure C1: Distribution of Estimated Carrier Fixed Effects



Note: Figure shows the distribution of estimated carrier fixed effects from estimating Equation (1). Standard errors are clustered at the carrier level. ($N = 2,265,378$ outpatient managed care claims.)

D Border Zip Code Analysis

In this appendix we replicate our main results limiting to border zip codes. The motivation for this analysis is that one might be concerned that our treatment counties are more urban than control counties and urban and rural counties may have been diferentially impacted by potential shocks that occurred around the time of our treatment (February 2007). Focusing on border zip codes may make control and treatment counties even more similar. Border zip codes are defined as zip codes in a control county that are within 25 miles of a treatment county and zip codes in a treatment county that are within 25 miles of a control county. Distance is measured as great-circle distance calculated using the Haversine formula based on internal points in zip codes.[2]

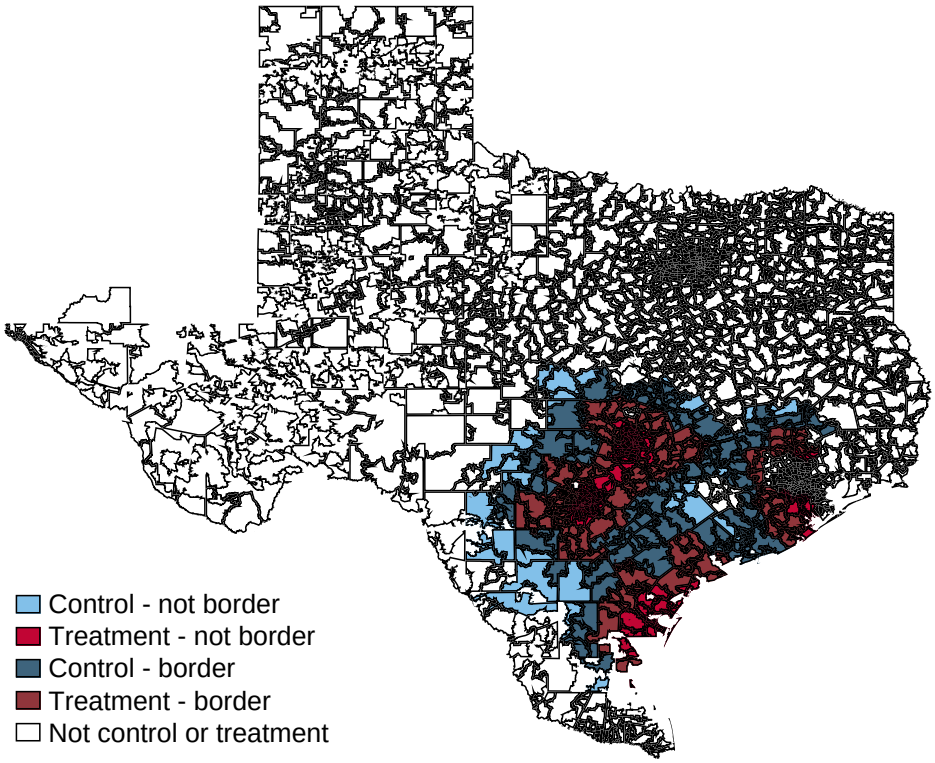
Appendix Figure D1 shows a map of zipcodes in Texas. Control and treatment counties are highlighted in shades of blue and shades of red, respectively, separating border and non-border zipcodes.

Appendix Table D1 replicates Table 1, limiting to the border zipcodes.

Appendix Table D2 replicates Table 2, limiting to the border zipcodes. For each primary outcome (healthcare spending, inpatient spending, drug spending, outpatient spending), we report coefficients from four regressions. The first two regressions include individual fixed effects while the second two regressions do not. The first and third regressions include an interaction between an indicator for residing in a treatment county ("Treatment") and an indicator for the quarter being after February 2007 ("Post"), the month in which mandated enrollment in private Medicaid plans began in Texas. The second and fourth columns break the "post" period into two periods, an "early-post" period (2007-2008) and a "late-post" period (2009-2010). For each regression specification we report both reduced form and IV coefficients. Reduced form coefficients should be interpreted as the effect of a county-level private-plan enrollment mandate on the outcome, allowing take-up of private plans to be incomplete even under mandated enrollment. IV coefficients should be interpreted as the difference in the outcome in the public Medicaid program vs. in a private plan for the average beneficiary who was induced by the mandate to enroll in a private plan. We highlight that our main results remain quite similar on this restricted sample.

[2]Files with distances between zip codes are available at https://www.nber.org/data/zip-code-distance-database.html.

Appendix Figure D1: Texas ZIP Codes



Note: Figure shows the map of zip codes in Texas. For our analysis of zip codes we classify zip codes within the control and treatment counties into border and non-border zip codes. Border zip codes are zip codes in control counties within 25 miles of a treatment zip code and zip codes in treatment counties within 25 miles of a control zip code. Not border zip codes are all the other zip codes in control and treatment counties. Distance is measured as great-circle distance calculated using the Haversine formula based on internal points in zip codes.

Appendix Table D1: Summary Statistics (Zipcodes)

	Control	Treatment
Average quarterly healthcare spending 2004	2,662	2,912
Average quarterly inpatient spending 2004	722	745
Average quarterly outpatient spending 2004	1,360	1,531
Average quarterly Rx spending 2004	580	636
Age 20 to 24	.095	.111
Age 25 to 29	.078	.083
Age 30 to 34	.080	.080
Age 35 to 39	.084	.086
Age 40 to 44	.099	.111
Age 45 to 49	.130	.124
Age 50 to 54	.142	.130
Age 55 to 59	.162	.149
Age 60 to 64	.130	.126
Female	.578	.560
Male	.422	.441
Heart Disease	.339	.327
Diabetes	.198	.214
HIV/AIDS	.010	.090
Cancer	.052	.052
Rheumatoid Arthritis	.036	.036
Obesity	.028	.029
Substance Use	.052	.051
Mental Illness	.212	.201
N recipients Jan 2004	6,092	8,710
N recipients Dec 2010	7,191	11,548
N pre-period recipient months	234,355	339,409
N post-period recipient months	315,790	503,044

Note: Table shows summary statistics for border zipcodes in control and treatment counties. For our analysis of zipcodes we classify zipcodes within the control and treatment counties into border and not border zipcodes. Border zipcodes are zipcodes in control counties within 25 miles of a treatment zipcode and zipcodes in treatment counties within 25 miles of a control zipcode. Not border zipcodes are all the other zipcodes in control and treatment counties. Distance is measured as great-circle distance calculated using the Haversine formula based on internal points in zipcodes.

Appendix Table D2: Main Outcomes (Border Zipcodes)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Healthcare Spending				Rx Spending				Outpatient Spending				Inpatient Spending			
Treatment × Post	477		516		151		145		391		388		-65.2		-17.2	
	(81.8)		(70.3)		(28.7)		(23.1)		(52)		(49.1)		(32.3)		(26.7)	
Treatment × Post (2007-2008)		241		327		89.9		82		200		254		-48.4		-8.5
		(72.1)		(58.6)		(23.1)		(24)		(50)		(41.6)		(35.6)		(27.2)
Treatment × Post (2009-2010)		718		645		219		187		556		469		-56.8		-10.9
		(93.6)		(93.5)		(38.9)		(27.3)		(65.9)		(63.7)		(33)		(34)
IV Coefficient	611	622	778	762	194	199	219	213	500	489	585	564	-83.3	-66.3	-25.9	-14.8
	(95.1)	(87.7)	(110)	(110)	(33.3)	(34.2)	(35.3)	(36.5)	(60.6)	(63)	(74.8)	(75.1)	(38.8)	(35.2)	(39.8)	(38.1)
Baseline Mean	2,781	2,781	2,781	2,781	630	630	630	630	1,477	1,477	1,477	1,477	673	673	673	673
Percent Change	.220	.224	.28	.274	.308	.316	.347	.337	.339	.331	.396	.382	-.124	-.098	-.038	-.022
	(.034)	(.032)	(.04)	(.04)	(.053)	(.054)	(.056)	(.058)	(.041)	(.043)	(.051)	(.051)	(.058)	(.052)	(.059)	(.057)
Individual Fixed Effects	X	X			X	X			X	X			X	X		

Note: Table shows reduced form and instrumental variable estimates for the main outcomes using only border zipcodes. For each outcome, the first and third columns show estimates of control-treatment differences from estimating the pooled reduced form specification in Equation (1) and estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. The second and fourth columns show reduced form and instrumental variable estimates, when the post-period is broken into two separate periods, 2007-2008 and 2009-2010. In the second and fourth columns we estimate the IV coefficient using the two separate treatment × post interaction terms as instruments. For more details, see Section 4. ($N = 369,823$ beneficiary-quarters.)

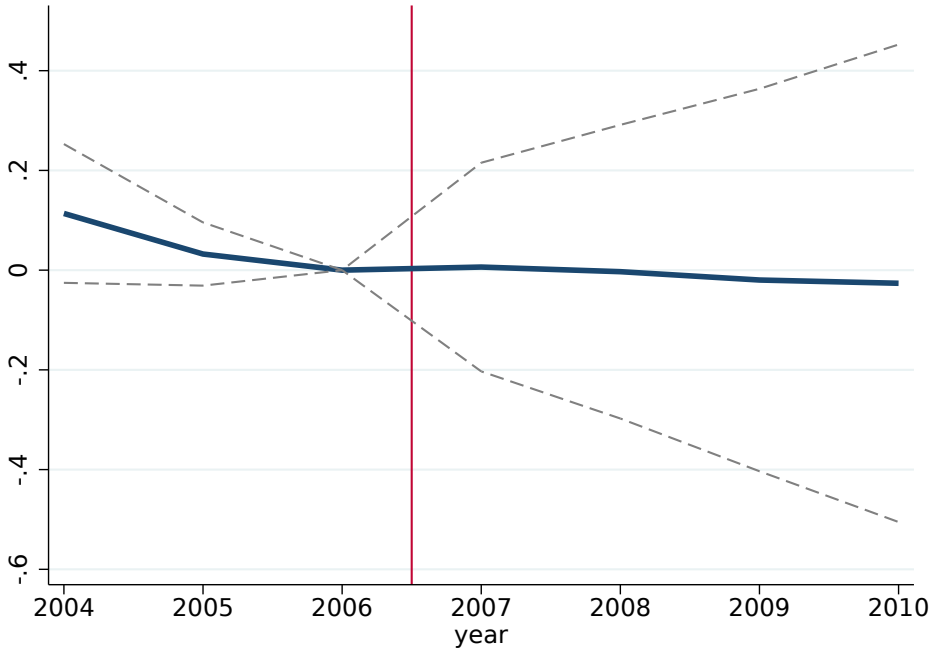
E Long-Term Care Spending

In this appendix, we present results related to spending on and utilization of institutional long-term care services. Use of these services is not uncommon among disabled Medicaid beneficiaries. However, beneficiaries using institutional long-term care are exempted from the STAR+Plus program, suggesting that the roll out of STAR+Plus should not have much effect on utilization of these services. Further, our data do not provide the same detailed information about utilization of these services that they provide for other types of services discussed in the paper. Indeed, we only observe annual summary measures of spending and utilization for institutional long-term care, preventing us from performing the same quarterly analyses we perform for other types of services. For these reasons, we present these results separately here in this appendix.

Figure E1 and Table E1 present results of our analyses of the effects of the reform on long-term care spending. We estimate the same regressions as we estimate for other outcomes but at the annual instead of the quarterly level. The event study presented in Figure E1 suggests no effect of the reform on long-term care spending, with the difference in spending between treatment and control counties remaining roughly constant over the period before and after the reform. However, standard errors are quite large, especially toward the end of the sample period. The results in Table E1 provide a similar picture: In the regressions with individual fixed effects (our preferred specification), coefficients are small and statistically insignificant. Regressions without individual fixed effects produce larger coefficients but are (1) subject to the caveat that changes in composition could potentially explain these results (though not the results with individual fixed effects) and (2) still statistically insignificant in all cases but one, and the single significant case (the "early-post"coefficient in column (4)) is only marginally significant at the 10% level. Further, in results not presented here, the coefficients on total healthcare spending from Table 2 change only slightly when including long-term care spending as part of total healthcare spending, indicating that our omission of long-term care spending has no material effect on the conclusions of the paper.

Taken together, these results suggest no effect of the reform on long-term care spending. This is not surprising, given that individuals using institutional long-term care are exempted from the STAR+Plus program.

Appendix Figure E1: Long-term Care Spending



Note: Figure shows control-treatment differences in long-term care spending in percent terms relative to the treatment mean in the pre-period. These coefficients are from estimating the event study difference-in-differences specification in Equation (1), including individual fixed effects. For more details, see Section 4. ($N = 189,935$ beneficiary-years.)

Appendix Table E1: Long-term Care Spending

	(1) Long-term Care Spending	(2) Long-term Care Spending	(3) Long-term Care Spending	(4) Long-term Care Spending
Treatment × Post	-146		-421	
	(556)		(257)	
Treatment × Post (2007-2008)		-117		-292
		(453)		(167)
Treatment × Post (2009-2010)		-193		-537
		(721)		(343)
IV Coefficient	-209	-219	-786	-807
	(626)	(653)	(485)	(501)
Baseline Mean	3,084	3,084	3,084	3,084
Percent Change	-.068	-.071	-.255	-.262
	(.203)	(.212)	(.157)	(.162)
Individual Fixed Effects	X	X		

Note: Table shows reduced form and instrumental variable estimates for long-term care spending. The first row shows estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and the second row shows estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, when the post-period is broken into two separate periods, 2007-2008 and 2009-2010. We estimate the IV coefficient using the two separate treatment × post interaction terms as instruments. We control for service area by year fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 189,935$ beneficiary-years.)

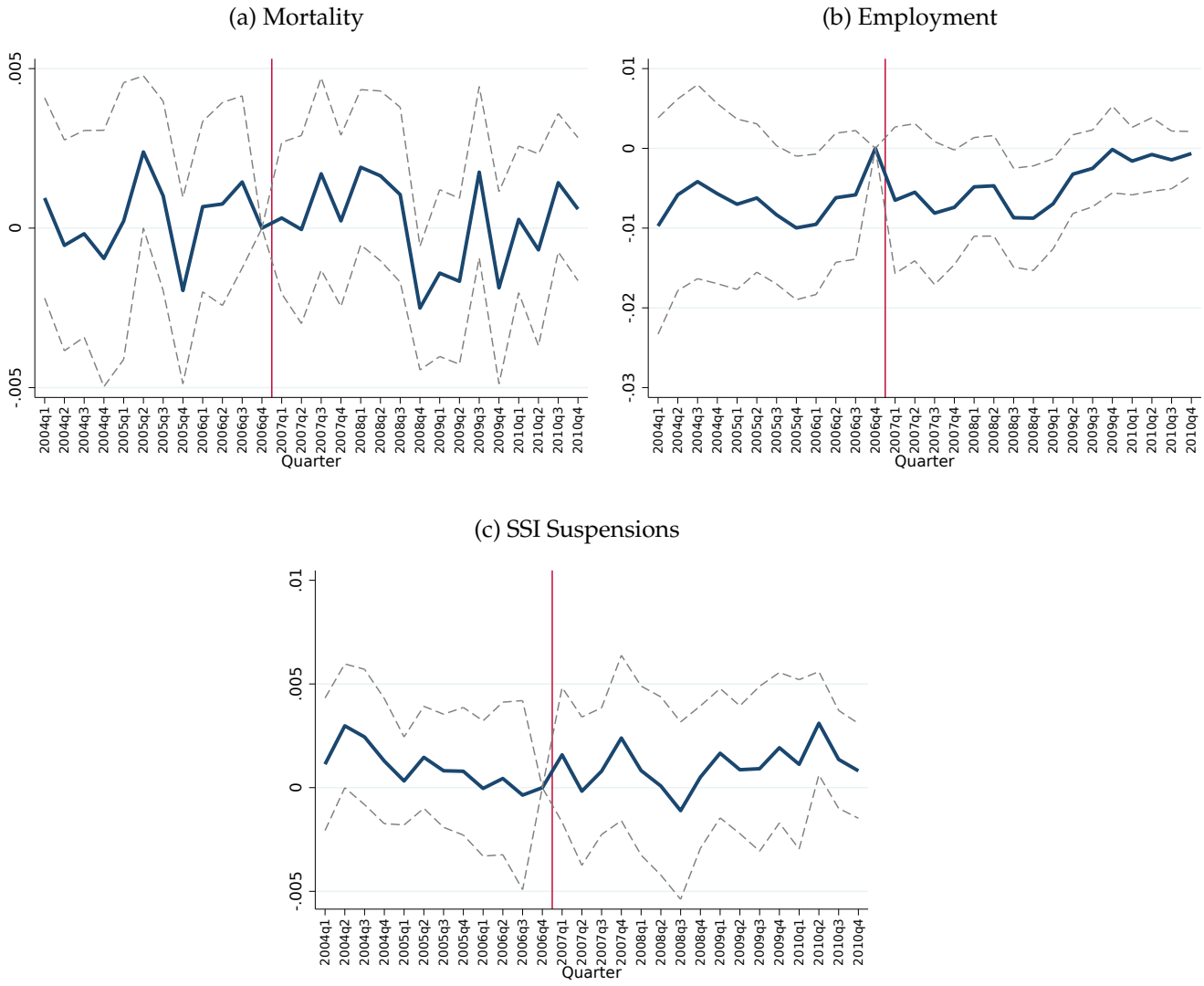
F Mortality and Employment Outcomes

In this section, we examine indicators of beneficiary health and functional capacity, including death, employment, and the suspension of SSI benefits using the SSA's Disability Analysis File (DAF). The DAF contains monthly administrative records on the universe of SSI and SSDI beneficiaries. We isolate adults (21-64) enrolled only in the SSI program during our sample period. We only observe Medicaid and Medicare eligibility and county of residence but not private vs. public plan enrollment in the SSA data. Mortality is defined as a binary indicator for whether a beneficiary died in a given quarter. Employment is defined as a binary indicator for whether the beneficiary had positive earnings in a given quarter. SSI suspension is defined as a binary indicator for whether a beneficiary's SSI benefits were suspended due to work in a given quarter. Mortality provides a direct measure of beneficiary health. Employment and SSI suspensions provide indirect measures of functional capacity, with the assumption being that take-up of employment or the suspension of benefits due to work indicate improvements in functional capacity and overall well-being.

Regression specifications follow Equation (1) (intent-to-treat estimator), as we do not observe managed care plan enrollment in the SSA data and therefore cannot account for incomplete take-up of managed care as well as the accompanying relaxation of the drug cap in an instrumental variables framework.[3] Regression results are presented in Appendix Figure F1 and Appendix Table F1. Odd columns pool all years in the post-period, and even columns split the post-period into an early and a late period. Coefficients generally go in a direction consistent with overall improvements in health and functional capacity, with managed care plus relaxation of the drug cap leading to long-run reductions in mortality, increases in employment, and more suspensions of benefits due to work. However, none of the coefficients are statistically significantly different from zero, and confidence intervals are quite wide. For mortality, we get a point estimate of -0.06 percentage points, or a reduction of 6% relative to the baseline mean quarterly mortality rate of 1%. However, the 95% confidence interval ranges from a mortality reduction of 0.18 percentage points (18%) to a mortality increase of 0.05 percentage points (5%), implying that we can only rule out mortality increases larger than 5%. For employment, we can only rule out reductions larger than 0.32 percentage points (6%), and for suspensions we can only rule out reductions larger than 0.21 percentage points (15%). We thus conclude that while the signs on these coefficients are all consistent with improvements in health and functional capacity, they are too noisy to lead to any firm conclusions.

[3] We also do not include individual fixed effects, as this is not appropriate with the mortality and suspension outcomes, which are absorbing states.

Appendix Figure F1: Other Outcomes



Note: Figure shows control-treatment differences in mortality, employment, and SSI suspensions. These coefficients are from estimating the event study difference-in-differences specification in Equation (1). For more details, see Section 4. ($N = 1,123,706$ beneficiary-quarters.)

Appendix Table F1: Other Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
	Mortality		Employment		SSI Suspensions	
Treatment × Post	-0.0003		0.003		0.00008	
	(0.0005)		(0.004)		(0.001)	
Treatment × Post (2007-2008)		0.00008		0.0003		-0.0004
		(0.0007)		(0.003)		(0.001)
Treatment × Post (2009-2010)		-0.0006		0.005		0.0005
		(0.0006)		(0.004)		(0.001)
Baseline Mean	0.010	0.010	0.051	0.051	0.014	0.014

Note: Table shows reduced form estimates for mortality, employment, and SSI suspension. For each outcome, the first column shows estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1), pooling over the entire post-period. The second column shows reduced form estimates, when the post-period is broken into two separate periods, 2007-2008 and 2009-2010. We control for service area by quarter fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 1,123,706$ beneficiary-quarters.)

G Exploration of Alternative Explanations for Increase in Drug Utilization

In this appendix we explore two alternative explanations for the increase in drug utilization we observe after the introduction of the STAR+Plus program. First, we consider the possibility that the increase in drug utilization occurred because MMC plans who were not responsible for drug spending encouraged utilization of drugs with the hope of offsetting non-drug medical expenditures. Second, we consider the possibility that the increase in drug utilization was a side-effect of the roll out of managed care for non-drug services. The evidence we present here suggests that these were not the driving factors behind the increase in drug utilization. Instead, as we discuss in Section 7, the evidence suggests that the relaxation of the drug cap was the driving factor.

Carve-Out of Prescription Drugs Even though the relaxation of the drug cap appears to be the main mechanism through which the Texas reform impacted drug utilization, the fact that drugs were carved out of private managed care plan contracts could also play a role; recall that drugs were paid for by the public program for all beneficiaries in all years, even for beneficiaries enrolled in a private plan. With this carve-out, plans had no incentive to reduce drug spending, and may have instead been incentivized to drive up drug utilization, given potential drug-driven medical offsets (Chandra, Gruber and McKnight, 2010; Starc and Town, 2020), including the inpatient offsets we document in Sections 6 and 7. If drugs had been "carved-in" or included in managed care plan contracts, plans may have chosen to ration access to drugs more aggressively than they did in the presence of the carve-out, possibly limiting the effect of relaxing the public drug cap.

To investigate this possibility, we leverage the fact that drugs were carved in to managed care plan contracts in Texas starting in 2012. Our detailed claims and enrollment data ends in 2010, so we cannot use it to study the effects of the carve-in of prescription drugs. Instead, we follow Dranove, Ody and Starc (2021) and use publicly available aggregate data describing prescription drug utilization and spending in Texas's Medicaid program (both public and private plans) over time.[4] In Appendix Figure G1, we document per-enrollee prescription drug utilization and expenditure levels in Texas Medicaid around the 2012 integration of drug services into private Medicaid contracts. The figures show no meaningful change in any of these measures of drug use within Texas Medicaid following the carve-in. In the figure, we also show the same set of outcomes for Arkansas as a reference and control, as it is the neighboring state with the most similar pre-2012 trends in drug utilization.

These results provide suggestive evidence that the prescription drug carve-out is relatively inconsequential for patterns of drug utilization in Texas. This is consistent with results from Dranove, Ody and Starc (2021) who show that, when a large set of states carve prescription drug benefits into managed care plan contracts, patterns of utilization change in ways that are similar to states which privatized medical and drug benefits at the same time. While they do find changes overall spending, these appear driven by changes in unit prices rather than by changes in utilization. The implication of this body of evidence is that there seems to be little consequence of including or excluding drugs from managed care plan contracts.

[4]The Medicaid State Drug Utilization Data is available online from https://www.medicaid.gov/medicaid/prescription-drugs/state-drug-utilization-data/index.html.

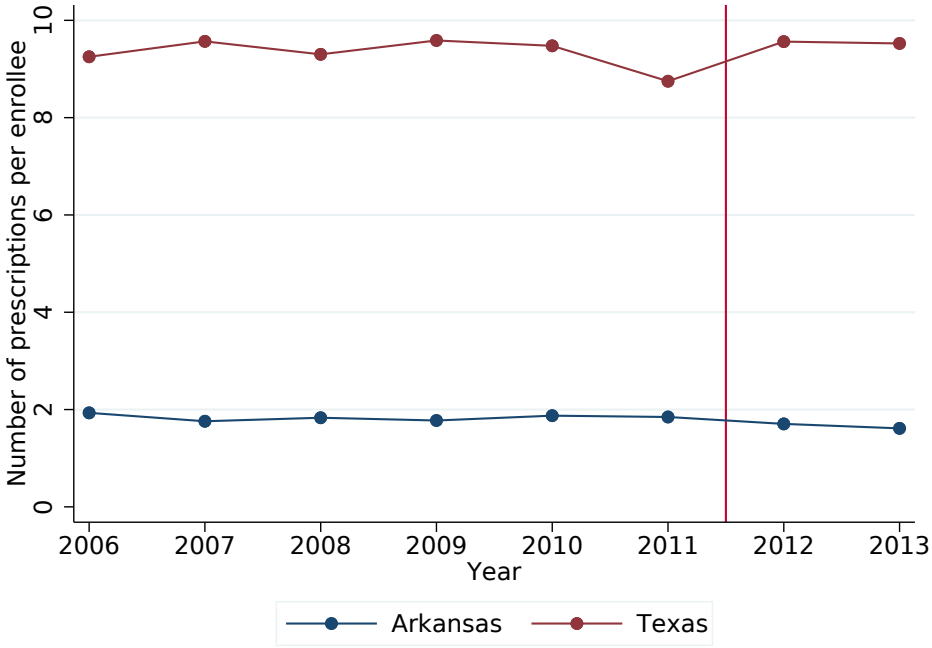
In other words, the evidence suggests that the effect of shifting to managed care on drug utilization would have been comparable irrespective of whether drugs were carved in or carved out, at the time of the shift.

Shift to Private Provision of Medical Benefits While the analysis so far suggests that the overall effect of the Texas reform on drug utilization came partly through the accompanying relaxation of drug caps, we cannot completely rule out the alternative mechanism of the drug effect instead coming through private provision's effect on patterns of medical care. For example, it is possible that the activities of the private Medicaid plans related to outpatient care (i.e. care management) naturally led to increased levels of drug utilization. Specifically, we showed that private provision led to increased use of outpatient care in Texas, and it is possible that just seeing the doctor more could lead to higher levels of drug utilization.

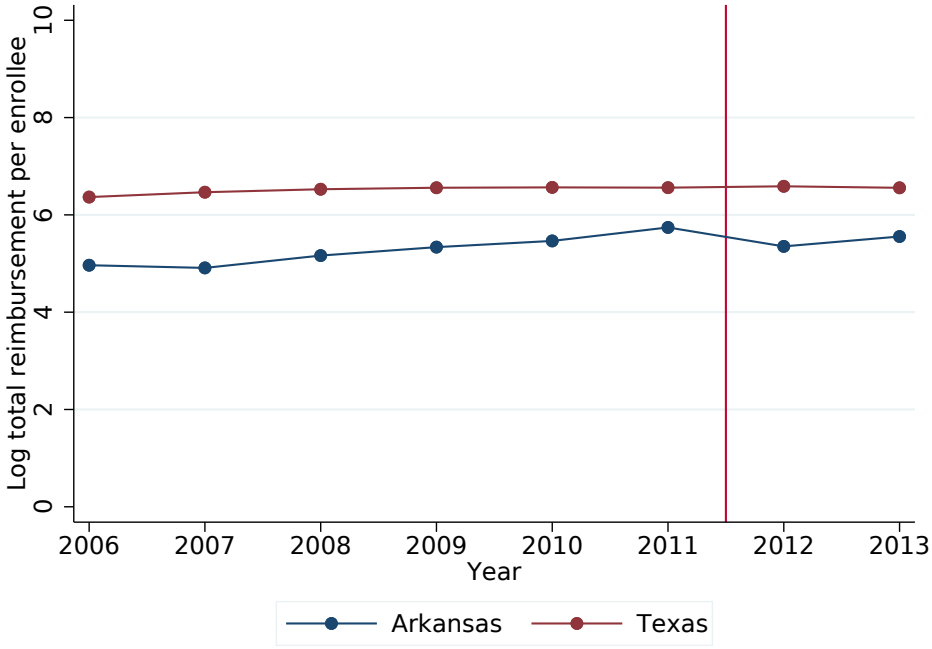
However, it seems unlikely that any care management activities would *only* affect utilization on the margin of taking three or more drugs, the margin we showed to be by far the most important for the drug effect we estimate. That said, our analysis cannot entirely rule out comparable drug effects, even absent the lifting of the public drug cap under privatization. To make this point, we must instead rely on the null result for drugs in our work studying the shift to managed care in New York, which had no drug cap (Layton et al., 2019).

Appendix Figure G1: Impact of the Prescription Drug Carve-in

(a) Number of Prescriptions



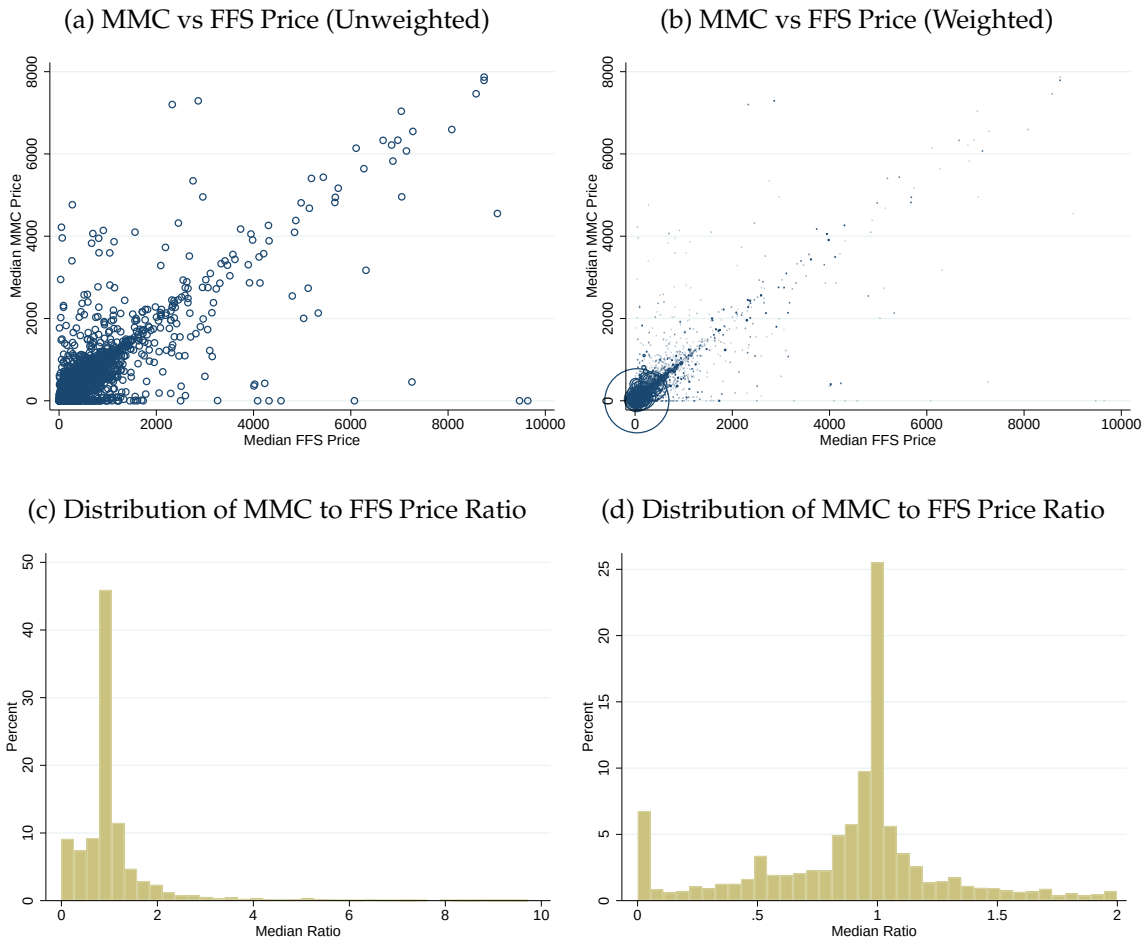
(b) Spending



Note: Figure shows the number of prescriptions and the amount of spending per enrollee in Texas and Arkansas before and after Texas carved prescription drugs into its managed care contracts in 2012. The data displayed here come from the publicly available Medicaid State Drug Utilization Data. For more details, see Appendix G. ($N = 64$ state-years.)

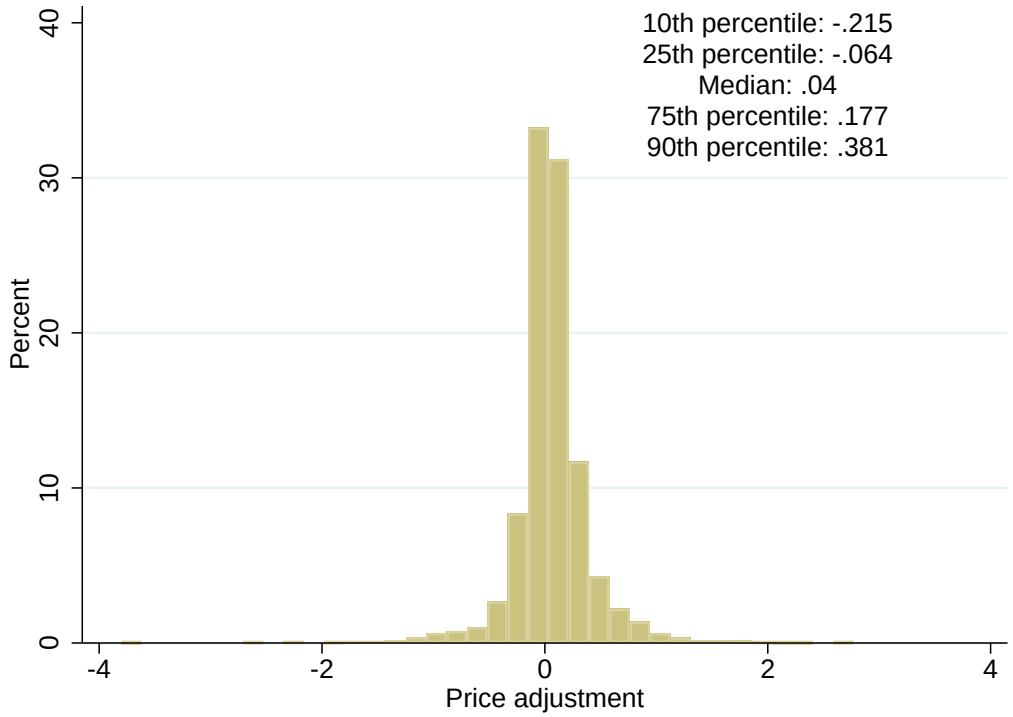
H Price Analysis

Appendix Figure H1: Prices Under FFS and MMC



Note: Figure shows how MMC and FFS prices compare in 2010, the final year in our data. For each procedure that we observe both under fee-for-service (FFS) Medicaid and Medicaid managed care (MMC), we compute the median price under FFS and under MMC. Panel (a) shows an unweighted scatterplot of the median MMC price vs the median FFS price, censored at $10,000 for readability. Panel (b) shows a weighted (by frequency under FFS) scatterplot of the median MMC price vs the median FFS price, censored at $10,000 for readability. Panel (c) shows a histogram of the distribution of the ratio of the median MMC price to the median FFS price, censored at 10 for readability. Panel (d) shows a histogram of the distribution of the ratio of the median MMC price to the median FFS price, censored at 2 for readability. For more details, see Section 7. ($N = 6,053$ unique procedure codes.)

Appendix Figure H2: Distribution of Procedure-Specific Price Differences



Note: Figure shows the distribution of procedure specific price differences. We estimate Equation (2) on the sample of procedures that we observe both under fee-for-service (FFS) Medicaid and Medicaid managed care, allowing the price difference to vary by procedure. We then plot the distribution of the estimated price differences. For more details, see Section 7. ($N = 6,053$ unique procedure codes.)

Appendix Table H1: Price Adjustment Coefficient

	(1) Log Medicaid Payment
Medicaid Managed Care	.085
	(.0002)

Note: Table shows the estimated difference in log Medicaid payments between Medicaid managed care and fee-for-service Medicaid. The results are from estimating Equation (2). For more details, see Section 7. ($N = 94,472,521$ claims.)

Appendix Table H2: Price-Adjusted Outpatient Spending Outcomes

	(1) Spending	(2) Spending	(3) Adjusted Spending	(4) Adjusted Spending
Treatment × Post	366		265	
	(45)		(42.8)	
Treatment × Post (2007-2008)		200		123
		(36.7)		(35.9)
Treatment × Post (2009-2010)		501		374
		(62.9)		(60.2)
IV Coefficient	489	480	354	343
	(54.3)	(57.5)	(53.3)	(56.9)
Baseline Mean	1,551	1,551	1,549	1,549
Percent Change	.316	.309	.229	.221
	(.035)	(.037)	(.034)	(.037)
Individual Fixed Effects	X	X	X	X

Note: Table shows reduced form and instrumental variable estimates for price-adjusted outpatient spending outcomes. For each outcome, the first column shows estimates of control-treatment differences from estimating the pooled version of the reduced form specification in Equation (1) and estimates of the impact of Medicaid managed care from estimating our instrumental variable specification, pooling over the entire post-period. The second column shows reduced form and instrumental variable estimates, when the post-period is broken into two separate periods, 2007-2008 and 2009-2010. In the second and fourth columns we estimate the IV coefficient using the two separate treatment × post interaction terms as instruments. We control for service area by quarter fixed effects. Standard errors are clustered at the county level. For more details, see Section 4. ($N = 643,751$ beneficiary-quarters.)

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