

TECHNICAL APPENDIX: THE ASSOCIATION BETWEEN DRUG REBATES AND LIST PRICES

Table A1. Sample Selection for Data Used in Tables 1 and 2

This table shows how we arrived at the final sample used in the main analysis. The final sample after Step 3 is that used in Table 1 and in columns (1) and (2) of Table 2. The final sample after Step 5 is that used for the “Excluding High Medicaid Share Drugs” analysis in column (3) of Table 2.

Step	Description	Number of NDCs	NDCs in 2016-18	NDC-Years	NDC-Years 2016-18	Number of Brand Names	Years
1	All NDCs appearing in both SSR Health and First Databank datasets, 2015-2018	2,046	1,919	6,952	5,067	951	2015, 2016, 2017, 2018
2	Drop NDCs with rebates < 0 (i.e. net price > list price) in any year	608		1,947		310	2015, 2016, 2017, 2018
	Remaining	1,438	1,313	5,005	3,682	641	2015, 2016, 2017, 2018
3	Calculate changes in rebates from year (t-1) to year (t), and drop NDC-Years where change in rebates is missing	103		1,444		42	2015, 2016, 2017, 2018
	Remaining	1,335		3,561		599	2016, 2017, 2018
For high Medicaid share analysis only (Table 2, Column 3)							
4	Drop NDCs that do not appear in both MEPS 2016 and SSR data	430		1,185		0	2016, 2017, 2018
	Remaining	905		2,376		390	2016, 2017, 2018
5	Drop NDCs in classes with Medicaid ratio above the 50th percentile	430		1,129		185	2016, 2017, 2018
	Remaining	475		1,247		205	2016, 2017, 2018

Notes: NDC=National Drug Code; MEPS=Medical Expenditure Panel Survey

Table A2. Sample Selection for Data Used in Tables A3 and A4

This table shows how we arrived at the final sample used in the sensitivity analyses with a less restricted sample of drugs. The final sample after Step 3 is that used in Table A3 and in columns (1) and (2) of Table A4. The final sample after Step 5 is that used in column (3) of Table A4.

Step	Description	Number of NDCs	NDCs in 2016-18	NDC-Years	NDC-Years 2016-18	Number of Brand Names	Years
1	All NDCs appearing in both SSR Health and First Databank datasets, 2015-2018	2,046	1,919	6,952	5,067	951	2015, 2016, 2017, 2018
2	Drop NDCs with rebates < -\$1,000 (i.e. net price - list price > \$1,000) in any year	44		127		27	2015, 2016, 2017, 2018
	Remaining	2,002	1,876	6,825	4,975	924	2015, 2016, 2017, 2018
3	Calculate changes in rebates from year (t-1) to year (t), and drop NDC-Years where change in rebates is missing	169		2,015		761	2015, 2016, 2017, 2018
	Remaining	1,833		4,810		853	2016, 2017, 2018
For high Medicaid share analysis only (Table A4, Column 3)							
4	Drop NDCs that do not appear in both MEPS 2016 and SSR data	671		1,793		339	2016, 2017, 2018
	Remaining	1,162		3,017		514	2016, 2017, 2018
5	Drop NDCs in classes with Medicaid ratio above the 50th percentile	592		1,535		246	2016, 2017, 2018
	Remaining	570		1,482		268	2016, 2017, 2018

Notes: NDC=National Drug Code; MEPS=Medical Expenditure Panel Survey

Table A3. Descriptive Statistics of Analytic Variables — Less Restricted Sample

This table describes the analytic variables (corresponding to Table 1) in our less restricted sample of 4,810 NDC-Years that excludes only the 44 NDCs (127 NDC-Years) with rebates < -\$1,000.

	Year	Mean (\$/Unit)	Standard Deviation (\$/Unit)	Minimum (\$/Unit)	Maximum (\$/Unit)	Number of NDCs
List Price	2015	305.42	1,335	0.19	27,849	1,712
	2016	337.08	1,524	0.20	28,712	1,712
	2017	398.56	1,644	0.20	28,161	1,639
	2018	448.33	1,700	0.20	31,339	1,459
Net Price	2015	247.80	1,105	0.21	25,097	1,712
	2016	257.89	1,134	0.09	21,963	1,712
	2017	299.51	1,241	0.06	22,138	1,639
	2018	315.49	1,209	0.04	21,453	1,459
Rebate	2015	57.62	371	(994.29)	7,134	1,712
	2016	79.19	499	(969.81)	10,784	1,712
	2017	99.05	527	(968.92)	9,071	1,639
	2018	132.83	633	(995.30)	9,886	1,459
Change in List Price	2015-16	31.65	283	(112.26)	10,139	1,712
	2016-17	27.76	431	(9,529)	13,730	1,639
	2017-18	18.30	330	(10,841)	3,178	1,459
Change in Net Price	2015-16	10.09	201	(3,134)	6,489	1,712
	2016-17	18.76	346	(7,651)	9,395	1,639
	2017-18	(12.83)	229	(7,324)	998.76	1,459
Change in Rebate	2015-16	21.57	182	(925.79)	3,997	1,712
	2016-17	9.00	178	(1,878)	4,335	1,639
	2017-18	31.13	217	(3,517)	3,863	1,459

Notes: The sample includes only drugs with rebates \geq -1,000. SSR Health methodology may produce negative rebates due to disparities in timing between inventory and sales. NDC=National Drug Code. All dollar figures are nominal. Stata[®] 14 was used for analyses.

Table A4. Association Between Change in List Prices and Change in Rebates (\$US/Unit) — Less Restricted Sample

This table presents our main results (corresponding to Table 2) using the less restricted sample of 4,810 NDC-Years that excludes only the 44 NDCs (127 NDC-Years) with rebates < -\$1,000.

Independent Variables	Dependent Variable: Annual Change in List Prices		
	(1) Longitudinal Estimation of Annual Change in List Prices	(2) Model (1) with (Drug Class) x (Year) Instead of Year Indicators	(3) Model (1) Excluding High Medicaid Share Drugs
Annual Change in Rebates	1.23	1.25	0.64
P-value	< 0.001	< 0.001	< 0.001
95% Confidence Interval	0.75 to 1.72	0.71 to 1.79	0.44 to 0.85
Year 2015-16 Indicator	Reference		Reference
Year 2016-17 Indicator	11.60		-1.49
P-value	0.22		0.47
95% Confidence Interval	-6.99 to 30.18		-5.49 to 2.51
Year 2017-18 Indicator	-25.15		-4.61
P-value	< 0.001		0.034
95% Confidence Interval	-39.28 to 11.01		-8.88 to -0.34
Constant	5.07	-1.35	6.96
P-value	0.50	0.001	< 0.001
95% Confidence Interval	-9.74 to 19.87	-2.17 to -0.52	3.39 to 10.53
Number of NDC-Years [†]	4,810	4,810	1,482

Notes: Robust standard errors are clustered by National Drug Code (NDC).

[†] *From the original 2,046 NDCs, we excluded 44 with rebates below -\$1,000 in any year from 2015 to 2018, and 169 with missing data in changes in rebates. Data are based on annual changes in list prices and rebates for 1,833 NDCs in columns (1) and (2), and for 570 NDCs in column (3). Not all NDCs are present in all years. In column (2) the coefficients on the (year) x (drug class) variables are not reported. Stata® 14 was used for estimations.*

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