
The Effect of Prescription Drug Monitoring Programs on Opioid Utilization in Medicare
Online Appendix

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Appendix

A.1 Variable Availability

Table A.1: Variable Availability

2007	2008	2009	2010	2011	2012	2013
Quantity Variables: P(taking opioids), 211+ Days Supply, 120+ Daily MED, Overlapping Claims States Identifying Impact: NV, LA, OK, OH, DE, WV, KY, NM, TN, NY						
		Shopping Variables: 5+ Prescribers/Pharmacies, Excess OOS Prescribers/Pharmacies States Identifying Impact: OK, OH, DE, WV, KY, NM, TN, NY				
Medical Services Variables: Poisonings, New Patient Visits States Identifying Impact: NV, LA, OK, OH, DE, WV, KY, NM						

Due to data availability constraints, not all variables studied in this paper are measured over the entire seven year (fourteen half-year) time period covered in this paper. Table A.1 describes the exact availability of our outcome variables. Quantity variables related to taking opioids or days supply are observed in all time periods. Our 2007 Part D Event dataset was from a preliminary release which did not record prescriber or pharmacy; therefore, outcomes related to prescribers or pharmacies are missing for 2007. We do not have inpatient, outpatient, or carrier medical claims for 2013, so variables calculated from those datasets, such as opioid poisoning incidents or new patient visits, are missing for 2013.

A.2 Supplementary Figures and Tables

Table A.2: Probits on Opioid Poisoning Incidents
 Misuse measures and opioid poisonings, Sample mean = 0.00203

VARIABLES	(1) Poisonings	(2) Poisonings	(3) Poisonings	(4) Poisonings	(5) Poisonings	(6) Poisonings	(7) Poisonings	(8) Poisonings	(9) Poisonings
211+ Days Supply	0.00651*** (0.000172)								0.00260*** (0.000142)
120+ Daily MED		0.00721*** (0.000413)							0.00085*** (0.000157)
Overlapping Claims			0.00571*** (0.000160)						0.00171*** (0.000114)
5+ Prescribers				0.01290*** (0.000476)					0.00456*** (0.000272)
5+ Pharmacies					0.02070*** (0.001179)				0.00206*** (0.000280)
Excess OOS Prescribers						-0.00004 (0.000187)			-0.00029 (0.000166)
Excess OOS Pharmacies							0.00148*** (0.000172)		0.00090*** (0.000154)
4+ New Patient Visits								0.00214*** (0.000296)	0.00033 (0.000172)
Observations	3,082,143	3,082,143	3,082,143	2,619,193	2,619,193	2,603,764	2,603,734	3,082,143	2,603,667

This table reports the marginal effects of probits predicting an opioid poisoning incident in a half-year using contemporaneous measures of misuse among opioid takers enrolled in Part D and fee-for-service Medicare (not Medicare Advantage) in the period 2007–2012. The number of observations varies because in 2007 we do not observe prescribers and pharmacies, and in any year a few prescribers and pharmacies cannot be reliably assigned to states.

Table A.3: "Must Access" PDMPs' Impact Among All Part D Enrollees

	Quantity Outcomes			Shopping Outcomes		Medical Services Outcomes	
	211+ Days Supply	120+ Daily MED	Overlapping Claims	5+ Prescribers	5+ Pharmacies	4+ New Patient Visits	Opioid Poisonings
P(taking opioids)	-0.00673*	-0.00165+	-0.00210*	-0.00085*	-0.00034**	-0.00079+	-0.00002
	(0.0032)	(0.0001)	(0.0008)	(0.0004)	(0.0001)	(0.0004)	(0.0001)
Must Access	0.0280	0.00473	0.0256	0.0065	0.0017	0.0075	0.0007
Mean of LHS	714	714	714	612	612	612	612
N							

This table repeats the analysis of Table ?? but does not limit the analysis sample to opioid takers. Each column is the result of OLS regression on state-halfyear aggregates of all Medicare beneficiaries enrolled in Part D and fee-for-service, where those who do not take opioids do not fulfill our misuse criteria. Each observation is weighted by the number of individuals represented. The excess out-of-state provider measures cannot be calculated for this sample, since the number of opioid prescriptions is zero. Fixed effects for states and halfyears are always included, and standard errors (in parentheses) are clustered at the state. The impact on quantity outcomes is estimated for 2007h1 to 2013h2; the impact on shopping outcomes is estimated for 2008h1 to 2013h2; the impact on medical services outcomes is estimated for 2007h1 to 2012h2.

Table A.4: “Must Access” PDMPs, Laws Allowing Delegates, Increasing Reporting Frequency, and Regulating Pain Clinics

	Quantity Outcomes				Shopping Outcomes			Medical Services Outcomes		
	P(taking opioids)	211+ Days Supply	120+ Daily MED	Over- lapping Claims	5+ Prescribers	5+ Phar- macies	Excess OOS Phar- macies	Excess OOS Phar- macies	4+ New Patient Visits	Opioid Poison- ings
Must Access	-0.00673* (0.0032)	-0.00429+ (0.0024)	0.000188 (0.0004)	-0.00552** (0.0016)	-0.00189* (0.0008)	-0.000935** (0.0003)	0.366+ (0.2080)	-0.0900 (0.1810)	-0.00223** (0.0007)	-0.000044 (0.0002)
Must Access	-0.00282 (0.0028)	-0.00225 (0.0021)	-0.00006 (0.0005)	-0.00368** (0.0013)	-0.00125 (0.0010)	-0.000668* (0.0003)	0.375+ (0.1970)	-0.110 (0.1790)	-0.00301* (0.0013)	-0.000002 (0.0002)
Allow Delegates	-0.00543* (0.0026)	-0.00328* (0.0013)	-0.00031 (0.0004)	-0.00150 (0.0012)	-0.00101 (0.0012)	0.00029 (0.0004)	0.0681 (0.0933)	-0.148 (0.1840)	0.000117 (0.0012)	0.000049 (0.0001)
Increase Frequency	0.00041 (0.0013)	-0.000888 (0.0010)	0.00035 (0.0006)	-0.00112 (0.0008)	-0.00004 (0.0007)	-0.000314 (0.0003)	-0.0968 (0.1030)	0.005 (0.1310)	-0.000955 (0.0009)	-0.000194 (0.0002)
Pain Clinic Regulation	-0.00417 (0.0029)	-0.00031 (0.0014)	0.00063 (0.0005)	-0.00171 (0.0017)	-0.000227 (0.0013)	-0.000608* (0.0003)	0.0153 (0.1100)	0.227* (0.0899)	0.00391* (0.0015)	0.000099 (0.0001)

This table estimates the impact of a “must access” PDMP, controlling for three different policies that sometimes co-occur with “must access” provisions. The top row repeats the analysis of Table ?? for reference. The lower panel adds as extra independent variables dummies for allowing delegates, increasing reporting frequency, and regulating pain clinics. Each column is the result of OLS regression on state-halfyear aggregates. Each observation is weighted by the number of individuals represented. Fixed effects for states and halfyears are always included, and standard errors (in parentheses) are clustered at the state. The impact on quantity outcomes is estimated for 2007h1 to 2013h2; the impact on shopping outcomes is estimated for 2008h1 to 2013h2; the impact on medical services outcomes is estimated for 2007h1 to 2012h2.

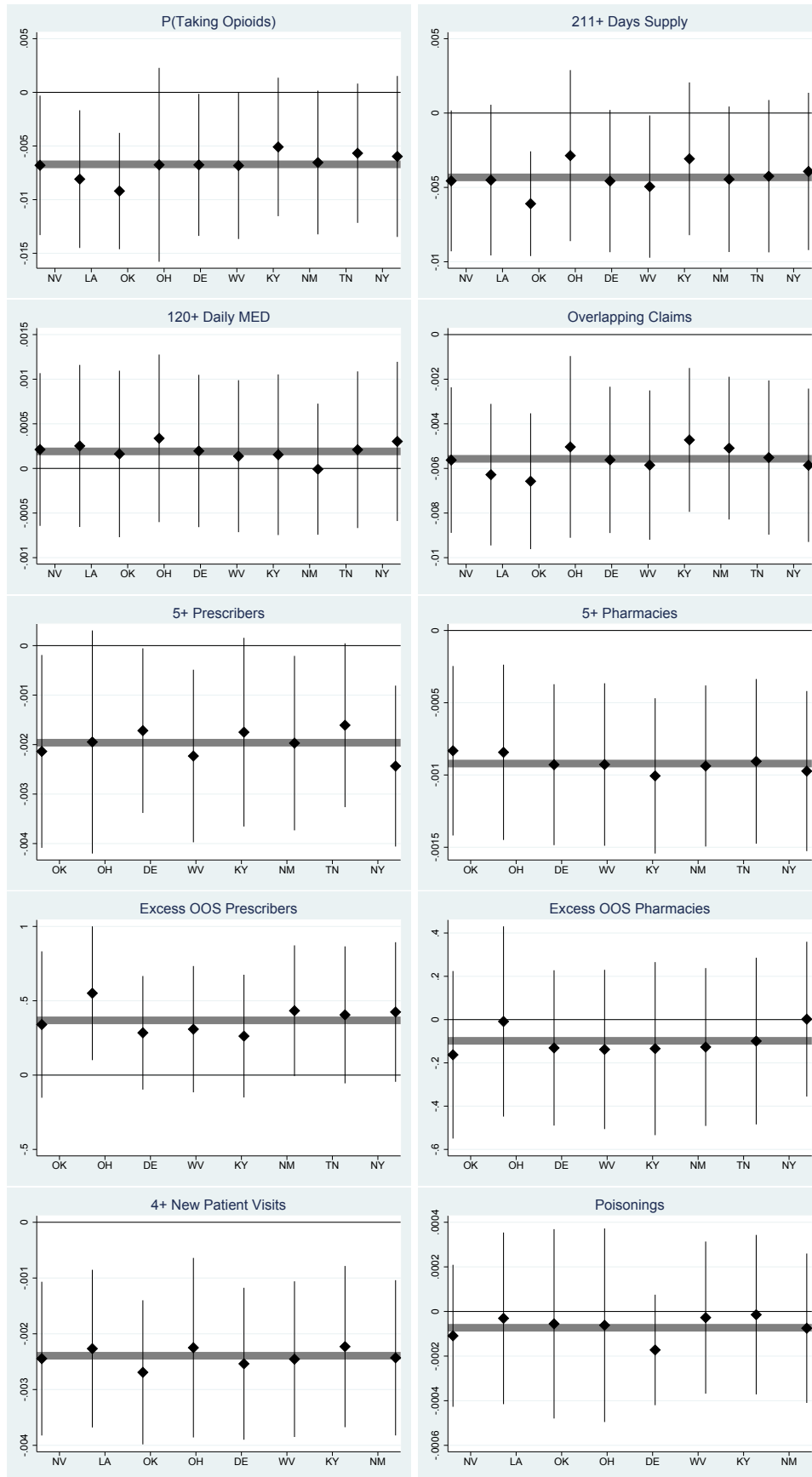


Figure A.1: State-by-State Analysis: Dropping Each State Sequentially. Gray bar denotes overall estimate.

The figures report the point estimate and 95% CI from Equation 1, where in each regression we drop one state that implements a “must access” PDMP.

Table A.5: Effect of “Must Access” PDMP Law on Health Status Subsamples

	Quantity Outcomes			Shopping Outcomes			Medical Services Outcomes		
	211+ Days Supply	120+ Daily MED	Overlapping Claims	5+ Prescribers	5+ Pharmacies	Excess OOS Prescribers	Excess OOS Pharmacies	4+ New Patient Visits	Opioid Poisonings
	Cancer Patients								
Must Access	-0.00383 (0.0050)	0.00468* (0.0019)	-0.000957 (0.0044)	-0.00550** (0.0019)	-0.00146 (0.0012)	0.114 (0.2550)	0.495** (0.1130)	-0.00338 (0.0021)	-0.00121** (0.0003)
mean of LHS	0.3700	0.0729	0.1010	0.0296	0.0053	0.0000	0.0000	0.0363	0.0020
	Not Cancer Patients								
Must Access	-0.000106 (0.0038)	-0.00234 (0.0026)	-0.00432* (0.0018)	-0.00275** (0.0009)	-0.00160** (0.0004)	0.389 (0.2400)	0.289* (0.1140)	-0.00170* (0.0007)	0.000107 (0.0002)
mean of LHS	0.2720	0.0907	0.0918	0.0237	0.0062	0.0000	0.0000	0.0125	0.0020
	Die in the Half-Year								
Must Access	-0.00404 (0.0051)	-0.00415 (0.0040)	-0.0106* (0.0042)	-0.00274 (0.0021)	-0.00137* (0.0006)	0.091 (0.2320)	-0.215 (0.1290)	0.00185 (0.0034)	-0.000231 (0.0015)
mean of LHS	0.3750	0.0295	0.1110	0.0140	0.0021	0.0000	0.0000	0.0085	0.0036
	Do Not Die in the Half-Year								
Must Access	-0.00673* (0.0032)	-0.00432+ (0.0025)	-0.00538** (0.0017)	-0.00187* (0.0009)	-0.000920** (0.0003)	0.363+ (0.2100)	-0.0825 (0.1800)	-0.00237** (0.0007)	-0.0000376 (0.0002)
mean of LHS	0.2780	0.0909	0.0908	0.0232	0.0060	0.0000	0.0000	0.0156	0.0020

This table repeats our baseline analysis on health subsamples. The panels show the results for OLS regressions on state-halfyear aggregates of opioid takers in each of the specified eligibility subsamples. Each observation is weighted by the number of individuals represented. Fixed effects for states and halfyears are always included, and standard errors are clustered at the state. +, *, **, and *** represent significance at the 5, 1, and 0.1 percent levels, respectively. The impact on quantity outcomes is estimated for 2007h1 to 2013h2; the impact on shopping outcomes is estimated for 2008h1 to 2013h2; the impact on medical services outcomes is estimated for 2007h1 to 2012h2.