Insurance Parity Laws and Reducing Suicides: Replicating Lang (2013)

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Abstract

Over the past two decades, despite efforts from psychologists and mental health professionals alike, the United States has seen a steady growth of suicides despite nearly all other Western countries experiencing the contrary. Apart of this growth could be attributed to the lagging implementation of mental health care pairty. The Mental Health Parity Act of 1996 (MHPA) was critized during the turn of the century for not doing enough to restrict insurance companies ability to discrimate between treating bodily and mental injury. In this study, I attempt to replicate and build upon results from Lang (2013) using additional data, propensity score matching methods along with heterogenous difference in difference.

Introduction

According to 2019 Survey for Drug use and Health, it was estimated that at least 51.5 million adults in the United States had some sort of mental illness. In the same year, 13.1 million were estimated to have a serious mental illness that resulted in serious functional impairment or interferes with at least one or more major life activity. Only 65.5% of those 13.1 million received any sort of mental health treatment in the past year. According to the Center for Disease Control's WISQARS Leading Causes of Death Report, Suicides are the second leading cause of death amongst people aged 10-34 and the fourth from 35-44 in the United States. Suicide rates have gradually increased over the past two decades, starting with 10.5 per 100,000 people to 14.2 per 10,000 in 2018. Suicide rates vary from state to state with both east and west coasts supporting low rates such as 7.4 per 100,000 while mid-western states suffer from rates as high as 25 per 100,000. Several Sources outline the negative effects not only through statistical life projections and productivity losses but more generally how devastating the preventable loss of life has on communities. (Klick and Markowitz 2006; Lang 2013)

The Federal Mental Health Parity Act of 1996 prevented group health plan and insurance issuers from offering less mental health or substance abuse coverage benefits compared to regular medical coverage. If a provider gave mental health services, they couldn't offer benefit limitations that they wouldn't otherwise give to their same medical/surgical coverage. Most states by 2002 instated mental health parity laws alongside further stipulations with varying degrees of restrictiveness and exemptions.

Lang (2013)

My seminal paper, Lang (2013) attempts to identify causal effects using difference-in-difference methods and fixed effects using policy shocks resulting from the aftereffects of the Federal Health Parity Act of 1996. Lang (2013) showed a statistically significant effect

of a 4-7% decrease in suicide rate after policy implementation. I draw the same data detailed in the study while using more modern statistical methods that surround difference in difference. I run my difference in difference using regression similar to Lang (2013) in addition to conducting propensity score matching methods to achieve a better balance between covariates between control and treatment states. I also use more modern difference in difference methods using the data and found

Parity laws:

Any state implementing a law that requires insurance packages to include access to mental health services and to have those services at parity with any other physical service is flagged as a parity state. This type of law is the strongest type amongst the ones implemented and is the type expected to create an effect this study investigates. A less strict version of the parity law is the "mandated offering" law, which does not force insurance package providers to provide mental health services in the first place. This can be a crucial difference when it comes to further analysis but for the purposes of this study both are lumped together as a Parity state.

Literature

Data

My dataset pulls from the same sources from Lang (2013) with the exception of one variable. I pull from the CDC's WISRAQ

Methods

Results

Discussion

Conclusion

Figures

Table 1: Summary Statistics

Variable	N	Wt. Mean	Wt. SD	Min	Pctl. 25	Pctl. 75	Max
Suicide Rate	765	11.32	2.681	4.021	10.59	13.98	24.97
Log suicide rate	765	2.398	0.2415	1.392	2.36	2.638	3.218
Unemployment rate	765	5.573	1.421	2.108	4.267	6.192	11.23
Bankrupcy rate per 100k	765	435.6	169.5	79.46	287.6	516.5	1117
Percent of workers in large Firms	765	0.483	0.03803	0.2699	0.4291	0.5025	0.5711

Table 2: Summary Statistics

Pre_Post_Parity	No-Parity			Post-Parity			Pre-Pairty		
Variable	N	Wt. Mean	Wt. SD	N	Wt. Mean	Wt. SD	N	Wt. Mean	Wt. SD
Suicide Rate	330	12.57	2.263	178	9.848	2.583	257	10.85	2.548
Log suicide rate	330	2.517	0.1696	178	2.255	0.2545	257	2.356	0.2385
Unemployment rate	330	5.338	1.288	178	5.134	1.113	257	6.131	1.568
Bankrupcy rate per 100k	330	442.5	188.5	178	476.1	169.3	257	401.3	137.3
Percent of workers in large Firms	330	0.4887	0.03845	178	0.4886	0.03846	257	0.4727	0.03511

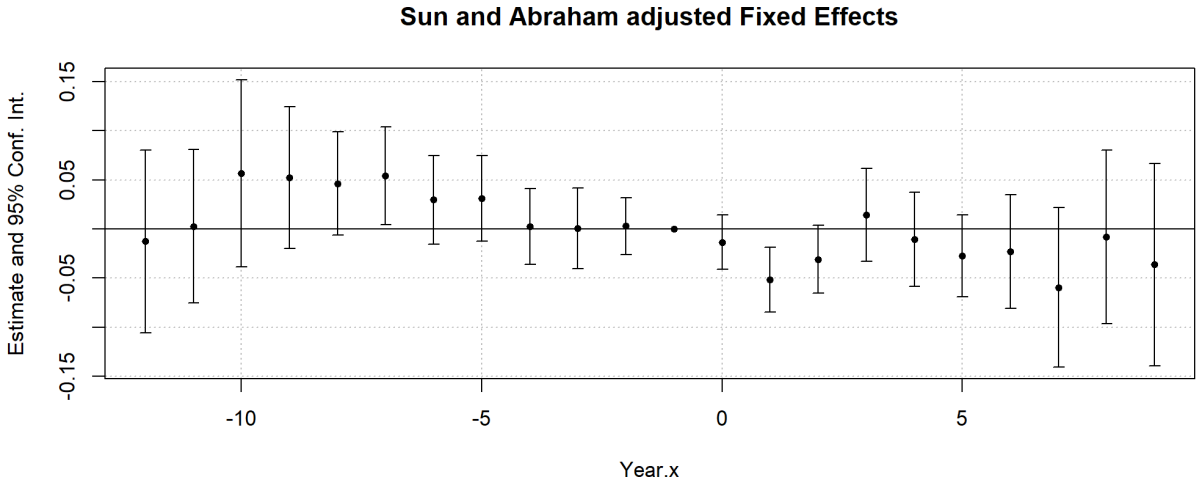


Table 3: Weighted Mean Suicide Rates of Treated and Nontreated States, Pre and Post Period

Time Period Group	mean	st.err	sd	n
NoTreatPost-Period	12.2426	0.2118	2.0905	154
NoTreatPre-Period	12.8921	0.2264	2.3786	176
Post-Period	9.7867	0.2927	2.5778	203
Pre-Period	11.0831	0.2616	2.4765	232

Table 4: Weighted Mean Log Suicide Rates of Treated and Nontreated States, Pre and Post Period

Time Period Group	mean	st.err	sd	n
NoTreatPost-Period	2.4915	0.0165	0.1625	154
NoTreatPre-Period	2.5413	0.0165	0.1732	176
Post-Period	2.2485	0.0288	0.2537	203
Pre-Period	2.3800	0.0241	0.2285	232

Table 5: Difference in Difference estimates of the impact of access to parity mandates on suicide rates

Panel A			
State/ Type Period	1990-1997	1998-2004	difference between periods
Access to Parity States	11.083	9.787	-1.2964
	(.262)	(.293)	(0.2272)
	[232]	[203]	
No Parity States/ No Law States	12.892	12.2426	0.6495
	(0.226)	(0.212)	(0.2730)
	[154]	[176]	
Difference between types of states	-1.809	-2.456	
	(0.2481)	(0.2541)	
Difference in Difference	-.647		
	(0.3552)		
Panel B			
State/ Type Period	1990-1997	1998-2004	difference between periods
Access to Parity States	2.380	2.249	-.131
	(.024)	(.029)	(.0202)
	[232]	[203]	
No Parity States/ No Law States	2.541	2.492	-.049
	(.0165)	(.0165)	(.02422)
	[176]	[154]	
Difference between types of states	-.161	-.243	
	(.022)	(.0226)	
Difference in Difference	-.0817***		
	(.032)		

Each cell contains the average suicide rate/log suicide rate for the specified group that are weighted by yearly state population.
Standard errors are reported in parentheses; sample sizes are reported in brackets.
*Significant at the 5% level, ***significant at the 1% level.

Table 6: The Two-way Fixed Effect Regressions on the Impact of Mental Health Parity Laws

Dependent Variable:	Log Suicide Rate			
Model:	(1)	(2)	(3)	(4)
Variables				
D_AccessToParity	-0.0418***	-0.0411***		-0.0461**
	(0.0129)	(0.0131)		(0.0186)
D_NonParityLaw	-0.0019			
	(0.0134)			
'unemploymentrate'	0.0152***	0.0152***	0.0151***	0.0155***
	(0.0049)	(0.0049)	(0.0049)	(0.0049)
Bankruptcy Per 100,000	0.0002***	0.0002***	0.0003***	0.0002***
	(4.38×10^{-5})	(4.41×10^{-5})	(4.27×10^{-5})	(4.29×10^{-5})
Percent Working in Large Firms	0.6413	0.6406	0.5382	0.6499
	(0.4625)	(0.4636)	(0.4538)	(0.4739)
D_ParityLawPassed			-0.0294**	
			(0.0144)	
D_Mandatedofferinglaws			-0.0872***	
			(0.0226)	
D_MandatedifOffered			-0.0196	-0.0220
			(0.0154)	(0.0179)
D_NoLaw				-0.0043
				(0.0148)
Fixed-effects				
State	Yes	Yes	Yes	Yes
Year.x	Yes	Yes	Yes	Yes
Fit statistics				
Observations	765	765	765	765
R^2	0.94704	0.94704	0.94836	0.94715
Within R^2	0.21667	0.21664	0.23609	0.21825

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 7: First Differences Regressions on the Impact of Mental Health Parity Laws

	ΔLog Crude Rate		ΔLog Crude Rate	
ΔUnemployment Rate	0.014		0.014	
	(0.008)		(0.008)	
ΔPercent of Workers in Large Firms	-0.702		-0.690	
	(0.647)		(0.660)	
ΔBankruptcy per 100,000	-0.000		-0.000	
	(0.000)		(0.000)	
ΔAccess to Parity	-0.021		-0.021	
	(0.012)		(0.012)	
ΔNon Parity Law			0.004	
			(0.015)	
Intercept	-0.007	**	-0.007	**
	(0.001)		(0.001)	
R^2	0.14		0.14	
N	714		714	
AdjustedR^2	0.05		0.05	
F Statistic	2.86		2.50	

** p<.01, * p<.05

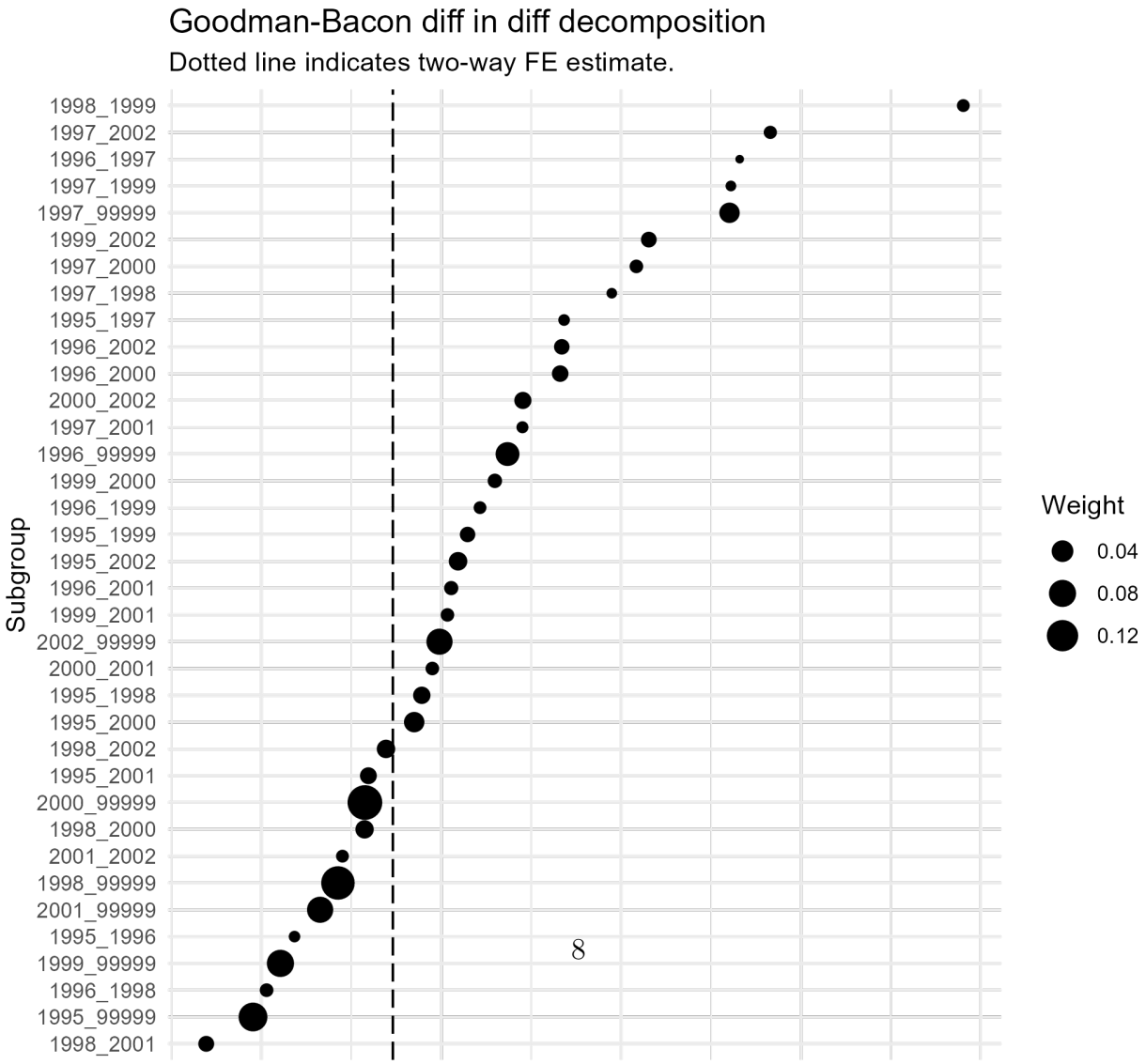


Table 8: Matched Table A

Dependent Variables: Matching Model:	Crude Suicide Rate Mahalanobis	Log Suicide Rate Mahalanobis	Crude Suicide Rate Full with Probit	Log Suicide Rate Full with Probit
Variables				
TreatPost	0.060	-0.015	-0.279	-0.043***
	(0.329)	(0.028)	(0.176)	(0.015)
'unemploymentrate'	0.229*	0.027**	0.121**	0.014***
	(0.126)	(0.011)	(0.057)	(0.005)
Bankruptcy Per 100,000	0.0007	5.64×10^{-5}	0.003***	0.0003***
	(0.0006)	(4.79×10^{-5})	(0.0005)	(4.25×10^{-5})
Percent Working in Large Firms	6.05	0.539	-0.346	0.548
	(8.36)	(0.788)	(4.43)	(0.435)
Fixed-effects				
State	Yes	Yes	Yes	Yes
Year.x	Yes	Yes	Yes	Yes
Fit statistics				
Observations	284	284	765	765
R^2	0.96644	0.96979	0.94241	0.94692
Within R^2	0.03924	0.06029	0.14513	0.21481

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 9: Matched Table B

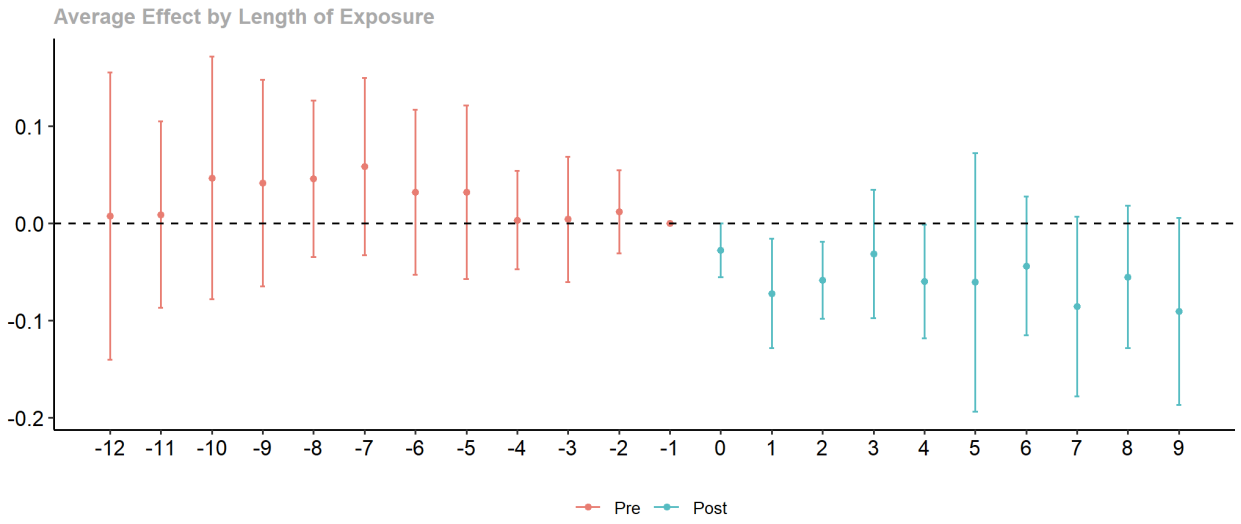
Dependent Variables: Matching Model:	Crude Suicide Rate Full with GLM	Log Suicide Rate Full with GLM	Crude Suicide Rate Full with Cardinality	Log Suicide Rate Full with Cardinality
Variables				
TreatPost	-0.279	-0.043***	-0.103	-0.038
	(0.176)	(0.015)	(0.408)	(0.038)
'unemploymentrate'	0.121**	0.014***	0.418***	0.039***
	(0.057)	(0.005)	(0.136)	(0.013)
Bankruptcy Per 100,000	0.003***	0.0003***	0.0002	-1.08×10^{-5}
	(0.0005)	(4.25×10^{-5})	(0.0009)	(8.48×10^{-5})
Percent Working in Large Firms	-0.346	0.548	17.8**	1.84**
	(4.43)	(0.435)	(8.07)	(0.803)
Fixed-effects				
State	Yes	Yes	Yes	Yes
Year.x	Yes	Yes	Yes	Yes
Fit statistics				
Observations	765	765	168	168
R^2	0.94241	0.94692	0.97177	0.97352
Within R^2	0.14513	0.21481	0.12200	0.16782

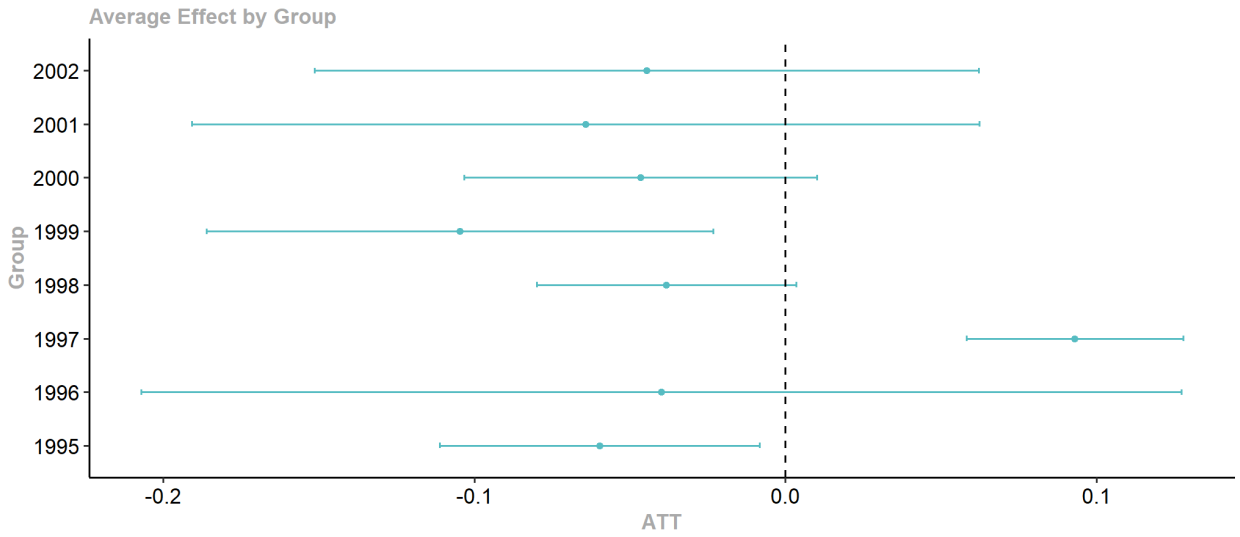
Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 10: Matched Table C

Dependent Variables: Matching Model:	Crude Suicide Rate Coarse-Exact Matching	Log Suicide Rate Coarse-Exact Matching	Crude Suicide Rate Subclass	Log Suicide Rate Subclass
Variables				
TreatPost	-0.156	-0.027	-0.279	-0.043***
	(0.217)	(0.020)	(0.176)	(0.015)
'unemploymentrate'	0.108	0.018	0.121**	0.014***
	(0.119)	(0.012)	(0.057)	(0.005)
Bankruptcy Per 100,000	0.002**	0.0002**	0.003***	0.0003***
	(0.0007)	(7.95×10^{-5})	(0.0005)	(4.25×10^{-5})
Percent Working in Large Firms	-6.37	-0.002	-0.346	0.548
	(7.16)	(0.666)	(4.43)	(0.435)
Fixed-effects				
State	Yes	Yes	Yes	Yes
Year.x	Yes	Yes	Yes	Yes
Fit statistics				
Observations	319	319	765	765
R^2	0.96784	0.96903	0.94241	0.94692
Within R^2	0.07776	0.10345	0.14513	0.21481

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*




Average Effect by Group
2002
2001
2000
1999
1998
1997
1996
1995
Group
-0.2
-0.1
0.0
0.1
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References

Klick, Jonathan, and Sara Markowitz. 2006. "Are Mental Health Insurance Mandates Effective? Evidence from Suicides." *Health Economics* 15 (1): 83–97. https://doi.org/10.1002/hec.1023.

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