Online Appendices: Regulating Markups in U.S. Health Insurance

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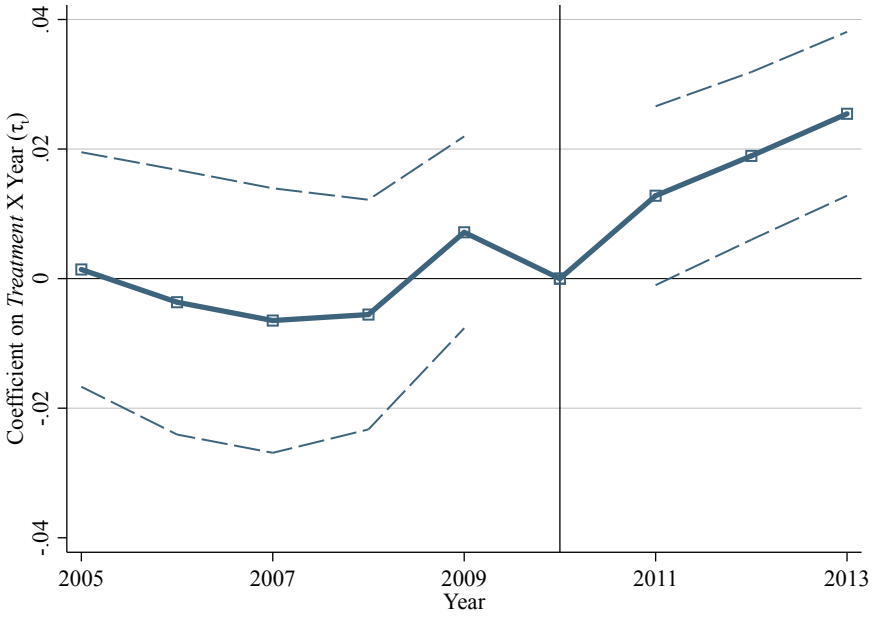
Appendix B Group Market Results

This Appendix contains results from out main specifications for the group market. Figure B.1 shows the year-by-year treatment effects for insurers in the group market. While there is a much smaller effect than measured in the individual market, there is still an uptick in MLRs in the post period.

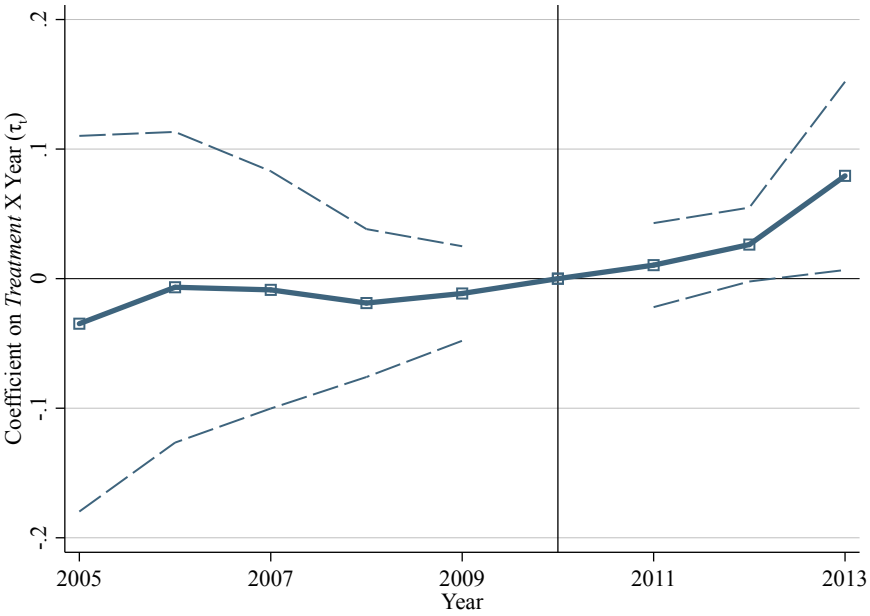
Figure B.1: Treatment Effects by Year in Group Market: MLR



Note: Event-study figures are based on estimation of equation (6) using MLR as the outcome variable and the binary definition of treatment, with year-specific treatment effects relative to 2010, and omitting the treatment group-specific linear trend. Regressions are weighted by enrollment. The broken lines are pointwise 95 percent confidence intervals based on standard errors clustered at the insurer level. $Treated \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$.

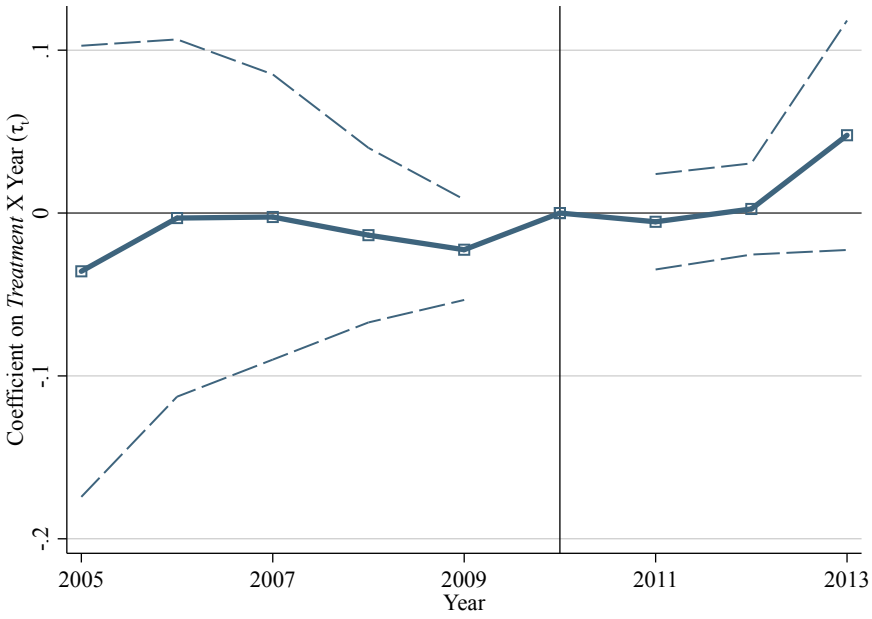
Figure B.2 shows the results using claims as the outcome variable. Treated and control firms have similar claims costs prior to the ACA, but after MLR regulation goes into effect, claims in the treated group appear to grow slightly relative to those in the control group. However, the estimates are imprecise and there appears to be a role for differential trends to play in lowering the ultimate point estimate. Finally, Figure B.3 shows a pattern quite similar to those of claims.

Figure B.2: Treatment Effects by Year in Group Market: $ln(Claims)$



Note: Figure is based on estimation of equation (6) using claims as the outcome variable and the binary definition of treatment, with year-specific treatment effects relative to 2010, and omitting the treatment group-specific linear trend. Regressions are weighted by enrollment. The logged outcome variable *Claims* is measured on a per life-year basis. The broken lines are pointwise 95 percent confidence intervals based on standard errors clustered at the insurer level. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$.

Figure B.3: Treatment Effects by Year: $ln(Premiums)$



Note: Event-study figures are based on estimation of equation (6) using the binary definition of treatment, with year-specific treatment effects relative to 2010, and omitting the treatment group-specific linear trend. Regressions are weighted by enrollment. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$. The logged outcome variable $Premiums$ is measured on a per life-year basis. The broken lines are pointwise 95 percent confidence intervals based on standard errors clustered at the insurer level.

Tables B.1 and B.2 present our primary regression analysis for the group market. Qualitatively, the results closely parallel those we found for the individual market: MLRs and claims costs grew each year after the new regulation went into effect. Our coefficient estimates in the group market are closer to zero, reflecting the fact that the group market as a whole was much closer to compliance than the individual market. However, instead of finding reductions in premiums in the first year which then dissipated over time, our point estimates suggest that premiums might have risen in the group market during the post period. The relatively low treatment intensity received by insurers in the group market makes it difficult to distinguish the claims/premiums components of change as statistically different from zero.

Table B.1: Effects of Minimum MLR Regulations: Group Market, Binary Treatment

	MLR		ln(Claims)		ln(Premiums)	
	(1)	(2)	(3)	(4)	(5)	(6)
Year $\geq$ 2011 * *Treatment*	0.015		0.019		0.003	
	(0.007)**		(0.024)		(0.022)	
2011 * *Treatment*		0.011		0.009		-0.004
		(0.007)		(0.019)		(0.016)
2012 * *Treatment*		0.017		0.020		0.001
		(0.009)*		(0.029)		(0.025)
2013 * *Treatment*		0.023		0.069		0.043
		(0.009)**		(0.060)		(0.057)
R^2	0.69	0.69	0.86	0.86	0.87	0.87
# Insurers	406	406	406	406	406	406
Observations	3,295	3,295	3,295	3,295	3,295	3,295

Note: Regressions are weighted by enrollment, and standard errors are clustered by insurer. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. The outcome variables *Claims* and *Premiums* are measured on a per life-year basis. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table B.2: Effects of Minimum MLR Regulations: Group Market, Continuous Treatment

	MLR		ln(Claims)		ln(Premiums)	
	(1)	(2)	(3)	(4)	(5)	(6)
Year $\geq$ 2011 * $Treatment$	0.523		1.255		0.577	
	(0.123)***		(0.651)*		(0.654)	
2011 * $Treatment$		0.464		0.930		0.333
		(0.117)***		(0.695)		(0.712)
2012 * $Treatment$		0.502		1.104		0.446
		(0.142)***		(0.631)*		(0.623)
2013 * $Treatment$		0.634		1.917		1.095
		(0.146)***		(0.827)**		(0.808)
R^2	0.70	0.70	0.86	0.87	0.87	0.87
# Insurers	406	406	406	406	406	406
Observations	3,295	3,295	3,295	3,295	3,295	3,295

Note: Regressions are weighted by enrollment, and standard errors are clustered by insurer. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. The outcome variables *Claims* and *Premiums* are measured on a per life-year basis. $Treatment \equiv \hat{d}_i$. * p<0.10, ** p<0.05, *** p<.01.

Appendix C Sensitivity Analysis and Ancillary Results

C.1 Unweighted regressions

Below we present the results of our main specifications, replicating Tables 3 and 4, without weighting observations by number of life-years.

Table C.1: Effects of Minimum MLR Regulations: Individual Market, Binary Treatment

	MLR		ln(Claims)		ln(Premiums)	
	(1)	(2)	(3)	(4)	(5)	(6)
Year $\geq$ 2011 * *Treatment*	0.106		0.149		0.010	
	(0.021)***		(0.049)***		(0.037)	
2011 * *Treatment*		0.095		0.130		0.004
		(0.021)***		(0.042)***		(0.033)
2012 * *Treatment*		0.123		0.182		0.025
		(0.025)***		(0.064)***		(0.050)
2013 * *Treatment*		0.138		0.172		-0.007
		(0.032)***		(0.080)**		(0.063)
R^2	0.62	0.62	0.83	0.83	0.81	0.81
# Insurers	184	184	184	184	184	184
Observations	1,417	1,417	1,417	1,417	1,417	1,417

Note: Regressions are **not** weighted by enrollment, and standard errors are clustered by insurer. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. The outcome variables *Claims* and *Premiums* are measured on a per life-year basis. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.2: Effects of Minimum MLR Regulations: Individual Market, Continuous Treatment

	MLR		ln(Claims)		ln(Premiums)	
	(1)	(2)	(3)	(4)	(5)	(6)
Year $\geq$ 2011 * *Treatment*	0.783		1.249		0.058	
	(0.179)***		(0.375)***		(0.232)	
2011 * *Treatment*		0.684		0.982		-0.071
		(0.190)***		(0.309)***		(0.225)
2012 * *Treatment*		0.751		1.416		0.279
		(0.209)***		(0.454)***		(0.301)
2013 * *Treatment*		1.001		1.520		0.012
		(0.218)***		(0.480)***		(0.309)
R^2	0.62	0.62	0.83	0.83	0.81	0.81
# Insurers	184	184	184	184	184	184
Observations	1,417	1,417	1,417	1,417	1,417	1,417

Note: Regressions are **not** weighted by enrollment, and standard errors are clustered by insurer. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. The outcome variables *Claims* and *Premiums* are measured on a per life-year basis. $Treatment \equiv \hat{d}_i * \mathbb{1}\left\{\hat{d}_i > 0\right\}$.
* p<0.10, ** p<0.05, *** p<.01.

C.2 Sensitivity Results: State Effects and Excluding Non-Profits

Below we present results analogous to those in Table 5, for the additional outcomes of claims and premiums, as well as for the continuous treatment definition.

Table C.3: Sensitivity Analysis: Individual Market, Binary Treatment

	ln(Claims)				
	(1)	(2)	(3)	(4)	(5)
Year $\geq$ 2011 * *Treatment*	0.068	0.146	0.079		
	(0.030)**	(0.068)**	(0.035)**		
Year $\geq$ 2011 * *Treatment* * *Treated State*				0.058	0.040
				(0.035)	(0.073)
Year $\geq$ 2011 * *Untreated* * *Treated State*				-0.016	-0.010
				(0.042)	(0.048)
Year $\geq$ 2011 * *Untreated* * % *Treated*					-0.030
					(0.120)
State-by-year FE	No	Yes	No	No	No
Exclude nonprofits	No	No	Yes	No	No
R^2	0.89	0.92	0.89	0.89	0.89
# Insurers	184	184	126	184	184
Observations	1,417	1,417	931	1,417	1,417

Note: The dependent variable in all columns is ln(Claims). Column (1) reproduces results from our main specification. Column (2) includes state-by-year fixed effects. Column (3) drops insurers that were ever nonprofits. Columns (4) and (5) present effects on untreated insurers in states with treated insurers versus those in states without treated insurers. *Treated State* is a state-level indicator variable for whether any treated insurer existed in a given state. % *Treated* is a state-level variable that measures the fraction of life-years that were treated in 2011. Regressions are weighted by enrollment, and standard errors are clustered by insurer. All specifications include insurer fixed effects and a treatment group linear time trend. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.4: Sensitivity Analysis: Individual Market, Binary Treatment

	ln(Premiums)				
	(1)	(2)	(3)	(4)	(5)
Year $\geq$ 2011 * *Treatment*	-0.025	0.035	-0.019		
	(0.024)	(0.050)	(0.031)		
Year $\geq$ 2011 * *Treatment* * *Treated State*				-0.051	-0.089
				(0.035)	(0.063)
Year $\geq$ 2011 * *Untreated* * *Treated State*				-0.040	-0.035
				(0.037)	(0.044)
Year $\geq$ 2011 * *Untreated* * % *Treated*					-0.026
					(0.119)
State-by-year FE	No	Yes	No	No	No
Exclude nonprofits	No	No	Yes	No	No
R^2	0.86	0.90	0.87	0.86	0.86
# Insurers	184	184	126	184	184
Observations	1,417	1,417	931	1,417	1,417

Note: The dependent variable in all columns is ln(Premiums). Column (1) reproduces results from our main specification. Column (2) includes state-by-year fixed effects. Column (3) drops insurers that were ever nonprofits. Columns (4) and (5) present effects on untreated insurers in states with treated insurers versus those in states without treated insurers. *Treated State* is a state-level indicator variable for whether any treated insurer existed in a given state. % *Treated* is a state-level variable that measures the fraction of life-years that were treated in 2011. Regressions are weighted by enrollment, and standard errors are clustered by insurer. All specifications include insurer fixed effects and a treatment group linear time trend. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.5: Sensitivity Results: Individual Market, Continuous Treatment

	MLR				
	(1)	(2)	(3)	(4)	(5)
Year $\geq$ 2011 * *Treatment*	0.695	0.600	0.681		
	(0.117)***	(0.155)***	(0.119)***		
Year $\geq$ 2011 * *Treatment* * *Treated State*				0.746	1.096
				(0.131)***	(0.269)***
Year $\geq$ 2011 * *Untreated* * *Treated State*				0.018	0.020
				(0.019)	(0.020)
Year $\geq$ 2011 * *Untreated* * % *Treated*					-0.006
					(0.027)
State-by-year FE	No	Yes	No	No	No
Exclude nonprofits	No	No	Yes	No	No
R^2	0.75	0.85	0.72	0.76	0.76
# Insurers	184	184	126	184	184
Observations	1,417	1,417	931	1,417	1,417

Note: The dependent variable in all columns is MLR. Column (1) reproduces results from our main specification. Column (2) includes state-by-year fixed effects. Column (3) drops insurers that were ever nonprofits. Columns (4) and (5) present effects on untreated insurers in states with treated insurers versus those in states without treated insurers. *Treated State* is a state-level indicator variable for whether any treated insurer existed in a given state. % *Treated* is a state-level variable that measures the fraction of life-years that were treated in 2011. Regressions are weighted by enrollment, and standard errors are clustered by insurer. All specifications include insurer fixed effects and a treatment group linear time trend. $Treatment \equiv \hat{d}_i * \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.6: Sensitivity Results: Individual Market, Continuous Treatment

	ln(Claims)				
	(1)	(2)	(3)	(4)	(5)
Year $\geq$ 2011 * *Treatment*	0.700	1.561	0.713		
	(0.199)***	(0.510)***	(0.219)***		
Year $\geq$ 2011 * *Treatment* * *Treated State*				0.655	1.576
				(0.212)***	(0.708)**
Year $\geq$ 2011 * *Untreated* * *Treated State*				-0.016	-0.011
				(0.038)	(0.045)
Year $\geq$ 2011 * *Untreated* * % *Treated*					-0.030
					(0.120)
State-by-year FE	No	Yes	No	No	No
Exclude nonprofits	No	No	Yes	No	No
R^2	0.89	0.92	0.90	0.89	0.89
# Insurers	184	184	126	184	184
Observations	1,417	1,417	931	1,417	1,417

Note: The dependent variable in all columns is ln(Claims). Column (1) reproduces results from our main specification. Column (2) includes state-by-year fixed effects. Column (3) drops insurers that were ever nonprofits. Columns (4) and (5) present effects on untreated insurers in states with treated insurers versus those in states without treated insurers. *Treated State* is a state-level indicator variable for whether any treated insurer existed in a given state. % *Treated* is a state-level variable that measures the fraction of life-years that were treated in 2011. Regressions are weighted by enrollment, and standard errors are clustered by insurer. All specifications include insurer fixed effects and a treatment group linear time trend. $Treatment \equiv \hat{d}_i * \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.7: Sensitivity Results: Individual Market, Continuous Treatment

	ln(Premiums)				
	(1)	(2)	(3)	(4)	(5)
Year $\geq$ 2011 * *Treatment*	-0.311	0.584	-0.295		
	(0.148)**	(0.495)	(0.168)*		
Year $\geq$ 2011 * *Treatment* * *Treated State*				-0.409	-0.088
				(0.179)**	(0.571)
Year $\geq$ 2011 * *Untreated* * *Treated State*				-0.036	-0.031
				(0.033)	(0.040)
Year $\geq$ 2011 * *Untreated* * % *Treated*					-0.026
					(0.119)
State-by-year FE	No	Yes	No	No	No
Exclude nonprofits	No	No	Yes	No	No
R^2	0.86	0.90	0.87	0.86	0.86
# Insurers	184	184	126	184	184
Observations	1,417	1,417	931	1,417	1,417

Note: The dependent variable in all columns is ln(Premiums). Column (1) reproduces results from our main specification. Column (2) includes state-by-year fixed effects. Column (3) drops insurers that were ever nonprofits. Columns (4) and (5) present effects on untreated insurers in states with treated insurers versus those in states without treated insurers. *Treated State* is a state-level indicator variable for whether any treated insurer existed in a given state. % *Treated* is a state-level variable that measures the fraction of life-years that were treated in 2011. Regressions are weighted by enrollment, and standard errors are clustered by insurer. All specifications include insurer fixed effects and a treatment group linear time trend. $Treatment \equiv \hat{d}_i * \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

C.3 Ancillary Results: Heterogeneity by Market Structure

Table C.8: Heterogeneity Results by Market Structure: Individual Market, Cont. Treatment

	MLR		ln(Claims)		ln(Premiums)	
	(1)	(2)	(3)	(4)	(5)	(6)
Year $\geq$ 2011 * $Treatment$	0.820	0.619	1.241	0.512	-0.046	-0.476
	(0.169)***	(0.175)***	(0.409)***	(0.612)	(0.374)	(0.589)
Year $\geq$ 2011 * $Treatment$ * $Market\ Share$	-0.214		-0.933		-0.458	
	(0.223)		(0.584)		(0.534)	
Year $\geq$ 2011 * $Treatment$ * HHI		0.157		0.389		0.341
		(0.301)		(1.130)		(1.112)
Interaction var. mean	.29	.54	.29	.54	.29	.54
R^2	0.75	0.75	0.89	0.89	0.86	0.86
# Insurers	.	.	.	.	.	.
Observations	1,417	1,417	1,417	1,417	1,417	1,417

Note: Regressions are weighted by enrollment, and standard errors are clustered by insurer. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. The outcome variables *Claims* and *Premiums* are measured on a per life-year basis. HHI is divided by 10,000 so that it ranges between 0 and 1. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

C.4 Sensitivity Results: Varying Years Used to Determine Treatment

Below we present results showing the robustness of our main results to varying the set of pre-period years that are used to determine treatment.

Table C.9: Sensitivity Results: Individual Market, Binary Treatment

	MLR					
	2005-2010	2006-2010	2007-2010	2008-2010	2009-2010	2010 only
Year $\geq$ 2011 * *Treatment*	0.072	0.073	0.083	0.082	0.080	0.082
	(0.018)***	(0.018)***	(0.018)***	(0.018)***	(0.018)***	(0.018)***
R^2	0.75	0.75	0.75	0.75	0.75	0.75
# Insurers	185	184	182	182	182	179
Observations	1,421	1,417	1,408	1,408	1,408	1,387

Note: The dependent variable in all columns is MLR. Column headers refer to the time period used to determine treatment. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. Regressions are weighted by enrollment, and standard errors are clustered by insurer. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.10: Sensitivity Results: Individual Market, Binary Treatment

	ln(Claims)					
	2005-2010	2006-2010	2007-2010	2008-2010	2009-2010	2010 only
Year $\geq$ 2011 * *Treatment*	0.068	0.068	0.074	0.062	0.063	0.067
	(0.030)**	(0.030)**	(0.029)**	(0.029)**	(0.029)**	(0.029)**
R^2	0.89	0.89	0.89	0.89	0.89	0.89
# Insurers	185	184	182	182	182	179
Observations	1,421	1,417	1,408	1,408	1,408	1,387

Note: The dependent variable in all columns is ln(Claims). Column headers refer to the time period used to determine treatment. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. Regressions are weighted by enrollment, and standard errors are clustered by insurer. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.11: Sensitivity Results: Individual Market, Binary Treatment

	ln(Premiums)					
	2005-2010	2006-2010	2007-2010	2008-2010	2009-2010	2010 only
Year $\geq$ 2011 * *Treatment*	-0.024	-0.025	-0.032	-0.043	-0.040	-0.038
	(0.024)	(0.024)	(0.024)	(0.024)*	(0.024)*	(0.024)
R^2	0.86	0.86	0.86	0.86	0.86	0.86
# Insurers	185	184	182	182	182	179
Observations	1,421	1,417	1,408	1,408	1,408	1,387

Note: The dependent variable in all columns is ln(Premiums). Column headers refer to the time period used to determine treatment. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. Regressions are weighted by enrollment, and standard errors are clustered by insurer. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.12: Sensitivity Results: Individual Market, Continuous Treatment

	MLR					
	2005-2010	2006-2010	2007-2010	2008-2010	2009-2010	2010 only
Year $\geq$ 2011 * *Treatment*	0.665	0.695	0.773	0.770	0.670	0.475
	(0.109)***	(0.117)***	(0.127)***	(0.119)***	(0.123)***	(0.140)***
R^2	0.75	0.75	0.75	0.75	0.75	0.75
# Insurers	185	184	182	182	182	179
Observations	1,421	1,417	1,408	1,408	1,408	1,387

Note: The dependent variable in all columns is MLR. Column headers refer to the time period used to determine treatment. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. Regressions are weighted by enrollment, and standard errors are clustered by insurer. $Treatment \equiv \hat{d}_i * \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.13: Sensitivity Results: Individual Market, Continuous Treatment

	ln(Claims)					
	2005-2010	2006-2010	2007-2010	2008-2010	2009-2010	2010 only
Year $\geq$ 2011 * *Treatment*	0.650	0.700	0.633	0.600	0.635	0.500
	(0.186)***	(0.199)***	(0.190)***	(0.182)***	(0.173)***	(0.158)***
R^2	0.89	0.89	0.89	0.89	0.89	0.89
# Insurers	185	184	182	182	182	179
Observations	1,421	1,417	1,408	1,408	1,408	1,387

Note: The dependent variable in all columns is ln(Claims). Column headers refer to the time period used to determine treatment. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. Regressions are weighted by enrollment, and standard errors are clustered by insurer. $Treatment \equiv \hat{d}_i * \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.14: Sensitivity Results: Individual Market, Continuous Treatment

	ln(Premiums)					
	2005-2010	2006-2010	2007-2010	2008-2010	2009-2010	2010 only
Year $\geq$ 2011 * *Treatment*	-0.317	-0.311	-0.480	-0.511	-0.351	-0.207
	(0.144)**	(0.148)**	(0.159)***	(0.162)***	(0.200)*	(0.201)
R^2	0.86	0.86	0.86	0.86	0.86	0.86
# Insurers	185	184	182	182	182	179
Observations	1,421	1,417	1,408	1,408	1,408	1,387

Note: The dependent variable in all columns is ln(Premiums). Column headers refer to the time period used to determine treatment. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. Regressions are weighted by enrollment, and standard errors are clustered by insurer. $Treatment \equiv \hat{d}_i * \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

C.5 Sensitivity Results: Number of Observations Determining Treatment

Below we present results showing the robustness of our main results to varying the number of pre-period years required in order to be included in the sample.

Table C.15: Regression Results: Individual Market, Binary Treatment

	MLR			
	1 Observation	2 Observations	3 Observations	4 Observations
Year $\geq$ 2011 * $Treatment$	0.073	0.072	0.070	0.069
	(0.018)***	(0.018)***	(0.018)***	(0.018)***
R^2	0.75	0.75	0.75	0.76
# Insurers	184	168	158	141
Observations	1,417	1,356	1,305	1,204

Note: The dependent variable in all columns is MLR. The column headings indicate the minimum number of observations required to determine treatment. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. Regressions are weighted by enrollment, and standard errors are clustered by insurer. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.16: Regression Results: Individual Market, Binary Treatment

	ln(Claims)			
	1 Observation	2 Observations	3 Observations	4 Observations
Year $\geq$ 2011 * $Treatment$	0.068	0.066	0.064	0.071
	(0.030)**	(0.030)**	(0.031)**	(0.031)**
R^2	0.89	0.89	0.89	0.88
# Insurers	184	168	158	141
Observations	1,417	1,356	1,305	1,204

Note: The dependent variable in all columns is ln(Claims). The column headings indicate the minimum number of observations required to determine treatment. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. Regressions are weighted by enrollment, and standard errors are clustered by insurer. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.17: Regression Results: Individual Market, Binary Treatment

	ln(Premiums)			
	1 Observation	2 Observations	3 Observations	4 Observations
Year $\geq$ 2011 * $Treatment$	-0.025	-0.025	-0.024	-0.017
	(0.024)	(0.024)	(0.025)	(0.025)
R^2	0.86	0.86	0.86	0.85
# Insurers	184	168	158	141
Observations	1,417	1,356	1,305	1,204

Note: The dependent variable in all columns is ln(Premiums). The column headings indicate the minimum number of observations required to determine treatment. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. Regressions are weighted by enrollment, and standard errors are clustered by insurer. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.18: Regression Results: Individual Market, Continuous Treatment

	MLR			
	1 Observation	2 Observations	3 Observations	4 Observations
Year $\geq$ 2011 * $Treatment$	0.695	0.685	0.665	0.681
	(0.117)***	(0.119)***	(0.116)***	(0.124)***
R^2	0.75	0.75	0.76	0.77
# Insurers	184	168	158	141
Observations	1,417	1,356	1,305	1,204

Note: The dependent variable in all columns is MLR. The column headings indicate the minimum number of observations required to determine treatment. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. Regressions are weighted by enrollment, and standard errors are clustered by insurer. $Treatment \equiv \hat{d}_i * \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.19: Regression Results: Individual Market, Continuous Treatment

	ln(Claims)			
	1 Observation	2 Observations	3 Observations	4 Observations
Year $\geq$ 2011 * $Treatment$	0.700	0.648	0.607	0.612
	(0.199)***	(0.183)***	(0.178)***	(0.180)***
R^2	0.89	0.89	0.89	0.88
# Insurers	184	168	158	141
Observations	1,417	1,356	1,305	1,204

Note: The dependent variable in all columns is ln(Claims). The column headings indicate the minimum number of observations required to determine treatment. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. Regressions are weighted by enrollment, and standard errors are clustered by insurer. $Treatment \equiv \hat{d}_i * \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

Table C.20: Regression Results: Individual Market, Continuous Treatment

	ln(Premiums)			
	1 Observation	2 Observations	3 Observations	4 Observations
Year $\geq$ 2011 * $Treatment$	-0.311	-0.338	-0.355	-0.363
	(0.148)**	(0.144)**	(0.146)**	(0.152)**
R^2	0.86	0.86	0.86	0.85
# Insurers	184	168	158	141
Observations	1,417	1,356	1,305	1,204

Note: The dependent variable in all columns is ln(Premiums). The column headings indicate the minimum number of observations required to determine treatment. All specifications include year fixed effects, insurer fixed effects, and a treatment group linear time trend. Regressions are weighted by enrollment, and standard errors are clustered by insurer. $Treatment \equiv \hat{d}_i * \mathbb{1}\left\{\hat{d}_i > 0\right\}$. * p<0.10, ** p<0.05, *** p<.01.

C.6 Adjustments between Raw and Final MLR

In the main body of the paper, we show that insurers with persistently low MLRs came in to compliance with new regulations primarily by increasing their claims costs. A separate question is how firms behave once claims and premiums have been realized and they find themselves liable to pay a rebate. The multitude of components that modify an insurer's raw claims or premiums in the MLR calculation process might provide additional opportunities to come into compliance. For example, an insurer could increase its current claims bill by increasing reserves used to pay unresolved medical claims, reserves for specific contracts, or reserves for experience rating refunds.[31] Although there appear to be simple changes to accounting that could bring firms into compliance, the $2.8 billion in rebates paid up through 2015 suggest that there are limits to this strategy.

To gauge the scope of such behavior, we study the extent to which a firm's incurred medical claims, the most direct measure of dollars spent on insureds' medical care in the data, differ from the final "claims" number reported for the MLR calculation. We refer to incurred medical claims as the "raw" claims while the claims value used for the MLR rebate calculation is referred to as the "final" claims; we use analogous terminology for changes in premiums.

We study these differences in claims and premiums for two groups of firms: (1) firms whose raw claims and premiums would put them below the threshold used to determine whether a rebate must be paid, and (2) firms whose raw claims and premiums put them at or above the threshold. When determining whether a firm is in the first or second group, we apply the credibility adjustments that modify the relevant MLR threshold and use that modified threshold as the relevant value. We do this because at the time that the firm is filling out its MLR reporting form, it knows what those adjustments will be and so can determine whether it needs to manipulate any other margins to come into compliance with the modified threshold.

This comparison provides an upper bound on the amount of *ex post* adjustment firms conduct after claims and premiums have been realized: If a firm were aiming for a just-compliant MLR and knew they would face a large tax bill at the end of the year, they would deliberately overshoot the threshold so that their post-adjustment MLR would be on-target. There are a number of such dimensions of adjustment that are predictable before the uncertainty surrounding the year's claims or premiums has been resolved. As a consequence, this exercise overstates the

[31] Under the ACA's MLR regulations, a firm may adjust its incurred (medical) claims for direct claim liability, claim reserves, contract reserves, experience rating refunds, reserves for experience rating refunds, medical incentive pools and bonuses, healthcare receivables, group conversion charges, blended rate adjustments, and quality improvement expenditures. Similarly, a firm may adjust its direct premiums written by unearned premiums, experience rating refunds, reserves for experience rating refunds, premium balances written off, group conversion charges, federal and state high risk pools, and other adjustments that are included in premiums for financial statement purposes.

amount that firms are adjusting their claims or premiums in order to come into compliance. By comparing the adjustments of firms whose raw MLRs are in and out of compliance, we can net out some of the adjustments which are not discretionary, e.g., federal and state taxes. However, these are not interpretable as causal effects, merely as a descriptive guide to the scope of the adjustments being made. We use the CCIIO data from 2011 through 2013 for this analysis.

Table C.21 presents the mean percentage difference between raw and final claims and premiums for each market based on whether an insurer's raw MLR was above or below the regulatory threshold. In the individual market, there was a 3.9 percent upwards adjustment between raw and final claims for firms that would have had to pay a rebate in the absence of any adjustments in a particular year. Firms that would not have had to pay a rebate adjusted their claims numbers up by 1.4 percent, for a difference of approximately 2.5 percent. Although firms in the individual market with low raw MLRs do reduce premiums slightly more than firms that have raw MLRs in compliance, the magnitude of the difference is again relatively small. The results for the small and large group markets are qualitatively the same as those for the individual market. Overall, it appears that these accounting adjustments have played a relatively minor role in affecting MLRs.

Table C.21: Adjustments Between Raw and Final Claims and Premiums

	Claims		Premiums	
	Raw MLR below threshold	Raw MLR at or above threshold	Raw MLR below threshold	Raw MLR at or above threshold
Individual market	0.039	0.014	-0.032	-0.002
Small group market	0.027	0.019	-0.045	-0.023
Large group market	0.045	0.023	-0.030	-0.020

Note: Average percentage adjustment to claims or premiums presented for each market. Raw MLR below threshold indicates that the firm's raw MLR is below the credibility-adjusted threshold that determines whether a rebate must be paid. Raw MLR at or above threshold indicates the firm would not need to pay a rebate. Means are weighted by life-years. CCIIO data from 2011–2013 is used for this analysis.

C.7 Instrumental Variables

In this subsection, we implement an instrumental variables approach to further address concerns of regression to the mean, or more generally, measurement error in our treatment variable. In particular, we use data from 2006–2008 and data from 2009–2010 to separately predict whether an insurer will be treated by the new federal regulations that went into effect in 2011. To fix ideas, recall that our difference-in-differences treatment variable is $D_{it} \equiv \mathbb{1}\left\{\hat{d}_i > 0;\ t > 2010\right\}$. Let $\hat{d}_i^{10}$ be a measure of $\hat{d}_i$ based on data from 2009 and 2010 and let $\hat{d}_i^{08}$ be a measure of $\hat{d}_i$ based on data from 2006 to 2008. Then we have corresponding treatment variables D_{it}^{10} and D_{it}^{08} constructed with $\hat{d}_i^{10}$ and $\hat{d}_i^{08}$.[32] Because our predicted distance from the MLR threshold enters our primary estimating equation through both D_{it} and $t\mathbb{1}\left\{\hat{d}_i > 0\right\}$, we need to instrument for both terms. We use D_{it}^{08} and $\mathbb{1}\left\{\hat{d}_i^{08} > 0\right\}$ as instruments to estimate the following system of equations via two-stage least squares.

$$y_{it} = \gamma_i + \delta_t + \tau D_{it}^{10} + \beta t\mathbb{1}\left\{\hat{d}_i^{10} > 0\right\} + u_{it} \tag{8}$$

$$D_{it}^{10} = \lambda_i + \lambda_t + \alpha_1 D_{it}^{08} + \alpha_2 t\mathbb{1}\left\{\hat{d}_i^{08} > 0\right\} + \eta_{it} \tag{9}$$

$$t\mathbb{1}\left\{\hat{d}_i^{10} > 0\right\} = \widetilde{\lambda}_i + \widetilde{\lambda}_t + \widetilde{\alpha}_1 D_{it}^{08} + \widetilde{\alpha}_2 t\mathbb{1}\left\{\hat{d}_i^{08} > 0\right\} + \omega_{it} \tag{10}$$

The first stage results are shown for the individual market in Table C.22. As seen in column (1), predicted treatment based on 2006–2008 is closely and positively related to predicted treatment based on 2009–2010 data. Not surprisingly then, column (2) shows that the differential linear trend for our 2009–2010 predicted treatment group is also closely related to that for our 2006–2008 predicted treatment group. We find similar results, shown in the remaining columns of the table, for the instruments when we use our continuous treatment measures as well.

The instrumental variables results for the individual market with the binary treatment variable are presented in Table C.23. The results are quite similar to the corresponding OLS results in shown Table 3. The estimated impact of the federal regulation goes from a 7.3 percentage point increase in the MLR to an 8.3 percentage point increase; for claims, our OLS results indicate that the regulation increased claims by 6.8 percent while our IV estimates suggest a 9.6 percent increase. Our IV results do not suggest any impacts on premiums. Results for the individual market using the continuous measure of treatment are in Table C.24, and closely mirror those of OLS from the main text.

[32] As we saw in Tables C.9 through C.14, our estimated results using D_{it} and D_{it}^{10} are quite similar.

Table C.22: First Stage Results: Individual Market

	Binary treatment		Continuous treatment	
	D_{it}^{10}	$t\mathbb{1}\left\{\hat{d}_i^{10} > 0\right\}$	D_{it}^{10}	$t\hat{d}_i^{10}$
	(1)	(2)	(3)	(4)
Year $\geq$ 2011 * *Treatment*	0.529	0.035	0.497	-3.231
	(0.077)***	(0.108)	(0.164)***	(1.615)**
Year * *Treatment*	-0.001	0.513	-0.005	4.787
	(0.004)	(0.087)***	(0.014)	(0.748)***
F-test on instruments	23.53	22.85	9.13	21.44
# Insurers	184	184	184	184
Observations	1,311	1,311	1,311	1,311

Note: Regressions are weighted by enrollment and standard errors are clustered by insurer. All specifications include year fixed effects and insurer fixed effects. D_{it}^{10} interacts a measure of treatment based on data from 2009–2010 with an indicator for $Year \geq 2010$. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i^{08} > 0\right\}$ for columns (1) and (2); $Treatment \equiv \hat{d}_i^{08}$ for columns (3) and (4), where $\hat{d}_i^{08}$ measures MLR compliance based on data from 2006 to 2008. * p<0.10, ** p<0.05, *** p<.01.

Table C.23: Instrumental Variables Results: Individual Market, Binary Treatment

	MLR		ln(Claims)		ln(Premiums)	
	(1)	(2)	(3)	(4)	(5)	(6)
Year $\geq$ 2011 * *Treatment*	0.083		0.096		-0.008	
	(0.024)***		(0.042)**		(0.035)	
2011 * *Treatment*		0.078		0.073		-0.025
		(0.023)***		(0.038)*		(0.031)
2012 * *Treatment*		0.088		0.121		0.011
		(0.027)***		(0.048)**		(0.040)
2013 * *Treatment*		0.094		0.145		0.028
		(0.035)***		(0.060)**		(0.051)
Wu-Hausman p-value	0.000	0.000	0.003	0.033	0.150	0.455
# Insurers	184	184	184	184	184	184
Observations	1,311	1,311	1,311	1,311	1,311	1,311

Note: Regressions are weighted by enrollment and standard errors are clustered by insurer. All specifications include year fixed effects and insurer fixed effects. The outcome variables *Claims* and *Premiums* are measured on a per life-year basis. $Treatment \equiv \mathbb{1}\left\{\hat{d}_i^{10} > 0\right\}$, instrumented with $\mathbb{1}\left\{\hat{d}_i^{08} > 0\right\}$, where $\hat{d}_i^{08}$ and $\hat{d}_i^{10}$ are measures of MLR compliance based on data from 2006 to 2008, and 2009–2010, respectively. * p<0.10, ** p<0.05, *** p<.01.

Table C.24: Instrumental Variables Results: Individual Market, Continuous Treatment

	MLR		ln(Claims)		ln(Premiums)	
	(1)	(2)	(3)	(4)	(5)	(6)
Year $\geq$ 2011 * $Treatment$	0.578		0.700		-0.090	
	(0.198)***		(0.272)**		(0.303)	
2011 * $Treatment$		0.519		0.468		-0.241
		(0.191)***		(0.244)*		(0.278)
2012 * $Treatment$		0.645		0.960		0.082
		(0.234)***		(0.328)***		(0.340)
2013 * $Treatment$		0.732		1.309		0.286
		(0.232)***		(0.415)***		(0.418)
Wu-Hausman p-value	0.000	0.000	0.023	0.060	0.268	0.774
# Insurers	184	184	184	184	184	184
Observations	1,311	1,311	1,311	1,311	1,311	1,311

Note: Regressions are weighted by enrollment and standard errors are clustered by insurer. All specifications include year fixed effects and insurer fixed effects. The outcome variables $Claims$ and $Premiums$ are measured on a per life-year basis. $Treatment \equiv \hat{d}_i^{10} * \mathbb{1}\left\{\hat{d}_i^{10} > 0\right\}$, instrumented with $\hat{d}_i^{08} * \mathbb{1}\left\{\hat{d}_i^{08} > 0\right\}$, where $\hat{d}_i^{08}$ and $\hat{d}_i^{10}$ are measures of MLR compliance based on data from 2006 to 2008, and 2009–2010, respectively. * p<0.10, ** p<0.05, *** p<.01.