Appendix for

Damage Caps and Defensive Medicine: Reexamination with Patient Level Data

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Appendix for

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Abstract: This online appendix provides additional results for Moghtaderi, Farmer, and Black, Damage Caps and Defensive Medicine: Reexamination with Patient Level Data (working paper 2018), available at http://ssrn.com/abstract=2816969.

1. Data and Methods Details

1.1. New-cap, no-cap, and old-cap states, and cap adoption years

The nine "new-cap" states, and the years in which they adopted caps on non-economic damages, are: Florida (2003), Georgia (2005; invalidated 2010), Illinois (2005; invalidated 2010), Mississippi (2003), Nevada (2002), Ohio (2003), Oklahoma (2003), South Carolina (2005), and Texas (2003).

The 20 no-cap states are: Alabama, Arizona, Arkansas, Connecticut, Delaware, District of Columbia, Iowa, Kentucky, Maine, Minnesota, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, Tennessee, Vermont, Washington, and Wyoming. North Carolina and Tennessee adopted non-econ caps in late 2011. We therefore exclude them from the control group for 2012.

The 22 old-cap states are: Alaska, California, Colorado, Hawaii, Idaho, Indiana, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Missouri, Montana, Nebraska, New Mexico, North Dakota, Oregon, South Dakota, Utah, Virginia, West Virginia, Wisconsin.

Table App-1 summarizes the caps in each of these states.

1.2. Procedure Codes

We used Healthcare Common Procedure Coding System (HCPCS), International Classification of Diseases (version ICD9-CM), and Diagnosis Related Group (DRG) codes to identify tests and procedures. Table App-2 presents coding details.

1.3. Counting Stress Tests

Most of the times, multiple claims are being generated for the same stress tests for multiple reasons. For example, a test can generate two claims, one for the technical component of the test, and another one for the professional service of the physician who interprets the image. These different claims usually have the same HCPCS codes accompanied by different claim modifiers. In case we see multiple claims associated with the same test in the same day, we count this is only one test. It is also unlikely to have multiple kinds of stress testing in a short period of time. Some HCPCS codes indicate some technical components of testing which are common for all types of stress tests. If we see indication of repeated stress testing in -3/+3 window, we count these as only one stress test. These are likely cases that different components of a test were claimed in multiple days, and they all indicate one test.

1.4. Physician Crosswalk

Our principal regression models use physician fixed effects. Physicians are uniquely identified by UPIN (unique physician identification number) for 1999-2006, and by NPI (national provider identifier) for 2007 on. We use a variety of sources to build a "Master Individual Provider Crosswalk," which links NPI and UPIN for the same physician where possible. The crosswalk is compiled from: (i) NPPES (National Plan and Provider Enumeration System) records since inception of NPPES in 2007; (ii) A UPIN directory compiled by ResDAC annually during 2003-2007; (iii) Medicare claims data (the 5% national Medicare random sample) over 1999-2014 (the "Carrier" file, which includes all claims by individual providers); (iv) a NPI-DEA directory available from 2010-2012, initially prepared by CMS.

The Master Individual Provider Crosswalk has 4,740,433 records including 1,518,291 distinct NPIs (unique providers), of whom 804,034 (53%) are physicians. The crosswalk includes all providers with claims included in the Medicare Carrier file. Each provider has a unique NPI, may have a unique UPIN, and can have one or more Medicare PINs. Of the 804,034 physicians in the Crosswalk: 571,119 have UPIN; 759,770 have at least one Medicare PIN (most have more than one); 549,741 have all three main identifiers (NPI, UPIN and Medicare PIN). The physicians with all three identifiers account for 83% of the cardiac stress tests performed by physicians for 1999 and 89% for 2006.

Our physician FE results use NPI if available, and UPIN for physicians with UPIN but not NPI; physicians with neither identifier are dropped. In robustness checks we obtain similar results if we limit the physician sample to those with both NPI and UPIN.

2. Univariate Graphical Results in Calendar Time

2.1. Imaging Tests

We begin with simple graphs of univariate results for imaging rates, both per patient and per physician, in calendar time, without covariates or fixed effects. Figure App 1 shows time trends in the diagnostic imaging rates between 1999-2013, separately for new-cap states (the treated states for our study), no-cap states (our narrow control group), and old-cap states (included in our broad control group). Figure App 1 provides graphs for any stress test, MRIs, and CT scans.[1] Overall, testing rates are higher in new-cap states than in old-cap states or no-cap states for overall stress tests, MRI, and CT. Rates are higher in old-cap than in no-cap states for cardiac tests, but lower for MRI and CT.

During the pre-treatment period from 1999-2002, the CT scan rate lines are reasonably parallel. But the MRI rate for new-cap states is rising somewhat more rapidly than the no-cap rate, and the cardiac testing rate is clearly rising more rapidly in new-cap states. Thus, at least without covariates, there is some evidence of non-parallel pre-treatment trends. These differential trends suggest caution in interpreting any post-treatment changes as causal. Unless the covariates absorb the pre-treatment differential trends, DiD estimates will be potentially biased.

[1] The outcome variables are dummy variables for whether a patient had one or more tests of a given type in a given year.

The different base rates in the three groups of states suggest that factors other than damages caps are important drivers of testing intensity. The secular factors that drive these time trends could differ between the three groups of states, either in intensity or when they arrive. This deepens concern with non-parallel trends. Standard DiD methods cannot distinguish between the effect of cap adoption and the possibly differing effects of these secular factors.

DiD estimation can face a further problem when base rates differ substantially, which can be illustrated with the Any Stress Test graph. In 2009, the mean rate per 1,000 patient in new-cap states was about 107 versus 86 for no-cap states. By 2013, mean rates fell to 79 in new-cap states and 67 in no-cap states. Measured as tests per 1,000 patients, rates fell faster in new-cap states: by 27 versus 19. But the *relative* drops in testing rates were much more similar, at 25.4% for new-cap versus 22.0% in no-cap states. Which is the right measure? Suppose that, damage caps aside, the same forces drove the secular drop in testing rates in all states. Did those forces operate on absolute rates, or relative rates? If the former, then rates in new-cap states dropped further, perhaps due to damage caps. If the latter, the drops were similar, and damage caps would appear to have little effect. Theory cannot tell us. If general pressures for fewer stress tests affect relative rates rather than percent-of-sample rates, this should bias our estimates *downward*. The true effect of cap adoption on stress testing rates would be higher than those we estimate from our regression models.[2]

We have no perfect response to these concerns with differing base rates and time-varying secular factors affecting those rates. As a partial response, we end our data period for the leads-and-lags graphs and regression results below in 2011; this allows at least 6 post-cap years in each treatment state, while cutting off some of the period of steep secular fall in stress testing rates.

2.2. Cardiac Procedures

Figure App 2 provides calendar time graphs, similar to Figure App 1, for the three main interventional cardiac procedures: LHC, PCI, and CABG, and for any revascularization (PCI or CABG).[3] LHC, performed by itself, is a diagnostic procedure. Similar to the results in Figure 1 for imaging tests, both per-patient and per-physician rates for these procedures are higher in new-cap states; the exception is CABG, for which per physician CABG rates are similar in new-cap and no-cap states. PCI rates rise in the first half of our sample period, then fall steadily from about 2004 on, then drop sharply in 2007 and 2008; this is plausibly a response to the February 2007 publication of results from the Courage trial. LHC per-patient rates rise between 1999-2004, while per physician rates are reasonably flat, both sets of rates begin to fall in 2004. CABG rates drop steadily throughout the 1999-2013 period. Prior research, with data through 2009, also find similar time trends for PCI and CABG, including a sharp drop in PCI rates in 2007 (Riley et al., 2011).

The challenges in DiD estimation discussed above, when base levels are subject to secular trends, and differ substantially between treated and control states, apply here too, most strongly to LHC, for which base rates are most different.

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[2] The drop in testing rates accelerates in 2010. The substantive reason for that may well be a sharp cut in reimbursement rates by the Centers for Medicare and Medicaid Services ("CMS") in 2010.

[3] LHC and PCI are often performed in the same procedure. PCI and CABG are often substitutes, but can sometimes be performed on the same patient at similar times, although in different procedures.

2.3. Spending

Figure App 3, presents per-patient and per-physician graphs, similar to Figure App 1, for laboratory spending, radiology spending, both categories combined, and Medicare Part B; it also presents per-patient Medicare Part A and total spending.[4] Lab spending rises rapidly through around 2006, then levels off; spending starts to fall in 2011. Lab spending rates are very similar in the three groups of states through 2003. After that, spending in new-cap states rises relative to no-cap and old-cap states. This divergence begins during the cap adoption period. This is consistent with damage caps leading to higher lab spending.

For radiology spending, spending levels rise through 2006 for all three groups of states, then fall after that. The three lines are reasonably parallel during the pre-treatment period, but new-cap spending rises during the cap adoption period, and remains well above spending in the other two groups after that. This provides initial evidence that radiology spending rises following adoption of damage caps. Combined laboratory and radiology spending trends rises through 2006. Combined spending falls sharply after that on a per-patient basis, but is flat on a per-physician basis.

Part B spending generally rises through 2011, then begins to fall on a per-patient basis. Both per-patient and per-physician, the new-cap line is parallel to and slightly above the no-cap line during the pre-cap-adoption period. The gap between the two lines grows during and after the cap adoption period, which suggests that cap adoption may increase Part B spending.

For part A spending, all three groups show a similar general pattern of a rise in spending through 2002, then roughly level through 2010, and generally falling after that. The new-cap line is in between the no-cap and old-cap lines throughout this period; all three lines converge to very similar levels for 2010-2013. The overall pattern provides little evidence of an effect of cap adoption on Part A spending. Also, the non-parallelism in what should be a placebo comparison between no-cap and old-cap states -- old-cap states have higher spending over 1999-2009; this difference then disappears – provides a warning against having confidence in any apparent cap effect we might find.

Part B spending generally rises through 2009, then flattens and begins to fall. The new-cap line is parallel to and slightly above the no-cap line during the pre-cap-adoption period. The gap between the two lines grows during and after the cap adoption period, which provide evidence suggestive that cap adoption may increase Part B spending.

Total spending is a blend of the Part A and Part B results. Prior to the cap adoption period, the new-cap and no-cap lines are both reasonably parallel and very close together. The new-cap line rises to modestly above the no-cap line in 2004, and remains slightly above the no-cap line thereafter. This graph provides mild evidence that caps may increase total Medicare spending.

3. Leads and Lags Graphs with Broad Control Group

In Figures App-4 to App-6, we present leads-and-lags graphs similar to those presented in the paper, but using the broad control group of both no-cap and old-cap states; the analogous figures in the text use No-Cap states as the control group . Results are generally similar with both control

[4] Radiology and laboratory spending are cleanly identified in our data beginning in 2000, so we exclude 1999 when studying these spending categories.

groups. One notable difference: with the broad control group, in the patient FE graphs, the increases in radiology and laboratory spending, and drop in PCI rates, observed during the first four years after damage cap adoption, reverses in the last data year (year 6+).

4. Additional Graphs and Tables for Results Presented in The Paper

4.1. Additional Summary Statistics

Table App-3 is similar in form to Table 1 in the text, and provides a covariate balance table for the treated states versus 21 *old-cap* states in 2002.

4.2.Covariate Coefficients for Cardiac Interventions and Medicare Spending Regressions

Table App-4, Panel B presents the coefficients on covariates from the simple DiD regressions presented in the text of the effect of damage caps on cardiac intervention; and Panel C presents coefficients on covariates for the simple DiD regressions presented in the text of the effect of damage caps on laboratory and radiology spending; and Panel D presents coefficients on covariates for the simple DiD regressions presented in the text of the effect of damage caps on Medicare Part A, Part B, and total spending.

4.3. Including Other Tort Reforms

In Table App-5, we present results from a specification which includes other tort reforms, not just damage caps. We do not favor this specification (see Paik, Black, and Hyman, 2013b, for detailed discussion), and the results with these additional tort reform variables need to be interpreted with caution. The other reforms we include are: punitive damage caps, split recovery reform, punitive evidence reform, collateral source reform, joint and several liability reform, periodic payments reform, and certificate of merit requirements. We use no-cap states as the control group. Coefficients of other tort reforms are presented in Table App 4. Coefficients for other tort reforms are never statistically significant with either patient or physician FE.

4.3. Results from Leave Out Regressions

We have a patient level data, and we have disproportionally larger number of observations from states with higher Medicare population. We are concerned that our results might be entirely driven by these states. To address this concern, we run our regressions and leave one treatment state out each time. These results are presented in Table App-6.

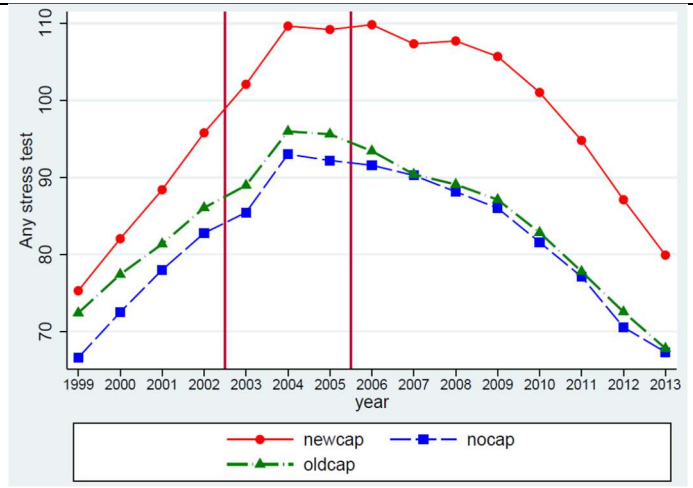
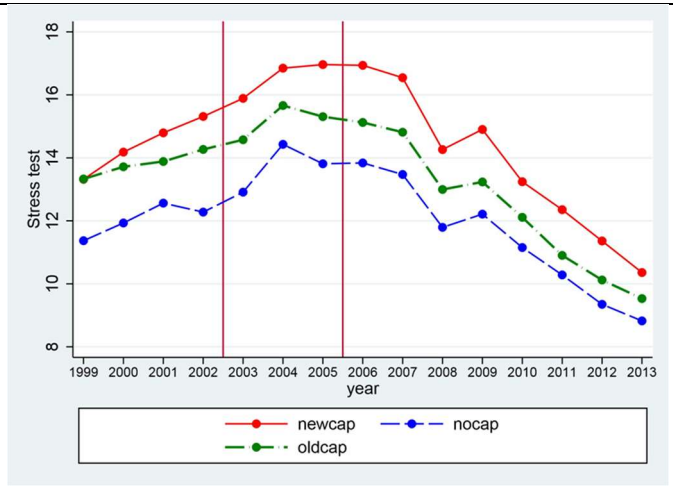
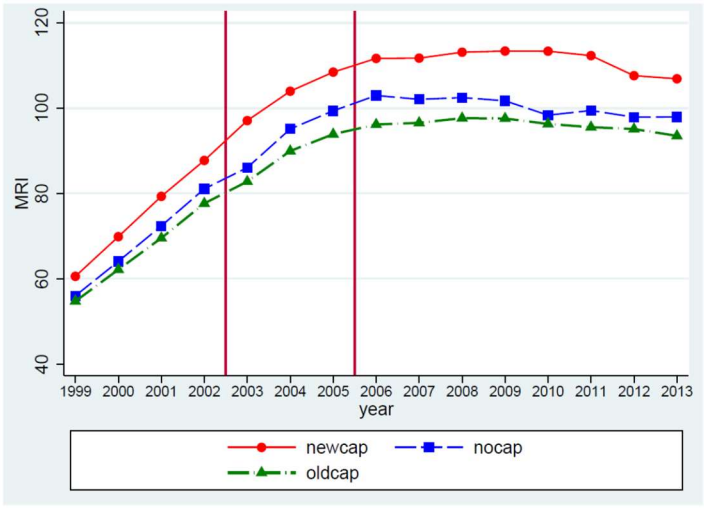
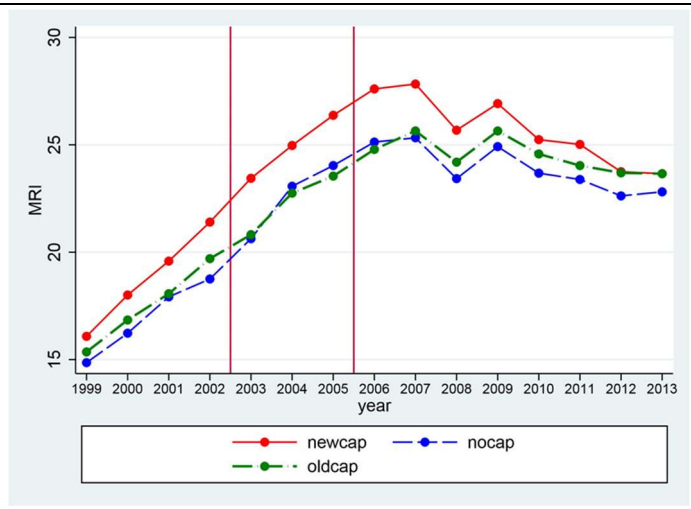
4.4. Synthetic Controls

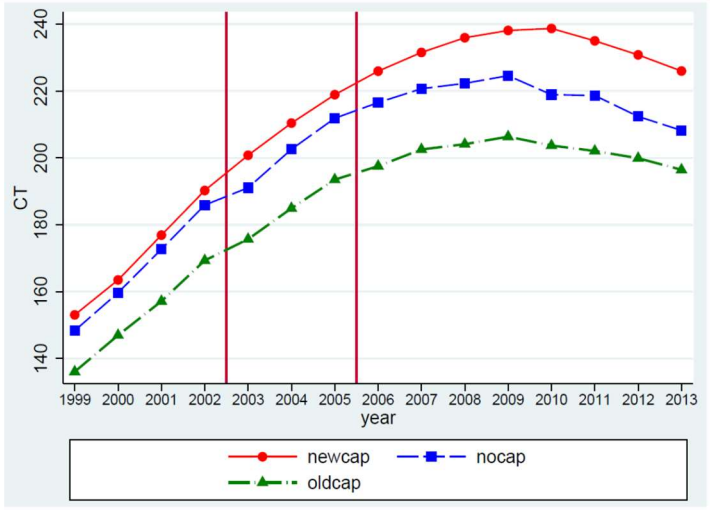
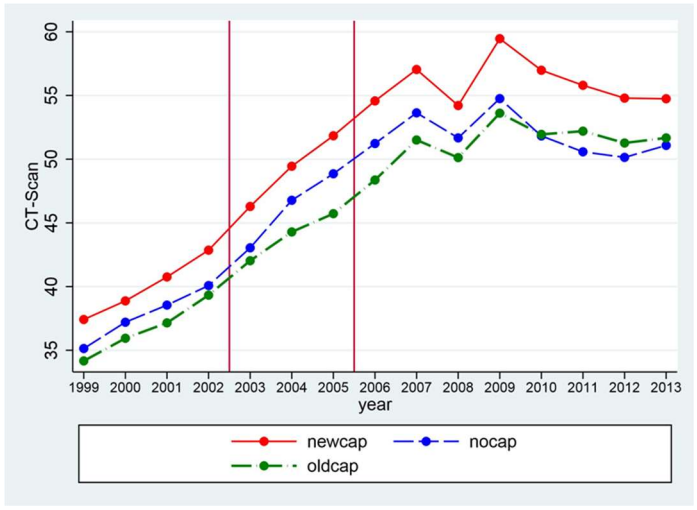
The synthetic control method is a data-driven procedure that provides single control unit as weighted average of several comparison units (Abadie et al., 2010). The synthetic control ensures the parallel pre-treatment trends by design, and it enables us to study the effect of reform by each state separately. We present the results for stress test, CT-Scan, MRI, and radiology spending. Other results are also very similar.

For imaging tests, we use *ln*(Number of beneficiaries with any stress test (MRI/CT scan per 1,000 beneficiaries) as our outcome variable and use the covariates listed in Table 1 (main paper) as predictor variables. The predictor variables are averaged over the pre-treatment period. For radiology spending, we specify ln (radiology spending per enrollee) as our outcome and other

covariates in Table 1 as predictors. Synthetic control graphs are presented in Figure App-7. State donor weights for synthetic control for each outcome is presented in Table App-7.

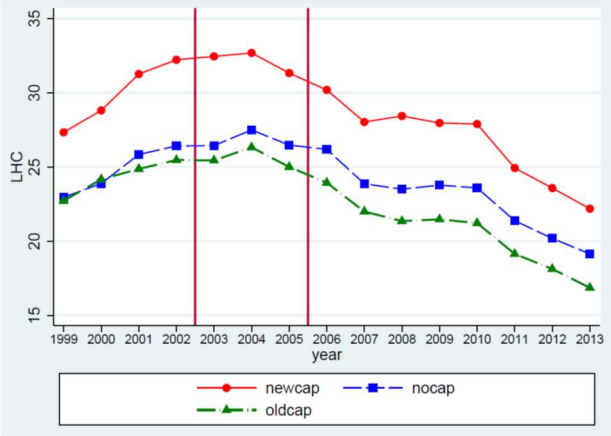
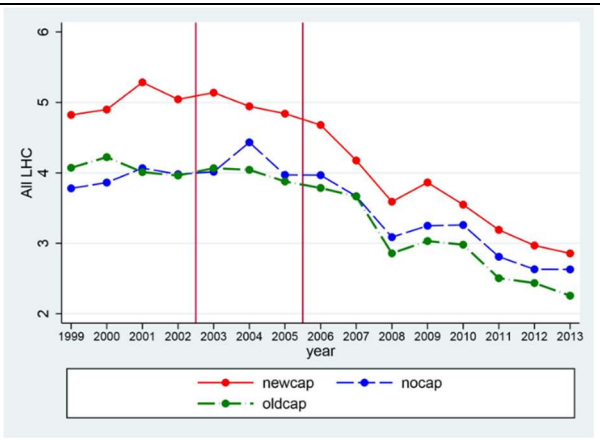
Figure App 1. Imaging Rates for New-cap, No-cap, and Old-cap States

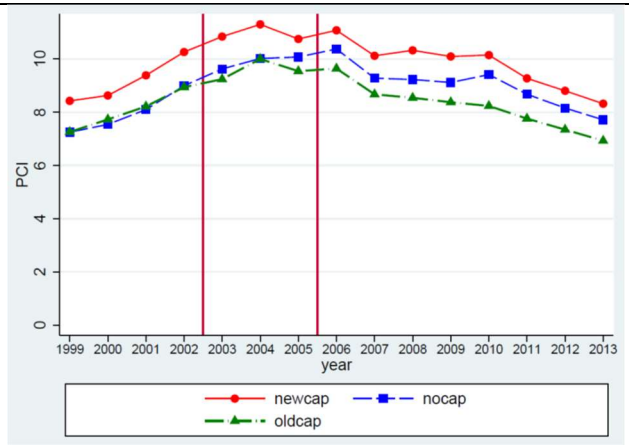
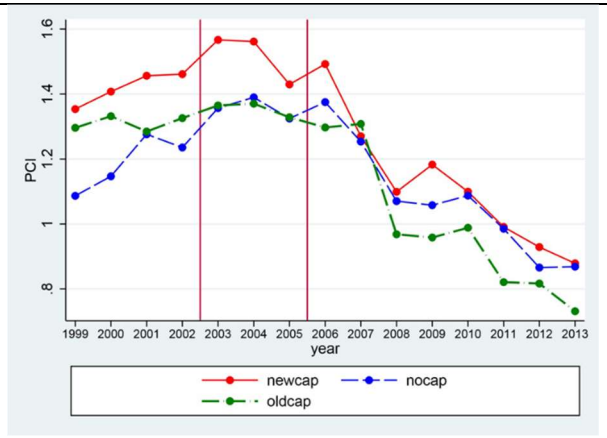
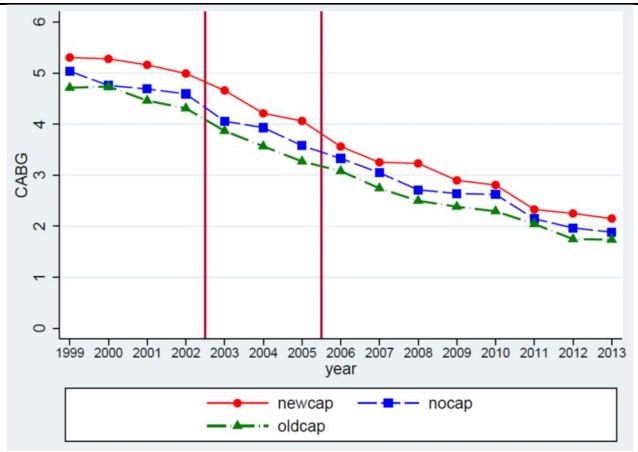
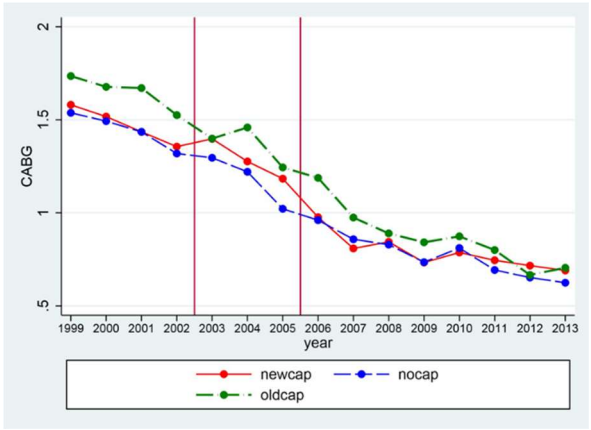
Rate per Patient	Rate per physician
Any Stress Test	
	
MRI	
	

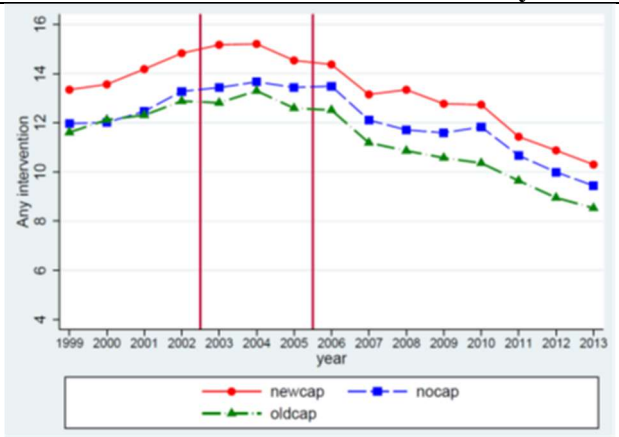
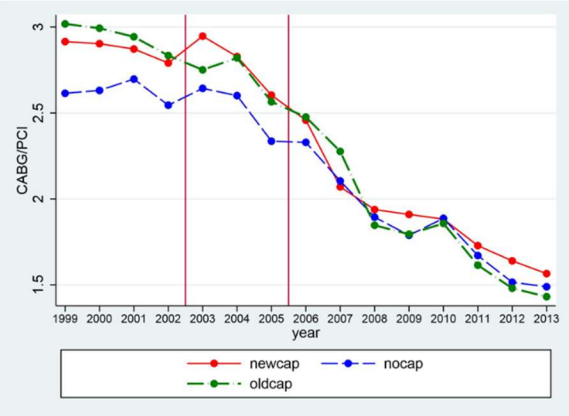
Rate per Patient	Rate per physician
CT-Scan	
	

Notes: Rates for indicated imaging tests, separately for 9 new-cap, 20 no-cap, and 22 old-cap states over 1999-2013. Means are weighted by county population, and calculated at state level from 1999-2013. Vertical lines in 2003 and 2006 indicate the third reform wave period. Outcome variable is number of indicated tests or procedures per 1,000 patients. We drop IL and GA from treatment group for 2010 on due to cap reversals in 2010, and drop NC and TN from control group for 2012 on, due to cap adoptions in late 2011.

Figure App-2.- Cardiac Intervention Rates for New-cap, No-cap, and Old-cap States

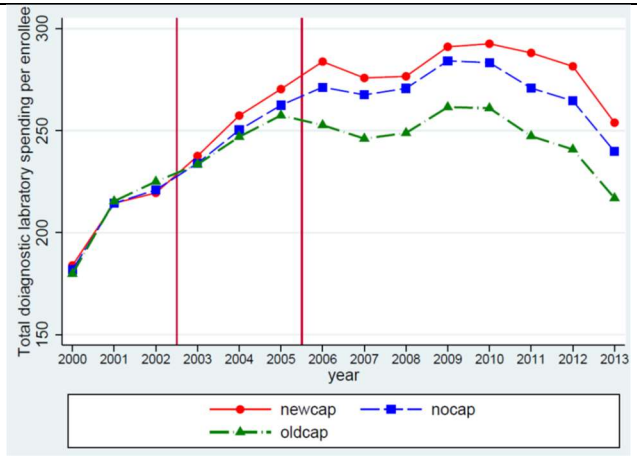
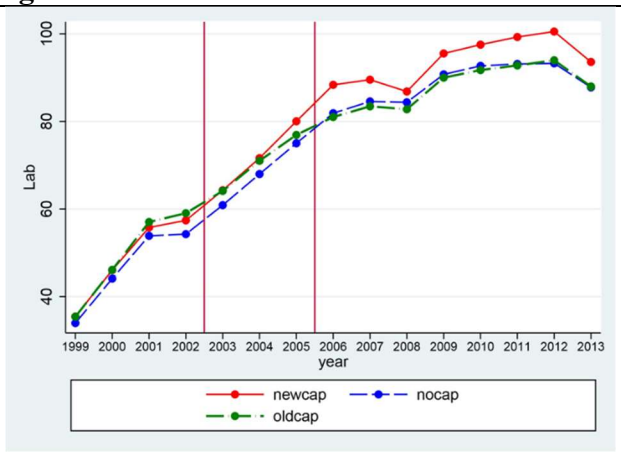
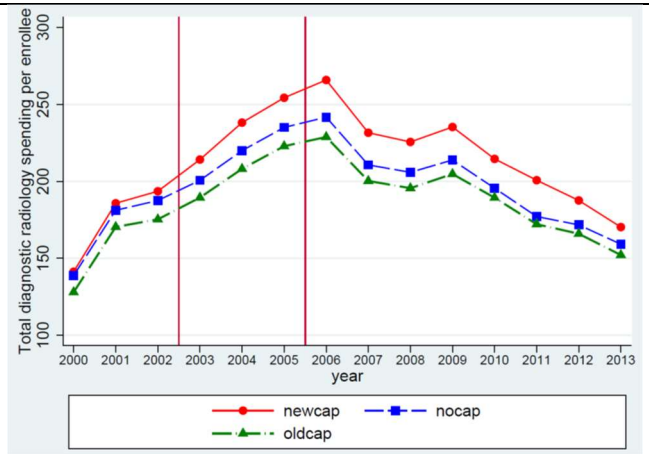
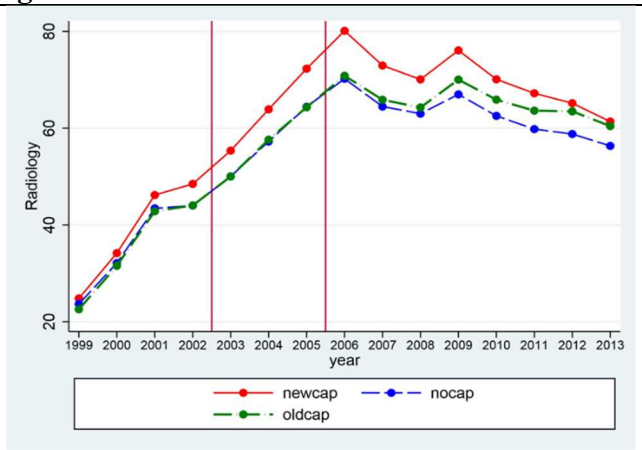
Rate per Patient	Rate per physician
LHC	
	

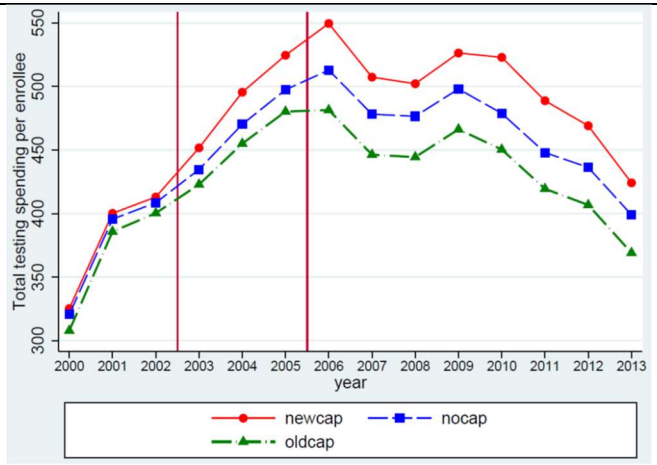
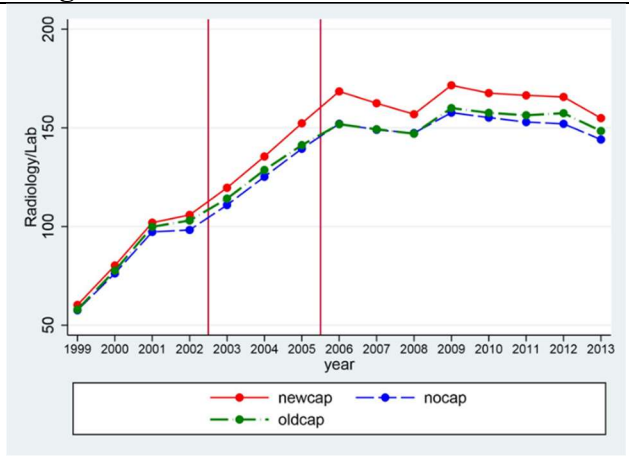
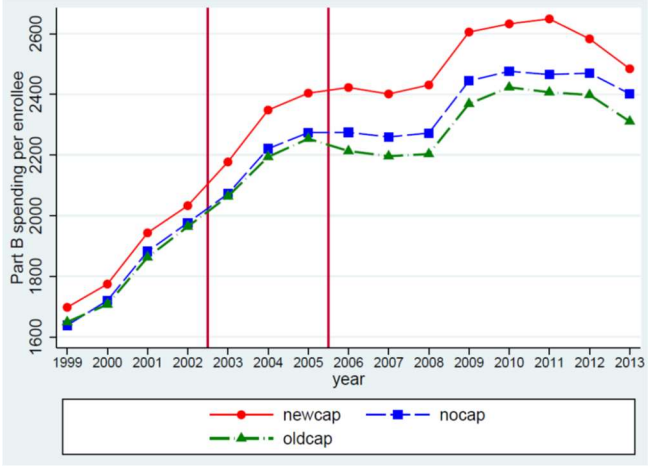
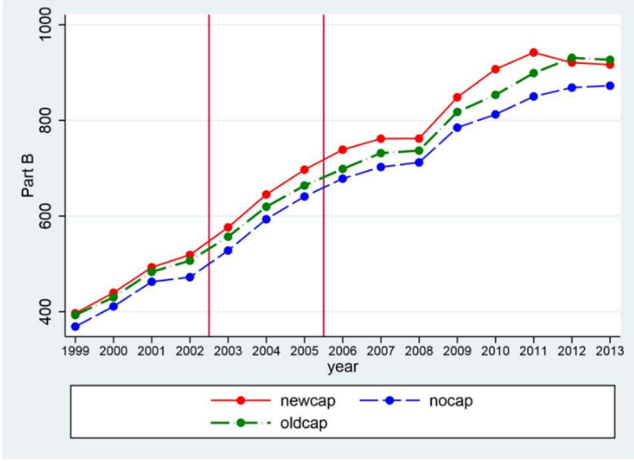
Rate per Patient	Rate per physician
PCI	
	
CABG	
	

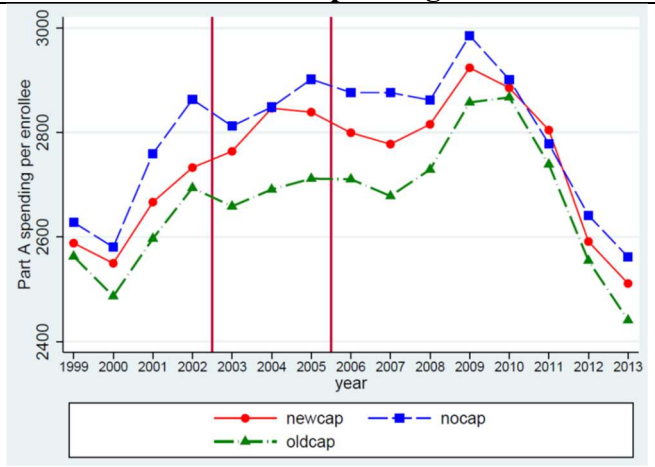
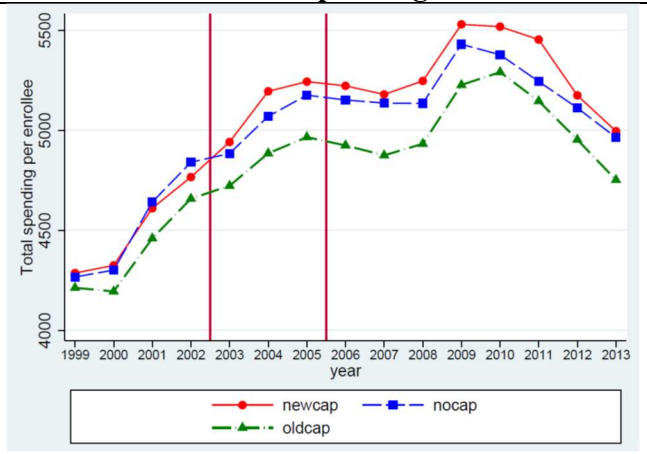
Rate per Patient	Rate per physician
Any Revascularization (PCI or CABG)	
	

Notes: Rates of LHC, PCI, CABG, and any intervention rates per beneficiary and per physician separately for 9 new-cap, 20 no-cap, and 22 old-cap states over 1999-2013. Means are weighted by county population, and calculated at state level from 1999-2013. Vertical lines in 2003 and 2006 indicate the third reform wave period.

Figure App 3. Medicare Spending for New-cap, No-cap, and Old cap States

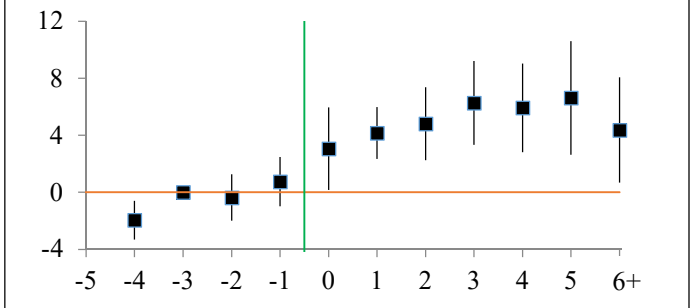
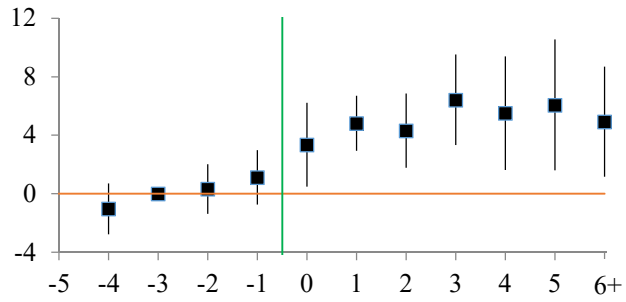
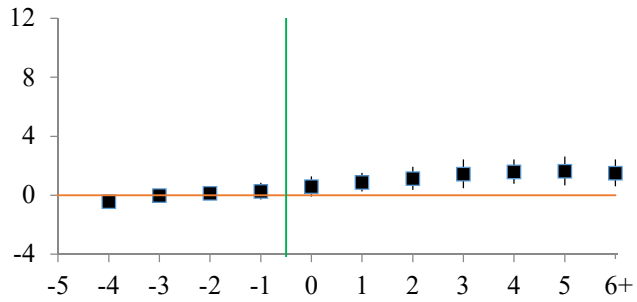
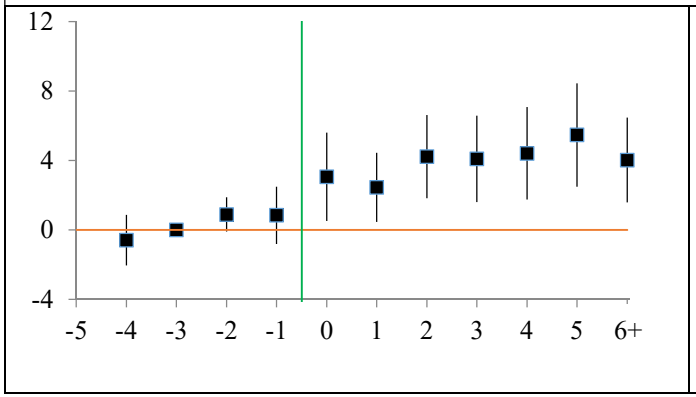
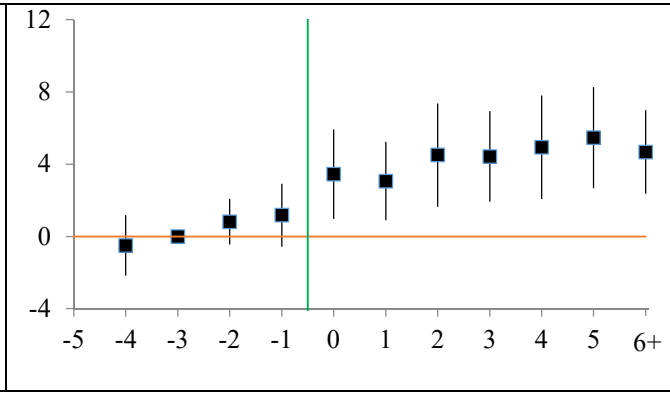
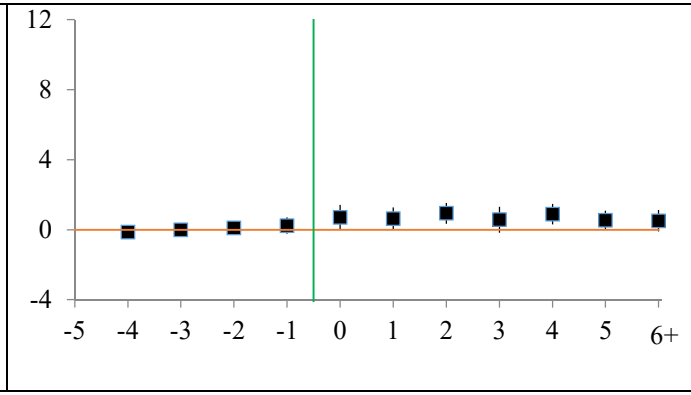
Per patient rates	Per physician rates
Laboratory Spending	
	
Radiology spending	
	

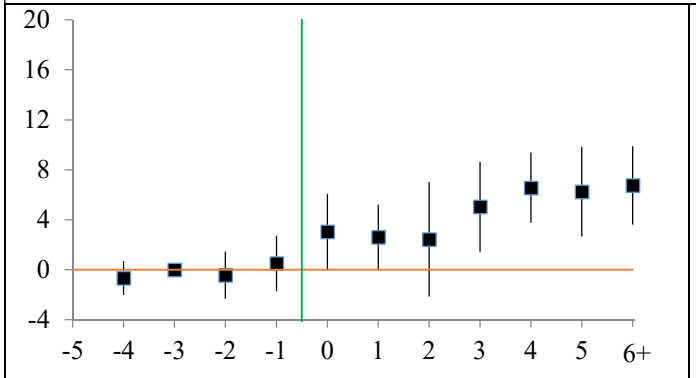
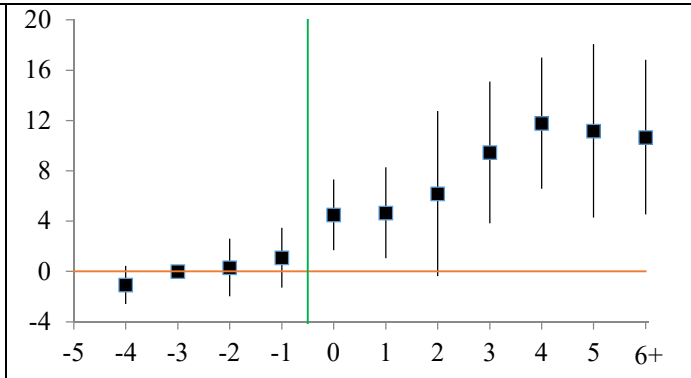
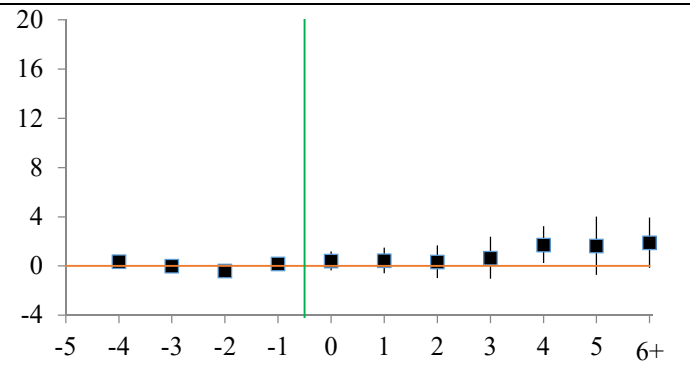
Per patient rates	Per physician rates
Lab + Radiology Spending	
	
Part B Spending	
	

Per patient rates	
Part A Spending	**Total Spending**
	

Notes: Annual average outpatient laboratory, radiology, combined (outpatient lab plus radiology), and part B spending per beneficiary and per physician, and Part A, and total (A + B) spending per beneficiary over 1999-2013, and for 20 no-cap, 9 new-cap, and 22 old-cap states. Means are weighted by county population, and are calculated at state level from 1999-2013. Vertical lines in 2003 and 2006 indicate the third reform wave period. Amounts in 1999 $.

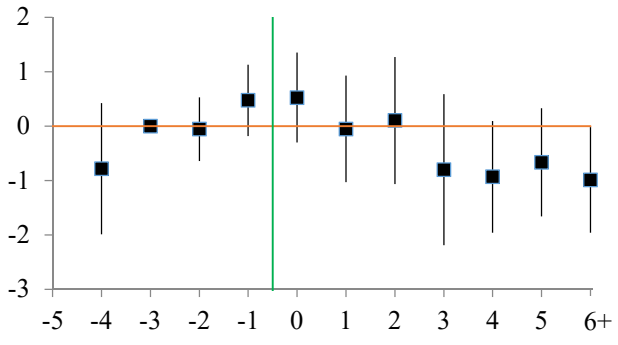
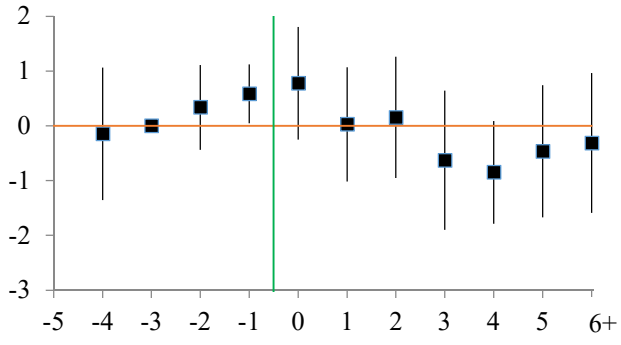
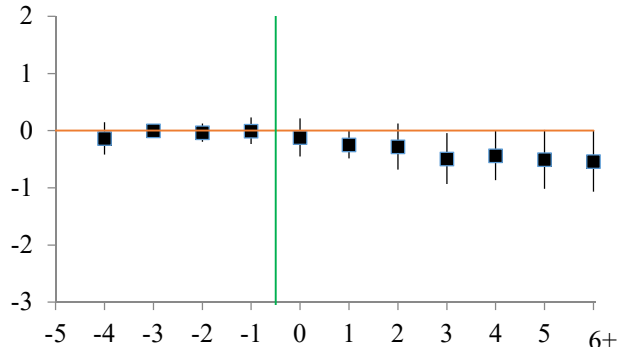
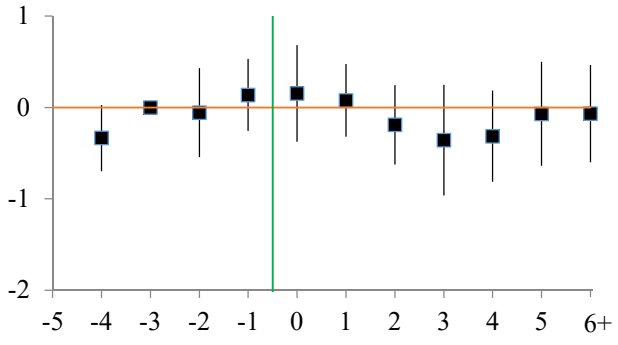
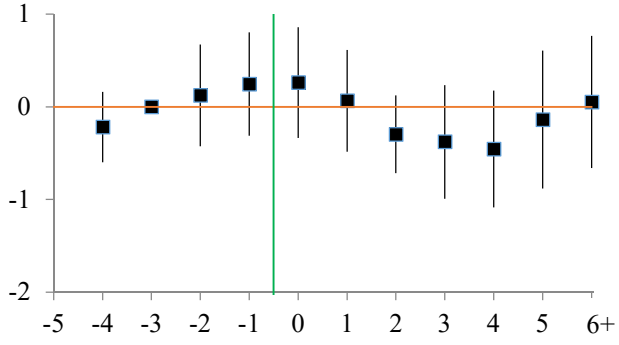
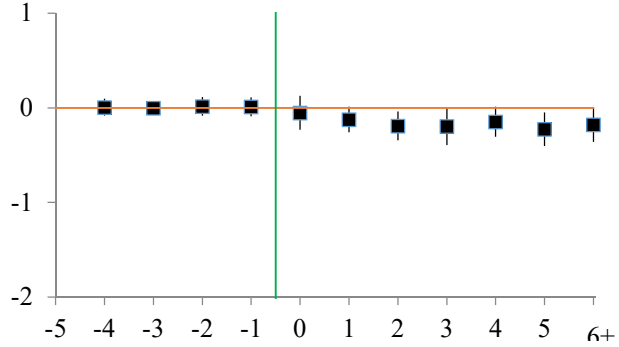
Figure App 4. Imaging Rates: Leads and Lags Graphs of Effect of Damage Cap Adoption, Broad Control Group

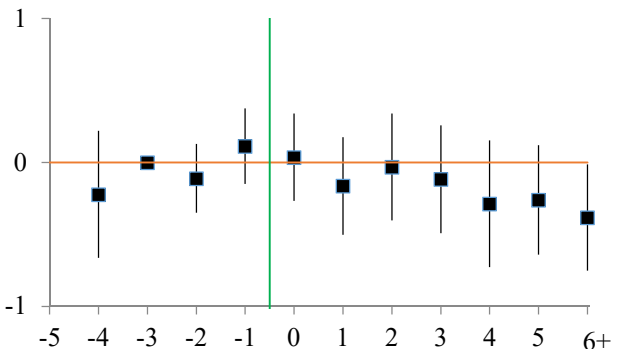
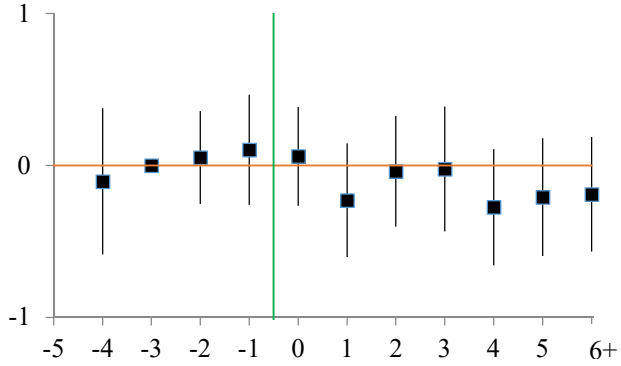
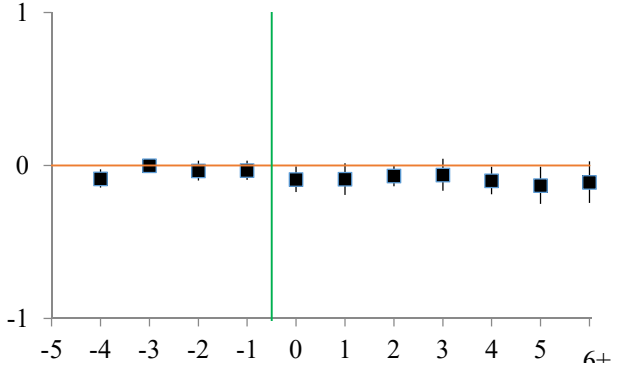
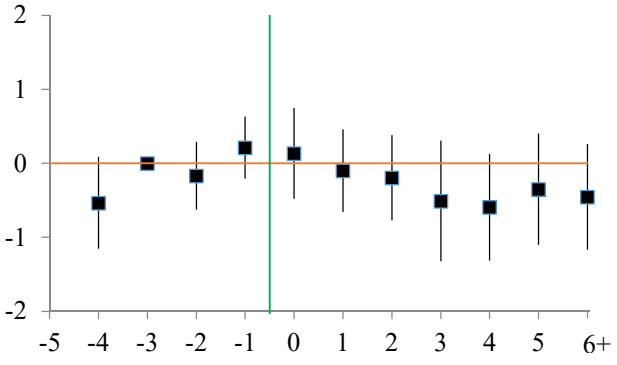
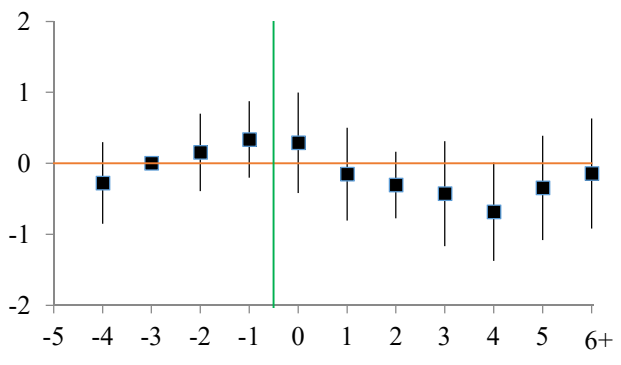
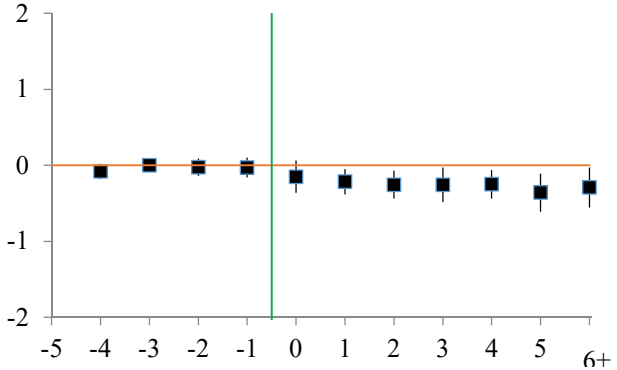
Without Patient or Physician FE	With Patient*Zip FE	With Physician*Zip FE
Any Stress Test		
		
MRI		
		

Without Patient or Physician FE	With Patient*Zip FE	With Physician*Zip FE
CT-Scan		
		

Notes: Leads and lags regressions (linear probability model) of dummy variables for whether a patient had the indicated imaging test in a given year, for 9 new-cap states, versus narrow control group of 20 no-cap states , over 1999-2011. Leads and lags coefficients are multiplied by 1,000, so provide predicted effect of cap on annual rates per 1,000 patients. Regressions include zip-code, and year fixed effects, and covariates described in section 3.1. y-axis shows coefficients on lead and lag dummies; vertical bars show 95% confidence intervals (CIs) around coefficients, using standard errors clustered on state. Coefficient for year -3 is set to zero.

Figure App 5- Cardiac Intervention Rates: Leads and Lags Graphs of Effect of Damage Cap Adoption, Broad Control Group

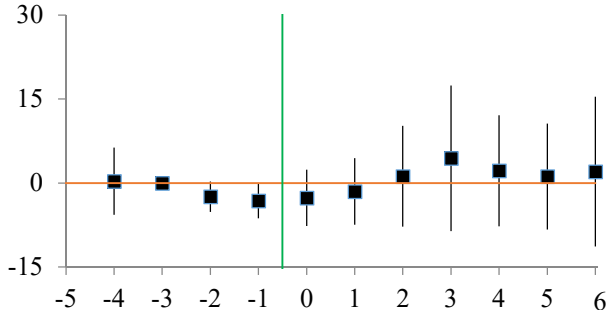
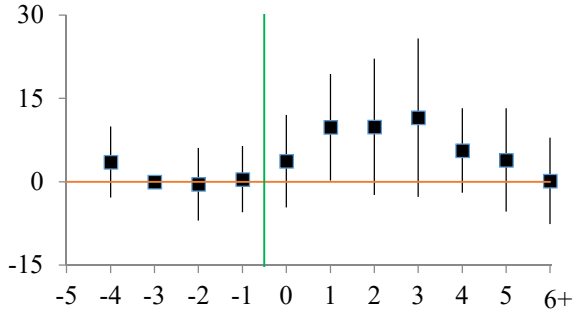
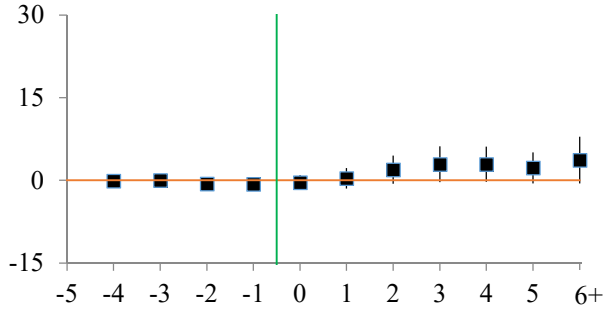
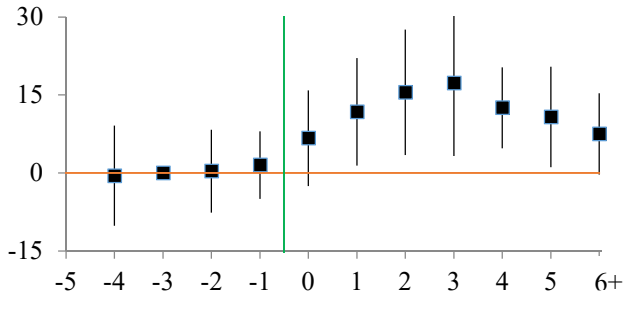
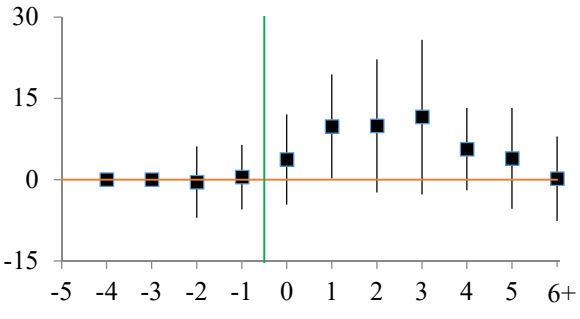
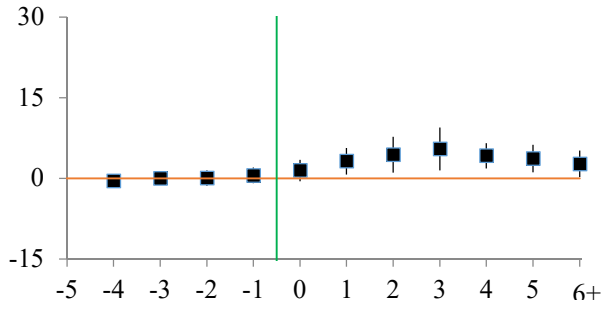
Without Patient or Physician FE	With Patient*Zip FE	With Physician*Zip FE
LHC		
		
PCI		
		

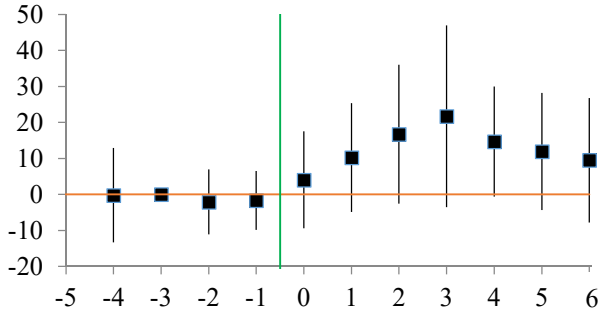
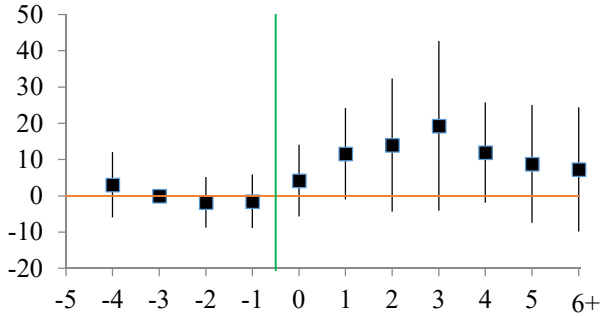
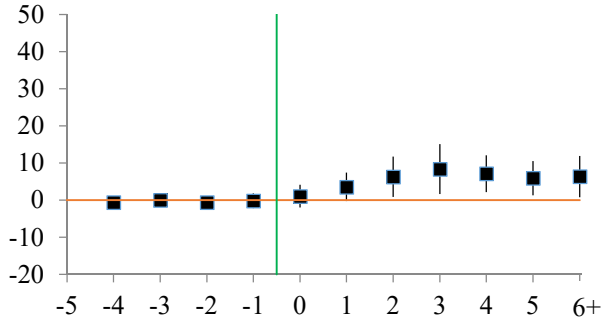
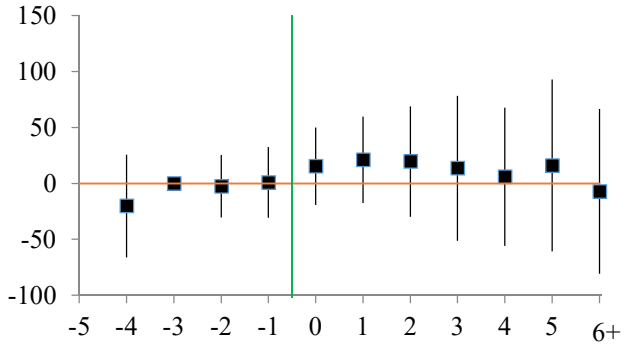
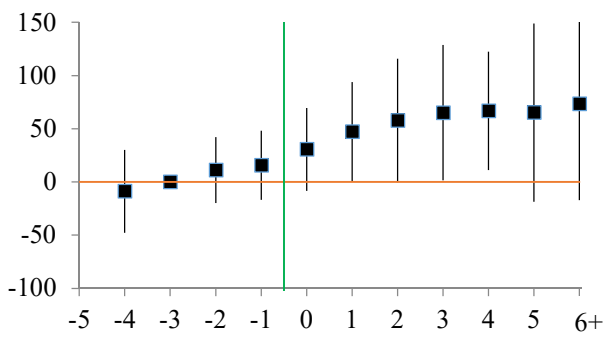
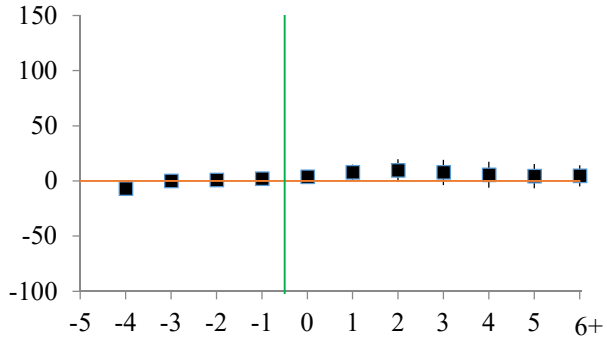
Without Patient or Physician FE	With Patient*Zip FE	With Physician*Zip FE
CABG		
		
Any Revascularization (PCI or CABG)		
		

Notes: Leads and lags regressions (linear probability model) of dummy variables for whether a patient had the indicated procedure in a given year, for 9 new-cap states, versus narrow control group of 20 no-cap states, over 1999-2011. Coefficients on leads and lags are multiplied by 1,000, so provide predicted effect of cap on annual rates per 1,000 patients. y-axis shows the coefficients on the lead and lag dummies; vertical bars show 95% CIs around coefficients, using standard errors clustered on state. Coefficient for year -3 is set to zero.

Figure App 6. Medicare Spending: Leads and Lags Graphs of Effect of Damage Cap Adoption, Broad Control Group

Panel A: Part B Spending

Without Patient or Physician FE	With Patient*Zip FE	With Physician*Zip FE
Laboratory Spending		
		
Radiology spending		
		

Without Patient or Physician FE	With Patient*Zip FE	With Physician*Zip FE
Lab + Radiology Spending		
		
Part B Spending		
		

Notes: Leads and lags regressions of outpatient laboratory, radiology spending, and combined (lab and radiology) spending per beneficiary over 2000-2011, and Part A, Part B, and total Medicare spending over 1999-2011, for 9 new-cap states versus narrow control group of 20 no-cap states. y-axis shows coefficients on the lead and lag dummies; vertical bars show 95% CIs around coefficients, using standard errors clustered on state. Coefficient for year -3 is set to zero. Regressions include patient*zip fixed effects. Amounts in 1999 $

Panel B: Part A and Total Spending

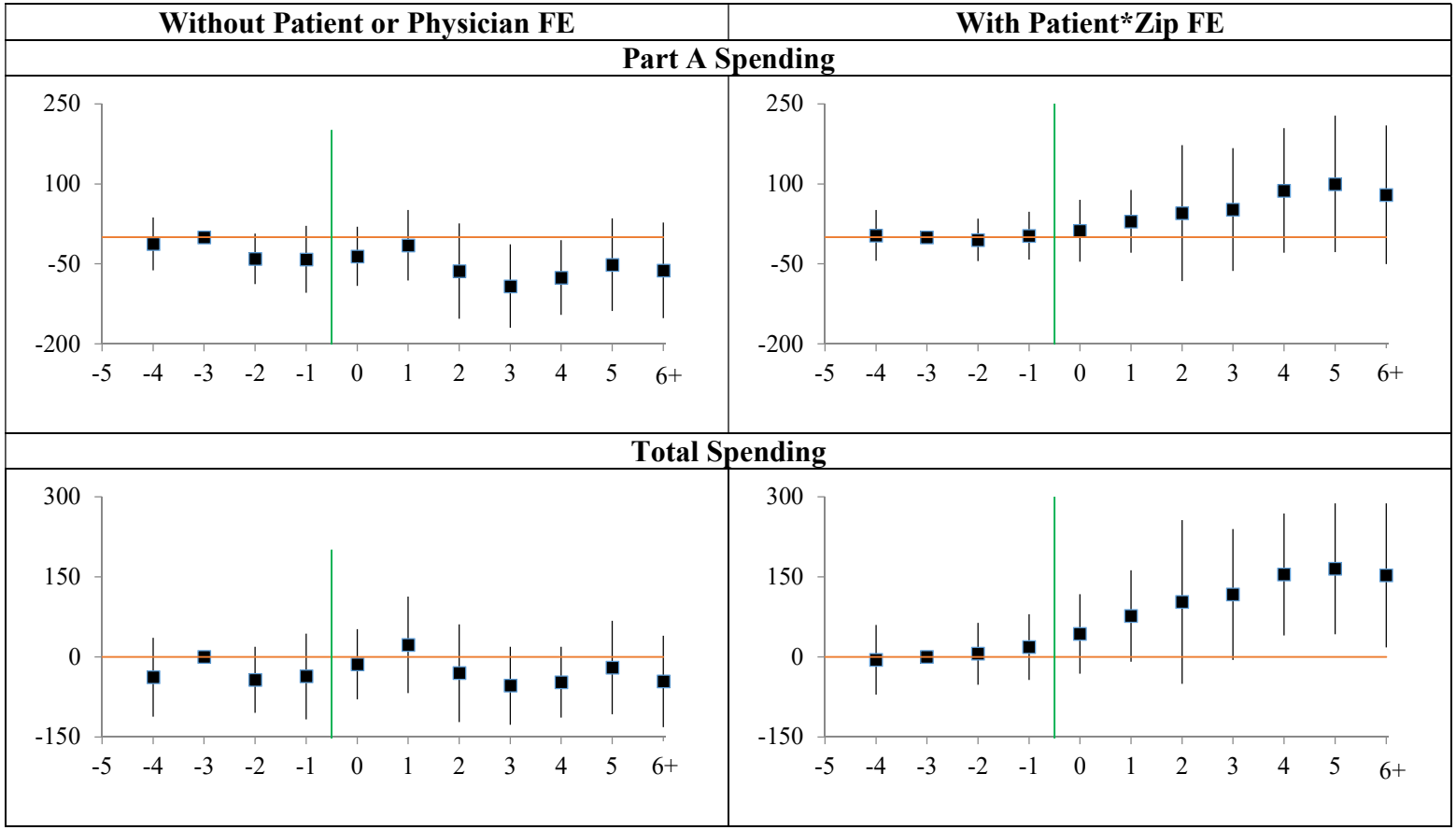
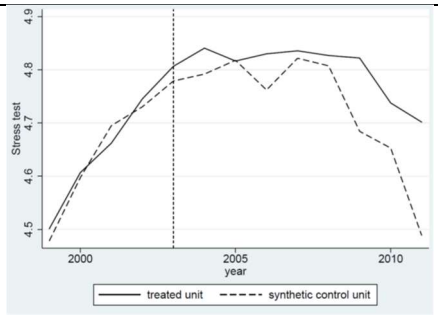
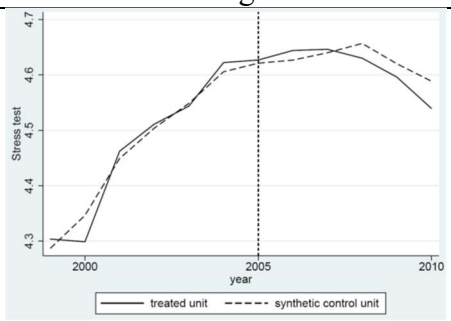
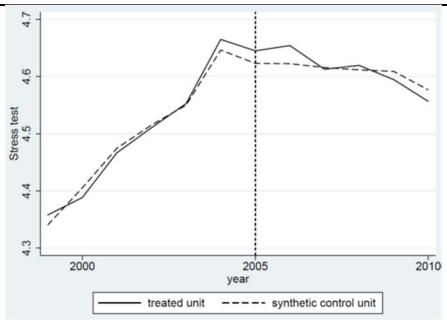
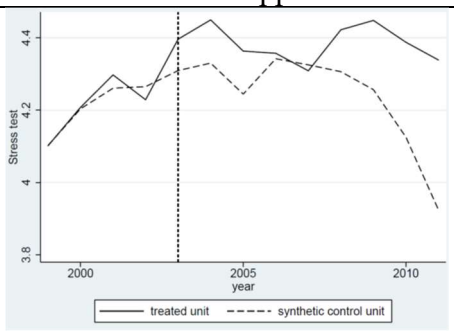
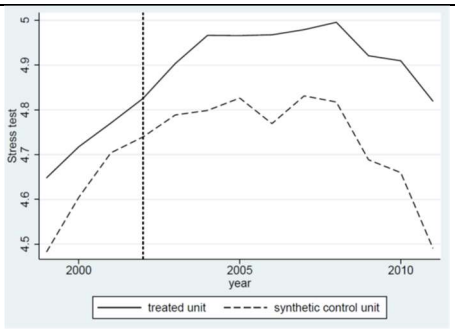
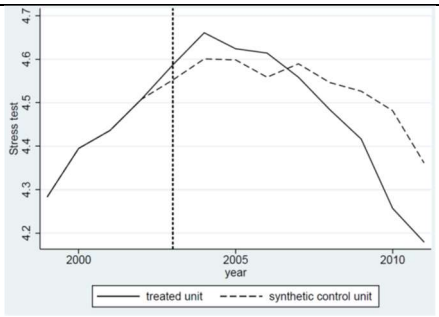
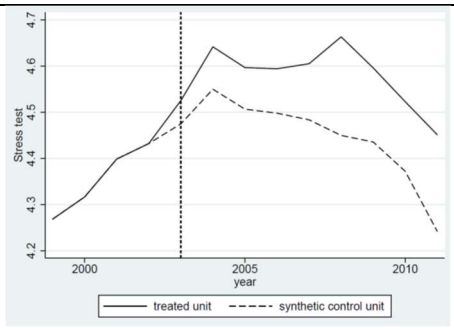
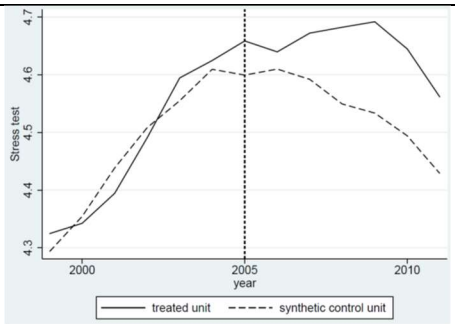
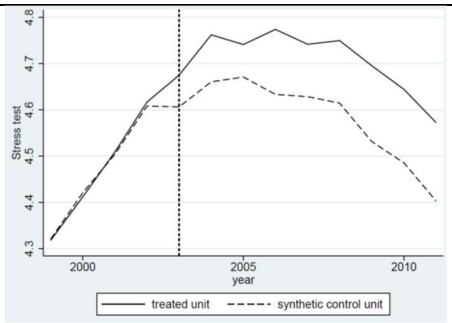
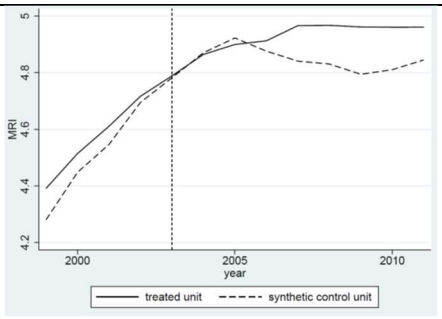
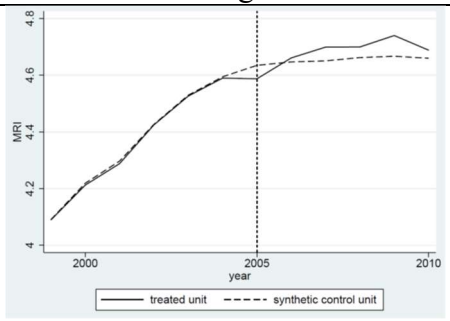
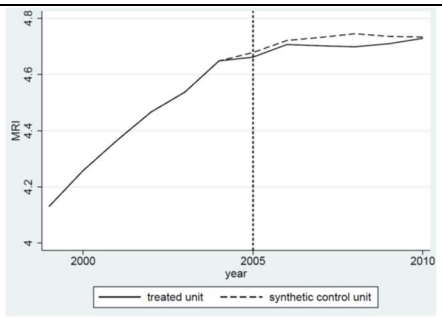
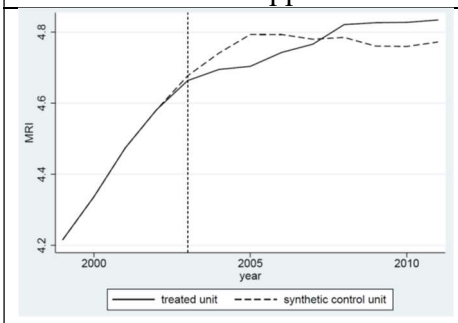
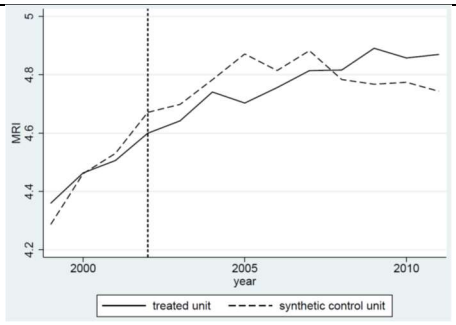
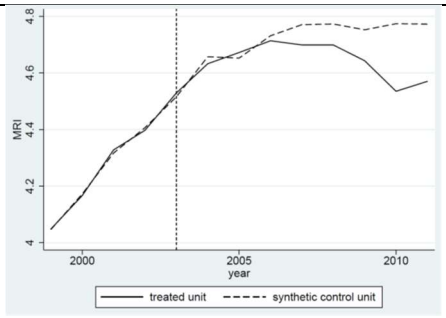
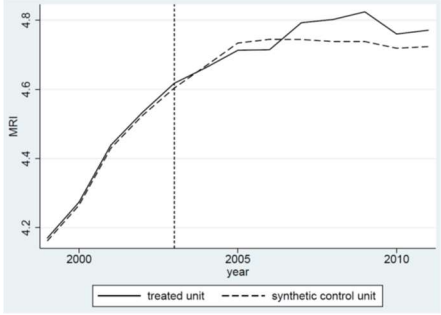
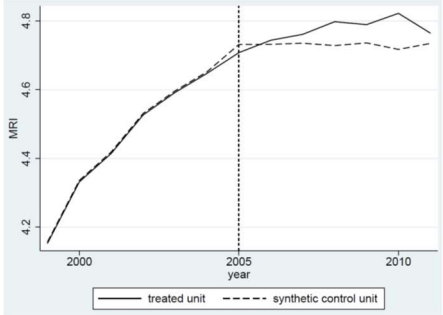
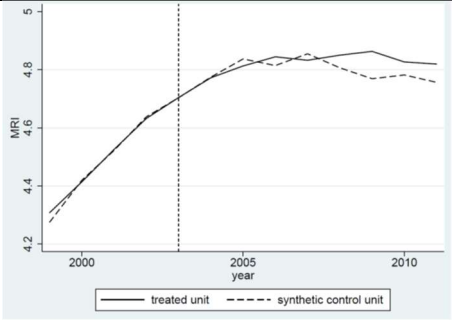


Figure App-7- Synthetic Control Analysis

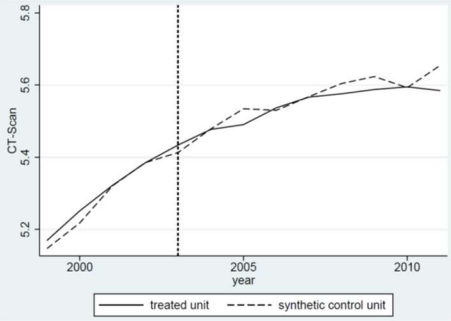
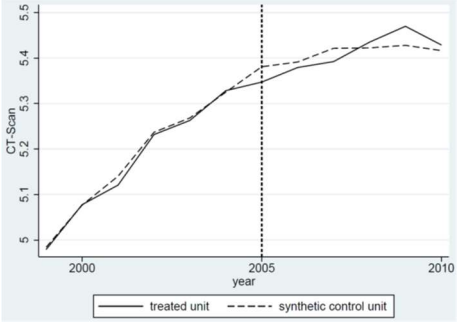
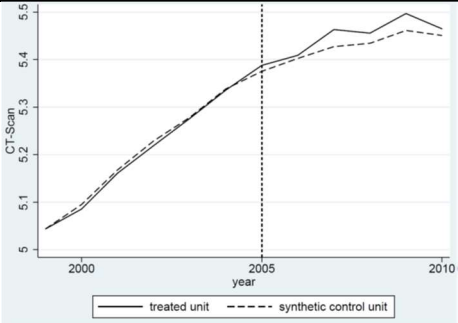
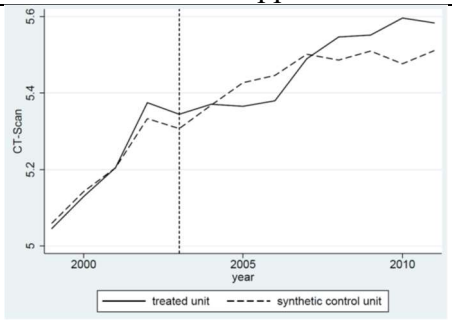
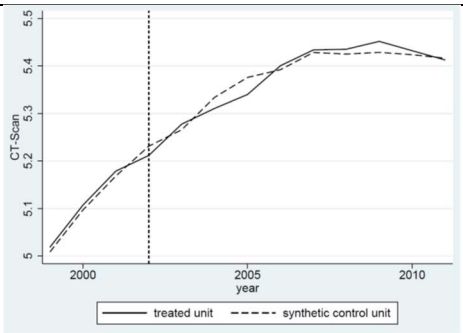
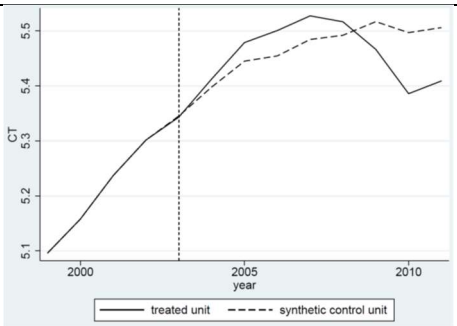
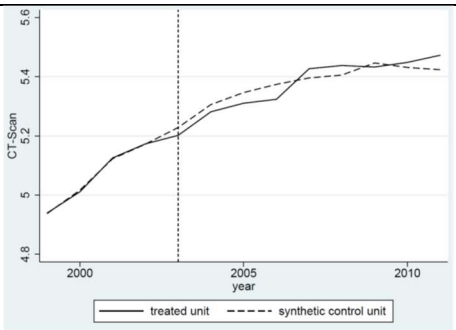
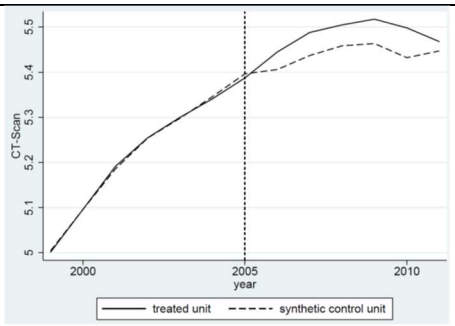
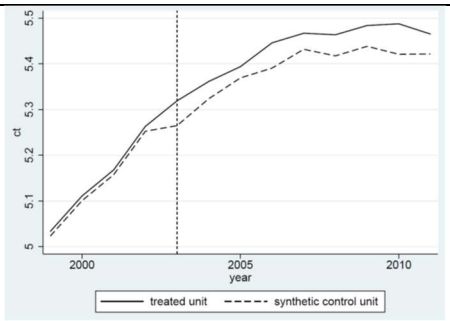
Panel A-Any Stress Test

Florida	Georgia	Illinois
		
Mississippi	**Nevada**	**Ohio**
		
Oklahoma	**South Carolina**	**Texas**
		

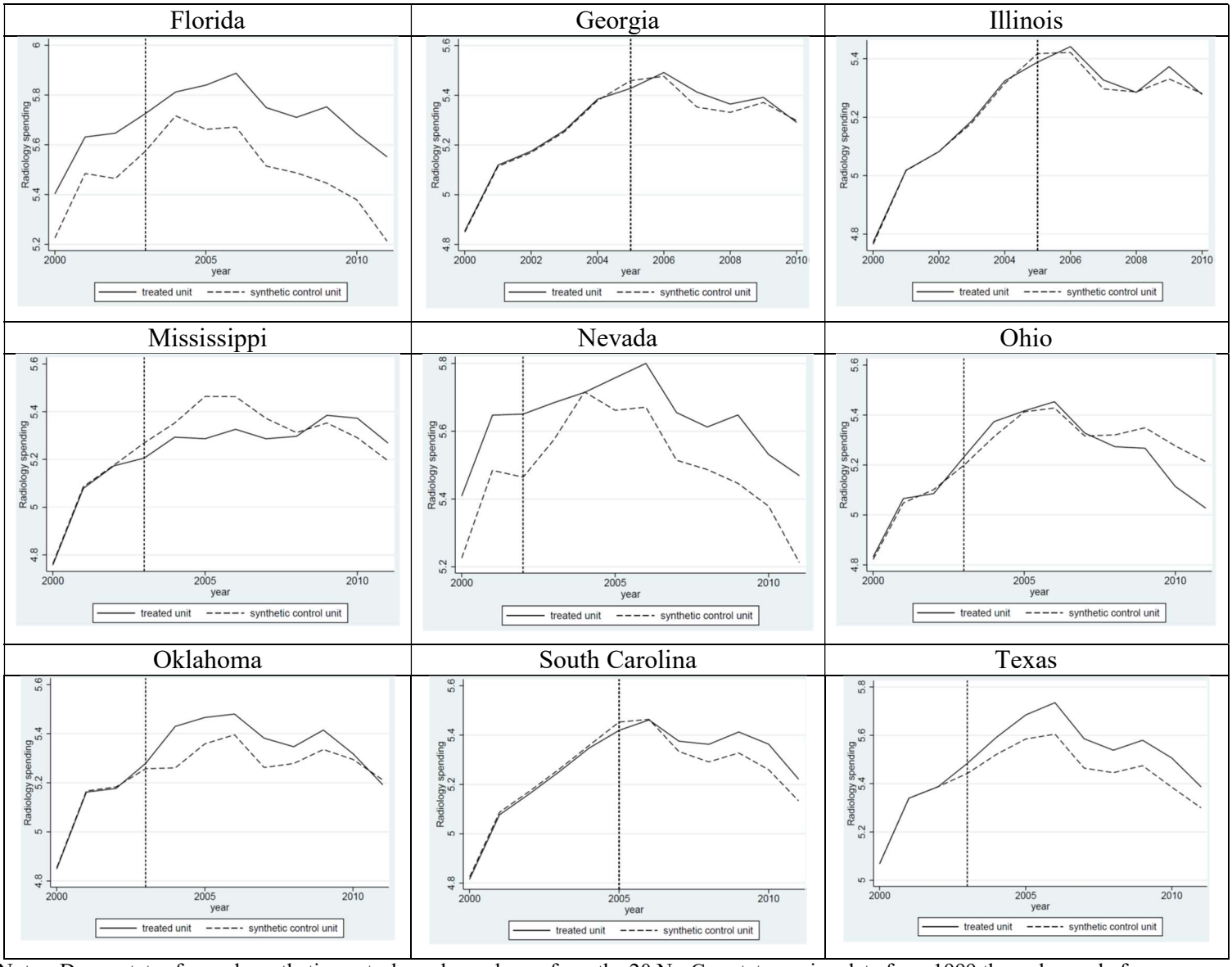
Panel B-MRI

Florida	Georgia	Illinois
		
Mississippi	**Nevada**	**Ohio**
		
Oklahoma	**South Carolina**	**Texas**
		

Panel C. CT scan

Florida	Georgia	Illinois
		
Mississippi	**Nevada**	**Ohio**
		
Oklahoma	**South Carolina**	**Texas**
		

Panel D-Radiology Spending



Notes: Donor states for each synthetic control graph are drawn from the 20 No-Cap states, using data from 1999 through year before cap adoption. Vertical line separates the pre- and post- treatment periods.

For each new-cap state, graph shows *ln*(Number of beneficiaries with Any Stress Test in indicated year/1,000) for that state versus its synthetic control.

Table App-1. Details on Non-Econ Damage Caps

State	Cap adopted	Cap invalidated	Cap level ($ '000)	Treatment group years	Control group years
No-cap states					
Alabama	1987	1991			
Arizona					
Arkansas					
Connecticut					
Delaware					
Dist. Of Columbia					
Iowa					
Kentucky					
Maine					
Minnesota	1986	1989			
New Hampshire	1977; 1986	1980; 1990			
New Jersey					
New York					
North Carolina					
Pennsylvania					
Rhode Island					
Tennessee					
Vermont					
Washington	1986	1988			
Wyoming					
New-cap states					
Florida	2003		$500 ($1,000 in death cases)	2004-2012	1999-2002
Georgia	2005	Feb. 2010	$350-$1,000, depending on number and type of defendants	2006-2009	1999-2004
Illinois	2005	Feb. 2010	$500, except $1,000 for hospitals	2006-2009	1999-2004
Mississippi	2003		$500	2004-2011	1999-2002
Nevada	2002		$350	2002-2011	1999-2001
Ohio	2003		Greater of $250 or (3x economic damages, up to $500)	2004-2011	1999-2002
Oklahoma	2003		$300	2004-2011	1999-2002
South Carolina	2005		$350-$1,050, depending on number and type of defendants	2006-2011	1999-2004
Texas	2003		$250 -$750, depending on number	1999-2002	2004-2011

State	Cap adopted	Cap invalidated	Cap level ($ '000)	Treatment group years	Control group years
			and type of defendants		
Old-cap states					
Alaska	1986-				
California	1975-				
Colorado	1986-				
Hawaii	1986-				
Idaho	1987-				
Indiana					
Kansas	1986-				
Louisiana					
Maryland	1986-				
Massachusetts	1986-				
Michigan	1986-				
Missouri	1986-				
Montana	1995-				
Nebraska	1976-				
New Mexico	1976-				
North Dakota	1995-				
Oregon	1987-99				
South Dakota	1976-85; 1996-				
Utah	1987-				
Virginia	1977-				
West Virginia	1986-				
Wisconsin	1986-90; 1995-				
Other recent cap adopters					
North Carolina	Nov. 2011		$500		1999-2011
Tennessee	Nov. 2011		$750		1999-2011

Notes: Table shows the 11 states which adopted caps during 2002-2011, details on each, and the period for which each is included in the treatment group or the control group. Caps are in nominal dollars unless otherwise specified.

Table App-2. Test and Procedure Coding Details

Procedure	Code Type	Codes	Notes
CABG	ICD-9	36.10, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.17, 36.19,	All codes were used from 1999-2015.
	DRG	106, 107, 109, 547, 548, 549, 550, 231, 232, 233, 234, 235, 236	Codes 107 and 109 are used from 1999-2005. Code 106 is used from 1999-2006. Codes 231, 232, 233, 234, 235 and 236 are used from 2008-2015.
	CPT/HCPCs	33510, 33511, 35512, 35513, 33514, 33516, 33533, 33534, 33535, 33536, S2205, S2206, S2207, S2208, S2209	Codes S2205, S2206, S2207, S2208 and S2209 are used from 2000-2015. All other codes were used from 1999-2015.
PCI	ICD-9	0.66, 36.01, 36.02, 36.03, 36.04, 36.05, 36.06, 36.07, 36.09, 17.55	Code 0.66 is used from 2006-2015. Codes 36.01 and 36.02 are used from 1999-2005. Code 17.55 is used from 2011-2015. All other codes are used from 1999-2015.
	DRG	112, 116, 246, 247, 248, 249, 250, 251, 516, 517, 518, 526, 527, 555, 556, 557, 558	Code 112 is used in 2000. Code 116 is used from 1999-2000. Codes 246, 247, 248 and 249 are used from October 2007-2015. Codes 250 and 251 are used from 2008-2015. Codes 516 and 518 are used from 2001-2005. Code 517 is used from 2001-September of 2005. Codes 526 and 527 are used from April 2003-Septemeber 2005. Codes 555, 556, 557 and 558 are used from October 2005-September 2007.
	CPT/HCPCs	92920, 92924, 92928, 92933, 92937, 92941, 92943, 92980, 92982, 92995, C1874, C1875, C9600, C9602, C9604, C9606, C9607, G0290, G0291	Codes 92920, 92924, 92928, 92933, 92937, 92941, 92943, C9600, C9602, C9604, C9606, and C9607 are used from 2013-2015. Codes 92980, 92982 and 92995are used from 1999-2012. Codes C1874 and C1875 are used from 2001-2015. Codes G0290 and G0291 are used from 2003-2012.
LHC	CPT/HCPCs	93501, 93508, 93510, 93511, 93524, 93526, 93527, 93452, 93453, 93454, 93455, 93456, 93457, 93458, 93459, 93460, 93461, 93539, 93540, 93543, 93544, 93545, 93555, 93556, 93571, 93572, 93564, 93565, 93567	Codes 93501, 93508, 93510, 93511, 93524, 93526, 93527, 93539, 93540, 93543, 93544, 93555 and 93556 are use from 1999-2010. Codes 93542, 93543, 93454, 93455, 93456, 93457, 93458, 93459, 93460, 93461, 93564, 93565, 93567 are used from 2011-2015. All other codes are used from 1999-2015.
SPECT	CPT/HCPCs	78451, 78452, 78464, 78465, 78468, 78469, 78478, 78480, G0038, G0039, G0042, G0043	Codes 78451 and 78452 are used from 2010-2015. Codes 78464, 78465, 78478 and 78480 are used from 1999-2009. All other codes are used from 1999-2015.
Stress ECHO	CPT/HCPCs	93350, 93351, 93015, 93016, 93017, 93018, 93320, 93321, 93325, 93352, A9700, C1759, C8928, C8930, G8961, G8962	Code 93015 is used from 1999-2008. Codes 93351and C8930 are used from 2009-2015. Code C8928 is used from 2008-2015. Codes G8961 and G8962 are used from 2013-2015. All other codes are used from 1999-2015.
Stress ECG	CPT/HCPCs	93015, 93016, 93017, 93018	All codes are used from 1999-2015.

Procedure	Code Type	Codes	Notes
MRI	CPT/HCPCs	70540, 70551, 70552, 70553, 71550, 72141, 72142, 72146, 72147, 72148, 72149, 72156, 72157, 72158, 72196, 73220, 73221, 73720, 73721, 74181, 75552, 75553, 75554, 75555, 75556, 76390, 70542, 70543, 70554, 70555, 70557, 70558, 70559, , 71551, 71552, , 72195, 72197, 73218, 73219, , 73222, 73223, 73718, 73719, 73722, 73723, 74182, 74183, 75557, 75559, 75561, 75563, 75565, 76498	Codes 71551, 71552, , 72195, 72197, 73218, 73219, , 73222, 73223, 73718, 73719, 73722, 73723, 74182 and 74183 are used from 2001-2015. Codes 70542 and 70543 are used from 2002-2015. Code 76498 is used from 2003-2015. Codes 70557, 70558 and 70559 are used from 2004-3015. Codes 70554 and 70555 are used from 2007-2015. Codes 75557, 75559, 75561 and 75563 are used from 2008-2015. Code 75565 is used from 2010-2015. Codes 75552, 75553, 75554, 75555 and 75556 are used from 1999-2007. All other codes are used from 1999-2015.
CT-Scan	CPT/HCPCs	70450, 70460, 70470, 70480, 70481, 70482, 70486, 70487, 70488, 70490, 70491, 70492, 70496, 70498, 71250, 71260, 71270, 71275, 72125, 72126, 72127, 72128, 72129, 72130, 72131, 72132, 72133, 72191, 72192, 72193, 72194, 73200, 73201, 73202, 73206, 73700, 73701, 73702, 73706, 74150, 74160, 74170, 74174, 74175, 74176, 74177, 74178, 74261, 74262, 74263, 75571, 75572, 75573, 75574, 75635, 76380, 76497, S8093, 0066T, 0067T, 0144T, 0145T, 0146T, 0147T, 0148T, 0149T, 0150T, 0151T	Codes 70496, 70498, 71275, 72191, 73206, 73706 and 74175 are used from 2001-2015. Codes 74261, 74262, 74263, 75571, 75572, 75573, 75574, 75635 and 76497 are used from 2010-2015. Codes 74176, 74177 and 74178 are used from 2011-2015. Code 74174 is used from 2012-2015. Code S8093 is used from 2004-2005. Codes 0066T, 0067T are used from 2005-2009. Codes 0144T, 0145T, 0146T, 0147T, 0148T, 0149T, 0150T, 0151T are used from 2007-2009. All other codes are used from 1999-2015.

Table App-3. Summary Statistics

				New-Cap v. Old-Cap	
States	**New-cap**	**No-cap**	**Old-cap**	**ND**	**t-test**
Per-patient rates					
Imaging (number per 1000 patients)					
stress echo	10.81 (0.41)	12.18 (0.42)	16.71 (0.48)	0.09	**10.41*** **
SPECT	74.88 (1.07)	61.64 (0.87)	56.05 (0.79)	0.30	**14.13*** **
stress ECG	14.58 (0.30)	12.95 (0.28)	18.60 (0.35)	0.10	**8.61*** **
Any Stress Test	95.78 (1.09)	82.76 (0.92)	86.05 (0.89)	0.20	**6.91**
MRI	87.73 (0.97)	81.07 (0.89)	77.65 (0.76)	0.11	**8.17**
CT scan	190.23 (1.59)	185.88 (1.51)	169.31 (1.26)	0.03	**10.29**
Cardiac procedures (number per 1,000 patients)					
LHC	32.22 (0.53)	26.42 (0.41)	25.47 (0.35)	0.29	**10.66*** **
LHC or stress test	110.02 (1.16)	94.56 (0.99)	97.15 (0.94)	0.21	**8.61*** **
PCI	10.26 (0.18)	9.00 (0.18)	8.94 (0.15)	0.17	**5.54*** **
CABG	4.99 (0.12)	4.59 (0.11)	4.31 (0.10)	0.10	**4.23*** **
PCI or CABG	14.82 (0.24)	13.28 (0.21)	12.88 (0.37)	0.15	**6.37*** **
Medicare Spending per Enrollee (in 1999 $)					
Laboratory	219.46 (2.53)	220.97 (2.24)	225.03 (2.60)	0.01	**1.53**
Imaging	193.56 (2.38)	187.55 (1.93)	175.31 (1.69)	0.04	**6.25*** **
Imaging + lab	413.02 (4.74)	408.52 (3.96)	400.35 (4.01)	0.01	**2.04** **

Part A	2732.96 (27.19)	2863.21 (41.68)	2693.99 (30.17)	0.06	**0.96**
Part B	2033.04 (19.46)	1976.70 (18.17)	1964.03 (17.05)	0.04	**2.67****
Total	4765.99 (42.63)	4839.91 (56.06)	4658.03 (44.37)	0.02	1.75*
Per physician rates					
Imaging (tests ordered by each physician per 1000 patients)					
stress echo	1.74 (2.33)	1.79 (4.89)	2.69 (2.69)	0.41	**7.93*****
SPECT	11.41 (5.93)	8.72 (5.70)	8.75 (6.96)	0.41	**8.66*****
stress ECG	2.79 (2.37)	2.19 (1.80)	3.47 (2.62)	0.27	**5.69*****
Any Stress Test	15.31 (6.61)	12.28 (7.50)	14.27 (7.54)	0.14	**3.11*****
MRI	21.40 (10.25)	18.75 (7.54)	19.70 (10.94)	0.16	**3.35*****
CT scan	42.86 (14.84)	40.08 (14.27)	39.33 (12.59)	0.26	**5.23*****
Cardiac procedures (number ordered by each physician per 1,000 patients)					
LHC	5.04 (3.49)	3.98 (3.21)	3.96 (2.62)	0.35	**7.06*****
LHC or stress test	18.11 (7.49)	14.62 (8.23)	16.44 (10.25)	0.22	**4.52*****
PCI	1.46 (1.31)	1.23 (1.66)	1.32 (1.19)	0.11	**2.22****
CABG	1.35 (1.44)	1.32 (1.78)	1.52 (1.51)	0.11	**2.40****
PCI or CABG	2.79 (2.13)	2.54 (2.55)	2.83 (2.08)	0.02	0.42
Medicare Spending per Physician (in 1999 $)					
Laboratory	57.40 (19.06)	54.26 (15.47)	59.04 (23.00)	0.08	1.65*
Imaging	48.49 (15.88)	44.02 (12.64)	44.05 (13.34)	0.30	**6.16*****

Imaging + lab	105.88 (31.47)	98.28 (25.11)	103.08 (31.93)	0.09	1.83*
Part B	518.84 (105.54)	472.24 (104.65)	506.73 (107.46)	0.11	**2.37****
Patient covariates					
Mean age	75.65 (0.05)	75.957 (0.04)	75.71 (0.03)	0.01	**1.15**
Number of Charlson comorbidities	1.09 (0.01)	1.12 (0.01)	1.06 (0.01)	0.04	**2.82*****
Covariates (state averages, with population weights)					
Percent of population age 65-74	6.53 (0.08)	6.70 (0.05)	5.99 (0.04)	0.04	**6.16*****
Percent of population age 75-84	4.42 (0.06)	4.73 (0.04)	4.19 (0.03)	0.10	**3.08*****
Percent of population above age 85	1.45 (0.02)	1.65 (0.01)	1.45 (0.01)	0.18	0.25
Percent white	80.16 (0.46)	82.41 (0.52)	82.14 (0.37)	0.04	**3.12*****
Percent black	16.41 (0.45)	13.11 (0.47)	10.15 (0.37)	0.28	**10.68*****
Percent Hispanic	16.30 (0.65)	8.92 (0.34)	15.31 (0.46)	0.47	**1.25**
Percent male	49.11 (0.04)	48.77 (0.04)	49.36 (0.03)	0.01	**4.47*****
Percent below poverty line	13.24 (0.17)	11.75 (0.17)	11.63 (0.13)	0.17	**7.44*****
Unemployment rate	5.95 (0.06)	5.82 (0.07)	5.90 (0.06)	0.03	0.49
Managed care penetration	10.78 (0.42)	13.04 (0.45)	17.66 (0.48)	0.13	**10.75*****
Physician per capita	2.01 (0.04)	2.51 (0.06)	2.57 (0.05)	0.23	**4.87*****
Percent of Medicare Enrollees who are disabled	14.24 (0.13)	14.73 (0.14)	13.61 (0.11)	0.05	**3.74*****
Population (millions)	0.11 (0.002)	0.11 (0.003)	0.09 (0.003)	0.06	**3.72*****

Median household income ($ thousands)	41.01 (0.33)	43.78 (0.39)	45.95 (0.34)	0.08	**10.46*****

Notes: Table presents summary statistics for 2002 (just before third reform wave), for outcome variables and averages for outcome variables and selected covariates, for 9 treated states versus 21 old-cap states, normalized difference, and two-sample *t*-test for difference in means. Amounts in 1999$. Normalized difference (ND) is defined as $ND_j = (\bar{x}_{jt} - \bar{x}_{jc}) / [(s_{jt}^2 + s_{jc}^2) / 2]^{1/2}$ (see Imbens and Rubin, 2015). *t*-test is for two-sample difference in means. *, **, *** indicates statistical significance at the 10%, 5%, and 1% level; significant differences at 5% level are in boldface.

Table App-4. Simple DiD Regressions, Showing Coefficient on Covariates

Panel A: Imaging Rates

See text for complete table, including covariates.

Panel B: Cardiac Intervention Rates

Patient or Physician FE	**No**	**No**	**No**	**No**	**Patient*zip**				**Physician*zip**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable	**LHC**	**PCI**	**CABG**	**Any Revasc.**	**LHC**	**PCI**	**CABG**	**Any Revasc.**	**LHC**	**PCI**	**CABG**	**Any Revasc.**
Male	**0.010*** **	**0.005*** **	**0.004*** **	**0.009*** **					**0.002*** **	**0.001*** **	**0.001*** **	**0.001*** **
	(0.0002)	**(0.0001)**	**(0.0001)**	**(0.0002)**					**(7.64e-05)**	**(3.70e-05)**	**(3.42e-05)**	**(6.64e-05)**
White	**0.004*** **	**0.002*** **	**0.001*** **	**0.002*** **					**0.0003*** **	**0.0001** **	**3.11e-05**	**0.0001** **
	(0.0003)	**(0.0002)**	**(0.0002)**	**(0.0002)**					**(0.0001)**	**(4.84e-05)**	**(3.28e-05)**	**(5.16e-05)**
Black	**-0.003*** **	**-0.002*** **	**-0.002*** **	**-0.004*** **					**-8.15e-05**	**-0.0004*** **	**-0.0002*** **	**-0.0005*** **
	(0.001)	**(0.0003)**	**(0.0002)**	**(0.0004)**					**(0.0001)**	**(6.57e-05)**	**(3.18e-05)**	**(6.49e-05)**
Hispanic	**0.003*** **	-7.37e-06	3.97e-05	-2.77e-06					**0.0005*** **	1.71e-05	5.30e-05	7.43e-05
	(0.001)	(0.0003)	(0.0002)	(0.0005)					**(0.0001)**	(6.21e-05)	(3.72e-05)	(7.62e-05)
Fraction of population age 65- 74	**0.079** **	0.021	0.020	0.038*	0.073	0.023	0.015	0.034	**0.041*** **	**0.018** **	**0.020** **	**0.037** **
	(0.034)	(0.015)	(0.013)	(0.022)	(0.043)	(0.020)	(0.016)	(0.022)	**(0.015)**	**(0.007)**	**(0.008)**	**(0.014)**
Fraction age 75- 84	-0.008	0.029	0.014	0.042	-0.039	0.057*	0.001	0.052	-0.025	0.001	-0.006	-0.005
	(0.054)	(0.021)	(0.015)	(0.028)	(0.076)	(0.028)	(0.020)	(0.033)	(0.019)	(0.007)	(0.008)	(0.013)
Fraction age 85+	-0.086	-0.009	-0.038	-0.049	0.044	0.006	-0.023	-0.013	-0.010	0.003	-0.014	-0.012
	(0.148)	(0.075)	(0.027)	(0.083)	(0.195)	(0.105)	(0.044)	(0.125)	(0.042)	(0.016)	(0.014)	(0.022)
Fraction white	-0.003	-0.014	-0.013	-0.026*	-0.011	-0.008	-0.010	-0.017	-0.0004	-0.001	0.003	0.002
	(0.013)	(0.011)	(0.009)	(0.014)	(0.026)	(0.020)	(0.015)	(0.022)	(0.008)	(0.003)	(0.004)	(0.006)
Fraction Black	0.009	-0.012	-0.015	-0.026	-0.006	-0.009	-0.015	-0.022	0.003	0.0003	-0.002	-0.002
	(0.021)	(0.016)	(0.010)	(0.019)	(0.035)	(0.023)	(0.016)	(0.028)	(0.009)	(0.003)	(0.003)	(0.005)
Fraction male	0.066	0.003	-0.003	-0.001	0.026	0.002	-0.013	-0.017	0.036**	0.009	0.004	0.014
	(0.046)	(0.023)	(0.011)	(0.027)	(0.053)	(0.028)	(0.013)	(0.026)	(0.016)	(0.008)	(0.007)	(0.012)
Fraction Hispanic	-0.011	-0.004	0.005	0.0005	-0.026	-0.014*	0.002	-0.012	**-0.015** **	**-0.006** **	-0.0005	**-0.007** **
	(0.009)	(0.004)	(0.004)	(0.006)	(0.021)	(0.007)	(0.006)	(0.011)	**(0.006)**	**(0.003)**	(0.001)	**(0.003)**
Fraction below poverty line	-0.0003	0.0004	0.001	0.002	-0.004	-0.001	0.003	0.002	0.001	-0.001	-0.0004	-0.001
	(0.006)	(0.004)	(0.002)	(0.004)	(0.007)	(0.004)	(0.003)	(0.004)	(0.001)	(0.001)	(0.001)	(0.001)
Unemployment rate	0.006	0.005	-0.002	0.004	0.0005	0.005	-0.005	0.001	-0.0002	0.002	-0.001	0.001
	(0.011)	(0.005)	(0.003)	(0.007)	(0.012)	(0.005)	(0.003)	(0.006)	(0.003)	(0.001)	(0.001)	(0.002)
Fraction of population disabled	0.012	0.008	-0.002	0.007	-0.002	0.014*	-0.005	0.011	-0.005	-0.001	**-0.006** **	-0.006
	(0.010)	(0.007)	(0.004)	(0.007)	(0.012)	(0.007)	(0.005)	(0.009)	(0.006)	(0.003)	**(0.002)**	(0.005)

Patient or Physician FE	**No**	**No**	**No**	**No**	**Patient*zip**				**Physician*zip**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable	**LHC**	**PCI**	**CABG**	**Any Revasc.**	**LHC**	**PCI**	**CABG**	**Any Revasc.**	**LHC**	**PCI**	**CABG**	**Any Revasc.**
Ln (population)	-0.002	-0.002	-0.001	-0.003	-0.005	-0.001	**-0.002****	-0.003	-0.002	-0.0005	-0.0004	-0.001
	(0.003)	(0.001)	(0.001)	(0.002)	(0.004)	(0.002)	**(0.001)**	(0.003)	(0.001)	(0.0005)	(0.0004)	(0.001)
Physician/1000 population	0.0004	0.0002	-0.0002	9.84e-05	0.0002	0.0001	-0.0002	-5.60e-05	-8.93e-05	-0.0001	-0.0001*	**-0.0002****
	(0.001)	(0.0002)	(0.0002)	(0.0004)	(0.001)	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(6.88e-05)	(8.11e-05)	**(0.0001)**
Ln(household median income)	0.003	0.002	0.001*	0.003	0.003	0.001	**0.002****	0.003	0.001	-3.43e-05	0.0003	0.0003
	(0.002)	(0.001)	(0.001)	(0.002)	(0.003)	(0.002)	**(0.001)**	(0.002)	(0.001)	(0.0003)	(0.0002)	(0.0003)
Medicare penetration	-0.003	0.0004	-0.002	-0.001	-0.007	0.001	-0.002	-0.001	**-0.004****	-0.001*	-0.001	**-0.002****
	(0.004)	(0.002)	(0.001)	(0.002)	(0.005)	(0.002)	(0.002)	(0.003)	**(0.001)**	(0.0004)	(0.0005)	**(0.001)**
(Medicare penetration)^2	-0.005	-0.004	0.003*	-0.001	-0.008	**-0.010****	0.002	-0.008	0.004	0.001	0.002*	0.003*
	(0.008)	(0.004)	(0.002)	(0.004)	(0.0102)	**(0.004)**	(0.004)	(0.006)	(0.002)	(0.001)	(0.001)	(0.001)
Constant	-0.048	-0.002	0.009	0.007	-0.015	-0.003	0.016	0.015	-0.015	-0.003	-0.004	-0.006
	(0.028)	(0.018)	(0.011)	(0.019)	(0.032)	(0.021)	(0.014)	(0.020)	(0.013)	(0.004)	(0.005)	(0.008)
R^2	0.026	0.011	0.007	0.015	0.30	0.28	0.24	0.28	0.07	0.04	0.13	0.08

Panel C. Laboratory and Radiology Spending

Patient or physician FE	No			Patient*zip			Physician*zip		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable	**Lab**	**Radiology**	**Both**	**Lab**	**Radiology**	**Both**	**Lab**	**Radiology**	**Both**
Male	3.395	-21.31***	-17.91***				**-1.304*** **	**4.696*** **	**3.392*** **
	(2.155)	(1.434)	(3.074)				**(0.276)**	**(0.528)**	**(0.732)**
White	40.65***	29.33***	69.98***				-0.558	0.446	-0.112
	(2.692)	(1.392)	(3.603)				(0.516)	(0.896)	(1.350)
Black	3.338	-9.335***	-5.997				**-4.017*** **	-0.210	**-4.228*** **
	(2.887)	(2.256)	(4.803)				**(0.497)**	(0.979)	**(1.310)**
Hispanic	30.77**	25.69***	56.46***				1.798*	0.882	2.680
	(13.39)	(7.247)	(19.87)				(0.916)	(1.476)	(2.252)
Fraction of population age 65- 74	138.5	71.64	210.1	198.70	225.60	409.4	28.38	-46.39	-18.01
	(371.8)	(245.1)	(391.0)	(408.10)	(319.90)	(497.9)	(101.4)	(124.9)	(196.6)
Fraction age 75- 84	-106.3	289.3	183.0	-204.9	128.1	-95.74	71.27	78.07	149.3
	(810.9)	(224.4)	(920.7)	(1,072)	(303.0)	(1,266)	(91.26)	(221.5)	(279.9)
Fraction age 85+	-13.99	-1,960***	-1,974	345.90	-1,139**	-821.8	**-576.9*** **	-296.0	-872.9
	(1,652)	(444.2)	(1,860)	(1,846)	(530.10)	(2,103)	**(207.1)**	(548.4)	(720.8)
Fraction white	-67.45	535.0***	467.5	228.8	**662.70*** **	869.5*	66.45**	-97.54	-31.08
	(256.9)	(142.3)	(325.3)	(358.8)	**(231.70)**	(428.7)	(29.23)	(109.6)	(120.5)
Fraction Black	-71.39	495.4***	424.0	190.5	**632.50** **	797.2	29.48	-164.6	-135.1
	(319.8)	(160.0)	(355.7)	(505.1)	**(234.90)**	(501.2)	(40.18)	(143.4)	(161.5)
Fraction male	76.08	273.0	349.1	378.0	305.00	630.1	58.26	40.01	98.27
	(268.5)	(250.8)	(393.8)	(417.0)	(271.20)	(558.6)	(80.29)	(139.5)	(155.0)
Fraction Hispanic	79.99	-137.8	-57.85	104.30	-139.40	-52.32	-8.364	68.20**	59.83
	(80.51)	(93.42)	(108.8)	(110.80)	(135.50)	(125.9)	(18.28)	(30.12)	(36.52)
Fraction below poverty line	9.529	4.328	13.86	-26.18	-6.147	-29.13	-8.218	-13.57	-21.78
	(49.86)	(39.69)	(60.80)	(41.17)	(46.55)	(61.67)	(9.790)	(16.48)	(18.29)
Unemployment rate	-34.92	-51.46	-86.38	-41.24	-72.44	-116.0	-5.566	16.09	10.53
	(44.30)	(81.90)	(114.0)	(52.47)	(103.9)	(130.8)	(18.93)	(13.93)	(18.98)
Fraction of population disabled	-573.8***	-24.33	-598.1***	**-619.1*** **	-36.63	**-658.2*** **	-27.50	**-201.3*** **	**-228.8*** **
	(154.1)	(87.88)	(208.7)	**(186.40)**	(104.40)	**(234.9)**	(27.17)	**(57.02)**	**(76.46)**
Ln (population)	-23.34	6.501	-16.84	**-65.35** **	8.983	-57.56	0.909	-17.66	-16.75
	(22.57)	(21.17)	(37.00)	**(30.83)**	(23.84)	(44.73)	(8.576)	(11.51)	(18.41)
Physicians/1000 population	-5.772*	0.567	-5.205	-10.88*	-1.10	-13.88	-1.475*	**-5.126*** **	**-6.601*** **
	(3.374)	(3.323)	(6.441)	(5.792)	(4.04)	(8.748)	(0.821)	**(1.668)**	**(2.373)**
Ln(household median income)	65.90***	17.16	83.06***	**62.45*** **	18.70	80.59***	11.51**	**26.43*** **	**37.94*** **
	(22.75)	(16.14)	(26.58)	**(19.59)**	(14.47)	(21.52)	(5.335)	**(5.259)**	**(8.618)**
Medicare penetration	53.14	-16.71	36.43	17.34	-10.22	3.617	-17.21***	-4.555	-21.77*

Patient or physician FE	**No**			**Patient*zip**			**Physician*zip**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable	**Lab**	**Radiology**	**Both**	**Lab**	**Radiology**	**Both**	**Lab**	**Radiology**	**Both**
	(41.62)	(22.57)	(59.01)	(40.72)	(35.43)	(71.30)	(5.467)	(7.778)	(11.84)
(Medicare penetration)^2	-152.1**	13.29	-138.8	**-164.70****	-51.07	-208.5	22.78**	-7.092	15.69
	(73.32)	(47.07)	(112.1)	**(73.24)**	(76.88)	(136.9)	(10.67)	(14.77)	(22.61)
Constant	-182.3	-670.2***	-852.5**	**-1,152*****	**-1,115*****	**-2,205*****	-87.12*	28.58	-58.55
	(221.8)	(236.9)	(328.9)	**(350.90)**	**(295.50)**	**(469.1)**	(48.09)	(99.32)	(113.3)
R^2	0.196	0.117	0.192	0.61	0.50	0.60	0.12	0.21	0.19

Panel D: Overall Medicare Spending

Patient or physician FE	No			Patient*zip			Physician*zip
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable	**Part A**	**Part B**	**Total**	**Part A**	**Part B**	**Total**	**Part B**
Male	117.9***	-32.84***	85.10***				35.03***
	(19.57)	(9.457)	(24.73)				(2.558)
White	505.9***	285.8***	791.7***				1.933
	(133.9)	(34.96)	(148.5)				(5.354)
Black	619.9***	250.3***	870.2***				49.43***
	(164.6)	(37.53)	(171.3)				(5.787)
Hispanic	297.3**	243.6***	540.9***				15.86*
	(117.5)	(70.63)	(135.1)				(8.229)
Fraction of population age 65- 74	4,380*	-1,937*	2,443	-3,898	**-4,871*** **	-8,768	-465.3
	(2,218)	(1,129)	(2,790)	(4,455)	**(1,413)**	(5,178)	(432.3)
Fraction age 75- 84	-2,492	-3,868	-6,361	**12,722*** **	-3,432	9,290	-919.9*
	(2,890)	(2,645)	(4,010)	**(4,023)**	(4,305)	(6,180)	(528.9)
Fraction age 85+	-12,313	11,169*	-1,144	-31,123	**23,324** **	-7,799	2,559**
	(7,983)	(6,381)	(9,302)	(18,939)	**(8,548)**	(23,848)	(976.3)
Fraction white	-4,060	717.8	-3,343	-8,941*	1,616	-7,325	-267.7
	(2,512)	(770.7)	(2,514)	(5,190)	(2,038)	(5,954)	(244.4)
Fraction Black	-3,570	885.1	-2,685	-10,293	2,527	-7,766	-384.4
	(2,775)	(1,178)	(3,014)	(7,246)	(2,747)	(8,392)	(307.8)
Fraction male	100.8	-2,701*	-2,600	-1,425	-3,587	-5,012	-447.3
	(2,745)	(1,447)	(3,888)	(4,492)	(2,342)	(6,030)	(498.3)
Fraction Hispanic	25.22	606.8	632.1	620.00	1,423*	2,043	263.0**
	(744.4)	(425.6)	(902.6)	(1,692)	(802.1)	(2,121)	(108.7)
Fraction below poverty line	1,180**	402.8*	1,582**	601.90	216.1	818.0	-11.49
	(549.1)	(211.7)	(623.4)	(560.50)	(241.50)	(727.90)	(54.29)
Unemployment rate	-90.28	-160.5	-250.8	31.03	20.35	51.38	-38.58
	(626.2)	(394.4)	(753.6)	(1,057)	(381.2)	(1,234)	(74.36)
Fraction of population disabled	400.4	-1,965***	-1,565	1,549	**-2,345*** **	-796.3	-256.8**
	(879.2)	(547.9)	(1,151)	(2,609)	**(719.00)**	(3,032)	(111.6)
Ln (population)	-349.8*	59.38	-290.5	**-1,20** **	-145.10	**-1,349** **	-37.74
	(197.6)	(88.85)	(200.6)	**(447.60)**	(150.10)	**(554.5)**	(41.46)
Physicians/1000 population	104.1**	**58.66*** **	**162.8*** **	34.96	16.98	51.94	-1.225
	(44.78)	**(18.68)**	**(51.67)**	(47.36)	(24.72)	(67.15)	(5.799)
Ln(household median income)	-16.51	-24.28	-40.79	317.60	75.06	392.6	32.97*
	(228.0)	(121.5)	(250.0)	(263.50)	(79.24)	(256.7)	(16.66)
Medicare penetration	-288.9	332.8*	43.85	**-1,152*** **	-158.00	**-1,310** **	-65.02

Patient or physician FE	**No**			**Patient*zip**			**Physician*zip**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable	**Part A**	**Part B**	**Total**	**Part A**	**Part B**	**Total**	**Part B**
	(195.3)	(180.4)	(235.9)	**(368.2)**	(231.00)	**(516.40)**	(48.28)
(Medicare penetration)^2	390.2	-1,326***	-935.6*	966.7	**-1,149*** **	-182.20	-54.12
	(469.9)	(377.5)	(532.7)	(790.2)	**(406.6)**	(745.30)	(73.66)
Constant	2,291	714.9	3,006	**13,304****	-3,401*	9,903	569.9**
	(2,419)	(913.3)	(2,526)	**(6,145)**	(1,901)	(7,106)	(264.8)
R^2	0.088	0.175	0.134	0.41	0.63	0.48	0.11

Notes: **All panels:** Standard errors, clustered on state, in parentheses. *,**, *** indicates statistical significance at the 10%, 5%, and 1% level. Significant results, at 5% level or better, in **boldface**.

Panel B: Table is same as simple DiD regressions in text Table 3, Panel A, but includes coefficients on covariates, which are suppressed in the text. **Panel C:** Table is same as simple DiD regressions in text Table 4, Panel A, but includes coefficients on covariates, which are suppressed in the text. **Panel D:** Table is same as simple DiD regressions in text Table 5, Panel A, but includes coefficients on covariates, which are suppressed in the text.

Table APP-5. Simple DiD Regressions with Other Tort Reforms

Panel A: Imaging Tests

Patient or physician FE	**No**			**Patient*zip**			**Physician*zip**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable	**Any Stress Test**	**MRI**	**CT**	**Any Stress Test**	**MRI**	**CT**	**Any Stress Test**	**MRI**	**CT**
Damage cap dummy	4.510*	2.000	**5.560*****	**6.04*****	**2.84****	**6.98****	1.010**	0.176	0.479
	(2.260)	(1.510)	**(1.470)**	**(2.050)**	**(1.270)**	**(3.000)**	(0.444)	(0.328)	(0.710)
Punitive damage cap	**-4.320****	-0.167	-1.540	-3.47*	0.887	0.697	-0.923**	0.064	-0.071
	(1.600)	(0.827)	(1.780)	(1.880)	(0.945)	(2.820)	(0.443)	(0.233)	(0.679)
Punitive damage evidence reform	2.210	-1.440	3.170	2.39	-1.58	2.37	1.770*	1.140*	1.340
	(3.240)	(2.060)	(2.500)	(3.600)	(2.020)	(4.800)	(0.891)	(0.597)	(1.170)
Collateral source reform	-0.461	1.250	-0.199	-0.35	2.8	3.01	-0.574**	0.796	0.755
	(1.020)	(1.860)	(1.190)	(1.750)	(2.170)	(2.250)	(0.238)	(0.521)	(0.610)
Split recovery reform	-4.270	0.489	**6.020****	-2.55	-1.53	1.24	-1.100*	-0.721	-1.150
	(2.750)	(1.800)	**(2.420)**	(3.100)	(1.610)	(3.280)	(0.620)	(0.550)	(1.220)
Periodic payment reform	-0.157	-0.869	-2.020	-0.282	-0.264	-3.48*	0.328	0.498***	1.520***
	(1.670)	(1.170)	(1.480)	(1.310)	(1.810)	(1.860)	(0.421)	(0.179)	(0.549)
Certificate of merit requirement	-0.047	-2.220*	-0.739	-0.698	-1.22	0.796	-0.232	-0.247	0.255
	(1.780)	(1.140)	(1.010)	(1.750)	(1.080)	(2.110)	(0.408)	(0.263)	(0.612)
Joint and several liability	2.490	**1.600*****	1.020	1.51	0.598	2.15	0.761*	0.265	0.316
	(1.550)	**(0.574)**	(0.855)	(1.020)	(0.982)	(1.500)	(0.386)	(0.193)	(0.578)

Panel B: Cardiac Interventions

Patient or Physician FE	**No**	**No**	**No**	**No**	**Patient*zip**				**Physician*zip**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable	**LHC**	**PCI**	**CABG**	**Any Revasc.**	**LHC**	**PCI**	**CABG**	**Any Revasc.**	**LHC**	**PCI**	**CABG**	**Any Revasc.**
Damage cap dummy	-0.495	-0.122	-0.185	-0.279	-0.151	0.0919	-0.217	-0.0948	**-0.371****	**-0.175*****	-0.042	-0.207***
	(0.433)	(0.168)	(0.134)	(0.253)	(0.429)	(0.174)	(0.178)	(0.260)	**(0.138)**	**(0.054)**	(0.041)	(0.071)
Punitive damage cap	**-1.190****	-0.149	-0.332	-0.484	-0.204	-0.0447	0.0498	0.00452	-0.173	-0.003	-0.002	-0.012
	(0.528)	(0.225)	(0.197)	(0.333)	(0.878)	(0.322)	(0.195)	(0.416)	(0.290)	(0.091)	(0.041)	(0.104)
Punitive damage evidence reform	**4.700*****	**2.640*****	-0.032	**2.510*****	2.46*	**2.8*****	-0.501*	2.21***	**1.610*****	**0.623*****	-0.093	**0.526*****
	(0.803)	**(0.369)**	(0.210)	**(0.453)**	(1.280)	**(0.441)**	(0.270)	(0.482)	**(0.423)**	**(0.130)**	(0.093)	**(0.163)**
Collateral source reform	**1.560*****	0.167	0.303**	**0.491****	1.42	0.0375	**0.365*****	0.408*	0.217	0.109	-0.024	0.077
	(0.543)	(0.176)	(0.118)	**(0.218)**	(0.848)	(0.164)	**(0.135)**	(0.205)	(0.222)	(0.089)	(0.048)	(0.110)
Split recovery reform	-1.850*	0.121	**-0.643****	-0.536	-0.82	0.544	-0.407	0.0867	-0.183	-0.023	0.206**	0.184
	(1.010)	(0.291)	**(0.279)**	(0.460)	(1.210)	(0.451)	(0.256)	(0.599)	(0.452)	(0.157)	(0.094)	(0.221)
Periodic payment reform	0.136	0.094	0.139	0.210	0.123	0.0291	0.236	0.227	0.049	-0.016	-0.034	-0.053
	(0.387)	(0.179)	(0.115)	(0.251)	(0.573)	(0.233)	(0.182)	(0.339)	(0.221)	(0.068)	(0.100)	(0.149)
Certificate of merit requirement	-0.102	-0.015	0.009	0.011	0.186	-0.0353	-0.0329	-0.0534	**-0.311****	-0.084	-0.054	**-0.140****
	(0.315)	(0.181)	(0.093)	(0.220)	(0.485)	(0.205)	(0.142)	(0.235)	**(0.134)**	(0.053)	(0.038)	**(0.060)**
Joint and several liability	-0.486	-0.454	0.035	-0.395	-1.21	**-0.788*****	**-0.264****	**-1.03*****	0.038	-0.060	-0.013	-0.069
	(0.395)	(0.315)	(0.140)	(0.405)	(0.753)	**(0.302)**	**(0.126)**	**(0.333)**	(0.161)	(0.064)	(0.053)	(0.102)

Panel C: Laboratory and Radiology Spending

Patient or physician FE	**No**			**Patient*zip**			**Physician*zip**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable	**Lab**	**Radiology**	**Both**	**Lab**	**Radiology**	**Both**	**Lab**	**Radiology**	**Both**
Damage cap dummy	8.798*	**12.17*** **	**20.96*** **	7.279	**11.64*** **	18.869**	1.183	**3.704*** **	**4.887*** **
	(4.755)	**(2.886)**	**(6.954)**	(5.412)	**(3.839)**	(8.472)	(1.072)	**(0.739)**	**(1.622)**
Punitive damage cap	-3.568	-4.123	-7.691	-1.399	-1.907	-3.273	-1.215	-1.114	-2.329
	(4.216)	(4.203)	(6.854)	(5.086)	(5.779)	(9.801)	(1.000)	(1.125)	(1.706)
Punitive damage evidence reform	10.17	**12.89** **	23.06*	9.749	6.008	15.605	**8.128*** **	**7.636*** **	**15.76*** **
	(8.744)	**(5.760)**	(11.40)	(10.55)	(7.746)	(15.266)	**(2.552)**	**(1.660)**	**(3.651)**
Collateral source reform	**-18.89** **	**-7.631** **	**-26.52*** **	-13.80	-6.345	**-20.038** **	-2.613	-1.509	**-4.122** **
	(7.293)	**(3.395)**	**(5.656)**	(9.266)	(4.514)	**(7.642)**	(1.777)	(1.027)	**(1.935)**
Split recovery reform	9.476	1.944	11.42	3.296	-2.591	0.525	-1.036	-1.925	-2.961
	(9.306)	(6.844)	(12.10)	(10.51)	(8.285)	(15.400)	(2.132)	(2.017)	(3.360)
Periodic payment reform	-3.446	-0.769	-4.215	1.815	2.696	4.703	1.346	0.846	2.192
	(2.801)	(3.904)	(4.618)	(4.562)	(4.553)	(7.284)	(1.421)	(2.003)	(3.194)
Certificate of merit requirement	-6.552	1.213	-5.339	-5.033	1.862	-3.230	-2.127*	-0.171	-2.298
	(3.978)	(2.844)	(5.731)	(4.451)	(3.461)	(6.763)	(1.175)	(0.920)	(1.812)
Joint and several liability	1.405	1.218	2.623	-1.699	-0.124	-1.804	-0.604	0.0981	-0.506
	(3.273)	(2.202)	(2.902)	(4.297)	(3.007)	(5.263)	(1.078)	(0.585)	(1.357)

Panel D. Overall Medicare Spending

Patient or physician FE	**No**			**Patient*zip**			**Physician*zip**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable	**Part A**	**Part B**	**Total**	**Part A**	**Part B**	**Total**	**Part B**
Damage cap dummy	-45.87	**71.92*** **	26.05	-81.41	67.71*	-13.70	**13.76*** **
	(49.84)	**(20.34)**	(40.07)	(55.76)	(36.85)	(76.70)	**(4.649)**
Punitive damage cap	**90.59*** **	-22.70	67.90*	154.5	9.047	163.5	-5.172*
	(32.56)	(17.11)	(34.35)	(40.01)	(32.33)	(66.23)	(2.731)
Punitive damage evidence reform	-101.4	-0.296	-101.7	-107.3	-57.10	-164.4	**32.73*** **
	(92.91)	(25.95)	(79.08)	(86.31)	(58.11)	(125.6)	**(6.812)**
Collateral source reform	-44.74	-61.00	**-105.7** **	-28.53	-34.82	-63.35	-3.918
	(31.20)	(40.30)	**(43.72)**	(42.28)	(49.72)	(62.00)	(5.198)
Split recovery reform	**126.6** **	125.0**	251.6***	-25.50	62.50	37.00	9.987
	(60.81)	(46.29)	(85.12)	(80.72)	(61.09)	(128.1)	(6.010)
Periodic payment reform	25.23	**-70.87*** **	-45.63	87.59	-25.43	62.16	-2.214
	(41.64)	**(10.90)**	(44.28)	(55.64)	(27.94)	(74.81)	(3.705)
Certificate of merit requirement	-52.07	-23.55	-75.62*	67.61	-3.049	64.56	-2.614
	(47.95)	(16.88)	(40.44)	(44.14)	(30.63)	(63.70)	(2.948)
Joint and several liability	77.57**	19.00	**96.58*** **	25.54	-3.027	22.51	-5.072*
	(36.17)	(11.27)	**(32.40)**	(29.99)	(21.56)	(44.07)	(2.969)

Notes: **All panels:** Standard errors, clustered on state, in parentheses. *,**, *** indicates statistical significance at the 10%, 5%, and 1% level. Significant results, at 5% level or better, in **boldface**.

Panel A: Regression specification is same as simple DiD regressions in text Table 2, Panel A, except that we include variables for indicated tort reforms. **Panel B:** Regression specification is same as simple DiD regressions in text Table 3, Panel A, except that we include variables for indicated tort reforms. **Panel C:** Regression specification is same as simple DiD regressions in text Table 4, Panel A, except that we include variables for indicated tort reforms. **Panel D:** Regression specification is same as simple DiD regressions in text Table 5, Panel A, except that we include variables for indicated tort reforms.

Table App-6. Simple DiD: Leave-one-state-out Regressions, Imaging Tests

Panel A. Imaging Tests

Row	Patient or physician FE	No			Patient*zip			Physician*zip		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable	**Any Stress Test**	**MRI**	**CT**	**Any Stress Test**	**MRI**	**CT**	**Any Stress Test**	**MRI**	**CT**
	Main Specification (from text)	**4.040*** **	**1.480**	**3.920** **	**5.300*** **	**3.050** **	**6.380** **	**0.993*** **	0.421	1.210*
		(1.440)	**(1.210)**	**(1.450)**	**(1.320)**	**(1.350)**	**(2.720)**	**(0.336)**	(0.322)	(0.633)
(1)	**Equally weighted states**	**5.470*** **	1.590	**4.950** **	**5.560*** **	2.310	6.970*	**1.150** **	0.330	1.400*
		(1.630)	(1.410)	**(1.800)**	**(1.670)**	(1.580)	(3.480)	**(0.431)**	(0.355)	(0.728)
(2)	**Exclude FL**	**3.880** **	0.630	**3.070** **	**4.98*** **	2.59	5.14*	**0.989** **	0.454	1.630**
		(1.480)	(1.190)	**(1.470)**	**(1.320)**	(1.380)	(2.850)	**(0.358)**	(0.337)	(0.600)
(3)	**Exclude GA**	**4.070** **	1.580	**4.580*** **	**5.62*** **	**3.15** **	**6.98** **	**1.030*** **	0.369	1.310*
		(1.510)	(1.280)	**(1.390)**	**(1.340)**	**(1.410)**	**(2.810)**	**(0.348)**	(0.342)	(0.654)
(4)	**Exclude IL**	**4.910*** **	2.430**	**3.780** **	**5.64*** **	**3.71** **	**5.96** **	**1.150*** **	0.617*	1.090
		(1.350)	(1.040)	**(1.540)**	**(1.400)**	**(1.340)**	**(2.900)**	**(0.339)**	(0.315)	(0.716)
(5)	**Exclude MS**	**4.280*** **	1.530	**4.150*** **	**5.65*** **	**3.09** **	**6.81** **	**1.070*** **	0.417	1.320**
		(1.460)	(1.230)	**(1.430)**	**(1.300)**	**(1.350)**	**(2.710)**	**(0.333)**	(0.325)	(0.620)
(6)	**Exclude NV**	**4.060*** **	1.600	**3.900** **	**5.34*** **	**3.17** **	**6.55** **	**0.972*** **	0.455	1.190*
		(1.450)	(1.220)	**(1.470)**	**(1.330)**	**(1.340)**	**(2.760)**	**(0.339)**	(0.323)	(0.640)
(7)	**Exclude OH**	**4.250** **	0.986	**4.050** **	**5.33*** **	2.47*	**5.75** **	**0.911** **	0.271	0.841
		(1.680)	(1.250)	**(1.530)**	**(1.540)**	(1.250)	**(2.750)**	**(0.354)**	(0.324)	(0.564)
(8)	**Exclude OK**	**4.060** **	1.550	**4.030** **	**5.17*** **	3.03	**6.53** **	**1.040*** **	0.382	1.190*
		(1.480)	(1.240)	**(1.470)**	**(1.340)**	(1.370)	**(2.760)**	**(0.343)**	(0.324)	(0.652)
(9)	**Exclude SC**	**0.360** **	1.470	**3.740** **	**5.17*** **	**3.20** **	**6.15** **	**0.887** **	0.401	1.130*
		(1.440)	(1.260)	**(1.490)**	**(1.390)**	**(1.380)**	**(2.790)**	**(0.357)**	(0.333)	(0.659)
(10)	**Exclude TX**	**3.460** **	1.520	**3.840** **	**4.89*** **	**2.68***	**7.24** **	**0.809** **	0.345	1.060
		(1.450)	(1.370)	**(1.540)**	**(1.350)**	**(1.390)**	**(2.780)**	**(0.331)**	(0.335)	(0.698)

Panel B: Cardiac Interventions

Patient or Physician FE	No	No	No	No	Patient*zip				Physician*zip			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable	**LHC**	**PCI**	**CABG**	**Any Revasc.**	**LHC**	**PCI**	**CABG**	**Any Revasc.**	**LHC**	**PCI**	**CABG**	**Any Revasc.**
Main Specification (from text)	**-0.803****	-0.297	-0.144	-0.409*	-0.288	-0.171	-0.114	-0.257	**-0.474*****	**-0.220*****	-0.079*	**-0.292*****
	(0.391)	(0.194)	(0.109)	(0.232)	(0.445)	(0.221)	(0.139)	(0.254)	**(0.160)**	**(0.060)**	(0.043)	**(0.078)**
Equally weighted states	-0.662	-0.140	0.013	-0.112	-0.815	-0.306	0.021	-0.291	**-0.630*****	**-0.256*****	-0.062	**-0.310*****
	(0.482)	(0.273)	(0.129)	(0.295)	(0.672)	(0.328)	(0.164)	(0.346)	**(0.197)**	**(0.077)**	(0.051)	**(0.085)**
Exclude FL	-0.884*	-0.276	-0.098	-0.351	-0.352	-0.226	-0.0621	-0.286	**-0.573*****	**-0.223*****	-0.108*	**-0.325*****
	(0.434)	(0.219)	(0.108)	(0.245)	(0.479)	(0.234)	(0.140)	(0.263)	**(0.190)**	**(0.071)**	(0.053)	**(0.099)**
Exclude GA	**-0.936****	-0.294	-0.157	-0.413*	-0.306	-0.176	-0.116	-0.251	**-0.500*****	**-0.215*****	-0.071	**-0.280*****
	(0.388)	(0.202)	(0.110)	(0.238)	(0.478)	(0.234)	(0.138)	(0.263)	**(0.162)**	**(0.062)**	(0.043)	**(0.076)**
Exclude IL	-0.652	-0.280	-0.101	-0.357	-0.266	-0.164	-0.0866	-0.224	**-0.450****	**-0.227*****	-0.079	**-0.298*****
	(0.413)	(0.205)	(0.122)	(0.252)	(0.490)	(0.237)	(0.146)	(0.267)	**(0.179)**	**(0.065)**	(0.048)	**(0.085)**
Exclude MS	-0.722*	-0.298	-0.144	-0.407*	-0.174	-0.165	-0.12	-0.252	**-0.445*****	**-0.214*****	-0.085 *	**-0.290*****
	(0.383)	(0.195)	(0.113)	(0.237)	(0.420)	(0.221)	(0.141)	(0.259)	**(0.151)**	**(0.058)**	(0.042)	**(0.078)**
Exclude NV	-0.777*	-0.264	-0.152	-0.383	-0.263	-0.15	-0.114	-0.235	**-0.480*****	**-0.215*****	-0.081*	**-0.290*****
	(0.395)	(0.195)	(0.110)	(0.233)	(0.449)	(0.219)	(0.140)	(0.252)	**(0.162)**	**(0.061)**	(0.044)	**(0.080)**
Exclude OH	-0.756*	-0.269	-0.091	-0.328	-0.394	-0.144	-0.108	-0.21	**-0.580*****	**-0.254*****	-0.071	**-0.316*****
	(0.437)	(0.201)	(0.127)	(0.249)	(0.506)	(0.247)	(0.148)	(0.285)	**(0.153)**	**(0.059)**	(0.045)	**(0.078)**
Exclude OK	**-0.902****	-0.304	-0.167	-0.435*	-0.406	-0.176	-0.14	-0.284	**-0.460****	**-0.215*****	-0.080*	**-0.289*****
	(0.387)	(0.193)	(0.110)	(0.235)	(0.455)	(0.219)	(0.140)	(0.256)	**(0.168)**	**(0.061)**	(0.045)	**(0.082)**
Exclude SC	-0.815*	-0.329*	-0.173	**-0.471****	-0.141	-0.119	-0.101	-0.197	**-0.473*****	**-0.221*****	-0.088**	**-0.303*****
	(0.404)	(0.191)	(0.102)	**(0.221)**	(0.415)	(0.213)	(0.139)	(0.242)	**(0.165)**	**(0.061)**	(0.042)	**(0.079)**
Exclude TX	-0.631	-0.268	-0.150	-0.390	-0.236	-0.14	-0.105	-0.231	**-0.367****	**-0.188*****	-0.046	**-0.229*****
	(0.388)	(0.191)	(0.125)	(0.242)	(0.516)	(0.217)	(0.166)	(0.267)	**(0.147)**	**(0.060)**	(0.038)	**(0.073)**

Panel C. Laboratory and Radiology Spending

Patient or physician FE	No			Patient*zip			Physician*zip		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable	**Lab**	**Radiology**	**Both**	**Lab**	**Radiology**	**Both**	**Lab**	**Radiology**	**Both**
Main Specification (from text)	3.585	**10.63*** **	**14.21** **	5.13	**12.36*** **	**17.53** **	0.430	**3.468*** **	**3.898** **
	(4.039)	**(2.927)**	**(5.923)**	(4.32)	**(3.34)**	**(6.654)**	(1.110)	**(0.945)**	**(1.843)**
Equally weighted states	3.419	**10.60*** **	**14.02** **	3.14	**9.58** **	12.99	1.030	**3.488*** **	**4.517** **
	(3.732)	**(3.557)**	**(5.735)**	(4.51)	**(4.57)**	(8.93)	(1.114)	**(1.152)**	**(1.888)**
Exclude FL	-0.419	**9.181*** **	**8.761***	1.912	**10.44*** **	12.35*	-0.272	**3.050*** **	**2.778**
	(2.860)	**(2.713)**	**(4.543)**	(3.564)	**(3.198)**	(6.16)	(1.187)	**(1.042)**	**(2.066)**
Exclude GA	4.005	**10.71*** **	**14.71** **	5.804	**13.01*** **	**18.81** **	0.432	**3.500*** **	**3.932***
	(4.417)	**(3.028)**	**(6.357)**	(4.716)	**(3.384)**	**(7.67)**	(1.203)	**(1.001)**	**(1.996)**
Exclude IL	4.735	**10.55*** **	**15.29** **	6.135	**11.6*** **	**17.74** **	0.961	**3.657*** **	**4.619** **
	(4.374)	**(3.303)**	**(6.427)**	(4.699)	**(3.958)**	**(8.18)**	(1.127)	**(1.045)**	**(1.901)**
Exclude MS	3.683	**11.27*** **	**14.95** **	5.401	**13.21*** **	**18.61** **	0.426	**3.602*** **	**4.028** **
	(4.084)	**(2.819)**	**(5.922)**	(4.337)	**(3.131)**	**(7.10)**	(1.129)	**(0.923)**	**(1.850)**
Exclude NV	3.522	**10.69*** **	**14.22** **	5.037	**12.37*** **	**17.40** **	0.357	**3.449*** **	**3.806***
	(4.115)	**(2.950)**	**(6.039)**	(4.343)	**(3.394)**	**(7.31)**	(1.124)	**(0.953)**	**(1.870)**
Exclude OH	5.566	**10.68*** **	**16.24** **	6.358	**11.55*** **	**17.91** **	0.810	**3.431*** **	**4.241** **
	(4.265)	**(3.062)**	**(6.304)**	(4.702)	**(3.704)**	**(8.10)**	(1.234)	**(0.994)**	**(2.018)**
Exclude OK	4.758	**10.83*** **	**15.59** **	6.397	**12.56*** **	**18.95** **	0.673	**3.477*** **	**4.149** **
	(3.925)	**(2.933)**	**(5.756)**	(4.030)	**(3.413)**	**(6.89)**	(1.103)	**(0.954)**	**(1.837)**
Exclude SC	3.707	**10.33*** **	**14.03** **	6.085	**12.87*** **	**18.96** **	0.654	**3.490*** **	**4.144** **
	(4.296)	**(2.993)**	**(6.254)**	(4.409)	**(3.371)**	**(7.28)**	(1.157)	**(0.986)**	**(1.932)**
Exclude TX	2.964	**9.788*** **	**12.75** **	3.700	**11.17*** **	14.86*	-0.329	**2.746*** **	2.417
	(4.339)	**(2.866)**	**(6.128)**	(4.523)	**(3.703)**	(7.60)	(1.006)	**(0.801)**	(1.538)

Panel D. Overall Medicare Spending

Patient or physician FE	No			Patient*zip			Physician*zip
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable	**Part A**	**Part B**	**Total**	**Part A**	**Part B**	**Total**	**Part B**
Main Specification (from text)	-17.52	24.99	7.471	11.97	**55.11****	67.08	**8.735****
	(36.25)	(20.45)	(35.92)	(59.06)	**(22.45)**	(68.79)	**(3.84)**
Equally weighted states	-23.69	21.74	-1.949	-1.13	37.75	36.61	8.867*
	(39.04)	(22.44)	(43.39)	(61.43)	(28.30)	(74.85)	(4.889)
Exclude FL	-1.998	1.860	-0.138	30.50	33.61	64.12	6.717
	(36.01)	(16.25)	(37.69)	(60.51)	(21.81)	(74.65)	(4.436)
Exclude GA	-1.312	31.00	29.69	28.71	**61.12****	89.83	**9.475****
	(35.36)	(21.12)	(30.90)	(58.69)	**(23.69)**	(66.87)	**(3.985)**
Exclude IL	-16.89	21.44	4.543	11.36	49.54*	60.89	7.138*
	(41.33)	(24.38)	(40.99)	(66.31)	(25.28)	(75.25)	(4.116)
Exclude MS	-18.32	25.43	7.107	13.09	**57.06****	70.15	**9.029****
	(37.22)	(20.73)	(36.81)	(59.58)	**(22.58)**	(69.38)	**(3.862)**
Exclude NV	-21.98	24.46	2.478	12.83	**54.34****	67.17	**8.247****
	(35.94)	(21.01)	(35.89)	(59.62)	**(22.87)**	(69.32)	**(3.868)**
Exclude OH	-45.44	34.95	-10.49	-17.40	**54.98****	37.58	**10.32****
	(31.81)	(20.76)	(35.09)	(53.96)	**(25.46)**	(64.89)	**(3.941)**
Exclude OK	-15.76	30.36	14.61	17.58	**61.74*****	79.33	**9.197****
	(36.87)	(20.24)	(36.51)	(59.69)	**(20.42)**	(67.95)	**(3.846)**
Exclude SC	-13.87	20.29	6.416	15.13	**58.78****	73.91	**9.044****
	(38.17)	(21.51)	(38.16)	(61.73)	**(23.16)**	(71.57)	**(3.954)**
Exclude TX	-16.07	32.18	16.12	-4.608	**54.37****	49.76	6.684*
	(39.78)	(21.70)	(40.28)	(59.45)	**(25.86)**	(72.44)	(3.588)

Notes: **All panels:** Standard errors, clustered on state, in parentheses. *,**, *** indicates statistical significance at the 10%, 5%, and 1% level. Significant results, at 5% level or better, in **boldface**.

Panel A: Regression specification is same as simple DiD regressions in text Table 2, Panel A, except that (i) in row 1, we give equal weight to each reform state; (ii) in each of rows 2-10, we leave one treated state out of the regression. **Panel B:** Regression specification is same as simple DiD regressions in text Table 3, Panel A, except that, similar to Panel A, we either (i) give equal weight to each reform state; or (ii) leave one treated state out of the regression. **Panel C:** Regression specification is same as simple DiD regressions in text Table 4, Panel A, except that, similar to Panel A, we either (i) give equal weight to each reform state; or (ii) leave one treated state out of the regression. **Panel D:** Regression specification is same as simple DiD regressions in text Table 5, Panel A, except that, similar to Panel A, we either (i) give equal weight to each reform state; or (ii) leave one treated state out of the regression.

Table App-7. Donor State Weights for Synthetic Controls

Part A-Any Stress Test

	New–cap states								
No-cap control states	FL	GA	IL	MS	NV	OH	OK	SC	TX
Alabama	0	0	0.492	0	0	0.162	0.002	0	0
Arizona	0	0.628	0.311	0	0	0.006	0.003	0.252	0
Arkansas	0	0	0	0	0	0.282	0.001	0	0
Connecticut	0	0	0	0	0	0.006	0.001	0	0.526
Delaware	0.957	0	0	0.008	1	0.367	0.098	0	0.372
Dist. of Columbia	0	0.065	0	0	0	0.002	0.02	0	0.079
Iowa	0	0	0	0	0	0.004	0.005	0	0
Kentucky	0	0	0	0	0	0.006	0.002	0	0
Maine	0	0	0	0	0	0.004	0.003	0	0
Minnesota	0	0	0	0	0	0.002	0.001	0	0
New Hampshire	0	0	0	0	0	0.002	0.001	0	0
New Jersey	0	0	0	0	0	0.007	0.002	0	0
New York	0	0.159	0	0	0	0.003	0.004	0	0
North Carolina	0	0	0	0	0	0.006	0.002	0.548	0
Pennsylvania	0	0.148	0.168	0	0	0.005	0.707	0.196	0
Rhode Island	0	0	0	0	0	0.001	0.005	0	0.023
Tennessee	0.043	0	0.029	0	0	0.024	0.002	0.004	0
Vermont	0	0	0	0.8	0	0.003	0.139	0	0
Washington	0	0	0	0	0	0.003	0.001	0	0
Wyoming	0	0	0	0.192	0	0.105	0.001	0	0

Panel B-MRI

	New–cap states								
No-cap control states	FL	GA	IL	MS	NV	OH	OK	SC	TX
Alabama	0.743	0	0.097	0	0	0	0.015	0.14	0
Arizona	0	0	0.044	0	0	0	0.011	0.21	0
Arkansas	0.257	0	0.02	0.207	1	0	0.014	0.009	0.642
Connecticut	0	0	0.014	0	0	0	0.015	0.015	0
Delaware	0	0	0.101	0	0	0.181	0.099	0.013	0.17
Dist. of Columbia	0	0	0.008	0	0	0	0.019	0.197	0
Iowa	0	0.096	0.013	0	0	0	0.014	0.014	0
Kentucky	0	0	0.11	0	0	0.676	0.018	0.012	0
Maine	0	0.216	0.037	0	0	0	0.012	0.014	0
Minnesota	0	0	0.022	0	0	0	0.016	0.028	0
New Hampshire	0	0	0.025	0.582	0	0.012	0.009	0.01	0
New Jersey	0	0	0.019	0	0	0	0.017	0.021	0
New York	0	0	0.324	0	0	0	0.062	0.011	0
North Carolina	0	0	0.029	0	0	0	0.025	0.015	0
Pennsylvania	0	0.259	0.025	0	0	0	0.034	0.014	0
Rhode Island	0	0	0.048	0	0	0.131	0.013	0.04	0
Tennessee	0	0.344	0.018	0	0	0	0.193	0.125	0.188
Vermont	0	0	0.014	0.212	0	0	0.006	0.081	0
Washington	0	0.086	0.018	0	0	0	0.014	0.017	0
Wyoming	0	0	0.014	0	0	0	0.392	0.015	0

Panel C- CT-Scans

	New–cap states								
No-cap control states	FL	GA	IL	MS	NV	OH	OK	SC	TX
Alabama	0	0	0	0	0.056	0.035	0	0	0.03
Arizona	0	0	0	0	0.035	0.011	0.423	0	0.016
Arkansas	0	0	0	0	0.045	0.013	0	0	0.019
Connecticut	0	0.176	0	0.663	0.051	0.011	0	0	0.332
Delaware	0	0	0	0	0.048	0.034	0	0	0.023
Dist. of Columbia	0	0	0	0	0.044	0.023	0	0	0.032
Iowa	0	0	0.317	0	0.035	0.013	0.214	0	0.02
Kentucky	1	0	0	0.337	0.065	0.172	0	0.393	0.025
Maine	0	0	0.08	0	0.03	0.025	0.221	0	0.013
Minnesota	0	0.164	0	0	0.035	0.009	0	0	0.018
New Hampshire	0	0	0	0	0.029	0.005	0	0	0.014
New Jersey	0	0	0	0	0.052	0.021	0	0.171	0.029
New York	0	0	0	0	0.039	0.015	0	0	0.022
North Carolina	0	0.33	0	0	0.051	0.021	0	0	0.04
Pennsylvania	0	0.049	0.379	0	0.073	0.236	0	0	0.25
Rhode Island	0	0.086	0	0	0.149	0.02	0	0	0.033
Tennessee	0	0	0.225	0	0.065	0.307	0.142	0	0.037
Vermont	0	0	0	0	0.035	0.016	0	0.064	0.017
Washington	0	0	0	0	0.032	0.008	0	0.311	0.015
Wyoming	0	0.196	0	0	0.029	0.005	0	0.061	0.013

Panel D. Radiology Spending

	New–cap states								
No-cap control states	FL	GA	IL	MS	NV	OH	OK	SC	TX
Alabama	0	0.118	0.315	0	0	0	0	0.004	0.01
Arizona	0	0.021	0	0	0	0	0	0.004	0.472
Arkansas	0	0.078	0.166	0.711	0	0	0	0.445	0.009
Connecticut	0	0.023	0	0	0	0	0	0.076	0.081
Delaware	1	0.027	0	0	1	0	0	0.002	0.1
Dist. of Columbia	0	0.023	0	0	0	0	0	0.007	0.011
Iowa	0	0.144	0.271	0	0	0.294	0	0.005	0.004
Kentucky	0	0.241	0	0	0	0	0	0	0.007
Maine	0	0.014	0	0	0	0	0	0.006	0.008
Minnesota	0	0.05	0	0	0	0	0	0.28	0.005
New Hampshire	0	0.012	0	0.273	0	0	0	0.005	0.007
New Jersey	0	0.025	0	0	0	0	0	0.004	0.031
New York	0	0.059	0	0	0	0.299	0.043	0.03	0.024
North Carolina	0	0.013	0	0	0	0	0	0.004	0.014
Pennsylvania	0	0.022	0	0	0	0	0	0.003	0.009
Rhode Island	0	0.012	0	0	0	0	0.464	0.003	0.018
Tennessee	0	0.034	0	0	0	0	0	0.005	0.01
Vermont	0	0.011	0	0	0	0	0	0.094	0.006
Washington	0	0.014	0	0	0	0	0	0.005	0.171
Wyoming	0	0.058	0.247	0.017	0	0.406	0.494	0.02	0.003

Notes: We construct a synthetic control for each new-cap state from the donor pool of 20 no-cap states, using state-level data over the pre-treatment period for each new-cap state, using data from 1999 (except for radiology spending which is from 2000) through the year before the reform year (2001-2004, depending on state). We obtain weights for the donor states by (i) minimizing the distance between covariates for a new-cap state and those for its synthetic control; subject to (ii) all weights must be non-negative, and (iii) weights sum to 1.