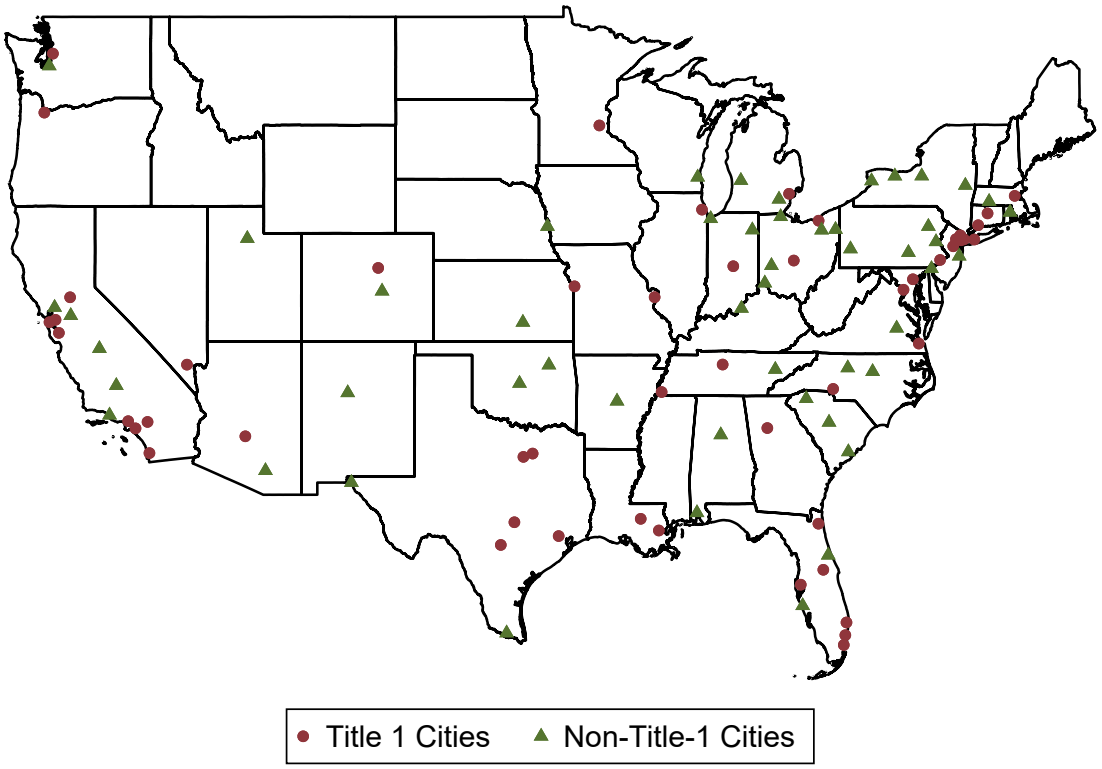
Appendices

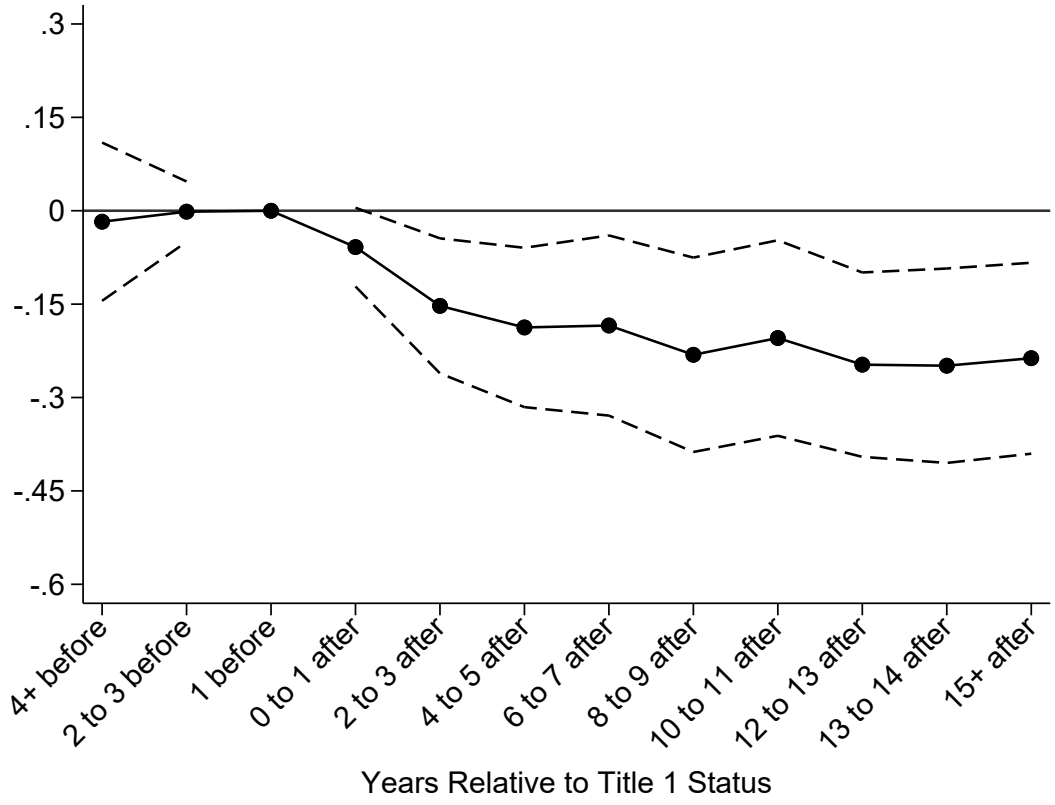
A Appendix Tables and Figures

Figure A.1: Cities in the AIDS Public Information Data Set



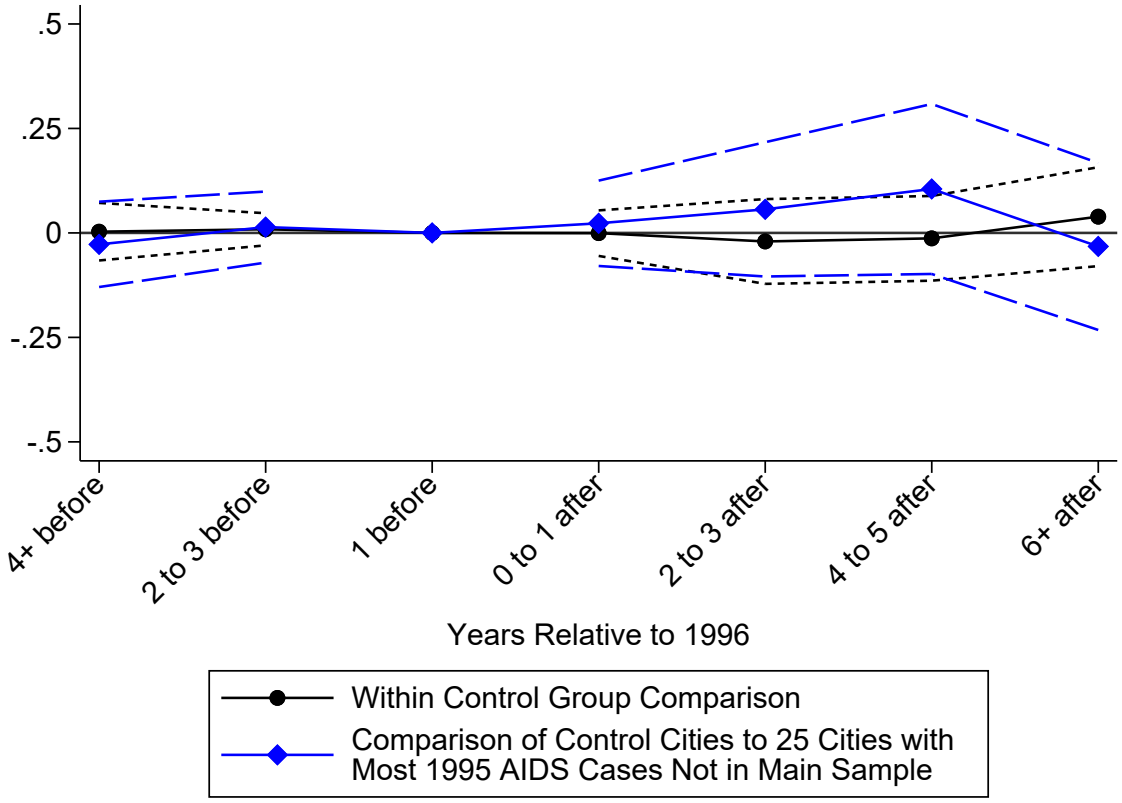
Notes: The graph shows Title 1 status as of 2018 for cities in the AIDS Public Information Data Set.

Figure A.2: Relationship between Title 1 Status and HIV/AIDS Death Rates, Using Data from 1990 to 2018



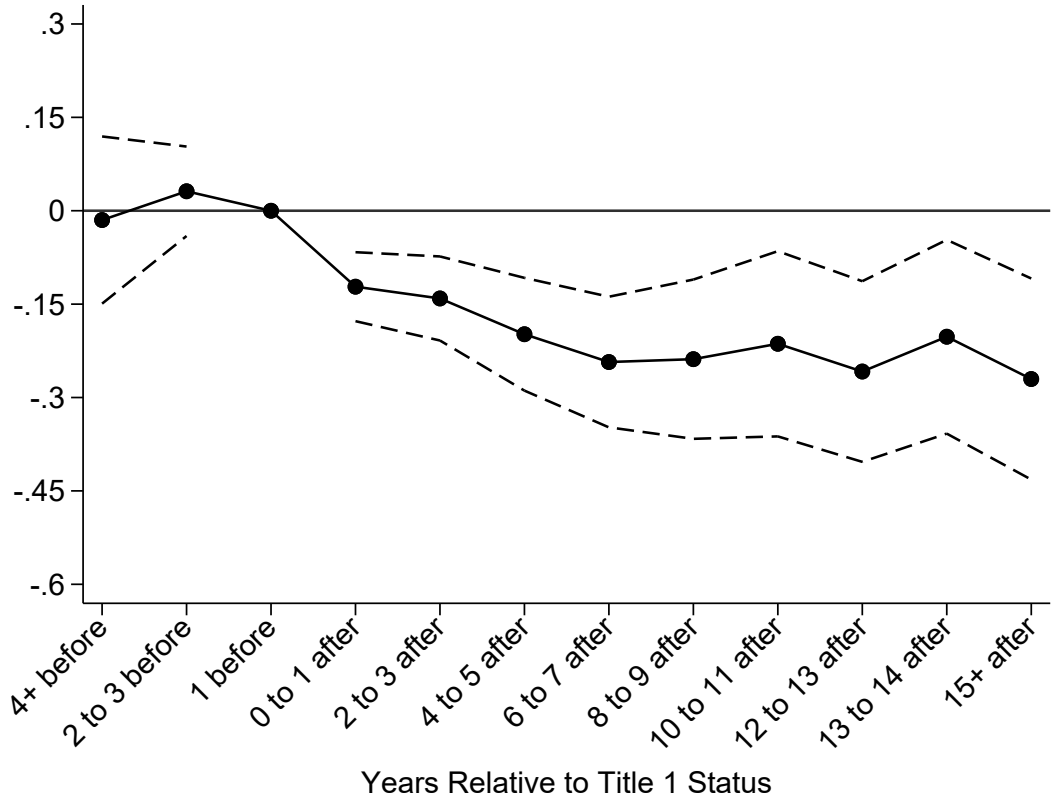
Notes: Each marker is a coefficient on Title 1 status interacted with number of years from initial Title 1 status eligibility from a single regression with the log of HIV/AIDS death rates as the dependent variable. The year before cities obtained Title 1 status is the omitted category. The x-axis indicates the number of years from Title 1 status. The y-axis indicates the coefficient estimate. The sample contains 1,450 observations from 50 cities from 1990 to 2018. The regression includes city fixed effects, year fixed effects, and controls for the share of cities' residents who are Black, Hispanic, younger than 18, 65 and older, and male. The dashed lines indicate 95-percent confidence intervals calculated using standard errors clustered by city.

Figure A.3: Placebo Analysis of Differential Trends among Cities with Fewer than 2,000 AIDS Cases Reported through March 31, 1995



Notes: Each marker is a coefficient on a placebo treatment indicator variable interacted with number of years from 1995 from a regression with the log of HIV/AIDS death rates as the dependent variable. The interaction with the year 1995 is the omitted category. The x-axis indicates the number of years from 1995. The y-axis indicates the coefficient estimate. The black circles are from a single regression that includes the 425 observations from 1990 to 2006 from the main analysis sample's 25 control cities. The coefficients plotted are time indicator variables interacted with an indicator variable equal to one for the 12 cities in the sample with the most AIDS cases by March 31, 1995. The blue diamonds are from a single regression that includes the 850 observations from 1990 to 2006 from the 50 cities with the most AIDS cases by March 31, 1995, that did not qualify for Title 1 under the original Ryan White rules. The coefficients shown are time indicator variables interacted with an indicator variable equal to one for the 25 cities in the sample with the most March 31, 1995, AIDS cases. The regressions include city fixed effects and year fixed effects. The dashed lines indicate 95-percent confidence intervals calculated using standard errors clustered by city.

Figure A.4: Relationship between Title 1 Status and Rates of New AIDS Cases, Using Data from 1990 to 2018



Notes: Each marker is a coefficient on Title 1 status interacted with number of years from initial Title 1 status eligibility from a single regression with the log of annual AIDS diagnosis rates from the CDC as the dependent variable. The year before cities obtained Title 1 status is the omitted category. The x-axis indicates the number of years from Title 1 status. The y-axis indicates the coefficient estimate. The sample contains 1,334 observations from 46 cities from 1990 to 2018. Each regression includes city fixed effects, year fixed effects, and controls for the share of cities' residents who are Black, Hispanic, younger than 18, 65 and older, and male. The dashed lines indicate 95-percent confidence intervals calculated using standard errors clustered by city.

Table A.1: Percent of Title 1 Spending by Category in Fiscal Year 2010

Type of Care	Percentage
Outpatient Care and Pharmacy	35.2%
Case Management and Treatment Adherence	18.3%
Mental Health	5.8%
Substance Abuse Services	4.9%
Nutrition and Food Services	4.4%
Early Intervention and Outreach Services	4.2%
Other Medical Services	9.3%
Support Services	5.7%
Clinical Quality Management	3.2%
Administration Costs	9.1%

Notes: The data come from the Health Resources and Services Administration's 2010 Ryan White expenditure report.

Table A.2: Cities in the AIDS Public Information Data Set

City	AIDS Cases by Original Cutoff	Ranking	Main Sample	Year Title 1 Status Achieved
Akron, OH	312	7	no	
Albany-Schenectady, NY	1,001	39	yes	
Albuquerque, NM	651	24	no	
Allentown, PA	461	13	no	
Ann Arbor, MI	252	4	no	
Atlanta, GA	9,729	93	no	1991
Austin, TX	2,466	68	yes	1995
Bakersfield, CA	527	20	no	
Baltimore, MD	7,811	90	no	1992
Baton Rouge, LA	794	30	no	2007
Bergen-Passaic, NJ	3,602	75	yes	1994
Birmingham, AL	1,038	43	yes	
Boston, MA	8,938	92	no	1991
Buffalo, NY	883	34	no	
Charleston, SC	885	35	yes	
Charlotte, NC	1,216	48	yes	2007
Chicago, IL	13,385	97	no	1991
Cincinnati, OH	1,211	46	yes	
Cleveland, OH	2,044	60	yes	1996
Colorado Springs, CO	288	6	no	
Columbia, SC	1,012	40	yes	
Columbus, OH	1,512	54	yes	2013
Dallas, TX	8,020	91	no	1991
Dayton, OH	616	21	no	
Daytona Beach, FL	649	23	no	
Denver, CO	3,945	78	yes	1994
Detroit, MI	4,742	85	no	1993
El Paso, TX	488	16	no	
Fort Lauderdale, FL	7,380	89	no	1991
Fort Wayne, IN	159	1	no	
Fort Worth, TX	2,063	61	yes	1996
Fresno, CA	715	28	no	
Gary, IN	402	10	no	
Grand Rapids, MI	485	15	no	
Greensboro, NC	1,016	41	yes	
Greenville, SC	796	31	no	
Harrisburg, PA	517	19	no	
Hartford, CT	2,244	66	yes	1996
Houston, TX	11,965	96	no	1991
Indianapolis, IN	1,725	56	yes	2007
Jacksonville, FL	2,697	70	yes	1995
Jersey City, NJ	4,406	83	yes	1991
Kansas City, MO	2,705	71	yes	1994
Knoxville, TN	402	9	no	
Las Vegas, NV	1,810	57	yes	1999
Little Rock, AR	630	22	no	
Los Angeles, CA	28,912	101	no	1991
Louisville, KY	748	29	no	
McAllen-Edinburg-Mission, TX	176	2	no	
Memphis, TN	1,490	53	yes	2007
Miami, FL	14,545	99	no	1991
New Brunswick, NJ	2,098	62	yes	1996
Milwaukee, WI	1,214	47	yes	
Minneapolis-St Paul, MN	2,180	65	yes	1996
Mobile, Al	674	25	no	
Ocean City, NJ	1,862	59	yes	
Nashville, TN	1,291	51	yes	2007
Nassau-Suffolk, NY	4,230	81	yes	1993
New Haven, CT	3,913	77	yes	1994
New Orleans, LA	4,132	79	yes	1993
New York, NY	75,781	102	no	1991
Newark, NJ	10,861	95	no	1991
Norfolk, VA	1,852	58	yes	1999

Continued on next page

Table A.2 – continued

City	AIDS Cases by March 31, 1995	Ranking	Baseline Sample	Year Title 1 Status Achieved
Oakland, CA	5,588	87	no	1992
Oklahoma City, OK	1,067	44	yes	
Omaha, NE	441	12	no	
Orange County, CA	3,773	76	yes	1993
Orlando, FL	3,324	74	yes	1994
Philadelphia, PA	10,750	94	no	1991
Phoenix, AZ	3,057	73	yes	1994
Pittsburgh, PA	1,600	55	yes	
Portland, OR	2,644	69	yes	1995
Providence, RI	1,220	49	yes	
Raleigh-Durham, NC	1,209	45	yes	
Richmond, VA	1,456	52	yes	
Riverside-San Bernardino, CA	4,322	82	yes	1994
Rochester, NY	1,247	50	yes	
Sacramento, CA	2,177	64	yes	1996
Saint Louis, MO	2,968	72	yes	1994
Salt Lake City, UT	954	37	yes	
San Antonio, TX	2,427	67	yes	1995
San Diego, CA	6,868	88	no	1991
San Francisco, CA	21,560	100	no	1991
San Jose, CA	2,145	63	yes	1996
Sarasota, FL	867	33	no	
Scranton, PA	266	5	no	
Seattle, WA	4,672	84	yes	1993
Springfield, MA	958	38	yes	
Stockton, CA	470	14	no	
Syracuse, NY	714	27	no	
Tacoma, WA	506	18	no	
Tampa-Saint Petersburg, FL	5,060	86	no	1993
Toledo, OH	359	8	no	
Tucson, AZ	900	36	yes	
Tulsa, OK	686	26	no	
Vallejo-Fairfield-Napa, CA	859	32	no	
Ventura, CA	495	17	no	
Washington, DC	13,635	98	no	1991
West Palm Beach, FL	4,151	80	yes	1994
Wichita, KS	421	11	no	
Wilmington, DE	1,030	42	yes	
Youngstown, OH	218	3	no	

Table A.3: Characteristics of HIV/AIDS and Non-HIV/AIDS Deaths from 1990 to 2018

	HIV/AIDS Deaths	Non-HIV/AIDS Deaths
Fraction Male	0.80	0.50
Fraction Female	0.20	0.50
Fraction Younger than 18	0.01	0.02
Fraction Ages 18 to 64	0.95	0.24
Fraction 65 or Older	0.04	0.73
Mean Age	42.4	72.3
Fraction Black	0.45	0.12
Fraction White	0.54	0.86
Fraction Other Race	0.01	0.02
Fraction in City in AIDS Public Information Data Set	0.83	0.61
Total	478,194	70,373,631

Notes: The data come from the Vital Statistics Mortality data from 1990 to 2018.

Table A.4: The Effect of Title 1 Status on HIV/AIDS Death Rates from Alternative Samples

	Number of Cities	(1)	(2)
Baseline	50	-0.170	-0.168
		(0.055)	(0.063)
		[0.003]	[0.010]
n		850	1,450
30 Cities Closest to Original Threshold on Both Sides of Threshold	60	-0.151	-0.146
		(0.054)	(0.061)
		[0.007]	[0.020]
n		1,020	1,740
20 Cities Closest to Original Threshold on Both Sides of Threshold	40	-0.164	-0.182
		(0.067)	(0.075)
		[0.019]	[0.020]
n		680	1,160
10 Cities Closest to Original Threshold on Both Sides of Threshold	20	-0.147	-0.151
		(0.095)	(0.097)
		[0.136]	[0.135]
n		340	580
Excluding 5 Cities Closest to Original Threshold on Both Sides of Threshold	40	-0.193	-0.173
		(0.072)	(0.080)
		[0.011]	[0.036]
n		680	1,160
Excluding Cities Obtaining Title 1 Status before 1994	47	-0.162	-0.156
		(0.058)	(0.066)
		[0.007]	[0.024]
n		799	1,363
Years		1990-2006	1990-2018

Notes: Each cell displays the effect of Title 1 status from separate regressions of Equation (1). The unit of observation is a city and year combination. The dependent variable is the log of HIV/AIDS deaths per 100,000 people. Numbers of HIV/AIDS deaths each year come from the Vital Statistics Mortality data. All regressions include city fixed effects, year fixed effects, and controls for the share of cities' residents who are Black, Hispanic, younger than 18, 65 and older, and male. Standard errors are clustered by city and are shown in parentheses. P-values are shown in brackets.

B Estimating the Effect of Title 1 Status Using Variation in Title 1 Status from the 2006 Ryan White CARE Act Reauthorization

As described in the main text, the primary analysis defines the Title 1 status treatment variable as an indicator variable equal to one for cities obtaining Title 1 status under the original rules for Title 1 eligibility. The 2006 Ryan White CARE Act reauthorization changed the eligibility rules to allow some cities on the worst HIV/AIDS trajectories to obtain Title 1 status. In this appendix, I first show that estimating a naive difference-in-differences model that uses variation in Title 1 status from the 2006 reauthorization to identify the impact of Title 1 status without accounting for pre-existing trends would wrongly attribute the worsening HIV/AIDS outcomes associated with these cities qualifying for Title 1 status in 2007 as being part of the effect of Title 1 status. I then show that estimating a specification that includes a control for linear city-specific time trends accounts for the pre-existing trends and provides further evidence that Title 1 status reduces HIV/AIDS deaths.

For this analysis, I focus on the five cities obtaining Title 1 status in 2007 after the eligibility rules were changed. These cities are Baton Rouge, Charlotte, Indianapolis, Memphis, and Nashville. I include as the control cities the 25 cities with the most AIDS cases reported by 1995 that did not achieve Title 1 status before the 2006 Ryan White reauthorization and focus on years 1998 to 2018.[26]

The black series in Figure B.1 shows estimates of duration-specific effects of Title 1 status from Equation (1). The estimates indicate HIV/AIDS death rates for the cities that obtained Title 1 status in 2007 were increasing in the early 2000s relative to other cities. Within a few years of these cities obtaining Title 1 status in 2007, HIV/AIDS death rates begin to fall relative to non-Title-1 cities. This profile of estimates is consistent with the evidence in the main text that Title 1 status reduces HIV/AIDS deaths. However, the pre-existing trend towards more HIV/AIDS deaths for the 2007 Title 1 cities means that the parallel trends assumption required for difference-

[26] I exclude Columbus, which obtained Title 1 status in 2013, though a similar analysis could also be done to estimate the impact of Title 1 status on Columbus.

in-differences models is violated and that the baseline estimating equation will not yield valid estimates of the impact of Title 1 status. Table B.1 displays the estimated effect of Title 1 status from Equation (1). The point estimate is positive and statistically insignificant.

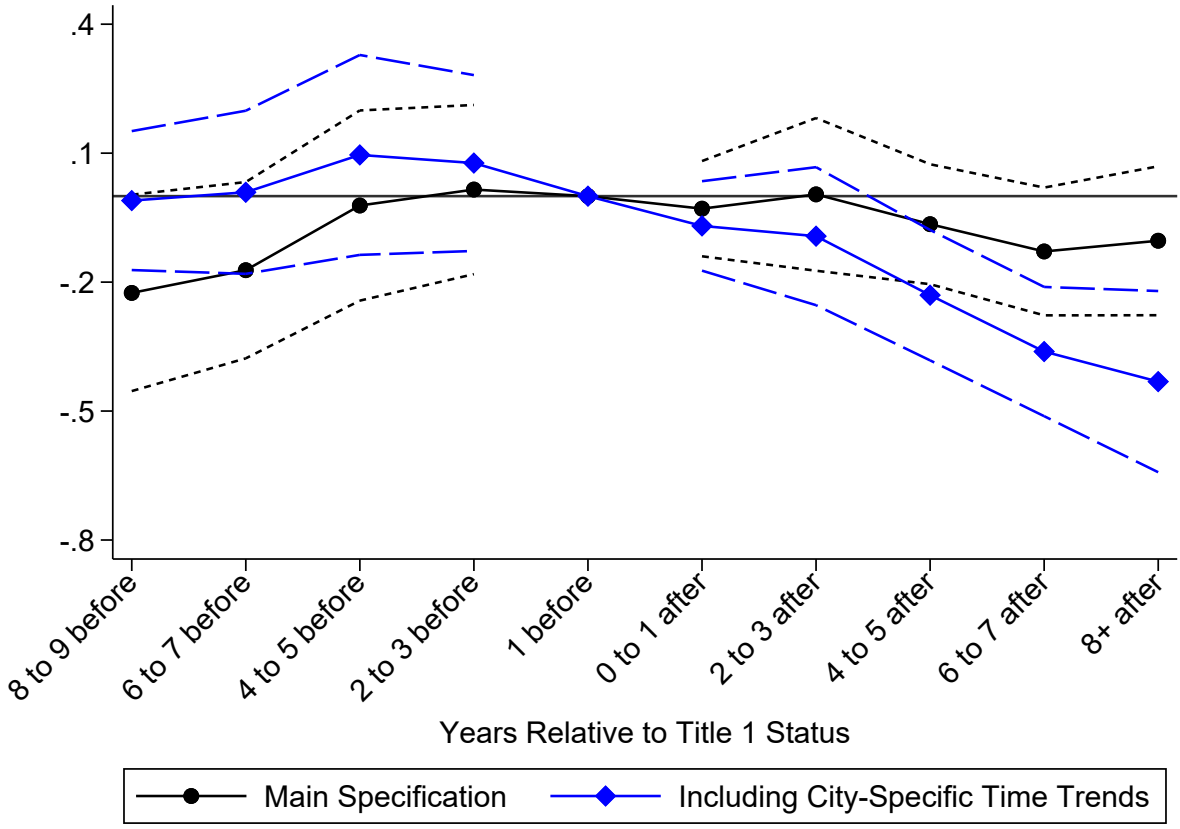
One approach to accounting for the differential pre-trends is to supplement Equation (1) with city-specific linear time trends. Under the assumption that the differential trends would have continued linearly absent Title 1 status, the estimated impact of Title 1 status from Equation (1) is valid once city-specific trends are included. To implement this approach, I first estimate 30 city-specific linear time trends using years 1998 to 2006 by estimating models with city fixed effects, year fixed effects, and the interaction of city indicator variables and year. I then include the product of each city's coefficient on its year-city interaction and the year as a control in Equation (1) with data from 1998 to 2018.[27]

The blue series in Figure B.1 displays the coefficients on years relative to Title 1 status from including the control for city-specific time trends. Column 2 of Table B.1 displays the estimate of the average impact once the control for city-specific time trends is included. Once the differential trends that led to certain cities obtaining Title 1 status are accounted for, the estimates follow a similar pattern as the estimates of Title 1 status presented in the main text. The estimate in Table B.1 indicates that Title 1 status leads to a reduction in HIV/AIDS death rates of 21.7 percent.[28]

[27] As Goodman-Bacon (2018b) explains, this two-step procedure is preferred over including city-specific time trends directly in Equation (1) because, unlike using only pre-treatment data to estimate the city-specific trend coefficients, directly including city-specific time trends risks attributing duration-specific treatment effects to being part of the city-specific time trend.

[28] Note that while the main analysis could also have included a control for city-specific time trends, I chose not to take this approach in the main analysis for the following three reasons. First, the main empirical approach is based on the initial eligibility rules, which were changed precisely because they did not prioritize places with worse-than-average HIV/AIDS trends for eligibility. Second, the analysis in Figures 2 and 6 suggests that the treatment and control cities were trending similarly prior to the treatment cities gaining Title 1 status. Third, the emergence of effective HIV/AIDS treatment means that the assumption that cities' HIV/AIDS death rates in the early 1990s would have trended linearly through 2006 or through 2018 is not realistic and does not hold. For these reasons, the preferred approach for the main analysis is to estimate a common time trend non-parametrically. Nevertheless, I have explored the sensitivity of the baseline analysis to including a control for city-specific linear time trends as in the analysis presented in this appendix. For this analysis, I estimate initial time trends using data prior to cities gaining Title 1 status through 1995. I then estimate models that supplement Equation (1) with a control for each city's predicted log HIV/AIDS death rate assuming HIV/AIDS death rates would have trended linearly. The results corroborate the main estimates with the point estimate on Title 1 status being -0.135 (p-value of 0.008) from 1990 to 2006 data and -0.159 (p-value of 0.010) from 1990 to 2018 data.

Figure B.1: Relationship between Title 1 Status and HIV/AIDS Death Rates for Cities Obtaining Title 1 Status in 2007



Notes: Each marker is a coefficient on Title 1 status interacted with number of years from initial Title 1 status eligibility with the log of HIV/AIDS death rates as the dependent variable. The x-axis indicates the number of years from Title 1 status. The y-axis indicates the coefficient estimate. The black circles are from a single regression with city fixed effects, year fixed effects, and the demographic controls described in the text. The blue diamonds are from a single regression that includes a city-specific linear time trend in addition to the baseline controls. The sample contains 630 observations from 30 cities from 1998 to 2018. Each regression includes city fixed effects, year fixed effects, and controls for the share of cities' residents who are Black, Hispanic, younger than 18, 65 and older, and male. The dashed lines indicate 95-percent confidence intervals calculated using standard errors clustered by city.

Table B.1: Estimated Effect of Title 1 Status Using Variation in Title 1 Status from 2006 Ryan White CARE Act Reauthorization

	(1)	(2)
	0.019	-0.217
	(0.093)	(0.093)
	[0.841]	[0.027]
Years	1998-2018	1998-2018
City-Specific Linear Trend		x
Number of Cities	30	30
n	630	630
Mean of Dependent Variable in Levels	4.0	4.0

Notes: Each column displays the effect of Title 1 status from separate regressions of Equation (1). The unit of observation is a city and year combination. The dependent variable is the log of HIV/AIDS deaths per 100,000 people. Numbers of HIV/AIDS deaths each year come from the Vital Statistics Mortality data. All regressions include city fixed effects, year fixed effects, and controls for the share of cities' residents who are Black, Hispanic, younger than 18, 65 and older, and male. Standard errors are clustered by city and are shown in parentheses. P-values are shown in brackets.