

# Do Fiscal Rules Matter?

## Online Appendix

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This Appendix provides additional information and robustness checks, which are also discussed in the paper. In particular, we describe the characteristics and sources of the variables we use (Table A1), and we present further robustness checks:

- difference in differences (Table A2);
- diff-in-disc estimates with covariates (Table A3);
- balance tests of time-invariant municipal characteristics (Table A4);
- falsification tests using 1999 (Table A5);
- falsification tests for the heterogeneity analysis (Table A6);
- the effect of relaxing fiscal rules, without fiscal years 2001 and 2002 (Table A7);
- the effect of relaxing fiscal rules, without fiscal years 1999 and 2000 (Table A8);
- pre-trends for difference-in-differences design (Figure A1);
- test of the continuity of the density at 5,000 in the 1991 Census, in the 2001 Census, and with respect to the difference between the two Censuses (Figure A2);
- sensitivity of the diff-in-disc estimates to the bandwidth for budget items (Figure A3);
- placebo tests based on permutation methods (Figure A4 and Figure A5).

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Table A1: Variables' description and sources

<b>Variable</b>	<b>Definition and measure</b>	<b>Available from-to</b>	<b>Source</b>
<i>Deficit</i>	Expenditure minus revenues Per-resident; 2009 Euros	1997-2004	IMI Financial reports, authors' calculations
<i>Fiscal gap</i>	Expenditure minus revenues (net of central transfers and debt service) Per-resident; 2009 Euros	1998-2004	IMI Financial reports, authors' calculations
<i>Current outlays</i>	Total current expenditure Per-resident; 2009 Euros	1998-2004	IMI Financial reports, <i>Quadro 4</i>
<i>Capital outlays</i>	Total capital expenditure Per-resident; 2009 Euros	1998-2004	IMI Financial reports, <i>Quadro 5</i>
<i>Debt service</i>	Interest payments on outstanding debt Per-resident; 2009 Euros	1998-2004	IMI Financial reports, <i>Quadro 4</i>
<i>Taxes</i>	Total tax revenues Per-resident; 2009 Euros	1997-2004	IMI Financial reports, <i>Quadro 2</i>
<i>Fees &amp; tariffs</i>	Total revenues from fees and tariffs Per-resident; 2009 Euros	1997-2004	IMI Financial reports, <i>Quadro 2</i>
<i>Central transfers</i>	Total transfers by the central state Per-resident; 2009 Euros	1997-2004	IMI Financial reports, <i>Quadro 2</i>
<i>Other revenues</i>	Residual category Per-resident; 2009 Euros	1997-2004	IMI Financial reports, authors' calculations
<i>Real estate tax rate</i>	The tax rate on real estate From 0.004 to 0.007 of the home value	1997-2004	IFEL-ANCI
<i>Income tax surcharge</i>	Municipal income tax surcharge Up to 0.6% of the taxable income	1999-2004	ME-DF

Notes: IMI stands for Italian Ministry of the Interior; IFEL-ANCI stands for Institute for the Local Finance and Economy of the National Italian Association of Municipalities; ME-DF stands for Italian Ministry of the Economy, Department of Finance.

Table A1: Variables' description and sources (cont'd)

<b>Variable</b>	<b>Definition and Measure</b>	<b>Available from-to</b>	<b>Source</b>
<i>Census population</i>	Census population of the municipality	1991 and 2001	ISTAT
<i>Young cohorts</i>	Ratio of residents aged 0–14 over resident population Fraction at municipality level	1998-2004	ISTAT
<i>Speed of public good</i>	Paid over committed current expenditures Fraction at municipality level	1999-2004	IMI Financial reports, authors' calculations
<i>Area size</i>	Municipal area size In km <sup>2</sup>	1999-2004	IMI
<i>Sea level</i>	Municipal sea level In meters	1999-2004	IMI
<i>Taxable income</i>	Municipal taxable income mean Per-resident; 2009 Euros	1999-2004	ME-DF
<i>Female Mayor</i>	Equal to 1 if the mayor in office is a woman Dummy variable	1999-2004	IMI Register of local politicians
<i>Mayor's age</i>	Age of the mayor Number of years	1999-2004	IMI Register of local politicians
<i>Mayor's schooling</i>	Years of choosing of the mayor in office Number of years	1999-2004	IMI Register of local politicians
<i>Mayor's tenure</i>	Experience of the mayor in office Number of mandates	1999-2004	IMI Register of local politicians
<i>Term limit</i>	Equal to 1 if the mayor in office faces term limit Dummy variable	1999-2004	IMI Register of local politicians

Notes: IMI stands for Italian Ministry of the Interior; IFEL-ANCI stands for Institute for the Local Finance and Economy of the National Italian Association of Municipalities; ME-DF stands for Italian Ministry of the Economy, Department of Finance.

Table A2: Difference-in-differences estimates

<i>Panel A: Fiscal Discipline and Expenditures</i>						
	<b>Deficit</b>	<b>Fiscal Gap</b>	<b>Current Outlays</b>	<b>Capital Outlays</b>	<b>Debt Service</b>	
Difference in Differences	5.279* (2.699)	16.669*** (3.384)	33.974*** (3.650)	84.534*** (26.497)	0.431 (0.308)	
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	
Obs.	6,300	6,300	6,300	6,300	6,300	
Municipalities	1,050	1,050	1,050	1,050	1,050	
<i>Panel B: Revenues and Tax Instruments</i>						
	<b>Taxes</b>	<b>Fees &amp; tariffs</b>	<b>Central Transfers</b>	<b>Other Revenues</b>	<b>Real estate tax rate</b>	<b>Income tax surcharge</b>
Difference in Differences	-8.472*** (1.936)	4.369*** (0.846)	11.822*** (2.148)	105.941*** (26.685)	-0.001 (0.002)	0.004 (0.004)
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	6,300	6,300	6,300	6,300	6,300	4,588
Municipalities	1,050	1,050	1,050	1,050	1,050	828

Notes. Municipalities between 3,500 and 7,000 inhabitants; budget years between 1999 and 2004. Differences in differences estimates of the impact of introducing fiscal rules on policy outcomes below 5,000 after 1999. All policy outcomes are per capita and in 2009 Euros. Significance at the 10% level is represented by \*, at the 5% level by \*\*, and at the 1% level by \*\*\*.

Table A3: The effect of relaxing fiscal rules, estimates with covariates

<i>Panel A: Fiscal Discipline and Expenditures</i>						
	<b>Deficit</b>	<b>Fiscal Gap</b>	<b>Current Outlays</b>	<b>Capital Outlays</b>	<b>Debt Service</b>	
Calonico et al. (2014)	16.871** (7.456)	68.857*** (26.122)	-68.088 (55.204)	83.495 (89.561)	-3.746 (7.379)	
<i>h</i>	600	513	443	427	404	
Obs.	2,414	2,136	1,828	1,724	1,646	
Cross Validation	9.473** (4.140)	48.296*** (18.592)	-9.246 (28.486)	31.130 (75.384)	-1.275 (3.028)	
<i>h</i>	1498	833	979	944	1202	
Obs.	5,858	3,438	4,112	3,974	4,908	
<i>Mean</i>	13.393	190.757	489.515	475.815	29.651	
<i>Panel B: Revenues and Tax Instruments</i>						
	<b>Taxes</b>	<b>Fees &amp; tariffs</b>	<b>Central Transfers</b>	<b>Other Revenues</b>	<b>Real estate tax rate</b>	<b>Income tax surcharge</b>
Calonico et al. (2014)	-78.018*** (29.298)	-6.598 (9.517)	43.093** (21.334)	-56.989 (102.313)	-0.051** (0.026)	-0.061 (0.041)
<i>h</i>	378	505	564	399	435	441
Obs.	1,536	2,104	2,286	1,622	1,782	1,310
Cross Validation	-42.825** (18.377)	-0.960 (6.799)	33.136** (16.425)	-30.224 (55.204)	-0.027* (0.016)	-0.040 (0.026)
<i>h</i>	684	795	833	1498	907	871
Obs.	2,810	3,238	3,438	5,858	3,806	2,594
<i>Mean</i>	184.811	57.836	207.014	531.925	0.581	0.309

Notes. Municipalities between 3,500 and 7,000 inhabitants; budget years between 1999 and 2004. Diff-in-disc estimates of the impact of relaxing fiscal rules on policy outcomes and tax instruments below 5,000 after 2001. Covariates are: dummies for north west, north east, and south (reference category: center), municipal sea level, and municipal area. Estimation method: Local Linear Regression with two optimal bandwidth  $h$ , as in equation (1). The optimal bandwidth  $h$  is estimated either following Calonico, Cattaneo, and Titiunik (2014a, 2014b), or implementing the cross-validation algorithm proposed by Ludwig and Miller (2007). All policy outcomes are per capita and in 2009 Euros. Significance at the 10% level is represented by \*, at the 5% level by \*\*, and at the 1% level by \*\*\*.

Table A4: Balance tests of time-invariant characteristics

	North-West	North-East	Center	South	Area size	Sea level
Calonico et al. (2014)	0.163*	-0.048	-0.068	-0.032	1.526	33.4798
	(0.087)	(0.075)	(0.080)	(0.074)	(8.051)	(31.429)
$h$	447	442	518	450	563	336
Obs.	1,920	1,908	2,190	1,920	2,340	1,482
Cross Validation	0.115	0.009	-0.074	-0.094*	3.261	5.542
	(0.102)	(0.070)	(0.056)	(0.048)	(9.703)	(26.588)
$h$	307	529	1,311	1,050	419	753
Obs.	1,350	2,220	5,430	4,494	1,812	3,168

Notes. Municipalities between 3,500 and 7,000 inhabitants. Diff-in-disc estimates. Estimation method: Local Linear Regression with two optimal bandwidth  $h$ , as in equation (1). The optimal bandwidth  $h$  is estimated either following Calonico, Cattaneo, and Titiunik (2014a, 2014b), or implementing the cross-validation algorithm proposed by Ludwig and Miller (2007). Robust standard errors clustered at the municipality level are in parentheses. Significance at the 10% level is represented by \*, at the 5% level by \*\*, and at the 1% level by \*\*\*.

Table A5: Falsification test in 1999

<i>Panel A: Fiscal Discipline and Expenditures</i>					
	<b>Deficit</b>	<b>Fiscal Gap</b>	<b>Current Outlays</b>	<b>Capital Outlays</b>	<b>Debt Service</b>
Calonico et al. (2014)	3.587 (7.105)	8.878 (11.016)	-0.346 (9.863)	-1.433 (59.782)	0.433 (1.341)
<i>h</i>	576	537	317	368	372
Obs.	1,420	987	621	726	735
Cross Validation	2.640 (5.120)	0.433 (7.558)	-2.325 (9.959)	-34.087 (36.921)	-0.683 (0.882)
<i>h</i>	1,498	1,132	401	1,092	1,022
Obs.	3,816	2,178	774	2,109	1,968
<i>Mean</i>	13.393	190.757	489.515	475.815	29.651
<i>Panel B: Revenues and Tax Instruments</i>					
	<b>Taxes</b>	<b>Fees&amp; tariffs</b>	<b>Central Transfers</b>	<b>Other Revenues</b>	<b>Real estate tax rate</b>
Calonico et al. (2014)	-3.581 (4.561)	-0.497 (3.420)	-0.466 (6.196)	10.235 (44.910)	0.001 (0.009)
<i>h</i>	334	318	544	310	395
Obs.	872	828	1,336	812	1,024
Cross Validation	-6.709 (5.116)	1.536 (3.174)	4.026 (5.842)	-10.373 (30.651)	0.004 (0.006)
<i>h</i>	281	392	1,129	945	1,129
Obs.	716	1,012	2,900	2,388	2,900
<i>Mean</i>	184.811	57.836	207.014	531.925	0.581

Notes. Municipalities between 3,500 and 7,000 inhabitants; budget years between 1997 and 2000. Diff-in-disc estimates of the (false) impact of introducing fiscal rules on policy outcomes below 5,000 after 1999 (when no discontinuity was introduced by the DSP; see Table 1). Estimation method: Local Linear Regression with two optimal bandwidth  $h$ , as in equation (1). The optimal bandwidth  $h$  is estimated either following Calonico, Cattaneo, and Titiunik (2014a, 2014b), or implementing the cross-validation algorithm proposed by Ludwig and Miller (2007). All policy outcomes are per capita and in 2009 Euros. The real estate tax rate is in percentage points (the income tax surcharge is not available for this test because it was introduced in 1999). Significance at the 10% level is represented by \*, at the 5% level by \*\*, and at the 1% level by \*\*\*.

Table A6: The political economy of deficit bias– Falsification test

	<i>Without covariates</i>
<b>Treatment*Term Limit</b>	-17.448
	(12.860)
<b>Treatment</b>	5.146
	(6.810)
Term Limit (Mean)	0.441
<b>Treatment*Number of Parties</b>	-1.630
	(3.331)
<b>Treatment</b>	6.850
	(11.070)
Number of Parties (Mean)	
<b>Treatment*Young Cohort</b>	5.818
	(10.070)
<b>Treatment</b>	-1.682
	(7.198)
Young Cohort (Mean)	
<b>Treatment*Public Good</b>	0.688
	(10.384)
<b>Treatment</b>	2.812
	(9.275)
Public Good (Mean)	
Obs.	4,176

Notes. Municipalities between 3,500 and 7,000 inhabitants; budget years between 1997 and 2000. Diff-in-disc estimates of the (false) impact of introducing fiscal rules on policy outcomes below 5,000 after 1999 (when no discontinuity was introduced by the DSP) in different subsamples (that is, above vs. below median number of parties; binding vs. non-binding term limit; above vs. below median percentage of young cohorts; above vs. below median speed of public good provision). Estimation method: Local Linear Regression with the optimal bandwidth  $h$  is estimated either following Calonico, Cattaneo, and Titiunik (2014a, 2014b). All variables are per capita and in 2009 Euros. Robust standard errors clustered at the municipality level are in parentheses. Significance at the 10% level is represented by \*, at the 5% level by \*\*, and at the 1% level by \*\*\*.



Table A7: The effect of relaxing fiscal rules, without fiscal years 2001 and 2002

<i>Panel A: Fiscal Discipline and Expenditures</i>						
	<b>Deficit</b>	<b>Fiscal Gap</b>	<b>Current Outlays</b>	<b>Capital Outlays</b>	<b>Debt Service</b>	
Calonico et al. (2014)	29.276*	75.374**	-40.012	150.339	-3.412	
	(14.999)	(35.012)	(66.655)	(111.385)	(8.076)	
<i>h</i>	572	508	431	427	421	
Obs.	1,564	1,428	1,198	1,180	1,168	
Cross Validation	13.355*	46.159**	-3.425	-38.664	-2.682	
	(7.916)	(22.787)	(35.448)	(58.779)	(3.616)	
<i>h</i>	1461	1022	979	1498	1239	
Obs.	3,902	2,876	2,760	3,974	3,418	
<i>Panel B: Revenues and Tax Instruments</i>						
	<b>Taxes</b>	<b>Fees&amp; tariffs</b>	<b>Central Transfers</b>	<b>Other Revenues</b>	<b>Real estate tax rate</b>	<b>Income tax surcharge</b>
Calonico et al. (2014)	-71.582**	-3.605	38.450	67.108	-0.046*	-0.059
	(33.865)	(11.144)	(28.152)	(133.387)	(0.025)	(0.039)
<i>h</i>	410	511	564	436	441	470
Obs.	1,140	1,438	1,542	1,214	1,234	900
Cross Validation	-32.201	-1.542	26.857	-68.474	-0.021	-0.045**
	(22.978)	(7.311)	(19.820)	(68.000)	(0.015)	(0.021)
<i>h</i>	688	942	1022	1498	985	1493
Obs.	1,902	2,658	2,876	3,974	2,776	2,736

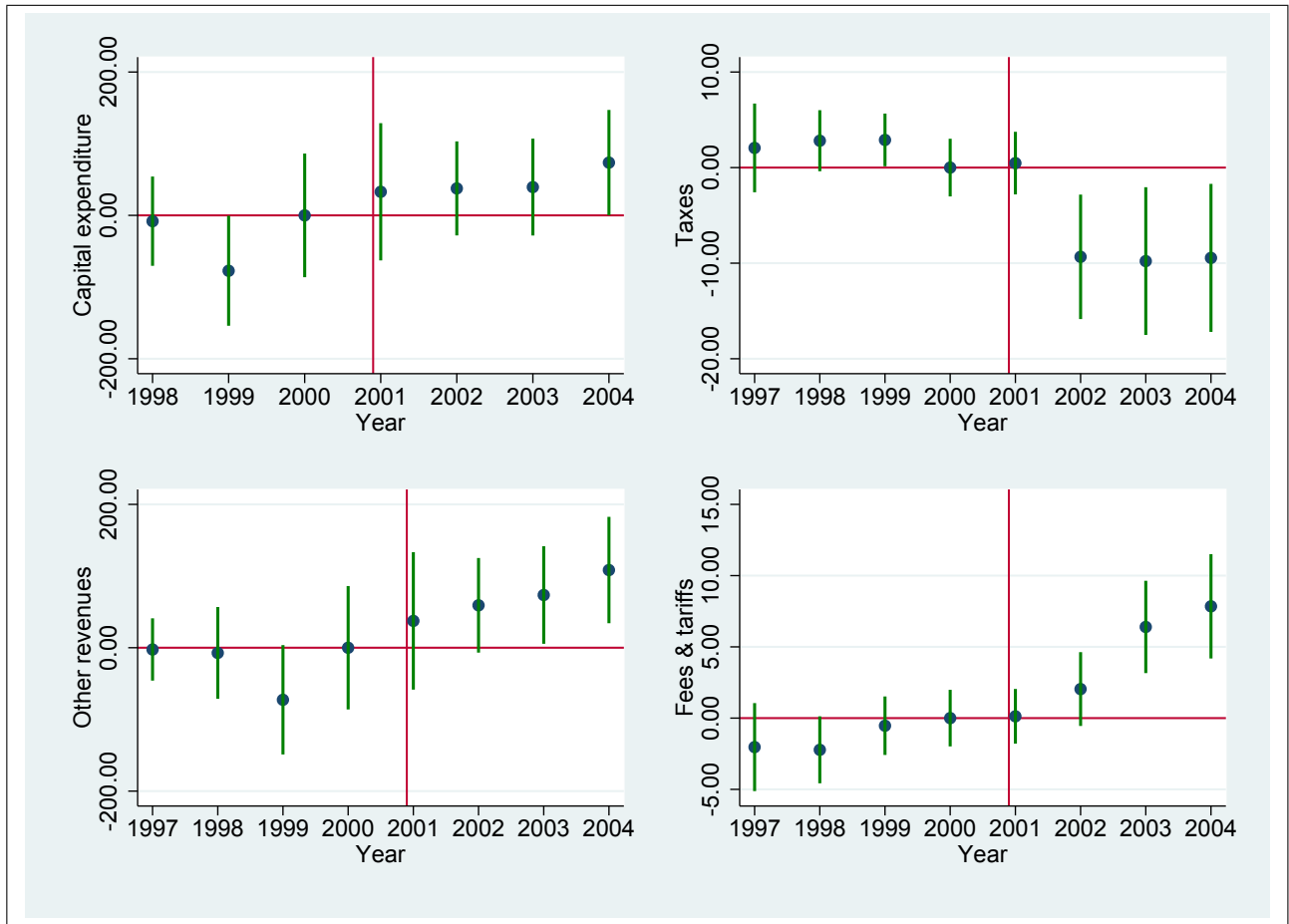
Notes. Municipalities between 3,500 and 7,000 inhabitants; budget years 1998, 2003, and 2004. Diff-in-disc estimates of the impact of relaxing fiscal rules on policy outcomes and tax instruments below 5,000 after 2001. Estimation method: Local Linear Regression with two optimal bandwidth  $h$ , as in equation (1). The optimal bandwidth  $h$  is estimated either following Calonico, Cattaneo, and Titiunik (2014a, 2014b), or implementing the cross-validation algorithm proposed by Ludwig and Miller (2007). All policy outcomes are per capita and in 2009 Euros. Significance at the 10% level is represented by \*, at the 5% level by \*\*, and at the 1% level by \*\*\*.

Table A8: The effect of relaxing fiscal rules, without fiscal years 1999 and 2000

<i>Panel A: Fiscal Discipline and Expenditures</i>						
	<b>Deficit</b>	<b>Fiscal Gap</b>	<b>Current Outlays</b>	<b>Capital Outlays</b>	<b>Debt Service</b>	
Calonico et al. (2014)	22.998** (8.925)	83.552*** (30.518)	-63.760 (56.867)	100.060 (104.360)	-2.748 (8.828)	
<i>h</i>	504	563	510	437	402	
Obs.	1,890	1,696	1,587	1,329	1,222	
Cross Validation	15.644*** (5.512)	68.222*** (23.181)	-41.518 (28.112)	-15.656 (51.076)	-2.503 (3.957)	
<i>h</i>	1497	836	1497	1497	1243	
Obs.	5,228	2,559	4,326	4,326	3,789	
<i>Panel B: Revenues and Tax Instruments</i>						
	<b>Taxes</b>	<b>Fees &amp; tariffs</b>	<b>Central Transfers</b>	<b>Other Revenues</b>	<b>Real estate tax rate</b>	<b>Income tax surcharge</b>
Calonico et al. (2014)	-81.706*** (30.295)	1.984 (11.296)	50.781* (29.412)	-89.995 (148.529)	-0.041 (0.026)	-0.090** (0.042)
<i>h</i>	427	518	531	275	413	440
Obs.	1,546	1,938	1,970	1,000	1,508	1,164
Cross Validation	-39.133* (21.945)	3.597 (6.729)	57.100** (22.337)	-335.604 (300.929)	-0.010 (0.017)	-0.078** (0.034)
<i>h</i>	649	1202	797	1497	870	652
Obs.	2,364	4,399	2,884	5,227	3,228	1,718

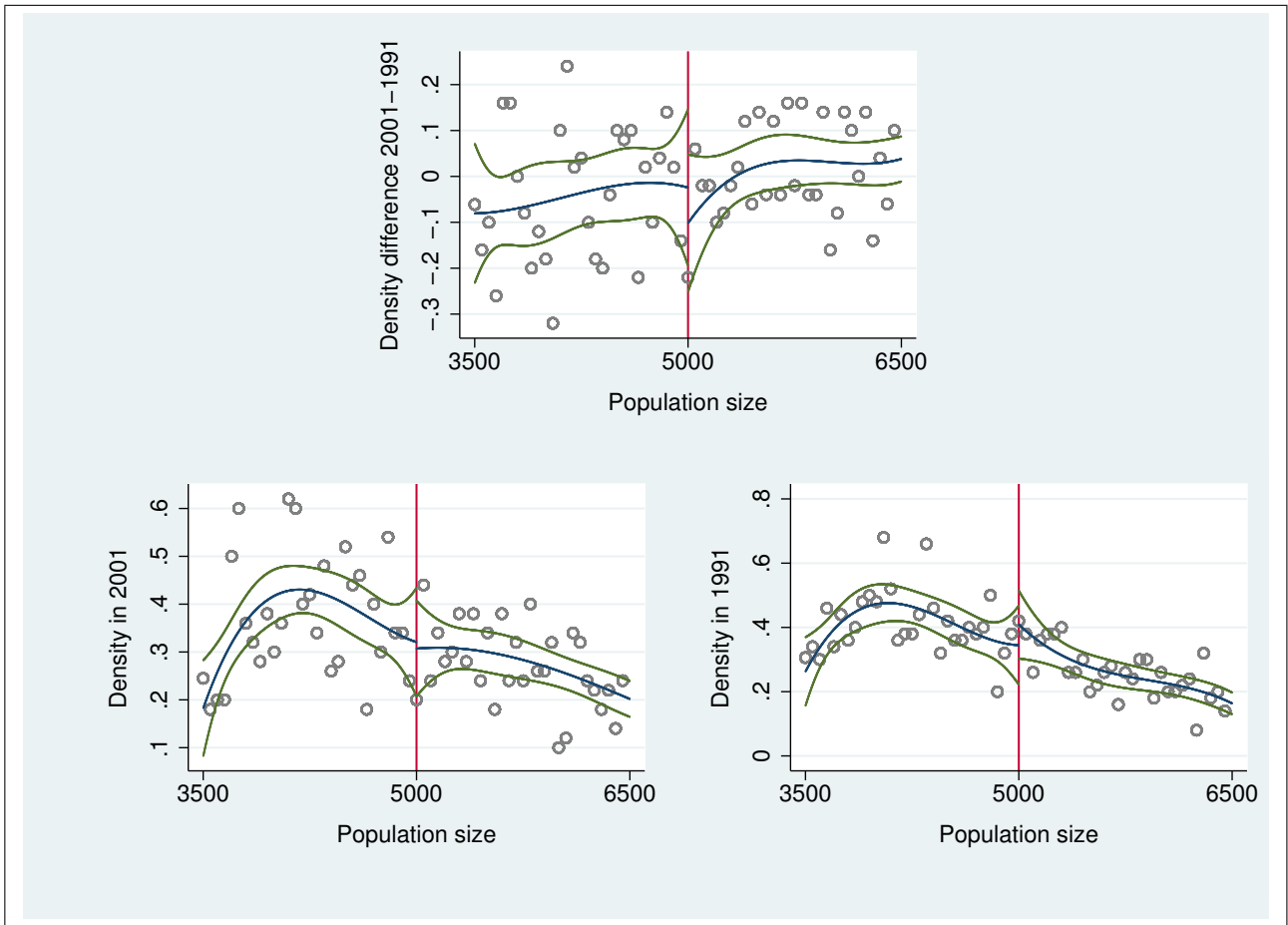
Notes. Municipalities between 3,500 and 7,000 inhabitants; budget years 1998, 2003, and 2004. Diff-in-disc estimates of the impact of relaxing fiscal rules on policy outcomes and tax instruments below 5,000 after 2001. Estimation method: Local Linear Regression with two optimal bandwidth  $h$ , as in equation (1). The optimal bandwidth  $h$  is estimated either following Calonico, Cattaneo, and Titiunik (2014a, 2014b), or implementing the cross-validation algorithm proposed by Ludwig and Miller (2007). All policy outcomes are per capita and in 2009 Euros. Significance at the 10% level is represented by \*, at the 5% level by \*\*, and at the 1% level by \*\*\*.

Figure A1: Pre-trends for difference-in-differences design



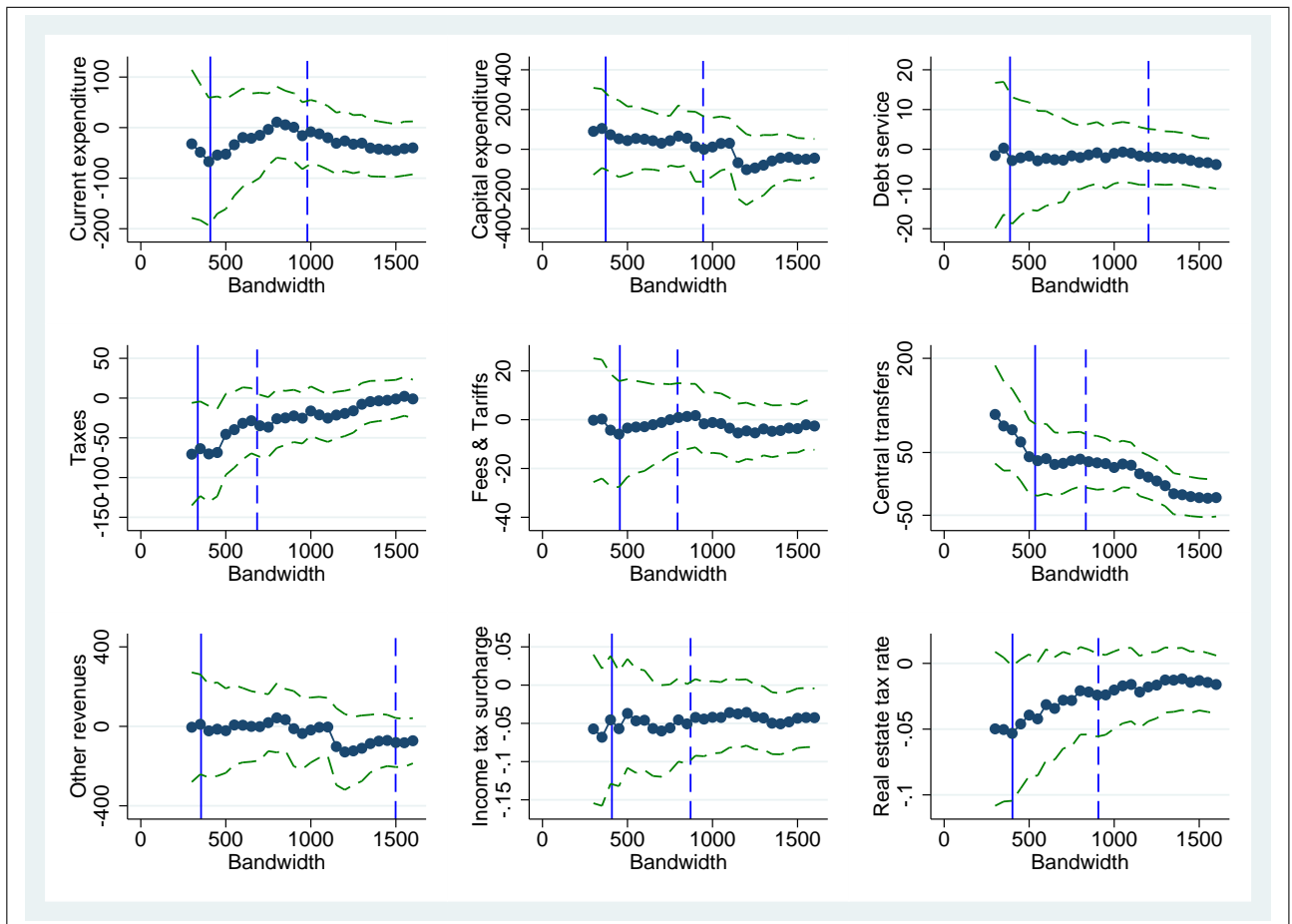
Notes. The graphs report the coefficients in a difference-in-differences specification, when the treatment defined as being below 5,000 inhabitants for each year. The regression includes town and year fixed effects. For each year, we report the point estimate and the 95% confidence interval. The coefficient on the year 2000 is the omitted category, for which confidence interval is obtained as the mean of the confidence interval in the years 1999 and 2001.

Figure A2: Density tests



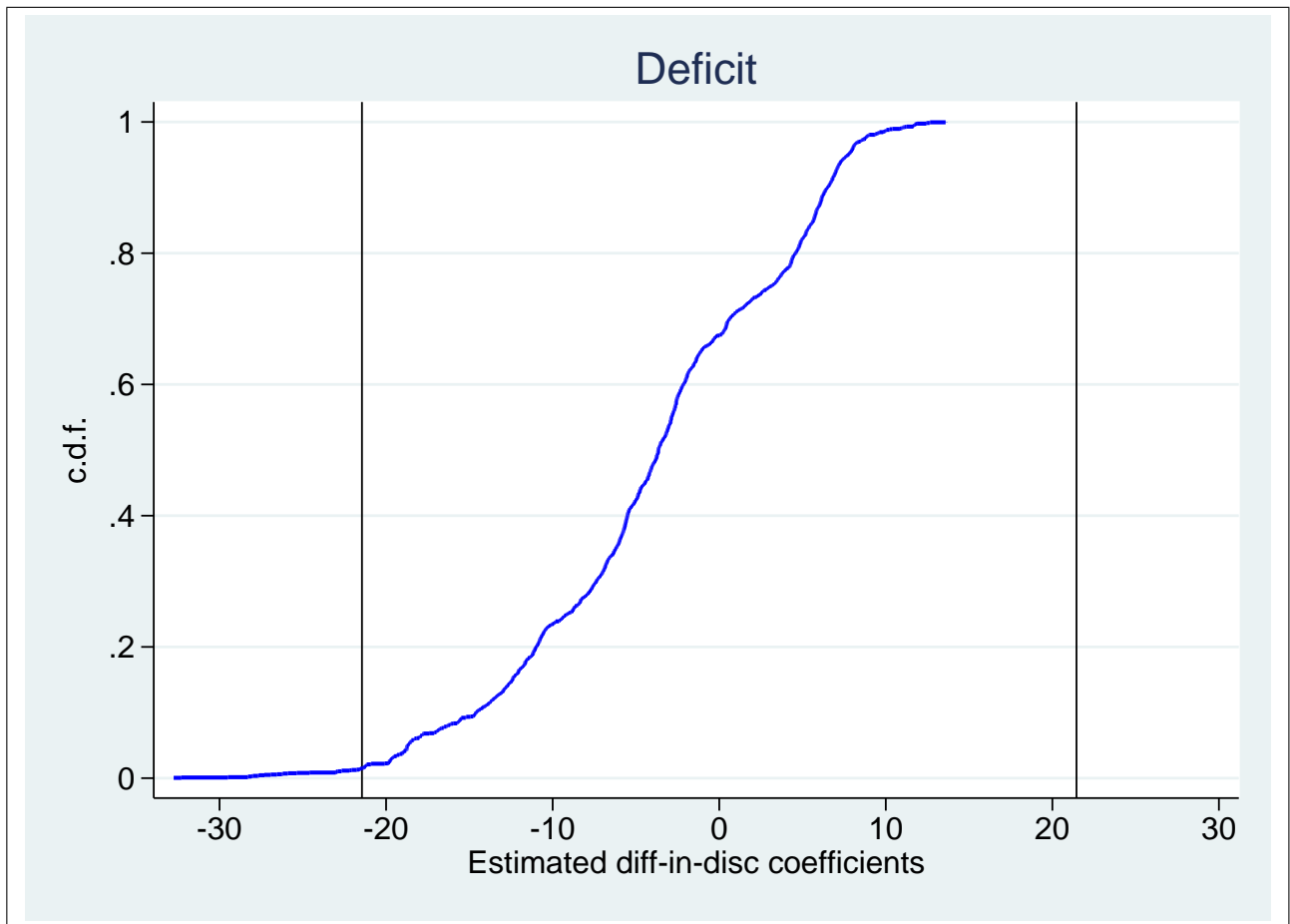
Notes. Test of the continuity at 5,000 of: (i) the difference between the density in the 2001 Census and in the 1991 Census (top graph); (ii) the density in the 2001 Census (bottom left graph); and (iii) the density in the 1991 Census (bottom right graph). The central line is a spline  $3^{rd}$ -order polynomial fit in population size; the lateral lines represent the 95% confidence interval. Scatter points are averaged over intervals of 50 inhabitants.

Figure A3: Sensitivity to bandwidth selection



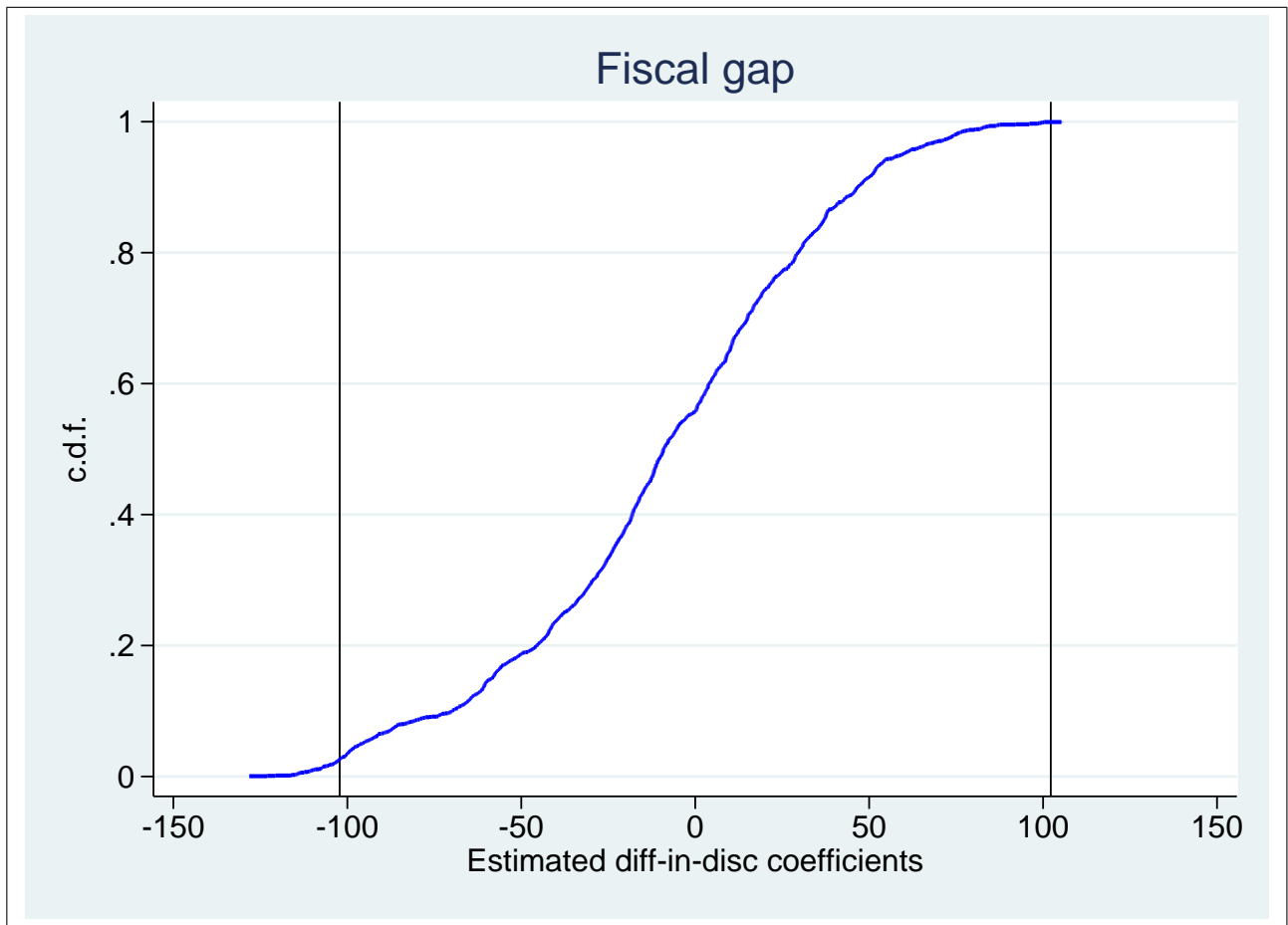
Notes. Difference in discontinuities. Vertical axis: diff-in-disc coefficients. Horizontal axis: bandwidth used to estimate the reported diff-in-disc coefficients.

Figure A4: Placebo tests for deficit



Notes. Placebo tests based on permutation methods for deficit. The figure reports the empirical c.d.f. of the normalized point estimates from a set of diff-in-disc estimations at 1,000 false thresholds below and 1,000 false thresholds above the true threshold at 5,000 (namely, any point from 4,900 to 3,900 and any point from 5,100 to 6,100). Estimation method: spline polynomial approximation with 3<sup>rd</sup>-order polynomial. The vertical lines indicate our benchmark estimate for deficit, which is equal to 21.499, and its negative value in Grembi et al. (2012) Table 4.

Figure A5: Placebo tests for fiscal gap



Notes. Placebo tests based on permutation methods for fiscal gap. The figure reports the empirical c.d.f. of the point estimates from a set of diff-in-disc estimations at 1000 false thresholds below and 1000 false thresholds above the true threshold at 5,000 (namely, any point from 4,900 to 3,900 and any point from 5,100 to 6,100). Estimation method: spline polynomial approximation with 3<sup>rd</sup>-order polynomial. The vertical lines indicate the benchmark estimate for fiscal gap, which is equal to 102.202, and its negative value as shown in Grembi et al. (2012) Table 4.