Online appendix for the paper "Long-run Impacts of Intergovernmental Tranfers"

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December 23, 2019

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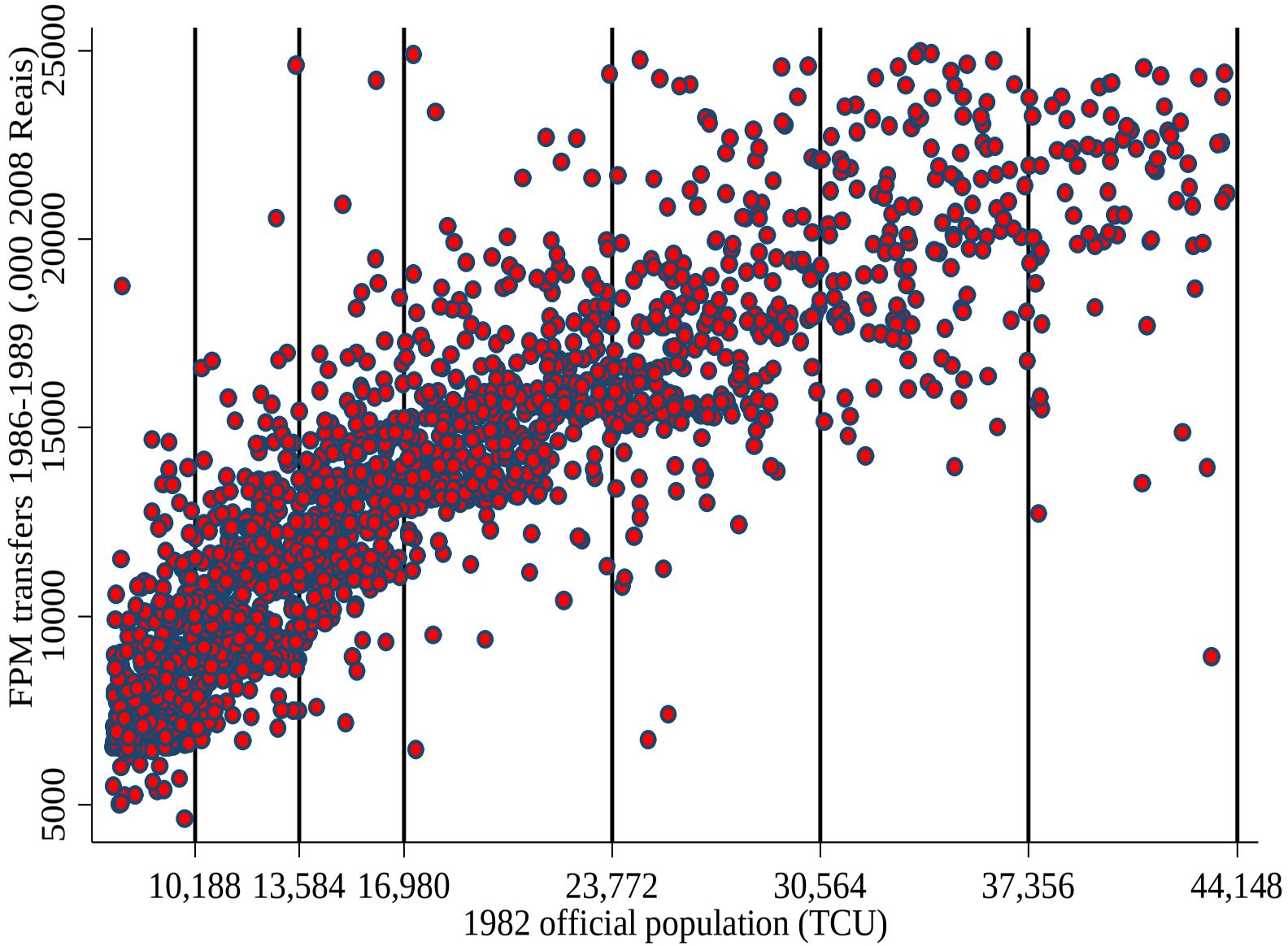
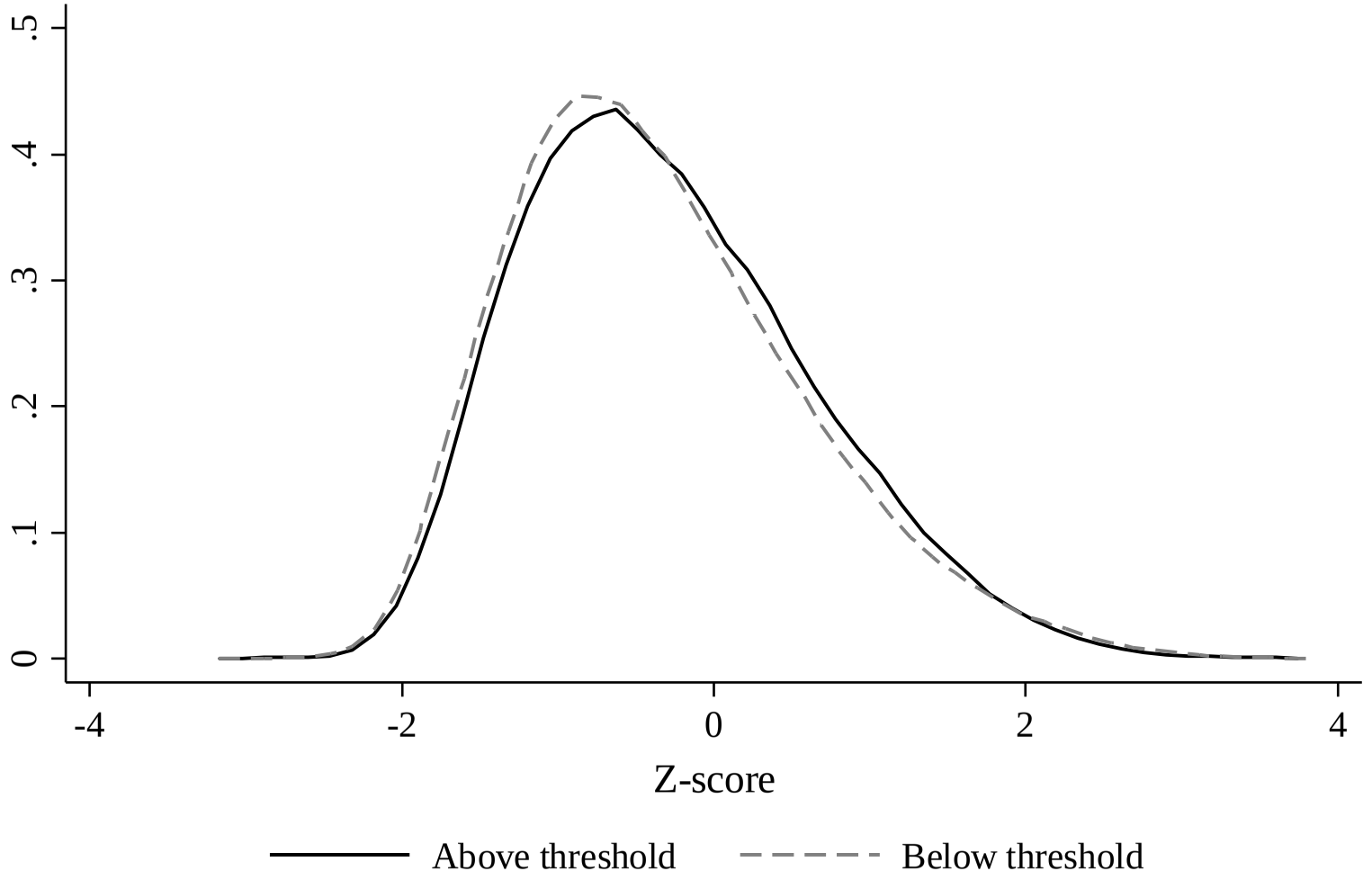
Figure 1: FPM Transfers 1986-1989 (,000 2008 Reais)



Notes: Each dot represents a municipality. FPM transfers are self-reported by municipalities. 1982 official population is based on the 1980 census conducted by the national statistical agency, IBGE.

Figure 2: Distribution of ENEM test scores above and below the cutoff



Notes: Marginal density estimates based on individual ENEM test scores of high school (12th grade) graduating cohorts in 2007-2011. Above (below) threshold indicates test takers from municipalities with population within 2 percent distance above (below) the respective FPM cutoffs. Z-scores are standardized with respect to the universe of test takers.

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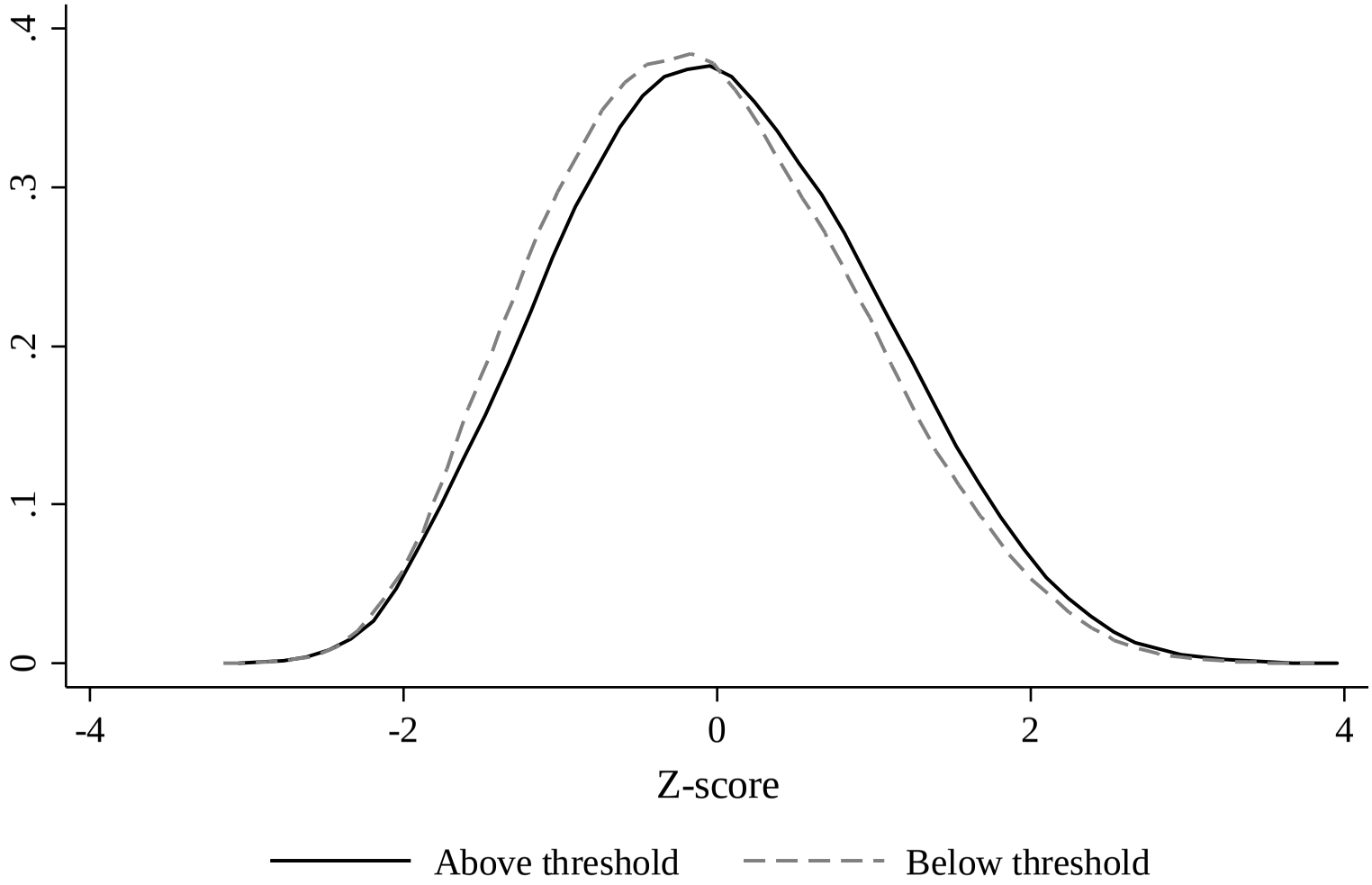

Notes: Marginal density estimates based on individual *Prova Brasil* test scores of 8th and 9th graders in 2007, 2009 and 2011. Above (below) threshold indicates test takers from municipalities with population within 2 percent distance above (below) the respective FPM cutoffs. Z-scores are standardized with respect to the universe of test takers.

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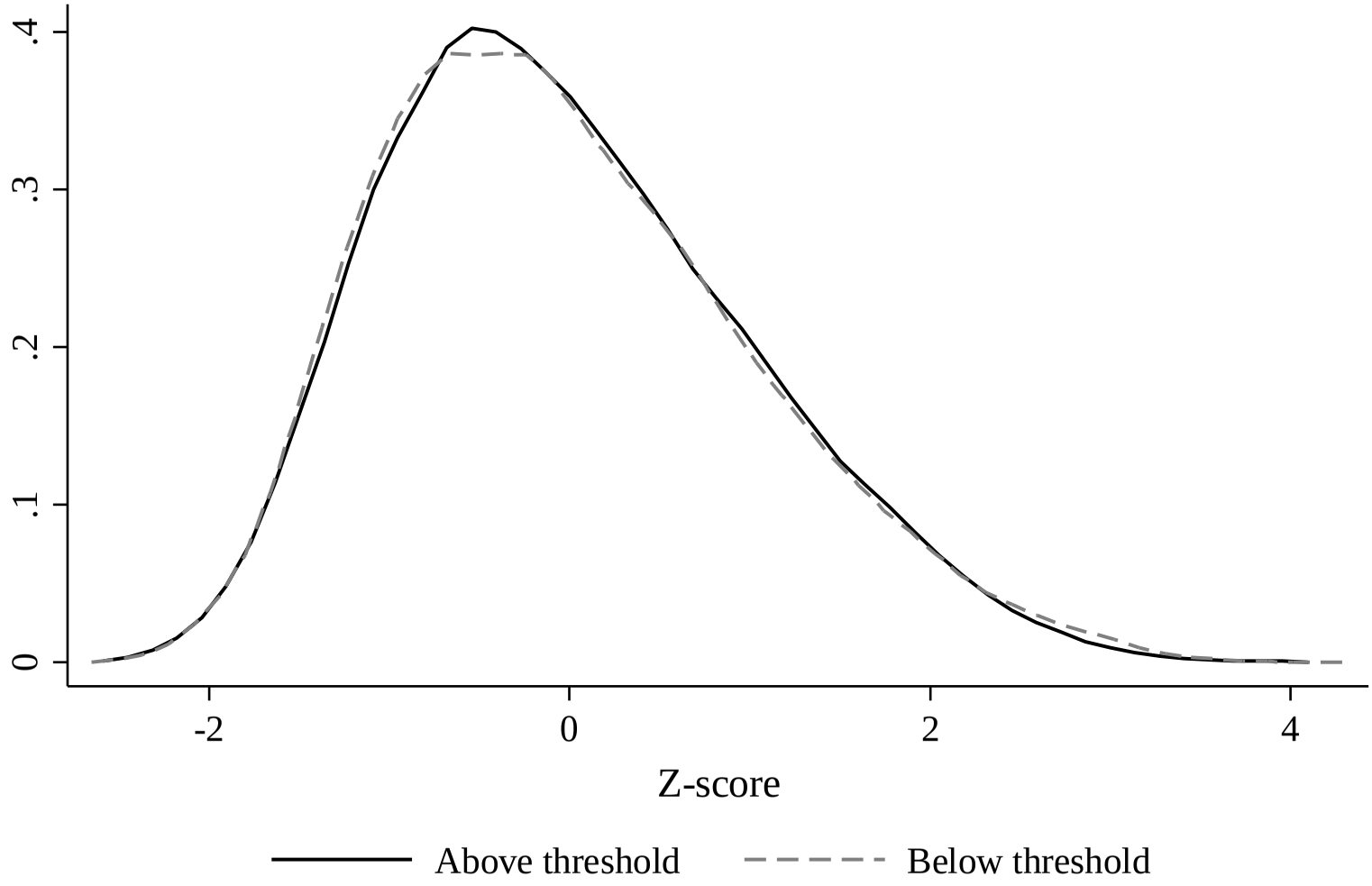

Notes: Marginal density estimates based on individual *Prova Brasil* test scores of 4th and 5th graders in 2007, 2009 and 2011. Above (below) threshold indicates test takers from municipalities with population within 2 percent distance above (below) the respective FPM cutoffs. Z-scores are standardized with respect to the universe of test takers.

Table 1: FPM transfers in 1986, 1987, 1988, 1989, and 1986-1989 (,000 2008 Reais)

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
FPM transfers in 1986 (,000 of 2008 Reais)	3,317								
I[X > 0]		29.07	126.26	-7.03	15.14	-372.11	-330.42	-137.60	-138.30
		(161.34)	(140.74)	(170.02)	(162.68)	(313.06)	(292.38)	(243.18)	(472.45)
R-squared		0.40	0.44	0.40	0.43	0.12	0.13		
Observations		199	196	294	291	388	384	1104	449
FPM transfers in 1987 (,000 of 2008 Reais)	2,857								
I[X > 0]		59.97	98.35	175.19	178.91	87.17	67.59	25.55	-17.27
		(165.35)	(162.02)	(122.87)	(124.18)	(119.08)	(119.31)	(83.48)	(108.55)
R-squared		0.61	0.65	0.55	0.57	0.54	0.55		
Observations		197	194	292	289	385	381	794	625
FPM transfers in 1988 (,000 of 2008 Reais)	2,677								
I[X > 0]		54.79	81.57	103.75	83.27	87.74	64.60	55.67	58.30
		(125.15)	(133.13)	(98.07)	(106.95)	(93.35)	(93.40)	(64.18)	(93.69)
R-squared		0.55	0.58	0.53	0.56	0.54	0.56		
Observations		191	188	282	279	370	367	1019	661
FPM transfers in 1989 (,000 of 2008 Reais)	2,508								
I[X > 0]		107.44	137.91	-763.76	-641.94	435.08	542.34	739.10	809.40
		(227.29)	(226.81)	(1040.30)	(956.78)	(398.14)	(484.67)	(559.21)	(584.30)
R-squared		0.55	0.60	0.10	0.11	0.05	0.05		
Observations		194	191	285	282	377	373	1185	1254
FPM transfers from 1986-1989 (,000 of 2008 Reais)	11,384								
I[X > 0]		33.64	246.43	-912.46	-838.97	-145.59	-26.63	619.70	109.0
		(515.20)	(493.69)	(1257.32)	(1208.40)	(614.94)	(646.69)	(705.58)	(604.89)
R-squared		0.63	0.67	0.16	0.17	0.13	0.14		
Observations		178	175	267	264	353	350	955	549

Notes: All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 2: Impacts on log own municipal revenue per capita, 1986-2010

Neighborhood (percent):	2	2	3	3	4	4	IK	CCT
Pretreatment covariates:	N	Y	N	Y	N	Y	Y	Y
Log own municipal revenue per capita, 1986-1990								
I[X > 0]	0.168	0.278	0.460	0.320	0.367	0.191	0.017	0.179
	(0.337)	(0.303)	(0.279)	(0.250)	(0.255)	(0.223)	(0.160)	(0.218)
R-squared	0.66	0.79	0.67	0.79	0.66	0.78		
Observations	182	179	272	269	359	356	720	484
Log own municipal revenue per capita, 1991-1995								
I[X > 0]	0.042	0.111	0.134	0.016	0.260	0.102	-0.022	-0.057
	(0.282)	(0.248)	(0.255)	(0.223)	(0.249)	(0.222)	(0.139)	(0.155)
R-squared	0.70	0.82	0.67	0.79	0.61	0.72		
Observations	200	197	295	292	389	385	787	908
Log own municipal revenue per capita, 1996-2000								
I[X > 0]	-0.170	0.044	0.178	0.139	0.206	0.143	0.007	0.015
	(0.293)	(0.247)	(0.239)	(0.196)	(0.206)	(0.176)	(0.139)	(0.175)
R-squared	0.68	0.82	0.63	0.77	0.59	0.75		
Observations	152	149	216	213	291	287	908	540
Log own municipal revenue per capita, 2001-2005								
I[X > 0]	0.058	0.167	0.224	0.075	0.251	0.151	0.020	0.026
	(0.275)	(0.242)	(0.220)	(0.197)	(0.190)	(0.166)	(0.106)	(0.148)
R-squared	0.49	0.69	0.47	0.68	0.45	0.66		
Observations	177	174	259	256	345	341	968	726
Log own municipal revenue per capita, 2006-2010								
I[X > 0]	-0.035	0.005	0.169	0.014	0.155	0.048	0.000	-0.023
	(0.294)	(0.235)	(0.223)	(0.194)	(0.197)	(0.172)	(0.107)	(0.149)
R-squared	0.45	0.63	0.42	0.62	0.40	0.59		
Observations	167	164	247	244	325	321	972	754

Notes: All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 3: Impacts on log total municipal revenue per capita, 1986-2010

Neighborhood (percent):	2	2	3	3	4	4	IK	CCT
Pretreatment covariates:	N	Y	N	Y	N	Y	Y	Y
Log total municipal revenue per capita, 1986-1990								
I[X > 0]	-0.027	0.024	-0.004	-0.012	0.027	0.016	0.021	0.006
	(0.071)	(0.061)	(0.064)	(0.059)	(0.057)	(0.052)	(0.034)	(0.046)
R-squared	0.70	0.81	0.59	0.68	0.56	0.65		
Observations	182	179	273	270	361	358	1152	660
Log total municipal revenue per capita, 1991-1995								
I[X > 0]	-0.086	-0.051	-0.056	-0.065	0.034	0.014	-0.068	-0.095
	(0.100)	(0.099)	(0.080)	(0.079)	(0.072)	(0.069)	(0.058)	(0.070)
R-squared	0.63	0.72	0.58	0.67	0.54	0.64		
Observations	200	197	295	292	389	385	606	536
Log total municipal revenue per capita, 1996-2000								
I[X > 0]	0.105	-0.008	-0.081	-0.059	0.003	0.017	0.025	-0.004
	(0.117)	(0.101)	(0.102)	(0.089)	(0.086)	(0.081)	(0.055)	(0.068)
R-squared	0.59	0.70	0.46	0.54	0.40	0.50		
Observations	152	149	216	213	291	287	729	579
Log total municipal revenue per capita, 2001-2005								
I[X > 0]	-0.030	0.032	0.038	-0.003	0.061	0.029	0.013	0.019
	(0.127)	(0.112)	(0.105)	(0.098)	(0.094)	(0.085)	(0.058)	(0.069)
R-squared	0.47	0.61	0.45	0.60	0.37	0.53		
Observations	177	174	259	256	345	341	786	809
Log total municipal revenue per capita, 2006-2010								
I[X > 0]	-0.122	-0.097	0.013	-0.058	0.044	-0.007	0.005	-0.003
	(0.153)	(0.125)	(0.123)	(0.110)	(0.110)	(0.098)	(0.067)	(0.085)
R-squared	0.42	0.59	0.40	0.57	0.35	0.51		
Observations	167	164	247	244	325	321	769	686

Notes: All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

1 Years of schooling coding in the 2010 census

For 1991 and 2000 the long forms of the census allow for a direct computation of years of schooling based on grade enrollment and completion. But the 2010 long-form census survey sometimes only investigated broad education categories, not specific grade enrollment. For example, someone enrolled in fifth grade of remedial primary or middle school would only report remedial education, not a specific grade enrollment. Similarly, someone who was already out of school at the time of the 2010 census and had completed fifth grade would only report that he or she enrolled in middle school and did not complete middle school, not a specific grade completion.

In order to compare education outcomes of early 1980s school-age cohorts across census years, we impute schooling using the 2000 census in case the highest grade enrollment was not completed. Specifically, we use the years of schooling variable (V4300) computed by IBGE based on detailed grade enrollment and completion responses from the 2000 census. To impute individual schooling in 2010, we use the corresponding weighted average years of schooling from the 2000 census, where the weight is a sample expansion factor calculated by IBGE.

In the first example above, imputed schooling would be 4.5 years, which corresponds to average schooling of respondents who were enrolled in remedial primary or middle school at the time of the census in 2000. In online Appendix Table 2 below, remedial primary or middle school would be included under "Educação de jovens e adultos ou supletivo do ensino fundamental". In the second example above, imputed schooling would be 5.8 years, which is the (weighted) average schooling of out-of-school respondents who had attended but never completed middle school in 2000. In online Appendix Table 3 below, middle school corresponds to "Ensino fundamental ou 1^o grau (da 5^a a 8^a série/6^o ao 9^o ano)" and the 5.8 figure comes from the column for respondents who did not conclude this level of education.

Table 4: Years of schooling coding in the 2010 census for individuals currently enrolled in a grade or program

	Years of schooling	Observations
V0628: Frequenta escola ou creche		
1-2 Sim		6,449,056
V0629: Curso que frequenta		
1 Creche	0.0	231,860
2 Pré-escolar (maternal e jardim da infância)	0.0	559,141
3 Classe de alfabetização - CA	0.0	318,446
4 Alfabetização de jovens e adultos	0.0	111,468
5 Regular do ensino fundamental		3,281,959
V630		
1 Primeiro ano	0.0	178,196
2 Primeira série/Segundo ano	1.0	278,558
3 Segunda série/Terceiro ano	2.0	365,700
4 Terceira série/Quarto ano	3.0	419,598
5 Quarta série/Quinto ano	4.0	447,165
6 Quinta série/Sexto ano	5.0	472,957
7 Sexta série/Sétimo ano	6.0	400,869
8 Sétima série/Oitavo ano	7.0	342,807
9 Oitava série/Nono ano	8.0	361,452
10 Não seriado[1]	3.6	14,657
6 Educação de jovens e adultos ou supletivo do ensino fundamental[2]	4.5	196,374
7 Regular do ensino médio		934,484
V631		
1 Primeira série	8.0	321,022
2 Segunda série	9.0	248,077
3 Terceira série	10.0	228,893
4 Quarta série	11.0	43,889
5 Não seriado[3]	8.7	92,603
8 Educação de jovens e adultos ou supletivo do ensino médio[4]	8.6	175,238
9 Superior de graduação[5]	12.4	561,528
10 Especialização de nível superior (mínimo de 360 horas)[5]	12.4	59,766
11 Mestrado[6]	17.0	13,269
12 Doutorado[6]	17.0	5,523
3 Não, ja frequentou[7]		12,079,177
4 Não, nunca frequentou	0.0	2,302,846
Total		20,831,079

[1] This is the weighted average years of schooling (V4300) for V0430=6 in the 2000 census.
[2] This is the weighted average years of schooling (V4300) for V0430=7 in the 2000 census.
[3] This is the weighted average years of schooling (V4300) for V0430=9 in the 2000 census.
[4] This is the weighted average years of schooling (V4300) for V0430=10 in the 2000 census.
[5] This is the weighted average years of schooling (V4300) for V0430=12 in the 2000 census.
[6] This is the weighted average years of schooling (V4300) for V0430=13 in the 2000 census.
[7] See online Appendix Table 3.

Table 5: Years of schooling coding in the 2010 census for individuals previously enrolled in a grade or program

V0633: Curso mais elevado que frequentou	V0634: Concluiu o curso no qual estudou? 1 Yes		2 No		Missing	
	Years of schooling	Obs.	Years of schooling	Obs.	Years of schooling	Obs.
1 Creche, pré-escolar, classe de alfabetização	0.0	38,285	0.0	142,766		
2 Alfabetização de jovens e adultos	0.0	53,111	0.0	166,777		
3 Antigo primário (elementar)[1]	4.0	422,709	2.5	636,492		
4 Antigo ginásio (médio 1º ciclo)[2]	8.0	99,749	6.1	68,223		
5 Ensino fundamental ou 1º grau (da 1ª a 3ª série/do 1º ao 4º ano)[3]					2.1	1,909,622
6 Ensino fundamental ou 1º grau (4ª série/5º ano)[4]					4.0	1,138,943
7 Ensino fundamental ou 1º grau (da 5ª a 8ª série/6º ao 9º ano)[5]	8.0	1,057,641	5.8	1,318,831		
8 Supletivo do ensino fundamental ou do 1º grau[6]	6.1	176,970	3.9	121,000		
9 Antigo científico, clássico, etc.(médio 2º ciclo)[7]	11.0	91,788	9.8	16,837		
10 Regular ou supletivo do ensino médio ou do 2º grau[8]	11.0	2,766,695	9.6	625,792		
11 Superior de graduação[9]	15.3	783,361	13.2	224,554		
12 Especialização de nível superior (mínimo de 360 horas)[9]	15.3	160,779	13.2	11,074		
13 Mestrado	17.0	29,428	17.0	3,751		
14 Doutorado	17.0	12,810	17.0	1,189		
Total						12,079,177

[1] This is the weighted average years of schooling (V4300) for V0432=2 (concluded, V0434=1; did not conclude, V0434=2) in the 2000 census.
[2] This is the weighted average years of schooling (V4300) for V0432=3 (concluded, V0434=1; did not conclude, V0434=2) in the 2000 census.
[3] This is the weighted average years of schooling for V0432=2, when years of schooling (V4300) is less than 4.
[4] By definition.
[5] This is the weighted average years of schooling (V4300) for V0432=5 (concluded, V0434=1; did not conclude, V0434=2 and V4300>4) in the 2000 census.
[6] This is the weighted average years of schooling (V4300) for V0432=2, 3, 5 (concluded, V0434=1; did not conclude, V0434=2) in the 2000 census.
[7] This is the weighted average years of schooling (V4300) for V0432=4 (concluded, V0434=1; did not conclude, V0434=2) in the 2000 census.
[8] This is the weighted average years of schooling (V4300) for V0432=6 (concluded, V0434=1; did not conclude, V0434=2) in the 2000 census.
[9] This is the weighted average years of schooling (V4300) for V0432=7 (concluded, V0434=1; did not conclude, V0434=2) in the 2000 census.

2 Migration and sample selection bias

2.1 Migration of directly exposed cohorts

In order to assess migration patterns and the potential for sample selection bias, we construct in- and out-migration flow rates between 1980 and 1991, 2000, and 2010 overall and for school-age cohorts in the early 1980s based on current residence, length of stay and prior residence. For example, the numerator of the 1991 in-migration rate is the weighted sum of long-form sample respondents residing in a given municipality in 1991 who are not natives of that municipality and who have lived in that municipality for at most 10 years.[1] The weights correspond to a sample expansion factor calculated by the national statistical agency. The denominator of the 1991 in-migration rate is the total number of residents from the 1980 census. For early 1980s school-age cohorts, we restrict the numerator to 9- to 18-year-olds and 19- to 28-year-olds in 1991 and the denominator to 0- to 7-year-olds and 8- to 17-year-olds in 1980, respectively. The numerator of the 1991 out-migration rate is the weighted sum of long-form respondents not residing in a given municipality in 1991 who moved away from that municipality within the preceding 10 years, where the weights again correspond to a sample expansion factor calculated by IBGE. The denominator of the out-migration rate is again the total number of residents from the 1980 census. For the out-migration rate of early 1980s school-age cohorts we use the same age restrictions as for the in-migration rate. For school-age cohorts in the early 1980s we also compute average years of schooling and literacy rates separately for natives and in- and out-migrants between 1980 and 1991. In addition to these flow rates by cohort, we also use the census long-form samples to compute the proportions of native non-migrant residents - native residents for short - in 1991, 2000, and 2010.

2.2 Sample selection bias in the RDD

To make the role of potential sample selection more precise, consider the RD-gap in Y, which is the difference in average outcomes at the cutoff:

$$\lim_{\Delta \downarrow 0} E[Y_{it}|X = \Delta] - \lim_{\Delta \uparrow 0} E[Y_{it}|X = \Delta] = \mu_t^+ - \mu_t^-$$

[1] The 1991 census had a long enumeration form that was applied to 20 percent of the population in municipalities with estimated populations up to 15'000 and to a 15 percent sample in the remaining municipalities.

where Y_{it} is an individual outcome, such as schooling, of resident i at point in time t, X denotes municipal population in 1980 and we normalize the cutoff to zero. If at time t all residents were natives (no in-migration) and all natives were residents (no out-migration), then the imperfect control assumption above would be sufficient for the RD-gap to identify the causal effect of extra FPM funds on the outcome considered. In general, however, residents include both natives N and in-migrants M and some natives will have moved away from the municipality. The RD-gap in Y can then be written as

$$\begin{aligned}\mu_t^+ - \mu_t^- &= (f_{N_t}^+ \mu_{N_t}^+ + f_{M_t}^+ \mu_{M_t}^+) - (f_{N_t}^- \mu_{N_t}^- + f_{M_t}^- \mu_{M_t}^-) \\ &= (\mu_{N_t}^+ - \mu_{N_t}^-) + f_{M_t}^+ \left[(\mu_{M_t}^+ - \mu_{M_t}^-) - (\mu_{N_t}^+ - \mu_{N_t}^-)\right] + (f_{M_t}^+ - f_{M_t}^-)(\mu_{M_t}^- - \mu_{N_t}^-)\end{aligned}$$

where

$$\begin{aligned}f_{N_t}^+ &= \lim_{\Delta \downarrow 0} P(N_{it} = 1 | X = \Delta), \\ f_{M_t}^+ &= \lim_{\Delta \downarrow 0} P(M_{it} = 1 | X = \Delta), \\ f_{N_t}^- &= \lim_{\Delta \uparrow 0} P(N_{it} = 1 | X = \Delta), \\ f_{M_t}^- &= \lim_{\Delta \uparrow 0} P(M_{it} = 1 | X = \Delta), \\ \mu_{N_t}^+ &= \lim_{\Delta \downarrow 0} E(Y_{it} | X = \Delta, N_{it} = 1), \\ \mu_{M_t}^+ &= \lim_{\Delta \downarrow 0} E(Y_{it} | X = \Delta, M_{it} = 1), \\ \mu_{N_t}^- &= \lim_{\Delta \uparrow 0} E(Y_{it} | X = \Delta, N_{it} = 1), \\ \mu_{M_t}^- &= \lim_{\Delta \uparrow 0} E(Y_{it} | X = \Delta, M_{it} = 1).\end{aligned}$$

In words, the RD-gap in Y for all residents can be decomposed into the outcome RD-gap for natives, $\mu_{N_t}^+ - \mu_{N_t}^-$, the difference between the outcome RD-gaps for migrants, $\mu_{M_t}^+ - \mu_{M_t}^-$, and natives, weighted by the proportion of migrants, and the RD-gap in the proportion of migrants times the difference in average outcomes between migrants and natives in marginal comparison communities. Identification now requires that the distributions of unobserved determinants of the outcome RD-Gaps for both natives and migrants are identical close to the cutoff. This assumption does not necessarily follow from imperfect control over 1980 population and it is not directly testable. Moreover, identification now also requires that either the proportion of migrants is iden-

tical at the cutoff, or that natives and migrants have the same average outcomes. Both of these assumptions are directly testable and are discussed below.

2.3 Selective migration and sample selection

Table 6 below documents that there are no differential in- or out-migration flow rates at the cutoffs for directly exposed cohorts between 1980 and 1991. Impact estimates both overall and for early 1980s school-age cohorts are close to zero and virtually never statistically significant. This evidence suggests that sample selection is unlikely to bias education results for early 1980s school-age cohorts or estimated impacts on the poverty rate in 1991. While we cannot observe migrants' outcomes before they move in or out of the municipality, Tables 7 and 8 below show that in-migrants between 1980 and 1991 exhibit similar education and literacy gains as the natives $(\mu^{+}_{M_t} - \mu^{-}_{M_t}) \simeq (\mu^{+}_{N_t} - \mu^{-}_{N_t})$, suggesting again that selective migration is unlikely to be driving our results. At the same time, out-migrants from the 0- to 9-year-old cohort in 1982 exhibit no education or literacy gains in marginal treatment communities, which further corroborates the validity of the design.

Table 9 below shows that the proportion of native residents exhibits no jump at the cutoff in 1991, 2000, or 2010, that is $f^{+}_{M_t} - f^{-}_{M_t} \simeq 0$, which is important because migrants tend to have better outcomes than resident natives, $\mu^{-}_{M_t} - \mu^{-}_{N_t} > 0$. OLS impact estimates are again close to zero and almost always statistically insignificant. Optimal bandwidth impact estimates are virtually zero. A similar picture emerges from Table 10 below, which again shows that in-migration flow rates in each of 1991, 2000, and 2010 are smooth at the cutoffs. Overall, these tests indicate that sample selection is unlikely to bias education results for early 1980s school-age cohorts in 1991, 2000 or 2010.

Table 11 below shows impact estimates on net enrollment in primary and middle school, as well as on the ENEM participation rate. The first two rows show that average overall net enrollment rates in primary and middle school are about 98 percent and 96 percent, respectively, and that there is no differential enrollment at the cutoff. The third row shows, however, that enrollment in public primary schools is about three percentage points lower in marginal treatment communities. Estimated impacts vary little across OLS specifications and are typically significant at 5 percent.

IK and CCT estimates are a bit smaller and insignificantly different from zero. If parents with strong preferences for education are responsible for the switch from public to private schools, it might explain why we find no test score gains for the selected sample of 5th graders that remained in public schools and took the *Prova Brasil* exam.

The fourth row in Table 11 below shows that there is no evidence of a discontinuity in enrollment for public middle schools. Although impact estimates are all negative, they are in the order of one percentage point and in all but one specification not statistically different from zero. This evidence suggests that sample selection is unlikely to bias test score results for 8th or 9th graders. The fifth row in Table 11 shows estimated impacts on the ENEM participation rate among individuals aged 16 to 21 in 2010. Again there is little if any evidence of a discontinuity in the ENEM participation rate. Impact estimates are mostly positive but small and in all but one specification not statistically different from zero. If anything, a positive effect on the likelihood of taking the ENEM test would suggest that sample selection bias is towards zero because test takers in treatment communities likely include weaker students that would not have taken the test in the absence of extra funds.

2.4 Mechanical Attenuation of Education Gains

A potential explanation for the attenuated schooling gain between 1991 and 2000 shown in Table 2 of the paper is that the proportion of native residents decreases over time and the new in-migrants have the same average outcomes in both treatment and comparison communities: $\mu_t^+ - \mu_t^- = (\mu_{N_t}^+ - \mu_{N_t}^-)(1 - f_{M_t}^+)$. Indeed, while Table 9 below shows that the proportion of native residents in the municipality is smooth at the cutoff in each of the census years, the proportion of native residents in the 19- to 28-year-old cohort in 1991 drops from about 70 percent to about 60 percent for 28- to 37-year-olds in 2000.

In order to account for the attenuating effect of non-selective migration, we investigate whether the average schooling gain also attenuates for native residents. Table 12 below shows that this is indeed the case. Estimates in the first three rows suggest that the older cohort of native residents (19-28 in 1991) accumulated about 0.3 additional years of schooling on average by 1991 and that reduced schooling gains of about 0.15 years persist in 2000. This evidence suggests that

the attenuated schooling gain for 28- to 37-year-olds in 2000 reflects a catch-up in comparison communities, rather than a mechanical artefact of non-selective migration. Rows four through six in online Appendix Table 12 show that for native residents in the 9- to 18-year-old cohort, the average schooling gain in 1991 is about 0.15 years and for 18- to 27-year-olds in 2000 the gain is almost 0.3 years. This evidence suggests that the younger cohort had not realized the entire schooling gain by 1991 but that by 2000 this cohort had accumulated about the same gain as the 19- to 28-year-olds in 1991, once migration is taken into account.

Rows one through three of Table 13 in the online Appendix show that the attenuation of literacy gains between 1991 and 2000 arises also for native residents from the older cohort (19- to 28-year-olds in 1991) and is thus not driven by non-selective migration. Rows four through six show that there is an attenuation of literacy gains among native residents from the younger cohort (9- to 18-year-olds in 1991) as well, going from about 3 percentage points in 1991 to about 2 percentage points in 2000, and that a literacy gain of about 2 percentage points persists even in 2010.

2.5 Municipality Splits

A final robustness check we perform accounts for the fact that some municipalities lost territory and population to newly-created municipalities between 1980 and 2010. When new municipalities are formed, they receive territory from a single existing municipality or from more than one. In the majority of cases, spin-off municipalities are former districts of an existing municipality, so they are fully contained within existing municipalities and we simply aggregate individual-level schooling and literacy outcomes, PB and ENEM test scores, parental schooling levels and student-teacher ratios to 1980 municipality borders. In a few cases, new municipalities are formed by incorporating territory from more than one existing municipality and we discard these newly created municipalities from our sample. Results of the robustness checks with 1980 municipality borders are quantitatively very similar to those shown in the paper and are available on request.

Table 6: Impacts on migration flows between 1981 and 1991, overall and for 1980s school-age cohorts

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
Out-migration rate, 1981 to 1991	0.21								
I[X > 0]		0.016	0.002	0.014	0.007	0.010	0.004	-0.004	-0.006
		(0.019)	(0.019)	(0.015)	(0.014)	(0.013)	(0.013)	(0.009)	(0.011)
R-squared/Observations		0.46	0.50	0.40	0.45	0.37	0.41	860	854
Out-migration rate, 9- to 18-yo, 1981 to 1991	0.23								
I[X > 0]		0.020	0.006	0.016	0.007	0.014	0.007	-0.009	-0.006
		(0.023)	(0.022)	(0.019)	(0.017)	(0.016)	(0.016)	(0.011)	(0.015)
R-squared/Observations		0.47	0.51	0.41	0.46	0.37	0.41	912	715
Out-migration rate, 19- to 28-yo, 1981 to 1991	0.22								
I[X > 0]		0.012	-0.007	0.015	0.006	0.013	0.004	-0.000	0.000
		(0.020)	(0.019)	(0.016)	(0.015)	(0.014)	(0.013)	(0.009)	(0.010)
R-squared/Observations		0.40	0.47	0.33	0.40	0.28	0.36	851	756
In-migration rate, 1981 to 1991	0.16								
I[X > 0]		-0.030	-0.015	0.012	0.001	0.032	0.021	0.025	0.025
		(0.040)	(0.042)	(0.057)	(0.056)	(0.059)	(0.054)	(0.031)	(0.038)
R-squared/Observations		0.42	0.50	0.20	0.26	0.15	0.22	1041	1034
In-migration rate, 9- to 18-yo, 1981 to 1991	0.17								
I[X > 0]		-0.036	-0.020	0.005	-0.006	0.027	0.016	0.025	0.020
		(0.044)	(0.045)	(0.053)	(0.052)	(0.053)	(0.049)	(0.027)	(0.038)
R-squared/Observations		0.40	0.50	0.22	0.30	0.18	0.27	1164	886
In-migration rate, 19- to 28-yo, 1981 to 1991	0.12								
I[X > 0]		-0.016	0.000	0.026	0.017	0.041	0.031	0.032	0.034
		(0.035)	(0.036)	(0.052)	(0.049)	(0.053)	(0.053)	(0.026)	(0.034)
R-squared/Observations		0.44	0.52	0.22	0.29	0.17	0.25	1113	954
Observations		202	199	297	294	391	387		

Notes: Authors' calculations of migration rates are based on long-form samples from the 1991 census. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 7: Impacts on schooling for 1980s school-age cohorts, 1991, natives, in- and out-migrants

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
Avg. schooling, natives (19- to 28-yo in 1991)	4.23								
I[X > 0]		0.390	0.306*	0.590***	0.377***	0.573***	0.320***	0.304***	0.395***
		(0.278)	(0.164)	(0.211)	(0.123)	(0.181)	(0.110)	(0.100)	(0.126)
R-squared/Observations		0.72	0.89	0.71	0.89	0.68	0.88	557	430
Avg. schooling, out-migrants (19- to 28-yo in 1991)	5.03								
I[X > 0]		0.286	0.226	0.526**	0.390**	0.574***	0.374**	0.219**	0.219*
		(0.300)	(0.241)	(0.208)	(0.173)	(0.184)	(0.149)	(0.107)	(0.118)
R-squared/Observations		0.53	0.69	0.53	0.68	0.50	0.69	794	886
Avg. schooling, in-migrants (19- to 28-yo in 1991)	4.46								
I[X > 0]		0.299	0.135	0.401	0.196	0.490**	0.244	0.152	0.213
		(0.331)	(0.298)	(0.264)	(0.248)	(0.232)	(0.218)	(0.141)	(0.182)
R-squared/Observations		0.44	0.55	0.46	0.54	0.49	0.58	926	725
Avg. schooling, natives (9- to 18-yo in 1991)	2.67								
I[X > 0]		0.189	0.154	0.271**	0.155**	0.268***	0.119*	0.113**	0.113**
		(0.167)	(0.094)	(0.123)	(0.073)	(0.103)	(0.064)	(0.066)	(0.055)
R-squared/Observations		0.84	0.94	0.83	0.93	0.81	0.93	611	761
Avg. schooling, out-migrants (9- to 18-yo in 1991)	3.00								
I[X > 0]		-0.047	-0.082	0.039	-0.018	0.103	0.028	-0.005	0.010
		(0.162)	(0.141)	(0.119)	(0.103)	(0.100)	(0.090)	(0.059)	(0.079)
R-squared/Observations		0.70	0.77	0.70	0.75	0.69	0.74	1044	794
Avg. schooling, in-migrants (9- to 18-yo in 1991)	2.67								
I[X > 0]		0.362*	0.314	0.296*	0.190	0.223*	0.102	0.094	0.087
		(0.209)	(0.191)	(0.153)	(0.141)	(0.129)	(0.123)	(0.085)	(0.089)
R-squared/Observations		0.62	0.69	0.63	0.69	0.65	0.71	776	1004
Observations		202	199	297	294	391	387		

Notes: Authors' calculations of average schooling are based on the long-form sample of the 1991 census. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 8: Impacts on literacy for 1980s school-age cohorts, 1991, natives, in- and out-migrants

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
Literacy rate, natives (19- to 28-yo in 1991)	0.75								
I[X > 0]		0.062**	0.054***	0.069***	0.056***	0.063***	0.044***	0.039***	0.048***
		(0.028)	(0.016)	(0.020)	(0.013)	(0.017)	(0.011)	(0.010)	(0.012)
R-squared/Observations		0.77	0.91	0.79	0.91	0.79	0.91	512	420
Literacy rate, out-migrants (19- to 28-yo in 1991)	0.84								
I[X > 0]		0.002	-0.004	0.020	0.012	0.026*	0.014	0.008	0.009
		(0.022)	(0.018)	(0.016)	(0.014)	(0.014)	(0.012)	(0.008)	(0.010)
R-squared/Observations		0.69	0.79	0.69	0.78	0.70	0.79	901	714
Literacy rate, in-migrants (19- to 28-yo in 1991)	0.77								
I[X > 0]		0.056*	0.046	0.047*	0.036	0.057**	0.041*	0.019	0.028
		(0.034)	(0.029)	(0.026)	(0.025)	(0.023)	(0.022)	(0.014)	(0.020)
R-squared/Observations		0.60	0.65	0.64	0.68	0.66	0.69	1098	714
Literacy rate, natives (9- to 18-yo in 1991)	0.73								
I[X > 0]		0.035	0.026	0.040*	0.024	0.042**	0.021	0.020*	0.018*
		(0.030)	(0.020)	(0.022)	(0.015)	(0.018)	(0.013)	(0.010)	(0.010)
R-squared/Observations		0.81	0.92	0.81	0.91	0.81	0.91	649	902
Literacy rate, out-migrants (9- to 18-yo in 1991)	0.80								
I[X > 0]		0.019	0.010	0.029	0.020	0.027	0.016	0.006	0.007
		(0.029)	(0.026)	(0.020)	(0.018)	(0.017)	(0.016)	(0.009)	(0.013)
R-squared/Observations		0.72	0.77	0.72	0.76	0.73	0.78	1130	823
Literacy rate, in-migrants (9- to 18-yo in 1991)	0.75								
I[X > 0]		0.054	0.047	0.056**	0.041*	0.061***	0.043**	0.042**	0.049**
		(0.035)	(0.031)	(0.024)	(0.023)	(0.022)	(0.021)	(0.019)	(0.021)
R-squared/Observations		0.67	0.71	0.68	0.72	0.69	0.73	616	656
Observations		202	199	297	294	391	387		

Notes: Authors' calculations of literacy rates are based on the long-form sample of the 1991 census. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 9: Impacts on the proportion of native residents in 1991, 2000 and 2010, by age group

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
Proportion of native residents 19- to 28-yo in 1991	0.69								
I[X > 0]		0.034	0.020	0.023	0.026	0.019	0.019	-0.003	0.000
		(0.038)	(0.033)	(0.032)	(0.028)	(0.028)	(0.024)	(0.016)	(0.019)
R-squared/Observations		0.54	0.67	0.48	0.57	0.44	0.53	936	845
Proportion of native residents 28- to 37-yo in 2000	0.61								
I[X > 0]		0.047	0.033	0.026	0.031	0.017	0.021	0.007	0.005
		(0.033)	(0.032)	(0.030)	(0.028)	(0.026)	(0.024)	(0.012)	(0.018)
R-squared/Observations		0.49	0.61	0.44	0.53	0.40	0.49	1326	899
Proportion of native residents 38- to 47-yo in 2010	0.59								
I[X > 0]		0.056	0.039	0.038	0.043	0.024	0.027	-0.005	0.013
		(0.037)	(0.033)	(0.032)	(0.028)	(0.027)	(0.024)	(0.011)	(0.019)
R-squared/Observations		0.51	0.62	0.44	0.56	0.42	0.52	1601	810
Proportion of native residents 9- to 18-yo in 1991	0.79								
I[X > 0]		0.002	-0.010	-0.001	0.003	-0.008	-0.005	-0.012	-0.011
		(0.029)	(0.025)	(0.025)	(0.023)	(0.022)	(0.019)	(0.012)	(0.016)
R-squared/Observations		0.50	0.67	0.43	0.56	0.40	0.52	1054	848
Proportion of native residents 18- to 27-yo in 2000	0.70								
I[X > 0]		0.037	0.019	0.026	0.031	0.012	0.019	0.056	0.009
		(0.031)	(0.027)	(0.028)	(0.025)	(0.024)	(0.022)	(0.013)	(0.016)
R-squared/Observations		0.46	0.62	0.40	0.53	0.37	0.49	1063	877
Proportion of native residents 28- to 37-yo in 2010	0.62								
I[X > 0]		0.056*	0.045	0.036	0.050**	0.009	0.024	0.009	0.018
		(0.033)	(0.029)	(0.028)	(0.025)	(0.024)	(0.021)	(0.012)	(0.017)
R-squared/Observations		0.53	0.69	0.47	0.61	0.44	0.57	1159	732
Observations		202	199	297	294	391	387		

Notes: Authors' calculations of proportion of native residents are based on long-form samples from the 1991, 2000, and 2010 censuses. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 10: Impacts on in-migration flow rates between 1980 and 1991, 2000, and 2010, by age-group

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
In-migration rate, 9- to 18-yo, 1981 to 1991	0.17								
I[X > 0]		-0.036	-0.020	0.005	-0.006	0.027	0.016	0.025	0.020
		(0.044)	(0.045)	(0.053)	(0.052)	(0.053)	(0.049)	(0.027)	(0.038)
R-squared/Observations		0.40	0.50	0.22	0.30	0.18	0.27	1164	886
In-migration rate, 18- to 27-yo, 1981 to 2000	0.23								
I[X > 0]		-0.083	-0.043	-0.012	-0.041	0.047	0.017	0.030	0.040
		(0.095)	(0.095)	(0.115)	(0.115)	(0.114)	(0.109)	(0.055)	(0.071)
R-squared/Observations		0.36	0.44	0.20	0.29	0.16	0.25	1129	1053
In-migration rate, 28- to 37-yo, 1981 to 2010	0.27								
I[X > 0]		-0.093	-0.032	-0.006	-0.044	0.055	0.016	0.022	0.032
		(0.142)	(0.136)	(0.144)	(0.143)	(0.137)	(0.131)	(0.082)	(0.095)
R-squared/Observations		0.31	0.41	0.21	0.31	0.18	0.28	847	954
In-migration rate, 19- to 28-yo, 1981 to 1991	0.12								
I[X > 0]		-0.016	0.000	0.026	0.017	0.041	0.031	0.032	0.034
		(0.035)	(0.036)	(0.052)	(0.049)	(0.053)	(0.053)	(0.026)	(0.034)
R-squared/Observations		0.44	0.52	0.22	0.29	0.17	0.25	1113	954
In-migration rate, 28- to 37-yo, 1981 to 2000	0.18								
I[X > 0]		-0.065	-0.039	0.011	-0.017	0.064	0.036	0.030	0.049
		(0.086)	(0.089)	(0.118)	(0.118)	(0.120)	(0.115)	(0.052)	(0.058)
R-squared/Observations		0.38	0.44	0.19	0.25	0.14	0.20	1248	1099
In-migration rate, 38- to 47-yo, 1981 to 2010	0.19								
I[X > 0]		-0.061	-0.024	0.010	-0.022	0.051	0.021	0.023	0.032
		(0.110)	(0.112)	(0.127)	(0.129)	(0.125)	(0.122)	(0.056)	(0.081)
R-squared/Observations		0.32	0.38	0.17	0.24	0.14	0.21	1237	1011
Observations		202	199	297	294	391	387		

Notes: Authors' calculations of migration rates are based on long-form samples from the 1991, 2000 and 2010 censuses. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 11: Impacts on primary and middle school net enrollment rates and ENEM participation rate

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
Net enrollment rate of 7- to 10-year-olds in 2010	0.98								
I[X > 0]		-0.002	-0.007	-0.006	-0.010*	-0.002	-0.006	-0.003	-0.002
		(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.004)	(0.003)
R-squared/Observations		0.48	0.58	0.40	0.48	0.35	0.40	724	1024
Net enrollment rate of 11- to 14-year-olds in 2010	0.96								
I[X > 0]		-0.003	-0.008	-0.005	-0.010**	0.002	-0.002	-0.003	-0.005
		(0.007)	(0.006)	(0.005)	(0.005)	(0.005)	(0.004)	(0.003)	(0.004)
R-squared/Observations		0.43	0.52	0.38	0.46	0.33	0.39	1194	675
Net enrollment rate of 7- to 10-year-olds in 2010 (public)	0.92								
I[X > 0]		-0.028*	-0.032**	-0.030**	-0.028**	-0.025**	-0.022*	-0.012	-0.007
		(0.015)	(0.014)	(0.013)	(0.013)	(0.011)	(0.011)	(0.008)	(0.008)
R-squared/Observations		0.27	0.37	0.22	0.33	0.20	0.32	640	1040
Net enrollment rate of 11- to 14-year-olds in 2010 (public)	0.92								
I[X > 0]		-0.016	-0.019	-0.020*	-0.017	-0.012	-0.009	-0.007	-0.010
		(0.012)	(0.012)	(0.011)	(0.011)	(0.010)	(0.009)	(0.006)	(0.008)
R-squared/Observations		0.33	0.44	0.26	0.39	0.23	0.35	1083	805
ENEM participation rate of 16- to 21-year-olds in 2010	0.21								
I[X > 0]		0.013	-0.003	0.026	0.012	0.037**	0.020	0.013	0.011
		(0.023)	(0.022)	(0.018)	(0.017)	(0.015)	(0.014)	(0.011)	(0.011)
R-squared/Observations		0.46	0.57	0.48	0.56	0.48	0.55	714	918
Observations		202	199	297	294	391	387		

Notes: Authors' calculations of net enrollment rates and ENEM participation rates are based on the 2010 census and ENEM 2007-2011 test-taker samples of high school (12th grade) graduating cohorts. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 12: Impacts on schooling for 1980s school-age cohorts, 1991, 2000 and 2010, native non-migrants

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
Avg. schooling (19- to 28-year-olds in 1991)	4.23								
I[X > 0]		0.390	0.306*	0.590***	0.377***	0.573***	0.320***	0.304***	0.395***
		(0.278)	(0.164)	(0.211)	(0.123)	(0.181)	(0.110)	(0.100)	(0.126)
R-squared/Observations		0.72	0.89	0.71	0.89	0.68	0.88	557	430
Avg. schooling (28- to 37-year-olds in 2000)	4.84								
I[X > 0]		0.058	-0.012	0.379*	0.165	0.354**	0.105	0.106	0.153
		(0.258)	(0.192)	(0.211)	(0.150)	(0.178)	(0.131)	(0.108)	(0.134)
R-squared/Observations		0.73	0.86	0.69	0.85	0.66	0.85	639	550
Avg. schooling (38- to 47-year-olds in 2010)	5.00								
I[X > 0]		0.049	-0.052	0.372	0.134	0.348*	0.103	-0.040	0.027
		(0.269)	(0.215)	(0.227)	(0.175)	(0.188)	(0.145)	(0.099)	(0.139)
R-squared/Observations		0.65	0.80	0.58	0.77	0.56	0.77	932	683
Avg. schooling (9- to 18-year-olds in 1991)	2.67								
I[X > 0]		0.189	0.154	0.271**	0.155**	0.268***	0.119*	0.113**	0.113**
		(0.167)	(0.094)	(0.123)	(0.073)	(0.103)	(0.064)	(0.066)	(0.055)
R-squared/Observations		0.84	0.94	0.83	0.93	0.81	0.93	611	761
Avg. schooling (18- to 27-year-olds in 2000)	5.83								
I[X > 0]		0.267	0.216	0.475**	0.282*	0.479***	0.271**	0.133	0.270**
		(0.270)	(0.201)	(0.209)	(0.155)	(0.174)	(0.132)	(0.106)	(0.135)
R-squared/Observations		0.74	0.86	0.72	0.85	0.72	0.85	695	544
Avg. schooling (28- to 37-year-olds in 2010)	6.26								
I[X > 0]		0.128	0.047	0.453**	0.228	0.512***	0.276*	0.061	0.204
		(0.265)	(0.228)	(0.227)	(0.179)	(0.195)	(0.154)	(0.112)	(0.158)
R-squared/Observations		0.65	0.79	0.59	0.77	0.57	0.76	843	595
Observations		202	199	297	294	391	387		

Notes: Authors' calculations of average schooling are based on long-form samples from the 1991, 2000 and 2010 censuses. Samples were restricted to native non-migrants. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 13: Impacts on literacy for 1980s school-age cohorts, 1991, 2000 and 2010, native non-migrants

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
Literacy rate (19- to 28-year-olds in 1991)	0.75								
I[X > 0]		0.062**	0.054***	0.069***	0.056***	0.063***	0.044***	0.039***	0.048***
		(0.028)	(0.016)	(0.020)	(0.013)	(0.017)	(0.011)	(0.010)	(0.012)
R-squared/Observations		0.77	0.91	0.79	0.91	0.79	0.91	512	420
Literacy rate (28- to 37-year-olds in 2000)	0.80								
I[X > 0]		0.019	0.012	0.047**	0.033**	0.037**	0.019*	0.014	0.018
		(0.024)	(0.016)	(0.019)	(0.014)	(0.016)	(0.012)	(0.009)	(0.011)
R-squared/Observations		0.77	0.89	0.77	0.88	0.76	0.88	612	534
Literacy rate (38- to 47-year-olds in 2010)	0.79								
I[X > 0]		0.029	0.019	0.039**	0.027**	0.040***	0.024***	0.016**	0.021**
		(0.022)	(0.013)	(0.016)	(0.010)	(0.014)	(0.009)	(0.009)	(0.010)
R-squared/Observations		0.80	0.92	0.80	0.91	0.80	0.90	536	473
Literacy rate (9- to 18-year-olds in 1991)	0.74								
I[X > 0]		0.035	0.026	0.040*	0.024	0.042**	0.021	0.020*	0.018*
		(0.030)	(0.020)	(0.022)	(0.015)	(0.018)	(0.013)	(0.010)	(0.010)
R-squared/Observations		0.81	0.92	0.81	0.91	0.81	0.91	625	902
Literacy rate (18- to 27-year-olds in 2000)	0.88								
I[X > 0]		0.026	0.020*	0.032***	0.024**	0.027***	0.017**	0.008	0.016**
		(0.017)	(0.012)	(0.012)	(0.009)	(0.010)	(0.008)	(0.006)	(0.008)
R-squared/Observations		0.75	0.86	0.75	0.85	0.75	0.84	696	466
Literacy rate (28- to 37-year-olds in 2010)	0.86								
I[X > 0]		0.021	0.012	0.031**	0.021**	0.031***	0.019**	0.015**	0.017**
		(0.017)	(0.012)	(0.013)	(0.010)	(0.011)	(0.009)	(0.007)	(0.008)
R-squared/Observations		0.78	0.88	0.77	0.86	0.77	0.85	651	644
Observations		202	199	297	294	391	387		

Notes: Authors' calculations of literacy rates are based on long-form samples from the 1991, 2000 and 2010 censuses. Samples were restricted to native non-migrants. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 14: Impacts on the distribution of Prova Brasil test scores, 2007, 2009 and 2011, 4th or 5th graders

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
Average test score	-0.11								
I[X > 0]		-0.023	-0.030	-0.003	-0.032	0.022	-0.018	0.000	-0.029
		(0.099)	(0.099)	(0.073)	(0.071)	(0.062)	(0.060)	(0.035)	(0.051)
R-squared/Observations		0.74	0.77	0.76	0.80	0.76	0.80	949	683
10th percentile	-1.18								
I[X > 0]		0.027	0.025	0.041	0.021	0.055	0.028	0.013	0.001
		(0.085)	(0.088)	(0.063)	(0.064)	(0.053)	(0.053)	(0.032)	(0.041)
R-squared/Observations		0.62	0.66	0.65	0.69	0.63	0.68	872	769
25th percentile	-0.74								
I[X > 0]		0.002	0.002	0.025	0.001	0.050	0.015	0.019	-0.001
		(0.098)	(0.100)	(0.072)	(0.072)	(0.061)	(0.060)	(0.031)	(0.047)
R-squared/Observations		0.67	0.71	0.70	0.74	0.68	0.73	1144	729
Median test score	-0.18								
I[X > 0]		-0.029	-0.035	-0.008	-0.038	0.021	-0.023	0.000	-0.031
		(0.108)	(0.109)	(0.080)	(0.078)	(0.067)	(0.065)	(0.035)	(0.055)
R-squared/Observations		0.72	0.76	0.75	0.78	0.74	0.79	1100	696
75th percentile	0.45								
I[X > 0]		-0.036	-0.046	-0.024	-0.058	0.002	-0.044	-0.018	-0.057
		(0.113)	(0.111)	(0.085)	(0.082)	(0.072)	(0.069)	(0.044)	(0.162)
R-squared/Observations		0.75	0.79	0.78	0.81	0.78	0.81	859	646
90th percentile	1.06								
I[X > 0]		-0.051	-0.067	-0.038	-0.071	-0.011	-0.055	-0.021	-0.045
		(0.116)	(0.111)	(0.087)	(0.083)	(0.073)	(0.070)	(0.050)	(0.061)
R-squared/Observations		0.76	0.80	0.79	0.82	0.79	0.82	756	696
Observations		202	199	297	294	391	387		

Notes: PB 2007 4th grade, 2009 5th grade, and 2011 5th grade test-taker samples. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 15: Impacts on parents' education levels, Prova Brasil 2007, 2009 and 2011, 4th or 5th graders

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
No more than primary school	0.42								
I[X > 0]		-0.028**	-0.027**	-0.025**	-0.018*	-0.032***	-0.026***	-0.015**	-0.018**
		(0.014)	(0.013)	(0.011)	(0.011)	(0.009)	(0.009)	(0.006)	(0.008)
R-squared/Observations		0.60	0.66	0.59	0.65	0.58	0.62	860	623
Some middle school	0.21								
I[X > 0]		0.010	0.006	-0.002	-0.001	-0.001	-0.000	0.009*	0.007
		(0.011)	(0.011)	(0.009)	(0.009)	(0.008)	(0.008)	(0.005)	(0.007)
R-squared/Observations		0.37	0.44	0.35	0.42	0.30	0.39	1234	742
Some high school	0.15								
I[X > 0]		0.008	0.008	0.013**	0.011*	0.008	0.006	0.005	0.007
		(0.008)	(0.007)	(0.006)	(0.006)	(0.005)	(0.005)	(0.004)	(0.005)
R-squared/Observations		0.28	0.40	0.24	0.35	0.21	0.30	756	656
Completed at least high school	0.22								
I[X > 0]		0.011	0.013	0.014	0.008	0.025***	0.020**	-0.000	0.005
		(0.012)	(0.012)	(0.010)	(0.010)	(0.009)	(0.009)	(0.005)	(0.008)
R-squared/Observations		0.53	0.58	0.53	0.58	0.51	0.57	1367	722
Observations		202	199	297	294	391	387		

Notes: PB 2007 4th grade, 2009 5th grade, and 2011 5th grade test-taker samples. The four categories correspond to the highest education level of the most educated parent. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 16: Net impacts on the distribution of ENEM test scores controlling for intermediary outcomes

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Intermediary outcomes:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
Average test score	-0.47								
I[X > 0]		0.082	0.041	0.108**	0.047	0.075*	0.027	0.013	0.004
		(0.057)	(0.045)	(0.045)	(0.038)	(0.041)	(0.034)	(0.025)	(0.028)
R-squared/Observations		0.76	0.84	0.75	0.83	0.73	0.82	602	607
10th percentile	-1.44								
I[X > 0]		0.094**	0.080**	0.089***	0.063**	0.062**	0.046	0.021	0.013
		(0.042)	(0.035)	(0.033)	(0.028)	(0.029)	(0.026)	(0.021)	(0.022)
R-squared/Observations		0.73	0.81	0.73	0.79	0.69	0.76	554	681
25th percentile	-1.05								
I[X > 0]		0.080	0.052	0.092**	0.051	0.057	0.027	0.012	0.003
		(0.052)	(0.043)	(0.040)	(0.035)	(0.036)	(0.031)	(0.024)	(0.024)
R-squared/Observations		0.74	0.82	0.74	0.80	0.72	0.79	548	701
Median test score	-0.55								
I[X > 0]		0.080	0.042	0.109**	0.050	0.066	0.022	0.007	-0.005
		(0.061)	(0.049)	(0.049)	(0.041)	(0.043)	(0.037)	(0.028)	(0.031)
R-squared/Observations		0.75	0.83	0.75	0.81	0.72	0.80	559	610
75th percentile	0.04								
I[X > 0]		0.077	0.024	0.121**	0.042	0.089*	0.025	0.016	0.006
		(0.068)	(0.057)	(0.055)	(0.048)	(0.050)	(0.043)	(0.030)	(0.035)
R-squared/Observations		0.76	0.83	0.74	0.82	0.72	0.81	680	656
90th percentile	0.62								
I[X > 0]		0.098	0.038	0.128**	0.039	0.090	0.020	0.009	0.001
		(0.080)	(0.070)	(0.064)	(0.056)	(0.058)	(0.050)	(0.035)	(0.043)
R-squared/Observations		0.73	0.82	0.72	0.80	0.70	0.79	666	567
Observations		202	193	297	286	391	375		

Notes: ENEM 2007-2011 test taker samples, high school (12th grade) graduating cohorts. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Intermediary outcomes include the primary school student-teacher ratio in 1997-2003, the share of 2007-2011 ENEM test taker parents with no more than primary school education and the share of 2007-2009 ENEM test taker parents with income up to 1 minimum wage. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 17: Net impacts on the distribution of Prova Brasil test scores controlling for intermediary outcomes

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Intermediary outcomes:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
Average test score	-0.14								
I[X > 0]		0.032	-0.021	0.105*	0.033	0.113**	0.023	0.050	0.040
		(0.068)	(0.064)	(0.056)	(0.051)	(0.048)	(0.046)	(0.033)	(0.042)
R-squared/Observations		0.72	0.77	0.72	0.77	0.70	0.76	904	794
10th percentile	-1.28								
I[X > 0]		0.039	-0.020	0.103*	0.031	0.112**	0.028	0.058**	0.056
		(0.074)	(0.071)	(0.059)	(0.054)	(0.050)	(0.048)	(0.028)	(0.043)
R-squared/Observations		0.61	0.67	0.61	0.67	0.60	0.66	1172	783
25th percentile	-0.78								
I[X > 0]		0.060	0.000	0.136**	0.060	0.140***	0.043	0.061*	0.057
		(0.074)	(0.072)	(0.060)	(0.056)	(0.052)	(0.050)	(0.033)	(0.045)
R-squared/Observations		0.67	0.72	0.68	0.73	0.66	0.72	1018	809
Median test score	-0.17								
I[X > 0]		0.023	-0.041	0.111*	0.028	0.125**	0.021	0.049	0.045
		(0.076)	(0.071)	(0.061)	(0.056)	(0.053)	(0.050)	(0.036)	(0.042)
R-squared/Observations		0.70	0.75	0.70	0.76	0.68	0.75	900	993
75th percentile	0.47								
I[X > 0]		0.015	-0.039	0.087	0.016	0.100*	0.009	0.038	0.022
		(0.074)	(0.068)	(0.059)	(0.054)	(0.052)	(0.049)	(0.037)	(0.046)
R-squared/Observations		0.73	0.77	0.73	0.78	0.72	0.77	847	751
90th percentile	1.06								
I[X > 0]		0.011	-0.019	0.092	0.040	0.090*	0.017	0.036	0.018
		(0.070)	(0.067)	(0.057)	(0.054)	(0.050)	(0.049)	(0.037)	(0.046)
R-squared/Observations		0.76	0.79	0.75	0.78	0.74	0.78	836	712
Observations		202	193	297	286	391	375		

Notes: PB 2007 8th grade, 2009 9th grade, and 2011 9th grade test taker samples. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Intermediary outcomes include the primary school student-teacher ratio in 1997-2003 and the share of 2007, 2009 and 2011 Prova Brasil test taker parents with no more than primary school education. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 18: Impacts on age at first birth and number and age of children by cohort in 2010

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
Average age at first birth, 28- to 37-yo in 2010	22.0								
I[X > 0]		0.294	0.261	0.342**	0.237	0.301**	0.185	0.090	0.112
		(0.181)	(0.182)	(0.149)	(0.146)	(0.129)	(0.127)	(0.010)	(0.109)
R-squared/Observations		0.51	0.59	0.48	0.56	0.44	0.52	679	732
Avg. number of 10-18-yo kids, 28- to 37-yo in 2010	0.57								
I[X > 0]		0.006	0.014	-0.021	0.000	-0.032	-0.009	-0.002	-0.005
		(0.030)	(0.029)	(0.026)	(0.023)	(0.023)	(0.021)	(0.016)	(0.018)
R-squared/Observations		0.54	0.67	0.52	0.66	0.50	0.65	756	799
Avg. age of 10-18-yo kids, 28- to 37-yo in 2010	12.8								
I[X > 0]		-0.054	-0.047	-0.071	-0.083	-0.058	-0.075	0.014	0.008
		(0.081)	(0.085)	(0.066)	(0.067)	(0.058)	(0.059)	(0.034)	(0.043)
R-squared/Observations		0.20	0.24	0.19	0.21	0.15	0.17	1143	1055
Average age at first birth, 38- to 47-yo in 2010	25.1								
I[X > 0]		0.042	0.004	-0.014	-0.037	0.058	0.016	-0.012	-0.006
		(0.215)	(0.224)	(0.156)	(0.165)	(0.147)	(0.148)	(0.103)	(0.127)
R-squared/Observations		0.51	0.56	0.48	0.53	0.41	0.47	950	851
Avg. number of 10-18-yo kids, 38- to 47-yo in 2010	0.73								
I[X > 0]		-0.038	-0.032	-0.054	-0.037	-0.049	-0.030	-0.026	-0.027
		(0.040)	(0.039)	(0.034)	(0.032)	(0.030)	(0.028)	(0.022)	(0.023)
R-squared/Observations		0.56	0.68	0.50	0.63	0.47	0.59	695	773
Avg. age of 10-18-yo kids, 38- to 47-yo in 2010	14.4								
I[X > 0]		0.035	0.020	0.038	0.034	0.023	0.012	0.006	-0.007
		(0.102)	(0.100)	(0.071)	(0.071)	(0.061)	(0.061)	(0.033)	(0.050)
R-squared/Observations		0.23	0.25	0.20	0.22	0.17	0.21	1313	873
Observations		202	199	297	294	391	387		

Notes: Authors' calculations based on the 2010 census. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 19: Impacts on primary and middle school net enrollment rates in 2000

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
Net enrollment rate of 7- to 10-year-olds in 2000	0.94								
I[X > 0]		0.009	-0.000	0.012	0.006	0.008	0.002	0.001	0.004
		(0.014)	(0.011)	(0.010)	(0.009)	(0.008)	(0.007)	(0.006)	(0.008)
R-squared/Observations		0.71	0.80	0.65	0.74	0.64	0.71	840	683
Net enrollment rate of 11- to 14-year-olds in 2000	0.92								
I[X > 0]		-0.010	-0.016	0.002	-0.005	0.004	-0.002	-0.004	-0.004
		(0.012)	(0.010)	(0.010)	(0.009)	(0.007)	(0.007)	(0.005)	(0.006)
R-squared/Observations		0.54	0.62	0.41	0.50	0.37	0.45	1093	983
Net enrollment rate of 7- to 10-year-olds in 2000 (public)	0.90								
I[X > 0]		-0.009	-0.018	-0.007	-0.007	-0.012	-0.011	-0.005	-0.006
		(0.018)	(0.016)	(0.014)	(0.013)	(0.012)	(0.011)	(0.007)	(0.011)
R-squared/Observations		0.56	0.64	0.51	0.57	0.47	0.54	1061	726
Net enrollment rate of 11- to 14-year-olds in 2000 (public)	0.89								
I[X > 0]		-0.027*	-0.034**	-0.010	-0.012	-0.010	-0.009	-0.007	-0.007
		(0.016)	(0.014)	(0.013)	(0.012)	(0.010)	(0.010)	(0.006)	(0.009)
R-squared/Observations		0.36	0.44	0.28	0.33	0.25	0.30	1286	828
Observations		202	199	297	294	391	387		

Notes: Authors' calculations of net enrollment rates are based on the 2000 census. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 20: Impacts on mayor election win margin, 1996, 2000, 2004 and 2008

Neighborhood (percent):		2	2	3	3	4	4	IK	CCT
Pretreatment covariates:		N	Y	N	Y	N	Y	Y	Y
	Comparison mean:								
Mayor election win margin 1996	0.17								
I[X > 0]		0.005	-0.011	-0.035	-0.045	-0.049	-0.060*	-0.023	-0.031
		(0.052)	(0.056)	(0.038)	(0.038)	(0.034)	(0.034)	(0.021)	(0.032)
R-squared/Observations		0.16	0.23	0.11	0.17	0.10	0.13	1114	675
Mayor election win margin 2000	0.19								
I[X > 0]		-0.003	-0.000	-0.043	-0.044	-0.055	-0.057	-0.034	-0.051
		(0.056)	(0.057)	(0.041)	(0.041)	(0.038)	(0.038)	(0.023)	(0.032)
R-squared/Observations		0.13	0.19	0.12	0.17	0.10	0.14	1174	853
Mayor election win margin 2004	0.14								
I[X > 0]		0.092*	0.085	0.013	0.013	0.011	0.013	0.014	0.008
		(0.053)	(0.053)	(0.045)	(0.045)	(0.040)	(0.041)	(0.025)	(0.031)
R-squared/Observations		0.12	0.16	0.07	0.11	0.06	0.09	895	804
Mayor election win margin 2008	0.18								
I[X > 0]		-0.010	-0.016	0.003	-0.001	-0.017	-0.011	0.002	-0.015
		(0.061)	(0.062)	(0.047)	(0.050)	(0.041)	(0.042)	(0.027)	(0.037)
R-squared/Observations		0.12	0.15	0.12	0.14	0.08	0.09	1085	713
Observations		202	199	297	294	391	387		

Notes: Authors' calculations of mayor election win margins (winner vote share – runner-up vote share) are based on data from the federal electoral court. All specifications pool across the first three cutoffs and include state fixed effects and segment dummies. Columns 1 through 6 are OLS local linear discontinuity estimates with robust standard errors in parentheses. OLS specifications allow for differential slopes by segment and on each side of the cutoff. Columns 7 and 8 give estimates and standard errors based on Imbens-Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT) optimal bandwidths. Neighborhood (percent) is percent distance from respective cutoff. Pretreatment covariates (1980 census) include county income per capita, average years of schooling for individuals 25 years and older, poverty headcount ratio, illiterate percentage of people over 14 years old, infant mortality, enrollment of 7- to 14-year-olds and percent of population living in urban areas. (***, **, and *) denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.