

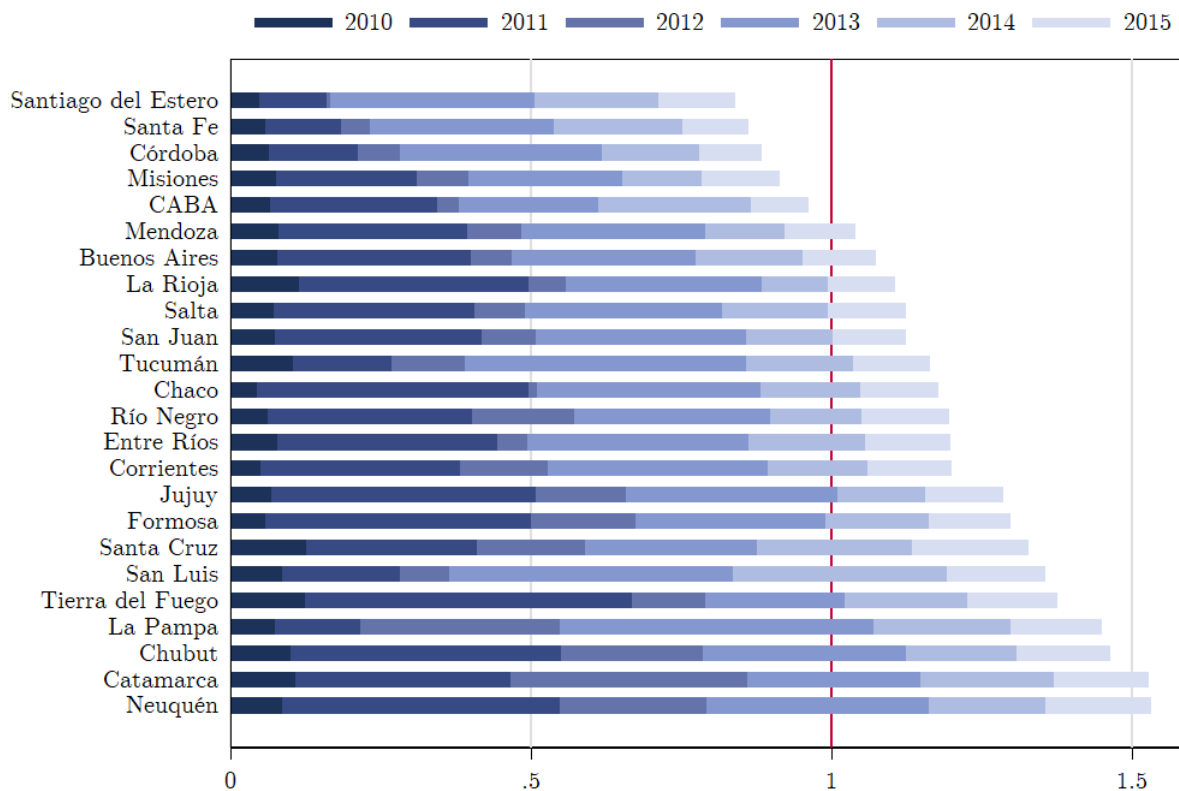
# Technology and Academic Achievement: Who Benefits?

## Evidence From Argentina

### Appendix

May 22, 2019

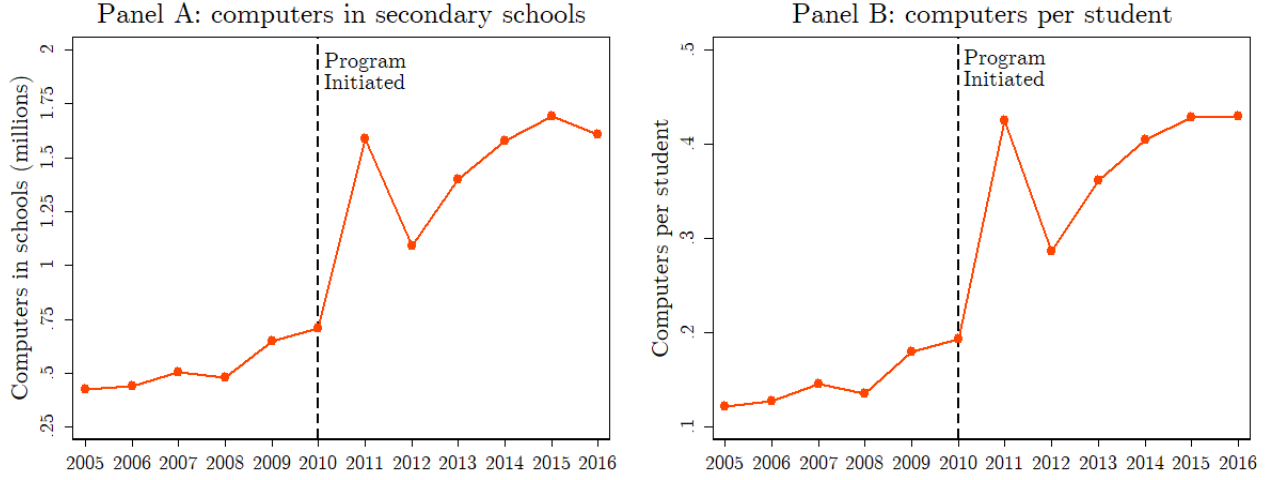
**Figure A1:** Laptops deployed as a share of secondary-school-aged population, cross-validation



*Notes:* This figure shows the rollout of the program Conectar Igualdad in Argentina at the annual level between 2010 and 2015, by province. The x-axis measures the total number of laptops that were deployed by the government each year, as a share of 2010's secondary-school-aged population (12–18 years old). The data on computers are based on official reports; they include laptops that were intended to to other groups as well as secondary-school students.

*Source:* Instituto Nacional de Previsión Social 2010–2015; Census of Population 2010.

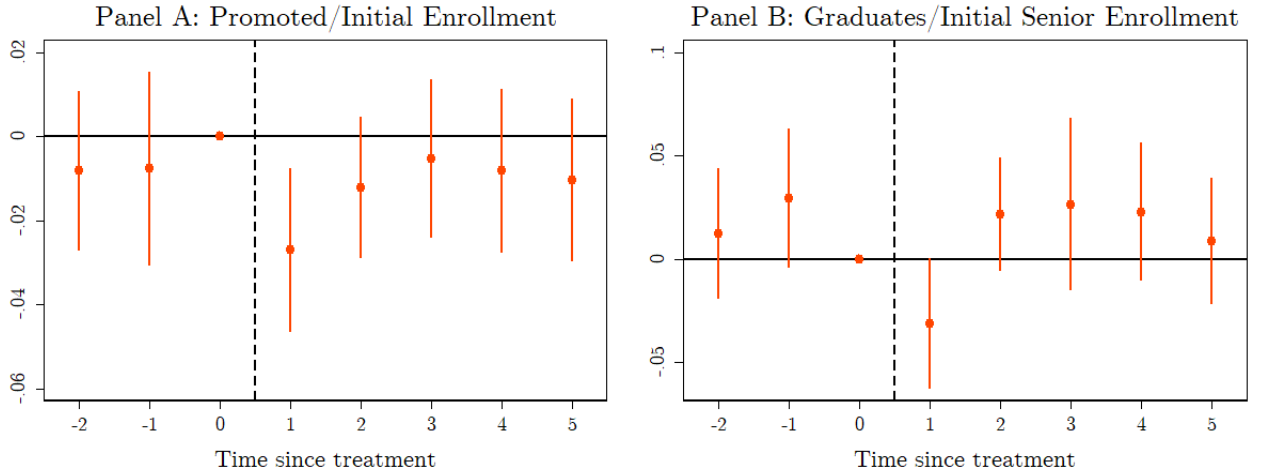
**Figure A2:** Number and share of computers in secondary schools



*Notes:* Panel A shows the number of computers (in millions) available in secondary schools of Argentina, before and after the start of the laptop program Conectar Igualdad. Panel B shows the share of computers per student enrolled in secondary schools in Argentina, before and after the start of the laptop program Conectar Igualdad.

*Source:* Relevamiento Anual 2005–2016, DiNIEE, Ministerio de Educación –Argentina.

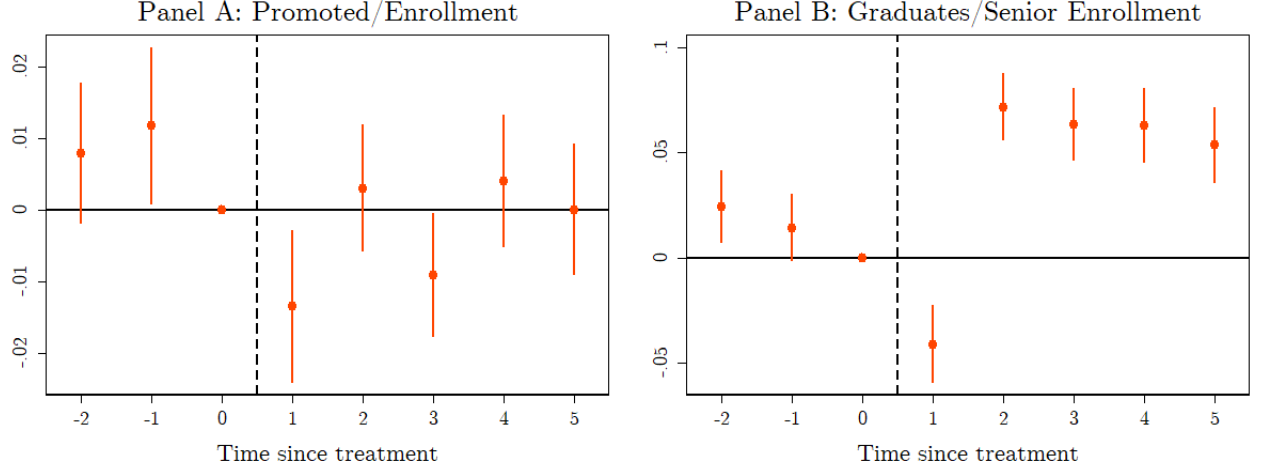
**Figure A3:** Relative effect of the laptop program on public school performance, all secondary schools 2008–2015



*Notes:* This figure plots the estimates of  $\delta_t$  (annual treatment effects in public relative to private school outcomes) for each year resulting from estimating equation 2 on a district-by-sector-by-year sample between 2008 and 2015. The x-axis (time since treatment) corresponds to the number of years since the start of the program, in 2010. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Panel A focuses on the share of promoted students in secondary schools; Panel B focuses on the share of students who graduate from secondary schools. Vertical lines show 95% confidence intervals based on district-clustered standard errors.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina.

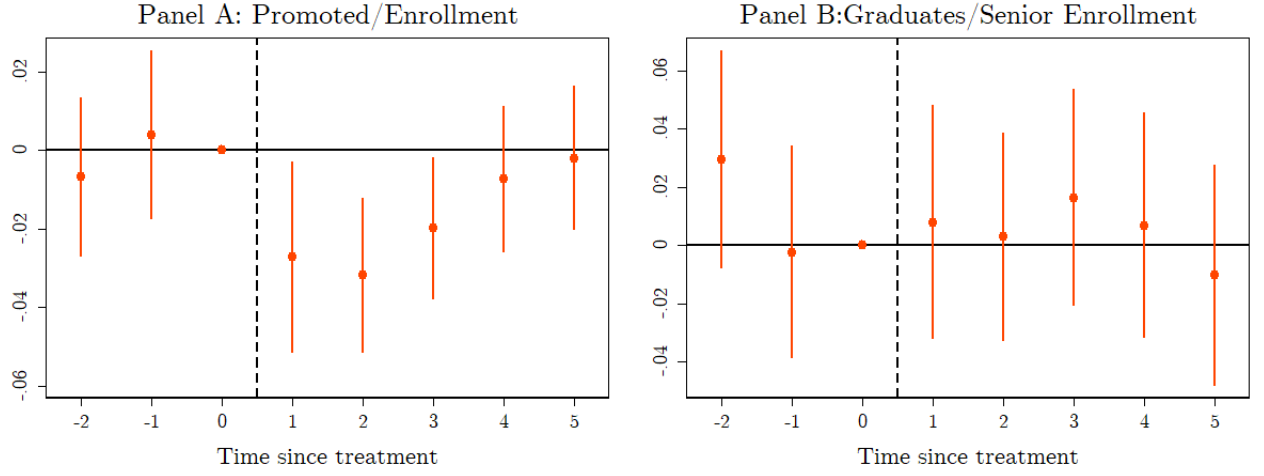
**Figure A4:** Relative effect of the laptop program on secondary school performance  
All primary and secondary schools 2008–2015



*Notes:* This figure plots the estimates of  $\delta_t$  (annual treatment effects in secondary relative to primary school outcomes) for each year resulting from estimating equation 3 on a district-by-level-by-year sample between 2008 and 2015. The x-axis (time since treatment) corresponds to the number of years since the start of the program, in 2010. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Panel A focuses on the share of promoted students in primary and secondary schools; Panel B focuses on the share of students who graduate from primary and secondary schools. Vertical lines show 95% confidence intervals based on district-clustered standard errors.

*Source:* Ministry of Education of Argentina 2008–2015.

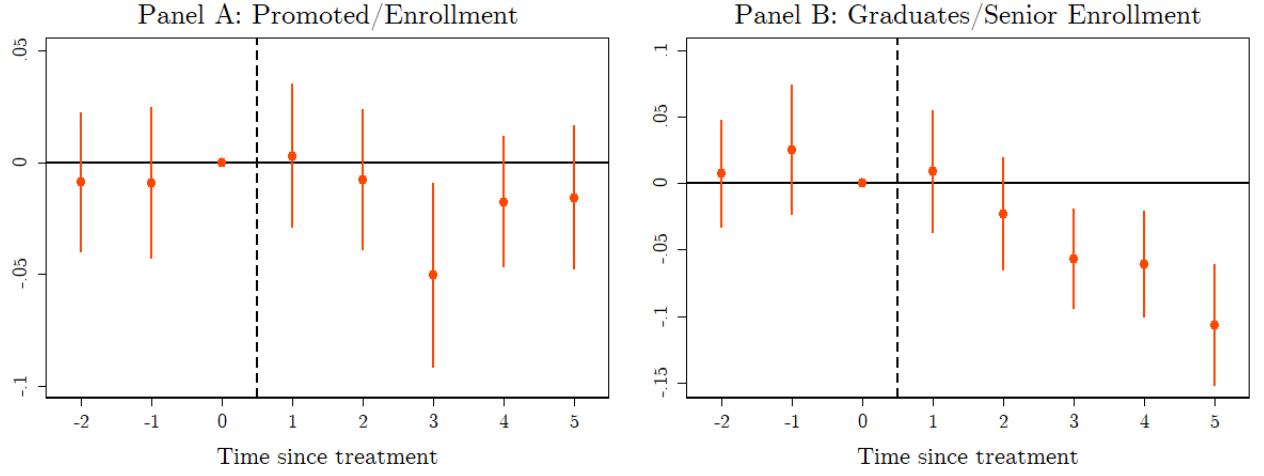
**Figure A5:** Relative effect of the laptop program on districts with high household computer access rates at baseline, all public secondary schools 2008–2015



*Notes:* This figure plots the estimates of  $\delta_t$  (relative annual treatment effects on high technology districts) for each year resulting from estimating equation 7 on a district-by-year sample between 2008 and 2015. The x-axis (time since treatment) corresponds to the number of years since the start of the program, in 2010. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Panel A focuses on the share of promoted students in public secondary schools; Panel B focuses on the share of students who graduate from public secondary schools. Household computer access rates in district is based on the Census of Population of 2001. Vertical lines show 95% confidence intervals based on robust standard errors.

*Source:* Ministry of Education of Argentina 2008–2015.

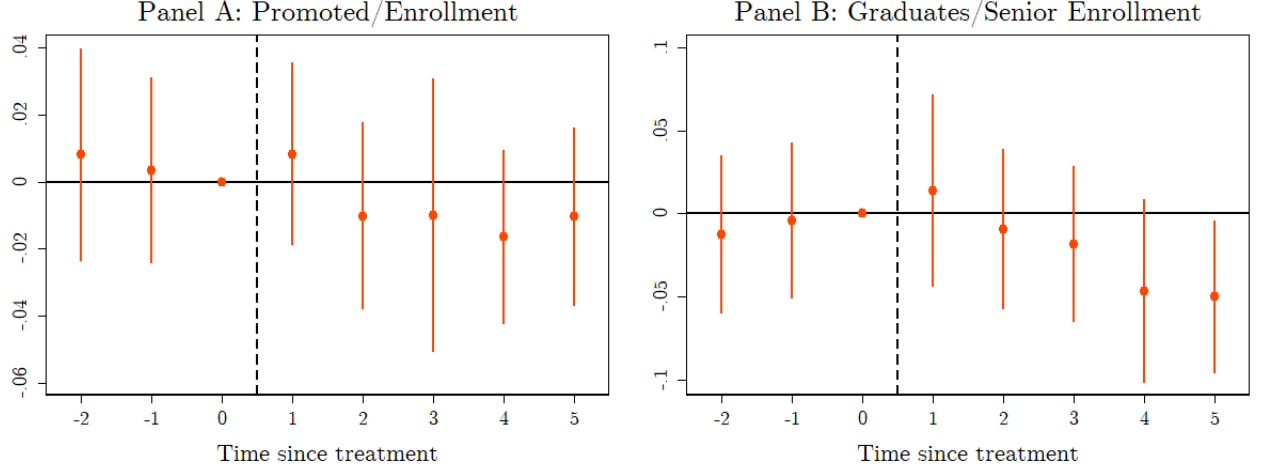
**Figure A6:** Relative effect of the laptop program on districts with high rate of computer labs in schools at baseline, all public secondary schools 2008–2015



*Notes:* This figure plots the estimates of  $\delta_t$  (relative annual treatment effects on high technology districts) for each year resulting from estimating equation 8 on a district-by-year sample between 2008 and 2015. The x-axis (time since treatment) corresponds to the number of years since the start of the program, in 2010. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Panel A focuses on the share of promoted students in public secondary schools; Panel B focuses on the share of students who graduate from public secondary schools. The rate of schools with computer labs in district is measured in 2008. Vertical lines show 95% confidence intervals based on robust standard errors.

*Source:* Ministry of Education of Argentina 2008–2015.

**Figure A7:** Relative effect of the laptop program on districts with high rate of internet-aided instruction at baseline, all public secondary schools 2008–2015



*Notes:* This figure plots the estimates of  $\delta_t$  (relative annual treatment effects on high technology districts) for each year resulting from estimating equation 9 on a district-by-year sample between 2008 and 2015. The x-axis (time since treatment) corresponds to the number of years since the start of the program, in 2010. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Panel A focuses on the share of promoted students in public secondary schools; Panel B focuses on the share of students who graduate from public secondary schools. The rate of schools with internet-aided instruction in district is measured in 2008. Vertical lines show 95% confidence intervals based on robust standard errors.

*Source:* Ministry of Education of Argentina 2008–2015.

**Table A1:** Effect of intervention on school performance using province-clustered SE  
—dynamic approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
<b>Panel A: All schools</b>	(1)	(2)	(3)	(4)	(5)	(6)
<u>A1. Treatment Effects</u>						
Year 1 After LP	0.233*** (0.0802)	0.249*** (0.0680)	-0.00173 (0.0117)	0.000579 (0.0112)	-0.0364** (0.0146)	-0.0382** (0.0153)
Year 2 After LP	0.227* (0.131)	0.244** (0.118)	0.0184** (0.00794)	0.0185** (0.00804)	0.0761*** (0.0163)	0.0741*** (0.0163)
Year 3 After LP	0.343** (0.163)	0.362** (0.149)	0.0333* (0.0170)	0.0300** (0.0118)	0.0900*** (0.0209)	0.0876*** (0.0203)
Year 4 After LP	0.388** (0.175)	0.408** (0.160)	0.0295*** (0.00517)	0.0210* (0.0110)	0.0780** (0.0315)	0.0735** (0.0327)
Year 5 After LP	0.432** (0.188)	0.453** (0.174)	0.0270*** (0.00496)	0.0182* (0.0103)	0.0715*** (0.0216)	0.0680** (0.0245)
<u>A2. Validity Check</u>						
Year 2 Before LP	-0.0495*** (0.0141)	-0.0534*** (0.0179)	0.00333 (0.00773)	0.00522 (0.0116)	0.00788 (0.00979)	0.000562 (0.00864)
Year 1 Before LP	-0.0214 (0.0125)	-0.0187 (0.0112)	0.00453 (0.00851)	0.00829 (0.00756)	-0.00418 (0.0116)	-0.00558 (0.0114)
Mean	0.408	0.408	0.783	0.783	0.701	0.701
Observations	4,208	4,208	4,208	4,208	4,200	4,200
Number of clusters	24	24	24	24	24	24
<b>Panel B: Public v.s Private</b>						
<u>B1. Treatment Effects</u>						
Year 1 After LP	0.287** (0.120)	0.312*** (0.0924)	-0.0261** (0.0125)	-0.0269** (0.0127)	-0.0283 (0.0207)	-0.0313 (0.0223)
Year 2 After LP	0.325*** (0.0911)	0.347*** (0.0680)	-0.00681 (0.00776)	-0.0121 (0.00948)	0.0262* (0.0140)	0.0216 (0.0177)
Year 3 After LP	0.499*** (0.155)	0.523*** (0.129)	-0.000739 (0.0101)	-0.00522 (0.00985)	0.0283 (0.0299)	0.0263 (0.0321)
Year 4 After LP	0.530*** (0.167)	0.555*** (0.139)	-0.00142 (0.00849)	-0.00812 (0.00765)	0.0287* (0.0150)	0.0228 (0.0157)
Year 5 After LP	0.573*** (0.184)	0.596*** (0.156)	-0.00334 (0.00966)	-0.0104 (0.00905)	0.0137 (0.0131)	0.00849 (0.0129)
<u>B2. Validity Check</u>						
Year 2 Before LP	0.0273 (0.0257)	0.0377 (0.0263)	-0.0104 (0.00883)	-0.00811 (0.00830)	0.0104 (0.0164)	0.0122 (0.0165)
Year 1 Before LP	-0.00848 (0.0132)	-0.00312 (0.0178)	-0.00922 (0.0113)	-0.00759 (0.0110)	0.0288 (0.0225)	0.0293 (0.0227)
Mean	0.284	0.284	0.806	0.806	0.654	0.654
Observations	4992	4992	4992	4992	3128	3128
Number of clusters	24	24	24	24	23	23
District FE	✓	✓	✓	✓	✓	✓
Trends by District	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\delta_t$  for each year resulting from estimating equations 1, 2, and 3 respectively between 2008 and 2015. Panel A estimates equation 1 on a district-by-year sample of secondary schools. Panel B estimates equation 2 on a district-by-sector-by-year sample of public and private secondary schools. Panel C estimates equation 3 on a district-by-level-by-year sample of primary and secondary schools. Controls include district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Province-clustered standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 1** (Continued): Effect of intervention on school performance using  
province-clustered SE —dynamic approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel C: Secondary v. Primary</b>						
<u>C1. Treatment Effects</u>						
Year 1 After LP	0.186*** (0.0642)	0.213*** (0.0626)	-0.0102 (0.0135)	-0.0135 (0.00981)	-0.0479** (0.0188)	-0.0411** (0.0156)
Year 2 After LP	0.141* (0.0754)	0.170** (0.0695)	-0.00195 (0.00621)	0.00307 (0.00615)	0.0680*** (0.0118)	0.0717*** (0.00876)
Year 3 After LP	0.247** (0.107)	0.257** (0.0989)	-0.0130** (0.00520)	-0.00906* (0.00526)	0.0709*** (0.0184)	0.0632*** (0.0174)
Year 4 After LP	0.280** (0.124)	0.283** (0.114)	-0.00300 (0.00609)	0.00406 (0.00633)	0.0684** (0.0313)	0.0629** (0.0286)
Year 5 After LP	0.286* (0.139)	0.268** (0.126)	-0.00536 (0.00548)	0.0000977 (0.00621)	0.0658*** (0.0217)	0.0536** (0.0216)
<u>C2. Validity Check</u>						
Year 2 Before LP	-0.00129 (0.00312)	-0.00646 (0.0131)	0.0140** (0.00655)	0.00790 (0.00613)	0.0212** (0.00766)	0.0244*** (0.00849)
Year 1 Before LP	-0.00176 (0.00363)	0.00266 (0.00470)	0.00893 (0.00816)	0.0118* (0.00637)	0.0153 (0.00952)	0.0143 (0.0118)
Mean	0.301	0.271	0.865	0.861	0.841	0.828
Observations	8112	6080	8112	6080	7032	5552
Number of clusters	24	24	24	24	24	24
District FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\delta_t$  for each year resulting from estimating equations 1, 2, and 3 respectively between 2008 and 2015. Panel A estimates equation 1 on a district-by-year sample of secondary schools. Panel B estimates equation 2 on a district-by-sector-by-year sample of public and private secondary schools. Panel C estimates equation 3 on a district-by-level-by-year sample of primary and secondary schools. Controls include district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Province-clustered standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



**Table A2:** Effect of intervention on school performance in province of Buenos Aires  
—dynamic approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel A: All schools</b>						
<u>A1. Treatment Effects</u>						
Year 1 After LP	-0.00296 (0.00661)	-0.00472 (0.00712)	-0.0229*** (0.00716)	-0.0137* (0.00819)	-0.0506*** (0.0158)	-0.0549*** (0.0175)
Year 2 After LP	-0.191*** (0.00559)	-0.193*** (0.00619)	0.000597 (0.00735)	0.00837 (0.00836)	0.0730*** (0.0155)	0.0686*** (0.0180)
Year 3 After LP	-0.191*** (0.00559)	-0.191*** (0.00623)	0.00869 (0.00655)	0.0172** (0.00743)	0.0942*** (0.0149)	0.0936*** (0.0171)
Year 4 After LP	-0.191*** (0.00557)	-0.191*** (0.00621)	0.0303*** (0.00761)	0.0379*** (0.00781)	0.117*** (0.0154)	0.115*** (0.0179)
Year 5 After LP	-0.191*** (0.00557)	-0.191*** (0.00619)	0.0247*** (0.00694)	0.0328*** (0.00816)	0.0904*** (0.0155)	0.0901*** (0.0183)
<u>A2. Validity Check</u>						
Year 2 Before LP	-0.0558*** (0.00607)	-0.0672*** (0.00735)	0.0115 (0.00708)	0.0242* (0.0130)	-0.00116 (0.0158)	0.00176 (0.0225)
Year 1 Before LP	-0.0616*** (0.00521)	-0.0632*** (0.00529)	0.00409 (0.00946)	0.00629 (0.00931)	-0.0243 (0.0162)	-0.0235 (0.0159)
Mean	0.0808	0.0808	0.769	0.769	0.732	0.732
Observations	1080	1080	1080	1080	1080	1080
Number of districts	135	135	135	135	135	135
<b>Panel B: Public v. Private</b>						
<u>B1. Treatment Effects</u>						
Year 1 After LP	0.00553* (0.00318)	0.0116 (0.0115)	-0.0352** (0.0177)	-0.0345 (0.0268)	-0.0406 (0.0290)	-0.0189 (0.0337)
Year 2 After LP	0.110*** (0.0151)	0.108*** (0.0213)	-0.0156 (0.0160)	-0.0293 (0.0289)	0.00725 (0.0253)	0.0163 (0.0322)
Year 3 After LP	0.110*** (0.0151)	0.111*** (0.0204)	0.00340 (0.0149)	-0.00269 (0.0278)	-0.0286 (0.0466)	-0.0147 (0.0500)
Year 4 After LP	0.110*** (0.0151)	0.109*** (0.0208)	0.0101 (0.0166)	-0.00521 (0.0296)	0.0227 (0.0322)	0.0322 (0.0359)
Year 5 After LP	0.110*** (0.0151)	0.108*** (0.0205)	0.00605 (0.0161)	-0.0109 (0.0285)	0.0256 (0.0319)	0.0341 (0.0361)
<u>B2. Validity Check</u>						
Year 2 Before LP	0.0111 (0.00716)	0.00944 (0.00740)	-0.0122 (0.0238)	-0.00191 (0.0204)	-0.0164 (0.0292)	-0.0181 (0.0296)
Year 1 Before LP	0.0137 (0.00876)	0.0155* (0.00833)	-0.0199 (0.0306)	-0.0144 (0.0278)	0.00681 (0.0353)	0.00667 (0.0352)
Mean	0.0887	0.0887	0.802	0.802	0.698	0.698
Observations	1664	1664	1664	1664	1144	1144
Number of districts	104	104	104	104	102	102
District FE	✓	✓	✓	✓	✓	✓
Trends by District	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\delta_t$  for each year resulting from estimating equations 1, 2, and 3 respectively in the province of Buenos Aires between 2008 and 2015. Panel A estimates equation 1 on a district-by-year sample of secondary schools. Panel B estimates equation 2 on a district-by-sector-by-year sample of public and private secondary schools. Panel C estimates equation 3 on a district-by-level-by-year sample of primary and secondary schools. Controls include district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Robust (Panel A) and district-clustered (Panels B and C) standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 2** (Continued): Effect of intervention on school performance in province of Buenos Aires —dynamic approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel C: Secondary v. Primary</b>						
<u>C1. Treatment Effects</u>						
Year 1 After LP	-0.00248* (0.00139)	-0.000955 (0.00460)	-0.0401*** (0.0116)	-0.0346*** (0.0129)	-0.0161 (0.0154)	-0.00751 (0.0161)
Year 2 After LP	-0.0767*** (0.00959)	-0.0747*** (0.0120)	-0.0101 (0.00856)	-0.00513 (0.0101)	0.0818*** (0.0148)	0.0839*** (0.0163)
Year 3 After LP	-0.0800*** (0.0103)	-0.0762*** (0.0129)	-0.0135 (0.00820)	-0.00743 (0.00942)	0.101*** (0.0144)	0.101*** (0.0155)
Year 4 After LP	-0.106*** (0.00962)	-0.102*** (0.0124)	0.00955 (0.00910)	0.0176* (0.00988)	0.119*** (0.0142)	0.125*** (0.0147)
Year 5 After LP	-0.160*** (0.0103)	-0.152*** (0.0125)	0.00461 (0.00820)	0.0123 (0.00946)	0.0936*** (0.0143)	0.0967*** (0.0149)
<u>C2. Validity Check</u>						
Year 2 Before LP	-0.00940*** (0.00249)	-0.00245 (0.0123)	0.0131 (0.00942)	0.0171 (0.0154)	0.0281** (0.0136)	0.00581 (0.0263)
Year 1 Before LP	-0.0130*** (0.00232)	-0.00977*** (0.00320)	-0.00400 (0.0121)	0.00985 (0.0104)	-0.00514 (0.0172)	-0.00759 (0.0165)
Mean	0.0900	0.0895	0.870	0.868	0.856	0.851
Observations	2144	1928	2144	1928	2072	1888
Number of districts	134	122	134	122	134	122
District FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\delta_t$  for each year resulting from estimating equations 1, 2, and 3 respectively in the province of Buenos Aires between 2008 and 2015. Panel A estimates equation 1 on a district-by-year sample of secondary schools. Panel B estimates equation 2 on a district-by-sector-by-year sample of public and private secondary schools. Panel C estimates equation 3 on a district-by-level-by-year sample of primary and secondary schools. Controls include district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Robust (Panel A) and district-clustered (Panels B and C) standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A3:** Effect of intervention on school performance controlling for economic activity —dynamic approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
<b>Panel A: All schools</b>	(1)	(2)	(3)	(4)	(5)	(6)
<u>A1. Treatment Effects</u>						
Year 1 After LP	0.233*** (0.0215)	0.254*** (0.0220)	-0.00173 (0.00624)	0.000567 (0.00634)	-0.0364*** (0.00972)	-0.0406*** (0.0100)
Year 2 After LP	0.227*** (0.0207)	0.250*** (0.0216)	0.0184*** (0.00565)	0.0184*** (0.00580)	0.0761*** (0.00995)	0.0713*** (0.0105)
Year 3 After LP	0.343*** (0.0200)	0.370*** (0.0215)	0.0333** (0.0140)	0.0300*** (0.0108)	0.0900*** (0.0156)	0.0839*** (0.0140)
Year 4 After LP	0.388*** (0.0195)	0.415*** (0.0216)	0.0295*** (0.00488)	0.0210** (0.00839)	0.0780*** (0.00997)	0.0697*** (0.0125)
Year 5 After LP	0.432*** (0.0212)	0.468*** (0.0247)	0.0270*** (0.00481)	0.0182** (0.00788)	0.0715*** (0.00948)	0.0607*** (0.0119)
<u>A2. Validity Check</u>						
Year 2 Before LP	-0.0495*** (0.0181)	-0.0556*** (0.0207)	0.00333 (0.00523)	0.00522 (0.00605)	0.00788 (0.00896)	0.00170 (0.0108)
Year 1 Before LP	-0.0214 (0.0176)	-0.0264 (0.0180)	0.00453 (0.00563)	0.00831 (0.00594)	-0.00418 (0.00945)	-0.00162 (0.00996)
Mean	0.408	0.408	0.783	0.783	0.701	0.701
Observations	4208	4208	4208	4208	4200	4200
Number of districts	526	526	526	526	525	525
<b>Panel B: Public v. Private</b>						
<u>B1. Treatment Effects</u>						
Year 1 After LP	0.287*** (0.0266)	0.311*** (0.0258)	-0.0261*** (0.00926)	-0.0269*** (0.00989)	-0.0283* (0.0158)	-0.0314* (0.0162)
Year 2 After LP	0.325*** (0.0314)	0.347*** (0.0322)	-0.00681 (0.00775)	-0.0121 (0.00852)	0.0262* (0.0133)	0.0211 (0.0139)
Year 3 After LP	0.499*** (0.0311)	0.523*** (0.0298)	-0.000739 (0.00856)	-0.00522 (0.00963)	0.0283 (0.0208)	0.0251 (0.0211)
Year 4 After LP	0.530*** (0.0313)	0.555*** (0.0298)	-0.00142 (0.00854)	-0.00814 (0.00995)	0.0287* (0.0168)	0.0213 (0.0169)
Year 5 After LP	0.573*** (0.0339)	0.596*** (0.0321)	-0.00334 (0.00848)	-0.0104 (0.00989)	0.0137 (0.0153)	0.00788 (0.0155)
<u>B2. Validity Check</u>						
Year 2 Before LP	0.0273*** (0.00955)	0.0381*** (0.0112)	-0.0104 (0.00997)	-0.00807 (0.00965)	0.0104 (0.0158)	0.0114 (0.0162)
Year 1 Before LP	-0.00848 (0.00515)	-0.00304 (0.00699)	-0.00922 (0.0123)	-0.00758 (0.0117)	0.0288* (0.0170)	0.0286* (0.0172)
Mean	0.284	0.284	0.806	0.806	0.654	0.654
Observations	4992	4992	4992	4992	3128	3128
Number of districts	312	312	312	312	280	280
District FE	✓	✓	✓	✓	✓	✓
Trends by District	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\delta_t$  for each year resulting from estimating equations 1, 2, and 3 respectively in between 2008 and 2015. Panel A estimates equation 1 on a district-by-year sample of secondary schools. Panel B estimates equation 2 on a district-by-sector-by-year sample of public and private secondary schools. Panel C estimates equation 3 on a district-by-level-by-year sample of primary and secondary schools. Controls include province-by-year unemployment rates, as well as district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Robust (Panel A) and district-clustered (Panels B and C) standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Encuesta Permanente de Hogares 2008–2015.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 2** (Continued): Effect of intervention on school performance controlling for economic activity —dynamic approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel C: Secondary v. Primary</b>						
<u>C1. Treatment Effects</u>						
Year 1 After LP	0.186*** (0.0178)	0.213*** (0.0196)	-0.0102 (0.00739)	-0.0135** (0.00544)	-0.0479*** (0.0104)	-0.0412*** (0.00939)
Year 2 After LP	0.141*** (0.0168)	0.171*** (0.0202)	-0.00195 (0.00480)	0.00304 (0.00451)	0.0680*** (0.00819)	0.0717*** (0.00814)
Year 3 After LP	0.247*** (0.0181)	0.258*** (0.0206)	-0.0130*** (0.00473)	-0.00908** (0.00440)	0.0709*** (0.00869)	0.0633*** (0.00879)
Year 4 After LP	0.280*** (0.0192)	0.283*** (0.0218)	-0.00300 (0.00477)	0.00405 (0.00470)	0.0684*** (0.00961)	0.0630*** (0.00897)
Year 5 After LP	0.286*** (0.0198)	0.268*** (0.0225)	-0.00536 (0.00448)	0.000101 (0.00468)	0.0658*** (0.00940)	0.0539*** (0.00919)
<u>C2. Validity Check</u>						
Year 2 Before LP	-0.00129 (0.00178)	-0.00639 (0.0110)	0.0140*** (0.00474)	0.00789 (0.00501)	0.0212*** (0.00759)	0.0241*** (0.00885)
Year 1 Before LP	-0.00176 (0.00123)	0.00308 (0.00371)	0.00893 (0.00615)	0.0118** (0.00557)	0.0153* (0.00798)	0.0144* (0.00825)
Mean	0.301	0.271	0.865	0.861	0.841	0.828
Observations	8112	6080	8112	6080	7032	5552
Number of districts	507	406	507	406	507	383
District FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\delta_t$  for each year resulting from estimating equations 1, 2, and 3 respectively between 2008 and 2015. Panel A estimates equation 1 on a district-by-year sample of secondary schools. Panel B estimates equation 2 on a district-by-sector-by-year sample of public and private secondary schools. Panel C estimates equation 3 on a district-by-level-by-year sample of primary and secondary schools. Controls include province-by-year unemployment rates, as well as district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Robust (Panel A) and district-clustered (Panels B and C) standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Encuesta Permanente de Hogares 2008–2015.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A4:** Effect of intervention on school performance using province-clustered SE  
—trend-break approach

	Computers/Initial Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<u>A. All</u>						
Treatment Effect	0.145** (0.0669)	0.151** (0.0652)	-0.00305 (0.0149)	0.00484 (0.0172)	-0.0153 (0.0122)	-0.00945 (0.0136)
Treatment Effect w/o 2011	0.127 (0.122)	0.130 (0.120)	0.0195 (0.0162)	0.0255 (0.0194)	0.0911*** (0.0215)	0.0955*** (0.0215)
Mean	0.408	0.408	0.783	0.783	0.701	0.701
Observations	4208	4208	4208	4208	4200	4200
Number of Districts	24	24	24	24	24	24
<u>B. Public vs. Private</u>						
Treatment Effect	0.187** (0.0864)	0.193** (0.0842)	-0.0216* (0.0117)	-0.0198* (0.0115)	-0.0248 (0.0188)	-0.0182 (0.0164)
Treatment Effect w/o 2011	0.245*** (0.0730)	0.234*** (0.0738)	-0.00634 (0.0120)	-0.00782 (0.0133)	0.0298 (0.0347)	0.0374 (0.0337)
Mean	0.284	0.284	0.806	0.806	0.654	0.654
Observations	4992	4992	4992	4992	3128	3128
Number of Districts	24	24	24	24	23	23
<u>C. Secondary vs. Primary</u>						
Treatment Effect	0.116** (0.0424)	0.164*** (0.0575)	-0.0126 (0.0147)	-0.0170 (0.0114)	-0.0361** (0.0170)	-0.0136 (0.0166)
Treatment Effect w/o 2011	0.0886 (0.0576)	0.120* (0.0639)	-0.00437 (0.00878)	-0.00454 (0.0119)	0.0726*** (0.0167)	0.0898*** (0.0142)
Mean	0.301	0.252	0.865	0.862	0.841	0.819
Observations	8112	5184	8112	5184	7032	5184
Number of Districts	24	23	24	23	24	23
District FE	✓	✓	✓	✓	✓	✓
Trends by District	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\beta$  resulting from estimating equations 4, 5, and 6 respectively between 2008 and 2015. Panel A estimates equation 4 on a district-by-year sample of secondary schools. Panel B estimates equation 5 on a district-by-sector-by-year sample of public and private secondary schools. Panel C estimates equation 6 on a district-by-level-by-year sample of primary and secondary schools. Controls include district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Province-clustered standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A5:** Effect of intervention on school performance in province of Buenos Aires  
—trend-break approach

	Computers/Initial Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<u>A. All</u>						
Treatment Effect	-0.00738 (0.0113)	-0.00899 (0.0127)	-0.0348*** (0.00730)	-0.0302*** (0.00949)	-0.0358** (0.0153)	-0.0387** (0.0195)
Treatment Effect w/o 2011	-0.187*** (0.00650)	-0.186*** (0.00703)	-0.0119 (0.01000)	-0.00639 (0.0127)	0.00634*** (0.00180)	0.0717*** (0.0235)
Mean	0.0808	0.0808	0.769	0.769	0.732	0.732
Observations	1080	1080	1080	1080	1080	1080
Number of Districts	135	135	135	135	135	135
<u>B. Public vs. Private</u>						
Treatment Effect	0.0150 (0.0199)	0.0144 (0.0252)	-0.0357** (0.0162)	-0.00798 (0.0375)	-0.0542* (0.0321)	-0.0163 (0.0437)
Treatment Effect w/o 2011	0.109*** (0.0120)	0.0955*** (0.0156)	-0.0192 (0.0216)	0.00184 (0.0515)	-0.0348 (0.0409)	-0.0231 (0.0537)
Mean	0.0887	0.0887	0.802	0.802	0.698	0.698
Observations	1664	1664	1664	1664	1144	1144
Number of Districts	104	104	104	104	102	102
<u>C. Secondary vs. Primary</u>						
Treatment Effect	0.0340** (0.0146)	0.0380** (0.0165)	-0.0450*** (0.00995)	-0.0469*** (0.0102)	-0.00803 (0.0157)	0.00433 (0.0190)
Treatment Effect w/o 2011	-0.0157 (0.0101)	-0.0109 (0.0107)	-0.0186* (0.0113)	-0.0280** (0.0134)	0.0919*** (0.0181)	0.0847*** (0.0245)
Mean	0.0900	0.0898	0.870	0.867	0.856	0.849
Observations	2144	1848	2144	1848	2072	1848
Number of Districts	134	117	134	117	134	117
District FE	✓	✓	✓	✓	✓	✓
Trends by District	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\beta$  resulting from estimating equations 4, 5, and 6 respectively in the province of Buenos Aires between 2008 and 2015. Panel A estimates equation 4 on a district-by-year sample of secondary schools. Panel B estimates equation 5 on a district-by-sector-by-year sample of public and private secondary schools. Panel C estimates equation 6 on a district-by-level-by-year sample of primary and secondary schools. Controls include district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Robust standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A6:** Effect of intervention on school performance controlling for economic activity —trend-break approach

	Computers/Initial Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<u>A. All</u>						
Treatment Effect	0.145*** (0.0192)	0.159*** (0.0218)	-0.00305 (0.00640)	0.00876 (0.00733)	-0.0153 (0.00981)	0.000604 (0.0125)
Treatment Effect w/o 2011	0.127*** (0.0244)	0.135*** (0.0256)	0.0195* (0.0104)	0.0247** (0.00979)	0.0911*** (0.0145)	0.0859*** (0.0152)
Mean	0.408	0.408	0.783	0.783	0.701	0.701
Observations	4208	4208	4208	4208	4200	4200
Number of Districts	526	526	526	526	525	525
<u>B. Public vs. Private</u>						
Treatment Effect	0.187*** (0.0295)	0.193*** (0.0327)	-0.0216** (0.00850)	-0.0198** (0.00816)	-0.0248 (0.0169)	-0.0179 (0.0169)
Treatment Effect w/o 2011	0.245*** (0.0409)	0.233*** (0.0457)	-0.00634 (0.0107)	-0.00802 (0.0111)	0.0298 (0.0198)	0.0370* (0.0200)
Mean	0.284	0.284	0.806	0.806	0.654	0.654
Observations	4992	4992	4992	4992	3128	3128
Number of Districts	312	312	312	312	280	280
<u>C. Secondary vs. Primary</u>						
Treatment Effect	0.116*** (0.0232)	0.163*** (0.0227)	-0.0126** (0.00591)	-0.0169*** (0.00436)	-0.0361*** (0.00971)	-0.0137 (0.00899)
Treatment Effect w/o 2011	0.0886*** (0.0300)	0.121*** (0.0288)	-0.00437 (0.00594)	-0.00453 (0.00573)	0.0726*** (0.0103)	0.0897*** (0.0101)
Mean	0.301	0.252	0.865	0.862	0.841	0.819
Observations	8112	5184	8112	5184	7032	5184
Number of Districts	507	337	507	337	507	337
District FE	✓	✓	✓	✓	✓	✓
Trends by District	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\beta$  resulting from estimating equations 4, 5, and 6 respectively between 2008 and 2015. Panel A estimates equation 4 on a district-by-year sample of secondary schools. Panel B estimates equation 5 on a district-by-sector-by-year sample of public and private secondary schools. Panel C estimates equation 6 on a district-by-level-by-year sample of primary and secondary schools. Controls include real GDP per capita at constant prices, as well as province-by-year unemployment rates and district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Robust standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Encuesta Permanente de Hogares 2008–2015.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A7:** Effect of intervention on school performance on districts with high technology at baseline using province-clustered SE —dynamic approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel A: Household computers</b>						
<u>A1. Complete sample</u>						
Year 1 After LP	-0.0526 (0.153)	-0.0408 (0.137)	-0.0289 (0.0251)	-0.0272 (0.0244)	0.00993 (0.0249)	0.00788 (0.0236)
Year 2 After LP	-0.319** (0.149)	-0.310** (0.133)	-0.0325** (0.0144)	-0.0318** (0.0139)	0.00488 (0.0190)	0.00286 (0.0200)
Year 3 After LP	-0.468** (0.192)	-0.460** (0.179)	-0.0231** (0.0105)	-0.0199* (0.0107)	0.0169 (0.0287)	0.0163 (0.0282)
Year 4 After LP	-0.493** (0.211)	-0.483** (0.196)	-0.0102 (0.0115)	-0.00734 (0.0128)	0.00745 (0.0451)	0.00678 (0.0463)
Year 5 After LP	-0.574** (0.222)	-0.565** (0.208)	-0.00605 (0.0105)	-0.00194 (0.0115)	-0.0111 (0.0351)	-0.0102 (0.0353)
<u>A2. Validity Check</u>						
Year 2 Before LP	0.00207 (0.0110)	0.00744 (0.0217)	-0.0114 (0.0152)	-0.00679 (0.0151)	0.0227* (0.0131)	0.0294* (0.0165)
Year 1 Before LP	-0.0197 (0.0130)	-0.0146 (0.0154)	0.00174 (0.0176)	0.00387 (0.0174)	-0.00236 (0.0177)	-0.00244 (0.0167)
Mean	0.428	0.428	0.757	0.757	0.635	0.635
Observations	3864	3864	3864	3864	2752	2752
Number of clusters	23	23	23	23	22	22
<b>Panel B: Computer Labs</b>						
<u>B1. Complete sample</u>						
Year 1 After LP	0.180 (0.107)	0.170 (0.104)	-0.0112 (0.0557)	0.00283 (0.0319)	0.00713 (0.0343)	0.00899 (0.0330)
Year 2 After LP	0.00267 (0.129)	-0.00870 (0.121)	-0.0239 (0.0416)	-0.00784 (0.0216)	-0.0262 (0.0242)	-0.0231 (0.0239)
Year 3 After LP	0.0399 (0.181)	0.0283 (0.178)	-0.0669 (0.0513)	-0.0505* (0.0258)	-0.0600** (0.0258)	-0.0570** (0.0242)
Year 4 After LP	0.0751 (0.171)	0.0608 (0.166)	-0.0418 (0.0453)	-0.0177 (0.0239)	-0.0636* (0.0326)	-0.0610* (0.0303)
Year 5 After LP	0.0895 (0.173)	0.0794 (0.169)	-0.0463 (0.0426)	-0.0158 (0.0257)	-0.110*** (0.0240)	-0.107*** (0.0221)
<u>B2. Validity Check</u>						
Year 2 Before LP	0.0303 (0.0217)	0.0539*** (0.0169)	-0.0376 (0.0485)	-0.00894 (0.0271)	0.0115 (0.0240)	0.00716 (0.0244)
Year 1 Before LP	0.00656 (0.0109)	0.0173 (0.0182)	-0.0456 (0.0513)	-0.00929 (0.0258)	0.0262 (0.0400)	0.0254 (0.0430)
Mean	0.446	0.446	0.767	0.767	0.631	0.631
Observations	3376	3376	3376	3376	2176	2176
Number of clusters	24	24	24	24	23	23
District FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\delta_t$  for each year resulting from estimating equations 7, 8, and 9 respectively on a district-by-year sample of secondary schools between 2008 and 2015. Controls include district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Province-clustered standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Census of Population 2001.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



**Table 4** (Continued): Effect of intervention on school performance on districts with high technology at baseline using province-clustered SE —dynamic approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel C: Internet-aided Instruction</b>						
<u>C1. Treatment Effects</u>						
Year 1 After LP	0.204 (0.134)	0.194 (0.131)	0.0239 (0.0153)	0.00821 (0.0209)	0.0125 (0.0363)	0.0138 (0.0371)
Year 2 After LP	0.316 (0.202)	0.310 (0.194)	0.00710 (0.0160)	-0.0103 (0.0198)	-0.00959 (0.0290)	-0.00913 (0.0314)
Year 3 After LP	0.350 (0.227)	0.340 (0.220)	-0.00256 (0.0286)	-0.0100 (0.0256)	-0.0200 (0.0259)	-0.0185 (0.0271)
Year 4 After LP	0.278 (0.190)	0.270 (0.180)	-0.00210 (0.0134)	-0.0165 (0.0148)	-0.0487** (0.0233)	-0.0467** (0.0220)
Year 5 After LP	0.295 (0.236)	0.292 (0.228)	0.00179 (0.0127)	-0.0104 (0.0147)	-0.0525** (0.0233)	-0.0502** (0.0235)
<u>C2. Validity Check</u>						
Year 2 Before LP	0.00958 (0.0172)	0.0153 (0.0216)	0.00794 (0.0291)	0.00803 (0.0281)	-0.0102 (0.0202)	-0.0125 (0.0204)
Year 1 Before LP	0.0150 (0.0149)	0.0188 (0.0150)	0.0000817 (0.0120)	0.00338 (0.0127)	-0.00476 (0.0357)	-0.00440 (0.0365)
Mean	0.442	0.442	0.763	0.763	0.631	0.631
Observations	4208	4208	4208	4208	2880	2880
Number of districts	24	24	24	24	23	23
District FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\delta_t$  for each year resulting from estimating equations 7, 8, and 9 respectively on a district-by-year sample of secondary schools between 2008 and 2015. Controls include district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Province-clustered standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Census of Population 2001.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A8:** Effect of intervention on school performance on districts with high technology at baseline in province of Buenos Aires —dynamic approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel A: Household computers</b>						
<u>A1. Complete sample</u>						
Year 1 After LP	0.00145 (0.0142)	0.000307 (0.0143)	0.00782 (0.0162)	0.00951 (0.0165)	0.0000300 (0.0335)	0.00504 (0.0336)
Year 2 After LP	0.0510*** (0.0121)	0.0498*** (0.0121)	-0.00616 (0.0177)	-0.00560 (0.0185)	0.0195 (0.0332)	0.0236 (0.0335)
Year 3 After LP	0.0504*** (0.0121)	0.0489*** (0.0121)	0.0101 (0.0154)	0.0100 (0.0160)	0.0225 (0.0317)	0.0260 (0.0322)
Year 4 After LP	0.0512*** (0.0121)	0.0485*** (0.0122)	-0.0132 (0.0190)	-0.0161 (0.0192)	-0.00344 (0.0345)	-0.00258 (0.0352)
Year 5 After LP	0.0511*** (0.0121)	0.0488*** (0.0121)	0.0311* (0.0177)	0.0265 (0.0180)	0.0289 (0.0333)	0.0282 (0.0343)
<u>A2. Validity Check</u>						
Year 2 Before LP	0.0258** (0.0129)	0.0250** (0.0127)	0.0241 (0.0180)	0.0291 (0.0179)	0.0124 (0.0361)	0.0159 (0.0362)
Year 1 Before LP	0.0271** (0.0113)	0.0266** (0.0112)	0.0634*** (0.0217)	0.0613*** (0.0215)	0.000254 (0.0375)	-0.000718 (0.0376)
Mean	0.0681	0.0681	0.731	0.731	0.684	0.684
Observations	1056	1056	1056	1056	976	976
Number of districts	132	132	132	132	122	122
<b>Panel B: Computer Labs</b>						
<u>B1. Complete sample</u>						
Year 1 After LP	0.00281 (0.0219)	0.00243 (0.0221)	0.00668 (0.0322)	0.00405 (0.0314)	0.132** (0.0570)	0.131** (0.0546)
Year 2 After LP	-0.103*** (0.0190)	-0.101*** (0.0190)	0.00244 (0.0291)	0.00441 (0.0273)	0.0619 (0.0774)	0.0680 (0.0724)
Year 3 After LP	-0.101*** (0.0184)	-0.103*** (0.0184)	0.00280 (0.0266)	-0.000352 (0.0271)	0.0523 (0.0536)	0.0557 (0.0502)
Year 4 After LP	-0.101*** (0.0185)	-0.103*** (0.0190)	-0.0256 (0.0242)	-0.0174 (0.0250)	0.0393 (0.0419)	0.0573 (0.0414)
Year 5 After LP	-0.101*** (0.0185)	-0.102*** (0.0192)	-0.0741 (0.0639)	-0.0643 (0.0662)	-0.0936 (0.0971)	-0.0761 (0.103)
<u>B2. Validity Check</u>						
Year 2 Before LP	-0.0442** (0.0207)	-0.0433** (0.0210)	-0.0117 (0.0436)	-0.00955 (0.0440)	0.101 (0.0734)	0.113 (0.0784)
Year 1 Before LP	-0.0455** (0.0203)	-0.0443** (0.0202)	-0.0606 (0.0485)	-0.0526 (0.0498)	0.227* (0.120)	0.241** (0.116)
Mean	0.0601	0.0601	0.730	0.730	0.677	0.677
Observations	864	864	864	864	776	776
Number of districts	108	108	108	108	97	97
District FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\delta_t$  for each year resulting from estimating equations 7, 8, and 9 respectively on a district-by-year sample of secondary schools in the province of Buenos Aires between 2008 and 2015. Controls include district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Robust standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Census of Population 2001.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 4** (Continued): Effect of intervention on school performance on districts with high technology at baseline in province of Buenos Aires —dynamic approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel C: Internet-aided Instruction</b>						
<u>C1. Treatment Effects</u>						
Year 1 After LP	-0.00351 (0.0324)	0.000142 (0.0326)	0.0585 (0.0470)	0.0493 (0.0491)	0.0270 (0.0744)	0.0162 (0.0760)
Year 2 After LP	0.00814 (0.0265)	0.0149 (0.0269)	0.0864* (0.0441)	0.0795* (0.0465)	0.208*** (0.0776)	0.201** (0.0788)
Year 3 After LP	0.00797 (0.0265)	0.0150 (0.0274)	0.0899* (0.0459)	0.0846* (0.0484)	0.157** (0.0653)	0.152** (0.0670)
Year 4 After LP	0.00835 (0.0265)	0.0137 (0.0269)	0.0570 (0.0461)	0.0513 (0.0474)	0.113 (0.0886)	0.109 (0.0877)
Year 5 After LP	0.00822 (0.0265)	0.0127 (0.0272)	0.0636 (0.0456)	0.0625 (0.0482)	0.0509 (0.0802)	0.0489 (0.0842)
<u>C2. Validity Check</u>						
Year 2 Before LP	0.00168 (0.0241)	-0.00126 (0.0249)	0.0383 (0.0448)	0.0442 (0.0501)	0.0529 (0.0717)	0.0517 (0.0751)
Year 1 Before LP	0.0115 (0.0240)	0.0120 (0.0242)	0.0611 (0.0610)	0.0564 (0.0618)	0.124* (0.0651)	0.119* (0.0668)
Mean	0.0681	0.0681	0.731	0.731	0.684	0.684
Observations	1080	1080	1080	1080	984	984
Number of districts	135	135	135	135	123	123
District FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\delta_t$  for each year resulting from estimating equations 7, 8, and 9 respectively on a district-by-year sample of secondary schools in the province of Buenos Aires between 2008 and 2015. Controls include district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Robust standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Census of Population 2001.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A9:** Effect of intervention on school performance on districts with high technology at baseline controlling for economic activity —dynamic approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel A: Household computers</b>						
<u>A1. Complete sample</u>						
Year 1 After LP	-0.0526 (0.0479)	-0.0374 (0.0478)	-0.0289** (0.0127)	-0.0274** (0.0123)	0.00993 (0.0204)	0.00706 (0.0204)
Year 2 After LP	-0.319*** (0.0419)	-0.313*** (0.0419)	-0.0325*** (0.01000)	-0.0316*** (0.0101)	0.00488 (0.0180)	0.00579 (0.0182)
Year 3 After LP	-0.468*** (0.0411)	-0.469*** (0.0417)	-0.0231** (0.00922)	-0.0191** (0.00920)	0.0169 (0.0187)	0.0207 (0.0190)
Year 4 After LP	-0.493*** (0.0394)	-0.491*** (0.0393)	-0.0102 (0.00965)	-0.00674 (0.00949)	0.00745 (0.0198)	0.00960 (0.0194)
Year 5 After LP	-0.574*** (0.0430)	-0.577*** (0.0439)	-0.00605 (0.00948)	-0.000985 (0.00939)	-0.0111 (0.0194)	-0.00673 (0.0192)
<u>A2. Validity Check</u>						
Year 2 Before LP	0.00207 (0.0358)	0.00654 (0.0365)	-0.0114 (0.0103)	-0.00672 (0.0103)	0.0227 (0.0186)	0.0305 (0.0191)
Year 1 Before LP	-0.0197 (0.0353)	-0.0308 (0.0350)	0.00174 (0.0110)	0.00518 (0.0110)	-0.00236 (0.0186)	0.00517 (0.0187)
Mean	0.428	0.428	0.757	0.757	0.635	0.635
Observations	3864	3864	3864	3864	2752	2752
Number of districts	483	483	483	483	344	344
<b>Panel B: Computer Labs</b>						
<u>B1. Complete sample</u>						
Year 1 After LP	0.180*** (0.0662)	0.170** (0.0668)	-0.0112 (0.0338)	0.00283 (0.0164)	0.00713 (0.0237)	0.00899 (0.0236)
Year 2 After LP	0.00267 (0.0524)	-0.00870 (0.0525)	-0.0239 (0.0337)	-0.00784 (0.0161)	-0.0262 (0.0214)	-0.0231 (0.0216)
Year 3 After LP	0.0399 (0.0570)	0.0283 (0.0580)	-0.0669* (0.0394)	-0.0505** (0.0211)	-0.0600*** (0.0193)	-0.0570*** (0.0194)
Year 4 After LP	0.0751 (0.0536)	0.0608 (0.0539)	-0.0418 (0.0330)	-0.0177 (0.0150)	-0.0636*** (0.0205)	-0.0610*** (0.0205)
Year 5 After LP	0.0895 (0.0588)	0.0794 (0.0594)	-0.0463 (0.0334)	-0.0158 (0.0164)	-0.110*** (0.0229)	-0.107*** (0.0234)
<u>B2. Validity Check</u>						
Year 2 Before LP	0.0303 (0.0464)	0.0539 (0.0474)	-0.0376 (0.0340)	-0.00894 (0.0160)	0.0115 (0.0208)	0.00716 (0.0208)
Year 1 Before LP	0.00656 (0.0438)	0.0173 (0.0437)	-0.0456 (0.0350)	-0.00929 (0.0173)	0.0262 (0.0245)	0.0254 (0.0250)
Mean	0.446	0.446	0.767	0.767	0.631	0.631
Observations	3376	3376	3376	3376	2176	2176
Number of districts	422	422	422	422	272	272
District FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\delta_t$  for each year resulting from estimating equations 7, 8, and 9 respectively on a district-by-year sample of secondary schools between 2008 and 2015. Controls include province-by-year unemployment rates, as well as district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Robust standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Census of Population 2001; Encuesta Permanente de Hogares 2008–2015.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 4** (Continued): Effect of intervention on school performance on districts with high technology at baseline controlling for economic activity —dynamic approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel C: Internet-aided Instruction</b>						
<u>C1. Treatment Effects</u>						
Year 1 After LP	0.204*** (0.0724)	0.196*** (0.0731)	0.0239* (0.0142)	0.00829 (0.0138)	0.0125 (0.0297)	0.0132 (0.0292)
Year 2 After LP	0.316*** (0.0823)	0.311*** (0.0822)	0.00710 (0.0140)	-0.0103 (0.0142)	-0.00959 (0.0246)	-0.00656 (0.0247)
Year 3 After LP	0.350*** (0.0765)	0.338*** (0.0770)	-0.00256 (0.0209)	-0.0101 (0.0210)	-0.0200 (0.0238)	-0.0138 (0.0241)
Year 4 After LP	0.278*** (0.0652)	0.268*** (0.0658)	-0.00210 (0.0138)	-0.0166 (0.0133)	-0.0487* (0.0283)	-0.0430 (0.0276)
Year 5 After LP	0.295*** (0.0769)	0.292*** (0.0761)	0.00179 (0.0135)	-0.0104 (0.0136)	-0.0525** (0.0236)	-0.0494** (0.0236)
<u>C2. Validity Check</u>						
Year 2 Before LP	0.00958 (0.0644)	0.0103 (0.0652)	0.00794 (0.0163)	0.00788 (0.0163)	-0.0102 (0.0240)	-0.0118 (0.0246)
Year 1 Before LP	0.0150 (0.0642)	0.0138 (0.0645)	0.0000817 (0.0140)	0.00323 (0.0141)	-0.00476 (0.0239)	0.0000635 (0.0245)
Mean	0.442	0.442	0.763	0.763	0.631	0.631
Observations	4208	4208	4208	4208	2880	2880
Number of districts	526	526	526	526	360	360
District FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
Controls	x	✓	x	✓	x	✓

*Notes:* Panels A, B, and C show estimates of  $\delta_t$  for each year resulting from estimating equations 7, 8, and 9 respectively on a district-by-year sample of secondary schools between 2008 and 2015. Controls include province-by-year unemployment rates, as well as district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Robust standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Census of Population 2001; Encuesta Permanente de Hogares 2008–2015.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A10:** Effect of intervention on school performance in high-technology districts using province-clustered SE— control groups with differential trends

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<u>A. Computers in 2001</u>						
Treatment Effect	0.0310 (0.133)	0.0430 (0.124)	-0.0434 (0.0264)	-0.0451* (0.0254)	0.0196 (0.0153)	0.0213 (0.0162)
Treatment Effect w/o 2011	-0.202 (0.138)	-0.200 (0.133)	-0.0517** (0.0188)	-0.0521** (0.0193)	0.0308 (0.0267)	0.0329 (0.0288)
Mean	0.428	0.428	0.757	0.757	0.635	0.635
Observations	3864	3864	3864	3864	2752	2752
Number of Districts	23	23	23	23	22	22
<u>B. Computer Labs in 2008</u>						
Treatment Effect	0.175 (0.106)	0.167 (0.112)	0.0267 (0.0233)	0.0234 (0.0206)	0.0313 (0.0257)	0.0260 (0.0191)
Treatment Effect w/o 2011	0.0603 (0.121)	0.0516 (0.119)	0.00400 (0.0294)	0.00107 (0.0269)	0.0120 (0.0361)	0.00635 (0.0352)
Mean	0.423	0.423	0.760	0.760	0.631	0.631
Observations	3176	3176	3176	3176	2176	2176
Number of Districts	24	24	24	24	23	23
<u>C. Teaching with Internet in 2008</u>						
Treatment Effect	0.212 (0.155)	0.199 (0.154)	0.0205 (0.0209)	0.0164 (0.0206)	0.0343 (0.0249)	0.0340 (0.0241)
Treatment Effect w/o 2011	0.332 (0.230)	0.323 (0.229)	0.00372 (0.0268)	0.00282 (0.0255)	0.0163 (0.0432)	0.0155 (0.0445)
Mean	0.424	0.424	0.757	0.757	0.631	0.631
Observations	4000	4000	4000	4000	2880	2880
Number of Districts	24	24	24	24	23	23
District FE	✓	✓	✓	✓	✓	✓
Trends by District	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\beta$  resulting from estimating equations 10, 11, and 12 respectively on a district-by-year sample of secondary schools between 2008 and 2015. Controls include district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Province-clustered standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Census of Population 2001.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A11:** Effect of intervention on school performance in high-technology districts in province of Buenos Aires —trend-break approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<u>A. Computers in 2001</u>						
Treatment Effect	-0.00112 (0.0211)	-0.000707 (0.0205)	-0.0284* (0.0171)	-0.0197 (0.0174)	0.00185 (0.0349)	0.0189 (0.0343)
Treatment Effect w/o 2011	0.0496*** (0.0138)	0.0506*** (0.0138)	-0.0367 (0.0247)	-0.0271 (0.0254)	0.0200 (0.0445)	0.0335 (0.0445)
Mean	0.0681	0.0681	0.731	0.731	0.684	0.684
Observations	1056	1056	1056	1056	976	976
Number of Districts	132	132	132	132	122	122
<u>B. Computer Labs in 2008</u>						
Treatment Effect	0.00287 (0.0629)	0.00543 (0.0615)	0.0677 (0.0420)	0.0534 (0.0414)	0.121 (0.0972)	0.107 (0.0960)
Treatment Effect w/o 2011	-0.104*** (0.0327)	-0.103*** (0.0332)	0.0782 (0.0564)	0.0721 (0.0523)	0.125 (0.141)	0.129 (0.136)
Mean	0.0593	0.0593	0.729	0.729	0.677	0.677
Observations	856	856	856	856	776	776
Number of Districts	107	107	107	107	97	97
<u>C. Teaching with Internet in 2008</u>						
Treatment Effect	-0.00596 (0.0498)	-0.0134 (0.0492)	0.0585 (0.0443)	0.0534 (0.0461)	0.0855 (0.118)	0.0573 (0.116)
Treatment Effect w/o 2011	0.00321 (0.0303)	0.00580 (0.0296)	0.100* (0.0548)	0.0979* (0.0578)	0.273*** (0.105)	0.258** (0.104)
Mean	0.0675	0.0675	0.730	0.730	0.684	0.684
Observations	1072	1072	1072	1072	984	984
Number of Districts	134	134	134	134	123	123
District FE	✓	✓	✓	✓	✓	✓
Trends by District	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\beta$  resulting from estimating equations 10, 11, and 12 respectively on a district-by-year sample of secondary schools in the province of Buenos Aires between 2008 and 2015. Controls include district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Robust standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Census of Population 2001.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A12:** Effect of intervention on school performance in high-technology districts  
controlling for economic activity —trend-break approach

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
<u>A. Computers in 2001</u>						
Treatment Effect	0.0310 (0.0449)	0.0388 (0.0447)	-0.0434*** (0.0121)	-0.0459*** (0.0115)	0.0196 (0.0213)	0.0196 (0.0210)
Treatment Effect w/o 2011	-0.202*** (0.0512)	-0.198*** (0.0506)	-0.0517*** (0.0126)	-0.0525*** (0.0128)	0.0308 (0.0246)	0.0339 (0.0254)
Mean	0.428	0.428	0.757	0.757	0.635	0.635
Observations	3864	3864	3864	3864	2752	2752
Number of Districts	483	483	483	483	344	344
<u>B. Computer Labs in 2008</u>						
Treatment Effect	0.00287 (0.0629)	0.00155 (0.0532)	0.0677 (0.0420)	0.0537 (0.0417)	0.121 (0.0972)	0.109 (0.0939)
Treatment Effect w/o 2011	0.0603 (0.0606)	0.0552 (0.0608)	0.00400 (0.0146)	0.000778 (0.0145)	0.0120 (0.0297)	0.00559 (0.0298)
Mean	0.0593	0.0593	0.729	0.729	0.677	0.677
Observations	856	856	856	856	776	776
Number of Districts	107	107	107	107	97	97
<u>C. Teaching with Internet in 2008</u>						
Treatment Effect	0.212*** (0.0682)	0.197*** (0.0690)	0.0205* (0.0110)	0.0161 (0.0112)	0.0343 (0.0291)	0.0337 (0.0290)
Treatment Effect w/o 2011	0.332*** (0.0911)	0.323*** (0.0913)	0.00372 (0.0141)	0.00281 (0.0142)	0.0163 (0.0316)	0.0176 (0.0320)
Mean	0.424	0.424	0.757	0.757	0.631	0.631
Observations	4000	4000	4000	4000	2880	2880
Number of Districts	500	500	500	500	360	360
District FE	✓	✓	✓	✓	✓	✓
Trends by District	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\beta$  resulting from estimating equations 10, 11, and 12 respectively on a district-by-year sample of secondary schools between 2008 and 2015. Controls include real GDP per capita at constant prices, as well as province-by-year unemployment rates and district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Robust standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Census of Population 2001; Encuesta Permanente de Hogares 2008–2015.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



**Table A13:** Effect of intervention on school performance on districts with high relative to low household computer access in 2010

	Computers/Enrollment		Promoted/Enrollment		Graduated/Senior Enrollment		Dropouts/Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<u>A. Complete sample</u>								
Year 1 After LP	-0.0543 (0.0453)	-0.0459 (0.0448)	-0.0138 (0.0185)	-0.0183 (0.0147)	0.00701 (0.0208)	0.00534 (0.0206)	-0.000281 (0.00229)	0.0000776 (0.00232)
Year 2 After LP	-0.225*** (0.0536)	-0.216*** (0.0535)	-0.0265 (0.0163)	-0.0362*** (0.0110)	-0.0268 (0.0179)	-0.0288 (0.0182)	0.00294 (0.00213)	0.00340 (0.00218)
Year 3 After LP	-0.409*** (0.0542)	-0.403*** (0.0547)	-0.0455 (0.0336)	-0.0434 (0.0310)	-0.00216 (0.0197)	-0.00296 (0.0200)	0.00303 (0.00233)	0.00333 (0.00237)
Year 4 After LP	-0.463*** (0.0493)	-0.457*** (0.0495)	-0.00252 (0.0160)	-0.00341 (0.0113)	0.00508 (0.0214)	0.00553 (0.0216)	-0.000586 (0.00236)	-0.000174 (0.00239)
Year 5 After LP	-0.507*** (0.0527)	-0.508*** (0.0542)	0.00476 (0.0155)	0.00701 (0.0110)	-0.00745 (0.0203)	-0.00571 (0.0204)	-0.00261 (0.00231)	-0.00191 (0.00233)
<u>B. Validity Check</u>								
Year 2 Before LP	-0.00549 (0.00942)	-0.0190 (0.0154)	0.00342 (0.0164)	0.00704 (0.0132)	0.00923 (0.0181)	0.00661*** (0.00230)	0.00589** (0.00230)	0.0174 (0.0190)
Year 1 Before LP	-0.0187*** (0.00606)	-0.0184*** (0.00662)	0.00877 (0.0187)	0.00720 (0.0134)	-0.0169 (0.0171)	-0.00150 (0.00228)	-0.00146 (0.00229)	-0.0173 (0.0172)
Mean	0.443	0.443	0.763	0.763	0.631	0.631	0.0457	0.0457
Observations	4200	4200	4200	4200	2880	2880	4200	4200
Number of districts	525	525	525	525	360	360	525	525
District FE	✓	✓	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✗	✓	✗	✓	✗	✓	✗	✓

*Notes:* Panels A, B, and C show estimates of  $\delta_t$  for each year resulting from estimating equations 7, 8, and 9 respectively on a district-by-year sample of secondary schools between 2008 and 2015. Controls include district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number promoted and graduated is lagged one period. Robust standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Census of Population 2010.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A14:** Effect of intervention on school dropout rates —trend-break approach

	Main	Province- clustered SE	No controls	Economic controls	Buenos Aires
	(1)	(2)	(3)	(4)	(5)
<u>A. All</u>					
Treatment Effect	0.00331*** (0.000933)	0.00331 (0.00255)	0.00323*** (0.000908)	-0.00138 (0.00120)	0.00148 (0.00162)
Treatment Effect w/o 2011	0.00536*** (0.00119)	0.00536* (0.00260)	0.00526*** (0.00118)	0.000980 (0.00135)	0.00477** (0.00200)
Mean	0.0399	0.0399	0.0399	0.0399	0.0281
Observations	4208	4208	4208	4208	1080
Number of Districts	526	526	526	526	135
<u>B. Public v. Private</u>					
Treatment Effect	0.00297* (0.00170)	0.00297 (0.00417)	0.00310** (0.00153)	0.00299* (0.00170)	0.00268 (0.00327)
Treatment Effect w/o 2011	0.00492* (0.00272)	0.00492 (0.00426)	0.00555** (0.00236)	0.00500* (0.00272)	0.00572 (0.00415)
Mean	0.0303	0.0303	0.0303	0.0303	0.0210
Observations	4992	4992	4992	4992	1664
Number of Districts	312	312	312	312	104
<u>C. Secondary v. Primary</u>					
Treatment Effect	0.00494*** (0.000977)	0.00494 (0.00420)	0.00393*** (0.000949)	0.00484*** (0.000969)	0.00259 (0.00204)
Treatment Effect w/o 2011	0.00648*** (0.00127)	0.00648 (0.00407)	0.00588*** (0.00120)	0.00646*** (0.00126)	0.00561** (0.00262)
Mean	0.0221	0.0215	0.0215	0.0215	0.0155
Observations	8112	5184	5184	5184	1848
Number of Districts	507	23	337	337	117
District FE	✓	✓	✓	✓	✓
Trends by District	✓	✓	✓	✓	✓
Controls	✓	✗	✓	✓	✓

*Notes:* Panels A, B, and C show estimates of  $\beta$  resulting from estimating equations 4, 5, and 6 respectively between 2008 and 2015. Panel A estimates equation 4 on a district-by-year sample of secondary schools. Panel B estimates equation 5 on a district-by-sector-by-year sample of public and private secondary schools. Panel C estimates equation 6 on a district-by-level-by-year sample of primary and secondary schools. Controls include real GDP per capita at constant prices, as well as province-by-year unemployment rates and district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number of drop out students is lagged one period. Robust standard errors are in parentheses. *Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Encuesta Permanente de Hogares 2008–2015.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A15:** Effect of intervention on school dropout rates in high-technology districts  
—trend-break approach

	Main	Province- clustered SE	No-controls	Economic- controls	Buenos Aires
	(1)	(2)	(3)	(4)	(5)
<u>A. Computers in 2001</u>					
Treatment Effect	0.00197 (0.00227)	0.00197 (0.00392)	0.00219 (0.00222)	0.00151 (0.00224)	-0.00258 (0.00363)
Treatment Effect w/o 2011	0.00636** (0.00285)	0.00636 (0.00425)	0.00745*** (0.00280)	0.00630** (0.00283)	-0.00759 (0.00488)
Mean	0.0463	0.0463	0.0463	0.0463	0.0359
Observations	3864	3864	3864	3864	1056
Number of Districts	483	483	483	483	132
<u>B. Computer Labs in 2008</u>					
Treatment Effect	0.00499 (0.00365)	0.00499 (0.00753)	0.00578 (0.00361)	0.00446 (0.00365)	0.00888 (0.0104)
Treatment Effect w/o 2011	0.00511 (0.00417)	0.00511 (0.00712)	0.00543 (0.00416)	0.00485 (0.00416)	0.00100 (0.0130)
Mean	0.0457	0.0457	0.0457	0.0457	0.0353
Observations	3176	3176	3176	3176	856
Number of Districts	397	397	397	397	107
<u>C. Teaching with Internet in 2008</u>					
Treatment Effect	-0.00553* (0.00319)	-0.00553 (0.00412)	-0.00530* (0.00318)	-0.00568* (0.00322)	0.00888 (0.0104)
Treatment Effect w/o 2011	0.00248 (0.00436)	0.00248 (0.00395)	0.00200 (0.00438)	0.00257 (0.00435)	0.00100 (0.0130)
Mean	0.0465	0.0465	0.0465	0.0465	0.0353
Observations	4000	4000	4000	4000	856
Number of Districts	500	500	500	500	107
District FE	✓	✓	✓	✓	✓
Trends by District	✓	✓	✓	✓	✓
Controls	✓	✗	✓	✓	✓

*Notes:* Panels A, B, and C show estimates of  $\beta$  resulting from estimating equations 10, 11, and 12 respectively on a district-by-year sample of secondary schools between 2008 and 2015. Controls include real GDP per capita at constant prices, as well as province-by-year unemployment rates and district-by-year level characteristics such as student vulnerability, student gender, teachers per student, hours per teacher, and share of public schools. All variables are measured at the start of the academic year; consequently, the number of drop out students is lagged one period. Robust standard errors are in parentheses.

*Source:* Relevamiento Anual 2008–2016, DiNIEE, Ministerio de Educación –Argentina; Census of Population 2001; Encuesta Permanente de Hogares 2008–2015.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$