A Online Appendix

A.1 Further Discussion of Teacher Results

We now turn to analyzing the teacher-level data from the Brazilian school census. The census includes a wide variety of teacher characteristics, both demographic and professional. We divide the teacher-level data and classify teachers in several different ways to see if certain types of teachers are driving our main results from Table 3. As before, because the effects of oil royalties are present only in municipal schools, we focus only on teachers who work for municipal schools in all of the following teacher results.

We first divide our teacher-level data into those who are teachers and those who are educational support staff, such as educational assistants and activity monitors. Our results are presented in Table A9 of the online appendix. In Panel A, we first use a similar measure as in our main results, constructing teachers and non-teachers per million inhabitants variables. Not only are the magnitudes between all educational staff (column (1)) and teachers (column (2)) almost identical but also the effects of oil royalties per capita on educational staff and on teachers are both highly significant. In contrast, we do not find any impact on non-teachers in column (3); the coefficient on oil royalties for non-teachers is both economically and statistically insignificant.

In Panel B of Table A9 in the online appendix, we instead employ a proportion-based measure, which captures, for both teachers and non-teachers, their proportion out of all educational staff in that municipality–year.[1] We find a similar story of our main results being driven by the hiring of teachers; in column (2), we show that the proportion of educational staff made up by teachers increases with higher royalties per capita, with a corresponding decrease in non-teachers in column (3). Taken together, the estimates in Table A9 of the online appendix support the assertion that oil royalties do in fact go towards hiring more teachers in municipally funded schools and not other types of staff.

We then examine the subjects taught by teachers. We pick out four particular groupings of subjects. We classify science as a broad subject, with a teacher being a science teacher if they report having chemistry, physics, mathematics, biology, or science as a discipline. Similarly, we classify a teacher as a languages teacher if they teach either Portuguese, English, or Spanish. Arts teachers are those who report in the census having a discipline defined as arts, which includes arts education, theatre, dance, music, and others. Finally, we also look at math teachers as a separate category. We should note that teachers can often have multiple disciplines so that these categories are not exclusive of each other; it is possible, for example, that a teacher can teach both mathematics and Portuguese, which would classify them as both a science and language teacher in our categories. In addition, because there are some differences in classifications and variables over time in the school census, this means that our categories do not capture all science or language subjects. For example, in later waves of the school census, teachers can report indigenous languages as a subject, which would place them as a languages teacher. Unfortunately this classification does not exist

[1] These proportions variables are scaled from 0 to 100.

in the earlier censuses in our sample, so we are unable to include them in our languages category. We, therefore, chose the disciplines that were most commonly used across Brazil and consistently present over our sample period to construct our three groupings.

Our subjects analysis is presented in Table A10 of the online appendix. Panel A shows that oil royalties are associated with higher levels of teachers that have disciplines in science (column (1)), languages (column (2)), arts (column (3)), and math (column (4)). This suggests that provision of all four types of subjects are increasing with oil royalties. In Panel B, we again turn to a proportions based dependent variable instead, with the denominator this time being all municipal teachers in that municipality–year.[2] We interestingly find that there is a minor decrease in the proportion of teachers that have science or languages disciplines, with no change in the proportion of teachers who teach arts. The magnitudes are fairly minor, however. We, therefore, interpret Table A10 of the online appendix as showing evidence that the provision of teachers across all subjects is increasing with higher oil royalties per capita, with little impact on the composition of subjects taught.

Finally, in Table A11 of the online appendix, we examine whether the teachers hired with oil royalties differ by demographics. We break down teachers by gender, age, and race. We find, from Panel A, that the additional teachers hired are primarily female, young (less than 40 years old), and white; the magnitudes for these coefficients are notably larger than those for males, older teachers (greater than or equal to 40 years old), and non-white teachers, respectively. As in the other teacher results, in Panel B, we also examine whether the proportion of teachers that have a particular characteristic (out of all teachers) changes in response to oil royalties per capita increases.[3] We find that there is no change in the proportion of teachers who are male or female; this is consistent with the fact that most teachers are female in Brazil, as can be seen in the summary statistics. We do show that, consistent with the Panel A results, the proportion of teachers who are less than 40 years old does increase; this suggests that the teachers hired with oil royalties are in fact relatively young. Column (5) of Panel B shows that there is no statistically significant relationship between the proportion of teachers who are white or non-white and oil royalties per capita. This stands in contrast to Panel A results, which showed that white teachers and not non-white teachers are driving our main results. In the final two columns of Panel A (columns (7) and (8)), we find that teachers with postgraduate degrees are the ones seemingly driving the results; when we go to Panel B, however, we do not find that there is a significant (statistically or economically) change in the proportion of teachers who have postgraduate degrees in municipalities with higher oil royalties per capita; this implies, as in much of the other teacher-level results, that teacher composition is not affected in a major way; municipalities, in other words, seemingly increase their teacher numbers when faced with oil shocks by hiring more teachers that resemble their existing pool of educators.[4]

[2]More specifically, the dependent variables in Panel B are the shares of all teachers that teach the subject listed in the heading.

[3]The dependent variables in Panel B in this case measure the share of teachers that have the demographic characteristic mentioned in the heading of the table.

[4]Unfortunately there are no data on teacher compensation available in the data, to our knowledge. This prevents us from analyzing if teacher sorting or selection is going on along this dimension, as in Marchand and Weber (2020).

The teacher results show that municipal staff increases from higher oil royalties are principally composed of teachers, and that of these teachers, those hired are disproportionately young. Additional teachers are spread across a variety of disciplines. Returning to the conceptual framework, it is not obvious whether new teachers are positively or negatively selected because, other than for age, teachers induced to begin teaching in a municipality funded by oil royalties do not look statistically dissimilar to other teachers. This implies that either the positive and negative selection channels are in large part cancelling each other out or that teacher composition is not affected by oil royalties. The teacher results also suggest that there is no increase in outside options in the private sector for teachers, unlike in Marchand and Weber (2020); this provides further evidence that oil royalties affect education via provision and not through any effect on the local economy.

A.2 Further Discussion of School Location Heterogeneity

Historically, a large disparity in educational attainment in Brazil has persisted across urban and rural locations within the same municipality (Bruns et al., 2011). Rural schools in particular have been characterized by inadequate schooling quality and low primary completion rates. In this section, we provide more evidence on the compositional effects of oil royalties by examining heterogeneity across rural and urban schools within the same municipality for: (i) school level outcomes, (ii) student inputs, and (iii) student outcomes.

The results are summarized in Table A14 of the online appendix. Panel A shows that oil royalties resulted in more schools in rural regions to a similar degree as in the main results, although the coefficient is not statistically significant. Classrooms, staff, teachers, and students per million also increase in response to oil royalties for rural municipal schools. Urban schools construct also relatively more classrooms and hire relatively more teachers. Student enrolment goes up by comparable magnitudes in both rural and urban schools within the same municipality.

New schools potentially being primarily concentrated in rural regions may be another explanation for worsening student outcomes found previously. Additional rural schools allow more students to enrol but may not be providing a better quality of schooling services or may have worse performing students than urban schools. Indeed, we do not observe any change in the student-input measures, presented in Panel B of Table A14 in the online appendix. The only significant estimate in Panel B shows that the student–school ratio is going up for urban schools. Panel C provides results consistent with this pattern: the effect of oil royalties on the pass rate in rural schools is three times lower than oil royalties' effect on the pass rate of urban schools; similarly, the effect of oil royalties on the fail rate is three times higher in rural municipalities compared with urban municipalities.[5] An important caveat of these results, as in most of the rural and urban school results in this table, is that we lose precision by dividing our sample into urban and rural regions and the standard errors are subsequently larger. While the overall evidence presented in Table A14

[5]The mean levels of pass and fail rates across urban and rural schools are quite similar in our data set. The pass rate is 85.1% and 83.1% for rural and urban schools respectively. The fail rates are 12.02% for rural schools and 13.22% for urban schools.

of the online appendix suggests that new schools may be concentrated more in rural areas, the estimates are not nearly precise enough and the evidence is not strong enough to make a definitive statement about oil royalties being driven mainly by one region type or the other.

We further explore how the effects of oil royalties may vary across new and old schools, to examine whether newer schools are of lower quality in terms of infrastructure and services. Unfortunately, our school-level census data do not provide a direct way to identify the new schools. We infer whether a particular school is newly built or not by examining when that school first shows up in our data. For example, if a school does not show up in 2007 (the first year in our data set) but appears in 2008, we designate that school to be a new school for the year 2008. We similarly identify new schools for each subsequent year. This process necessarily requires us to drop all observations for the year 2007 because we are unable to identify new schools in 2007.

The results are summarized in Table A15 of the online appendix. Column (1) shows that classrooms, staff, teachers, and student enrolment in new schools do not vary with oil royalties. In contrast, existing schools respond by adding more classrooms, hiring more staff and teachers, and enrolling more students. These results underscore that, while increases in oil royalty-driven revenues may lead to creation of more schools (particularly in rural regions), the new schools are not markedly different in terms of their schooling infrastructure. Panel B shows that there is no evidence of heterogeneity across new and old schools in terms of student inputs.

A.3 Further Discussion of Corruption and Clientelism Results

The main explanation in Caselli and Michaels (2013) for the lack of correlation between oil-driven revenues and public goods provision is the significant levels of corruption prevalent in many Brazilian municipalities. In order to examine whether this mechanism could also help explain the relatively small magnitudes of our main results, we empirically test whether our main results differ in municipalities with higher levels of corruption. To do this, we make use of a measure of corruption from Ferraz and Finan (2011).

The Ferraz and Finan (2011) measure of corruption is derived from a policy enacted by the Brazilian government in 2003. This policy mandated that municipalities would be randomly selected to be audited to verify that federal funds transfers are being spent appropriately. The auditors examine spending on various public resources and classify spending as irregular if they determine that some type of overspending, funds diversion, or fraud has occurred. The auditors then prepare reports of each audited municipality that are made publicly available. Ferraz and Finan (2011) use these reports and create a measure of corruption by calculating the share of the value of all audited spending that is deemed to be irregular. Specifically, Ferraz and Finan (2011) use the reports from the first 11 waves of the random audits, which cover the period from the start of this policy to the beginning of 2004. This captures 496 randomly selected municipalities in total, 122 of which are oil royalty receiving municipalities in our main sample.

We then use this measure of corruption and create an interaction term between corruption and our oil royalties variable to test whether oil royalties have a heterogeneous effect on schooling

provision by levels of corruption. These results are reported in Table A12 of the online appendix. We again focus on municipally funded schools in these specifications. In columns (1), (3), and (5), we first verify that our main results in Table 3 are the same in the much smaller sample of oil municipalities that are also audited in the Ferraz and Finan (2011) sample. The results are very similar in terms of magnitudes and sign, although they no longer statistically significant due to the lower precision from the much smaller sample.[6]

In columns (2), (4), and (6) of Table A12 in the online appendix, we then test whether corruption, interacted with oil royalties, has an economically or statistically significant effect on schooling provision. The estimated coefficients show that municipalities with higher levels of corruption do not show any evidence of having smaller effects of oil royalties on schooling provision. The coefficients on the interaction term are statistically insignificant and the small magnitudes suggest that there is at most a very economically small effect.[7]

A couple of caveats should be kept in mind for these results. First, thanks to the smaller sample sizes, the lack of statistical significance could be due to the lower precision; again, however, the small magnitudes of the coefficients does additionally point towards a lack of evidence for heterogeneous effects of corruption. Second, the audits were conducted prior to the sample period in our paper, which begins in 2007. This means that audited municipalities could have amended the corrupt practices and become no less corrupt than low-corruption municipalities by 2007. While this is entirely possible, there are also various municipality characteristics that are relatively time-invariant that determine the level of corruption present. For example, Ferraz and Finan (2011) find that municipality characteristics such as local media, the presence of local prosecutors, or the degree of political competition influences the amount and effects of corruption. We, therefore, believe that the Ferraz and Finan (2011) measure of corruption serves as a proxy for corruption during our sample period.

We also explore an alternative measure for capturing potential malfeasance and inefficiencies in the utilization of public resources—political clientelism. In the context of this paper, clientelism refers to the promise of a private transfer to a selective group of voters in exchange for electoral support (Stokes, 2005; Hicken, 2011). Clientelistic practices, also known as vote-buying, often involve the use of public funds to provide targeted private transfers. Targeted private transfers, financed through public funds and contingent on electoral support, is highly prevalent in the local political context of Brazil (Alston and Mueller, 2006; Fried, 2012).[8] A large literature argues that clientelism worsens governmental allocative inefficiencies, leading to under-provision of public goods (Bobonis et al., 2019).

[6] We also verify that there is no statistically significant difference in the effect of oil royalties on our school outcomes by regressing our schooling outcomes on royalties, plus an interaction term for royalties interacted with a dummy equal to 1 if that municipality is an audited municipality; there is no significant coefficient on the interaction variable. These results are not reported for the sake of brevity.

[7] For context, out of 122 municipalities that were audited in our sample, the average proportion of resources that are irregular was 0.0621, with a standard deviation of 0.088.

[8] A recent survey in Northeastern municipalities of Brazil find that 28% of all respondents who are eligible voters received vote-buying offers and 66% of all respondents were aware of quid pro quo offers for votes (Sugiyama and Hunter, 2013).

We use the Democratic Accountability and Linkages Project (DALP) survey from 2008, conducted by the Political Science Department at Duke University, to assign scores on clientelistic tendencies to the political party that the incumbent mayor (for the years 2008 to 2012) belonged to in a given municipality. To construct the measure of clientelism, we use the following five questions from the DALP survey on the intensity of effort exerted by local political parties in Brazil as an inducement to obtain votes: (i) promise to give citizens consumer goods (e.g., food or liquor, clothes, cookware, appliances, medicines, building materials etc.), (ii) promise to give citizens preferential access to material advantages in public social policy schemes, (iii) promise to give citizens preferential access to employment in the public sector or in the publicly regulated private sector, (iv) promise to give citizens and businesses preferential access to government contracts or procurement opportunities, and (v) influence or promise to influence the application of regulatory rules issued by government agencies. Around 73% of municipalities in our sample were governed by a party that was represented in the DALP survey. A higher score on this measure of clientelism indicates that the political party has a greater tendency to engage in clientelistic practices.

We then create an interaction term between this measure of clientelism and the oil royalties variable to test whether oil royalties have a heterogeneous effect on schooling provision by levels of clientelistic tendencies of the mayoral party in power. These results are reported in Table A13 of the online appendix. As before, we focus on municipally funded schools in these specifications. In columns (1), (3), and (5), we first verify that our main results in Table 3 are the same in the smaller sample of oil municipalities that are also represented in the DALP survey. The results are very similar in terms of magnitudes and sign as well as statistical significance. In columns (2), (4), and (6) of Table A13 in the online appendix, the estimated coefficients on the interaction terms show that municipalities characterized by higher levels of political clientelism do not show any evidence of having smaller effects of oil royalties on schooling provision. On the contrary, there seems to be a marginally significant and positive effect on the provision of schools, although the magnitude of the coefficient is relatively very small compared to the main results from Table 3. The coefficients on the interaction terms for the number of classroom and staff are statistically insignificant and the small magnitudes suggest that there is at most a very economically small effect.[9]

A.4 Further Discussion of Additional Results and Robustness Checks

One concern is that our results could be driven partly by municipalities receiving oil royalties residing in states that are undergoing economic booms. For example, if oil production in a region is partly driven by unobservables within a state that also correlate with increases in the provision of schooling then our results could be upwardly biased. To help compensate for these concerns, we estimate our schools, staff, and classrooms results from panels A to C in Table 3 and replace the year fixed effects with state–year–interaction fixed effects. The results are presented in panels A

[9]We also examine whether the link between oil royalties and public school provision is heterogeneous along the dimensions of incumbent mayors' education, vote share, and prior public sector experience as well as the education of the electorate. We find no evidence of any such heterogeneous effects.

to C of Table A16 in the online appendix. For the purpose of brevity, we do not extensively discuss those results here but the findings are very similar to those of the main analysis. To be more specific, in each case, the sign of the coefficients of interest are identical, and are also of very similar magnitude. The coefficients are also more precisely estimated than in the main results. Finally, in all of these robustness results the municipally funded schools are also the schools driving the results. These additional robustness checks, therefore, are entirely consistent with our primary estimates.

We also examine how long takes increases in expenditures driven by oil royalties to affect municipal education provision. We augment the baseline specification to include lagged oil royalties two years ago and three years ago (in addition to royalties one year ago, which is our explanatory variable of interest in the baseline specification). We report these results in Table A4 of the online appendix. We find that almost all the effects are captured by our measure of lagged (by one year) oil royalties variable, except for teachers. We find that oil royalties from two and three years ago do not have any significant effect on total number of schools, classrooms, or students per million inhabitants in municipally funded schools. However, the total number of teachers per million inhabitants respond similarly to oil royalties from one and two years ago.

A potential explanation for the results we observe is that schooling outcomes in the present are responding to expected future oil revenues. Therefore, we carry out a placebo check for pre-existing trends by regressing our main dependent variables on future oil royalties (one year ahead of the outcome variables' timing). The results are presented in Table A5 of the online appendix. None of the coefficient estimates on future oil royalties are significant, unlike our main results where school outcomes respond directly to oil royalties received in the past year. The results indicate that pre-existing trends in our dependent variables are unlikely to be driving our results. We also include a specification in the online appendix (Table A6), where we include both a lead and a lag together. The table shows that none of the coefficient estimates on future oil royalties are significant, similar to our previous results with the placebo test employing only future oil royalties. Lagged oil royalties are positively associated with school provision outcomes and is statistically significant for classrooms and students in municipal schools (panels C and D, column (4)). This potentially captures the persistence over the medium to long run in the effects of oil revenue windfalls and is consistent with our main results.

In Table A17 of the online appendix, we include the log of a municipality's population as a control variable. The results show that, for schools (Panel A), staff (Panel B), and classrooms (Panel C), this additional control variable leaves the magnitudes of the coefficients largely unaffected, and the coefficients for column (1) (all schools) and column (4) (municipal schools) remain statistically significant. This implies that the inclusion of population doesn't affect our main results.

Another concern with our main analysis could be that our results are driven by one particular year of data. For example, one might be concerned that our results are driven mostly by variation coming from a year where oil prices spike significantly upwards or downwards. To test the stability of our results to the inclusion of any particular year, in Table A18, we re-estimate the Table 3

results, leaving out one year of data at a time. We focus only on municipal schools because these drive our main results, and because of space limitations. For ease of interpretation, we include the column (4) estimates, using municipal schools only, which covers our entire sample period. The results in Table A18 of the online appendix clearly demonstrate that our results are not driven by any particular year of data; the estimates in all columns are very similar and remain statistically significant.

Table A19 of the online appendix modifies the sample from our main analysis to also include all other coastal municipalities that have constant boundaries during our sample period. As a reminder, in our original analysis the sample consisted only of municipalities with constant boundaries that received non-zero oil royalties at some point during our sample period. In order to provide further evidence that our results are not simply driven by heterogeneity in oil royalty municipalities versus other municipalities that are similar but do not receive oil royalties at all, we include all coastal municipalities that do not receive oil royalties that have constant boundaries. Note that the sample size only modestly increases because most coastal municipalities already receive oil royalties. In addition, the estimates from Table A19 show that the coefficients remain significant at the same levels as in our main table and all magnitudes remain very similar; this suggests that adding other coastal municipalities as a further control group does not have a major impact on our results.

In our main analysis, we cluster at the municipality level. In the next two tables, we explore other choices for standard errors. In Table A20 of the online appendix, we instead use two-way clustering by municipality and year. The standard errors from two-way clustering are very similar to those obtained in our main results. In addition, the statistical significance of our coefficients from our main table are almost unchanged; the only exception is the coefficient for municipal schools per million inhabitants, which is just nudged from being significant at the 5% level to the 10% level. Because the p-value for this coefficient is 0.051, we take the results from Table A12 of the online appendix as showing that two-way clustering does not affect our findings. In Table A21 of the online appendix, we cluster standard errors at the microregion level. Microregions are aggregations of multiple municipalities, and are the next-highest level of geographical unit in Brazil. This higher level of clustering helps account for the possibility that errors in municipalities within the same microregion might be correlated. The results in Table A21 are, again, very similar to our main results and show that our results are robust to clustering by microregion, suggesting that spatial correlation is not a significant issue in our context.

We also construct an offshore oil output measure as in Caselli and Michaels (2013) for use as an instrumental variable. This exercise will help us determine whether using this measure is consistent with our main analysis, which uses a much larger set of municipalities receiving oil royalties. We collected the necessary data to calculate total amount of offshore royalties that each municipality receives. Offshore royalties to municipalities have two components: (i) a variable quota determined by geographic features that must lie between 0% and 5% of the value of oil extracted from a particular field and (ii) a fixed quota of 5% of the value of oil extracted from a given field, which is then allocated to municipalities based on population size and other features that may affect a

particular municipality. We follow the methodology employed by Caselli and Michaels (2013) and focus only on the component of offshore royalties that is determined by purely geographic factors, i.e., the variable quota.

To determine the variable quota offshore royalties to each municipality, we first calculated the value of oil output from each offshore field. We collected data on monthly prices and monthly offshore oil output (both oil and natural gas) from the website of ANP. Given that royalty transfers take place after a lag of two months, the value of output for a given month is calculated using the prices from two months prior. We convert all prices to 2013 reals, consistent with all of our main analyses. We use the following formula to estimate the value of oil output of each field with the assembled data:

Value of oil output of a field = (oil reference price per unit $\times$ oil output) + (gas reference price per unit $\times$ gas output).

Offshore royalties based on this value of oil output are allocated to only "facing" municipalities. A municipality is designated as facing an oil field if its borders's extensions on the continental shelf contain any portion of the field. As discussed in more detail in the paper, the procedure involves extending the boundaries of each municipality (by drawing both perpendicular and parallel lines) towards the sea and then calculating the proportion of each oil field that fell into each extended municipality's borders. This proportion is known as the "facing percentage" of a particular municipality, in relation to a particular field. We collected data from the ANP website on these facing percentages, which enabled us to observe which municipalities received variable quota royalties from a given field and the percentage they received. ANP allocates 22.5% of the oil output to facing municipalities. Therefore, the formula for calculating total variable quota offshore royalty is as follows (Caselli and Michaels, 2013):

Variable quota royalties by municipality for a given field = value of output of a field $\times$ facing percentage $\times$ 0.225.

We include only those municipalities in our final sample whose borders did not change over the time period of our study. Moreover, our data for prices go back to only 2009, which is why we cannot include the years 2007 and 2008 in the following regressions (unlike our main results, which span over the years 2007 to 2014). Furthermore, not all municipalities receive offshore royalties each year, if the field they are facing did not report any output for that year. Only 51 municipalities are designated as facing municipalities in our resulting sample, which is less than 10% of our original sample of 700 municipalities.

We then instrument for total municipal royalties with the variable quota royalties for this subsample of municipalities in Table A22. The first stage of the instrument is strong. The identification assumption is that variable quota oil royalties based on geographic features of a municipality af-

fect school outcomes only through their effect on total royalties received by the municipality. The results for our main outcome variables, school provision, are reported in Table A22 of the online appendix. As is evident, we lose precision in our estimates because of the drastically lower sample size. However, the pattern of the results is very similar to our main results of the effect of oil royalties on school provision, which is reassuring. Oil royalties are associated with higher levels of schools, staff, and students for all schools. These overall results are primarily driven by municipal schools (column (4)), as is also the case with our larger sample of 700 municipalities across eight years. The magnitude of the estimates is almost three times as large for schools and student enrolment relative to our main results, although imprecisely estimated. The estimate for staff is comparable to our main results. We also observe negative effects on private schools and private students in this subsample, unlike the main results. Overall, though, the results in Table A22 are consistent with our main analysis's conclusion that oil royalties increase education provision with municipal schools being the driving force.

We also further examine the heterogeneity of the oil royalty effect on the offshore receiving municipalities. If there is a differential effect between these municipalities and the rest of our main sample, then this could imply that our main results are subject to some bias. The heterogeneity analysis, in Table A23 of the online appendix, reassuringly show that there is no differential effect of oil royalties on the offshore receiving municipalities. This implies that even though the rest of our sample may receive oil royalties from sources other than offshore oil production, there is no bias introduced in our estimates because of this additional variation.

A.5 Additional Tables

Table A1: Effect of oil royalties on sources of municipal revenues and expenditures

	(1)	(2)	(3)
	Federal and state transfers	Municipal taxes	Total municipal expenses
Royalties per capita	−0.0220	−0.298	1.191***
	(0.0214)	(0.390)	(0.435)
Observations	3,847	3,937	3,937
R^2	0.6290	0.9969	0.9863

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

Table A2: Effect of oil royalties on students by student type

	(1) Female students	(2) Male students	(3) Special students
Panel A: All schools			
Royalties per capita	1.954	2.401**	−0.329
	(1.278)	(1.193)	(0.343)
Observations	5,600	5,600	5,600
Panel B: Federal schools			
Royalties per capita	0.00546	−0.0267	0.00117
	(0.0820)	(0.0743)	(0.00155)
Observations	5,600	5,600	5,600
Panel C: State schools			
Royalties per capita	−0.959	−0.750	−0.0129
	(0.880)	(1.005)	(0.0452)
Observations	5,600	5,600	5,600
Panel D: Municipal schools			
Royalties per capita	3.161**	3.518***	−0.159
	(1.243)	(1.228)	(0.265)
Observations	5,600	5,600	5,600
Panel E: Private schools			
Royalties per capita	−0.252	−0.340	−0.158*
	(0.210)	(0.214)	(0.0872)
Observations	5,600	5,600	5,600

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

Table A3: Family of outcomes: Education provision, infrastructure, and school activities

	(1) Education provision	(2) Education provision	(3) Education provision	(4) Education provision	(5) Infrastructure	(6) School activities	(7) Combined index
Royalties per capita	−6.58e-06	−2.21e-05	0.000101***	−9.39e-06	9.50e-06	−2.33e-05	2.67e-05
	(5.22e-05)	(3.06e-05)	(3.23e-05)	(1.95e-05)	(1.66e-05)	(4.23e-05)	(2.83e-05)
Observations	5,600	5,600	5,600	5,600	2,100	4,200	1,400
Mean of dependent variable	2.34e-09	6.49e-12	4.26e-10	−8.94e-09	−0.2030338	0.0704653	−0.0947234
R^2	0.838	0.945	0.945	0.949	0.960	0.745	0.926
School type:	Federal	State	Municipal	Private	Municipal	Municipal	Municipal

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

Table A4: Effect of current and lagged oil royalties on main outcomes

	Schools per million		Classrooms per million		Teachers per million		Students per million	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Royalties per capita, t-1	0.0328**	0.0205	0.220***	0.135	2.134***	0.799	6.679***	3.283
	(0.0163)	(0.0125)	(0.0675)	(0.0879)	(0.567)	(0.525)	(2.457)	(3.245)
Royalties per capita, t-2		0.00981		−0.0375		1.207**		−0.191
		(0.0123)		(0.112)		(0.606)		(3.002)
Royalties per capita, t-3		−0.00268		0.135**		0.735		1.464
		(0.0113)		(0.0591)		(0.653)		(3.160)
Observations	5,600	4,200	5,600	4,200	5,577	4,177	5,600	4,200

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

Table A5: Main results, with future oil royalties

School type:	(1) All	(2) Federal	(3) State	(4) Municipal	(5) Private
Panel A: Schools per million					
Future royalties per capita	0.0219	0.000449	−0.00126	0.0192	0.00347
	(0.0204)	(0.000638)	(0.00606)	(0.0184)	(0.00313)
Observations	4,200	4,200	4,200	4,200	4,200
R^2	0.958	0.807	0.931	0.960	0.916
Panel B: Staff per million					
Future royalties per capita	0.748	0.00514	−0.0921	0.731	0.104
	(0.465)	(0.0226)	(0.150)	(0.455)	(0.113)
Observations	4,200	4,200	4,200	4,200	4,200
R^2	0.888	0.771	0.956	0.910	0.951
Panel C: Classrooms per million					
Future royalties per capita	0.175	0.00248	−0.00116	0.157	0.0163
	(0.1874)	(0.00688)	(0.0319)	(0.1665)	(0.0266)
Observations	4,200	4,200	4,200	4,200	4,200
R^2	0.894	0.850	0.944	0.916	0.961
Panel D: Students per million					
Future royalties per capita	2.837	0.124	−1.648	4.023	0.338
	(4.589)	(0.165)	(2.329)	(3.379)	(0.413)
Observations	4,200	4,200	4,200	4,200	4,200
R^2	0.903	0.883	0.953	0.955	0.966

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. Future oil royalties refer to oil royalties (per capita) a year (t + 1) ahead of the outcome variables' timing. All regressions include municipality and year fixed effects.

Table A6: Main results, with future and lagged oil royalties jointly

	(1)	(2)	(3)	(4)	(5)
School type:	All	Federal	State	Municipal	Private
Panel A: Schools per million					
Royalties per capita, t+1	0.0241	0.000718	0.00298	0.0171	0.00329
	(0.0211)	(0.000835)	(0.00659)	(0.0172)	(0.00486)
Royalties per capita, t-1	0.00395	−0.000420	−0.0110	0.0167	−0.00133
	(0.0158)	(0.000424)	(0.00862)	(0.0137)	(0.00406)
Observations	3,500	3,500	3,500	3,500	3,500
R^2	0.965	0.812	0.952	0.966	0.939
Panel B: Staff per million					
Royalties per capita, t+1	0.514	0.0167	−0.0595	0.556	0.00151
	(0.480)	(0.0319)	(0.156)	(0.475)	(0.122)
Royalties per capita, t-1	0.999*	−0.0174	0.0254	0.838	0.154
	(0.573)	(0.0278)	(0.216)	(0.520)	(0.146)
Observations	3,500	3,500	3,500	3,500	3,500
R^2	0.909	0.777	0.958	0.930	0.957
Panel C: Classrooms per million					
Royalties per capita, t+1	0.136	0.00607	0.0225	0.102	0.00470
	(0.109)	(0.00954)	(0.0421)	(0.0747)	(0.0357)
Royalties per capita, t-1	0.0856	−0.00568	−0.0615	0.160*	−0.00731
	(0.0986)	(0.00661)	(0.0429)	(0.0930)	(0.0324)
Observations	3,500	3,500	3,500	3,500	3,500
R^2	0.897	0.857	0.952	0.916	0.968
Panel D: Students per million					
Royalties per capita, t+1	−0.416	0.141	−0.691	0.0383	0.0951
	(5.337)	(0.223)	(3.232)	(3.569)	(0.639)
Royalties per capita, t-1	7.362**	−0.0293	−1.788	9.565***	−0.386
	(3.550)	(0.171)	(2.411)	(2.461)	(0.832)
Observations	3,500	3,500	3,500	3,500	3,500
R^2	0.909	0.906	0.960	0.959	0.973

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

Table A7: School infrastructure, preschools and elementary schools only

Proportion of schools with:	(1) Library	(2) Science lab	(3) Computer lab	(4) Gym	(5) Internet	(6) Broadband internet	(7) Filtered water	(8) Electricity
Royalties per capita	0.00155***	7.10e-05	−0.00145*	−4.45e-05	0.00175	−0.00177	0.000715	−0.000308***
	(0.000520)	(0.000242)	(0.000826)	(0.000817)	(0.00162)	(0.00138)	(0.000442)	(0.000115)
Observations	5,600	5,600	5,600	2,800	5,555	4,833	5,600	5,600
R^2	0.767	0.829	0.754	0.948	0.729	0.787	0.937	0.864

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

Table A8: School-provided services, preschools and elementary schools only

Proportion of schools with:	(1) Meals	(2) Special ed. programs	(3) Free activities
Royalties per capita	−0.000423*	0.000238	−0.00210**
	(0.000229)	(0.000710)	(0.000834)
Observations	5,600	4,200	4,900

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

Table A9: Staff, by teachers and non-teachers

Group:	(1) All staff	(2) Teachers	(3) Non-teachers
Panel A: Per million inhabitants			
Royalties per capita	2.241***	2.134***	0.107
	(0.420)	(0.567)	(0.415)
Observations	5,577	5,577	5,577
R^2	0.885	0.872	0.744
Panel B: Proportions			
Royalties per capita		0.000777*	−0.000777*
		(0.000411)	(0.000411)
Observations		5,577	5,577
R^2		0.958	0.958

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. The proportions results in Panel B use as dependent variables the share of staff that are comprised of either teachers (column (2)) and non-teachers (column (3)). All regressions include municipality and year fixed effects.

Table A10: Teachers, by subjects taught

	(1)	(2)	(3)	(4)
Subject:	Science	Languages	Arts	Math
Panel A: Per million inhabitants				
Royalties per capita	0.277***	0.453***	0.622***	0.257***
	(0.106)	(0.133)	(0.166)	(0.0421)
Observations	5,577	5,577	5,577	5,577
R^2	0.877	0.882	0.879	0.886
Panel B: Proportions				
Royalties per capita	−0.000548**	−0.000324	−7.33e-05	−0.000203
	(0.000234)	(0.000227)	(0.000275)	(0.000294)
Observations	5,412	5,412	5,412	5,412
R^2	0.886	0.886	0.910	0.859

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. The proportions results in Panel B use as dependent variables the share of teachers that teach the subject listed in the subject heading (science, languages arts, math). All regressions include municipality and year fixed effects.

Table A11: Teachers, by demographics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Group:	Male	Female	Young	Old	White	Non-white	Postgrad	Non-postgrad
Panel A: Per million inhabitants								
royalties per capita	0.337	1.797***	1.738***	0.397	1.659***	0.475	2.199***	−0.0777
	(0.228)	(0.374)	(0.342)	(0.347)	(0.305)	(0.321)	(0.524)	(0.360)
Observations	5,577	5,577	5,577	5,577	5,577	5,577	5,577	5,577
R^2	0.822	0.867	0.833	0.848	0.842	0.861	0.754	0.758
Panel B: Proportions								
Royalties per capita	−3.59e-05		0.00231**		0.000521		0.000422	
	(0.000439)		(0.00115)		(0.000438)		(0.000747)	
Observations	5,412		5,412		5,412		5,411	
R^2	0.814		0.607		0.909		0.773	

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. The proportions results in Panel B use as dependent variables the share/proportion of teachers that have the characteristic listed in the group heading (young, white, having a postgraduate degree); the proportions results for the converse categories (old, non-white, no postgrad) are omitted because they would exactly mirror the columns already shown. All regressions include municipality and year fixed effects.

Table A12: Heterogeneous effects by corruption

	(1)	(2)	(3)	(4)	(5)	(6)
Dependant variable:	Schools p.c.	Schools p.c.	Classrooms p.c.	Classrooms p.c.	Staff p.c.	Staff p.c.
Royalties per capita	0.0376	0.0263	0.243	0.226	1.378	1.177
	(0.0692)	(0.0807)	(0.196)	(0.241)	(2.130)	(2.583)
Corrupt × royalties		0.470		0.711		8.365
		(0.832)		(2.499)		(32.92)
Observations	744	744	744	744	744	744
R^2	0.932	0.932	0.938	0.938	0.884	0.884

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita (p.c.) are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects. Specifications in this table use only municipal schools.

Table A13: Heterogeneous effects by clientelism

	(1)	(2)	(3)	(4)	(5)	(6)
Dependant variable:	Schools p.c.	Schools p.c.	Classrooms p.c.	Classrooms p.c.	Staff p.c.	Staff p.c.
Royalties per capita	0.0304***	−0.173	0.164***	−0.409	1.468***	−0.806
	(0.0117)	(0.108)	(0.0376)	(0.429)	(0.532)	(3.064)
Royalties per capita × clientelism		0.0118*		0.0333		0.132
		(0.00647)		(0.0254)		(0.193)
Observations	3,432	3,432	3,432	3,432	3,432	3,432
R^2	0.941	0.941	0.880	0.880	0.903	0.903

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita (p.c.) are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects. Specifications in this table use only municipal schools.

Table A14: Heterogeneity of effect of oil royalties by urban and rural regions

	Rural municipal schools	Urban municipal schools
	(1)	(2)
Panel A: School outcomes		
Schools per million	0.02434	0.00845
	(0.01362)	(0.00750)
Classrooms per million	0.07654**	0.14325**
	(0.03473)	(0.06385)
Staff per million	0.46675**	1.09246**
	(0.18509)	(0.46166)
Teachers per million	1.64325**	0.49098
	(0.70736)	(0.55403)
Students per million	3.51332**	5.15185***
	(1.65000)	(1.50575)
Panel B: Inputs per students		
Student–teacher ratio	−0.01200	0.03101
	(0.00045)	(0.02793)
Student–classroom ratio	0.00017	0.00064
	(0.00045)	(0.00056)
Student–school ratio	0.00071	0.01308***
	(0.00052)	(0.00411)
Panel C: Student outcomes		
Pass rate	−0.00046	−0.00028
	(0.00045)	(0.00050)
Fail rate	0.00040	0.00005
	(0.00045)	(0.00045)
Dropout rate	0.00006	0.00024
	(0.00052)	(0.00013)
Observations	5,551	5,551

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

Table A15: Heterogeneity of effect of oil royalties across new and existing schools

	New municipal schools	Existing municipal schools
	(1)	(2)
Panel A: School outcomes		
Classrooms per million	0.03485	0.19600***
	(0.05963)	(0.05630)
Staff per million	0.26568	1.19454***
	(0.41309)	(0.41654)
Teachers per million	0.00998	2.09109***
	(0.05698)	(0.41355)
Students per million	0.17458	4.55809**
	(0.32296)	(2.06267)
Panel B: Inputs per students		
Student–teacher ratio	0.00049	−0.00017
	(0.00040)	(0.00014)
Student–classroom ratio	0.00079	−0.00059
	(0.00055)	(0.00044)
Student–school ratio	0.00254	−0.00091
	(0.00344)	(0.00152)
Observations	7,196	7,196

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

Table A16: Main results, with state–year fixed effects

	(1)	(2)	(3)	(4)	(5)
School type:	All	Federal	State	Municipal	Private
Panel A: Schools per million					
Royalties per capita	0.0266***	−8.54e-05	−0.00303	0.0280***	0.00175
	(0.0101)	(0.000468)	(0.00614)	(0.0105)	(0.00184)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.946	0.762	0.914	0.949	0.908
Panel B: Staff per million					
Royalties per capita	1.527***	−0.00770	−0.0931	1.485***	0.143
	(0.431)	(0.0229)	(0.113)	(0.506)	(0.0928)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.871	0.754	0.946	0.899	0.947
Panel C: Classrooms per million					
Royalties per capita	0.185***	−0.00407	−0.00958	0.195***	0.00357
	(0.0458)	(0.00534)	(0.0242)	(0.0570)	(0.0213)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.880	0.830	0.929	0.910	0.953
Panel D: Students per million					
Royalties per capita	5.199**	−0.0226	−1.943	7.025***	0.141
	(2.397)	(0.151)	(1.762)	(2.368)	(0.410)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.854	0.864	0.942	0.927	0.962

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and state–year fixed effects.

Table A17: Main results, with logged population

	(1)	(2)	(3)	(4)	(5)
School type:	All	Federal	State	Municipal	Private
Panel A: Schools per million					
Royalties per capita	0.0244*	2.11e-05	−0.00579	0.0309*	−0.000771
	(0.0125)	(0.000473)	(0.00650)	(0.0163)	(0.00170)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.937	0.752	0.907	0.940	0.898
Panel B: Staff per million					
Royalties per capita	1.600***	−0.00185	0.00963	1.537***	0.0553
	(0.444)	(0.0249)	(0.128)	(0.525)	(0.0902)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.850	0.745	0.921	0.889	0.941
Panel C: Classrooms per million					
Royalties per capita	0.162***	−0.00169	−0.0234	0.213***	−0.0257
	(0.0475)	(0.00568)	(0.0278)	(0.0664)	(0.0192)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.871	0.823	0.920	0.904	0.947
Panel D: Students per million					
Royalties per capita	3.822*	−0.0169	−1.878	6.319***	−0.602
	(2.175)	(0.152)	(1.860)	(2.307)	(0.413)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.857	0.857	0.932	0.925	0.953

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects as well as a logged population variable.

Table A18: Main results, leaving out one year at a time

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Leaving out year:	None	2007	2008	2009	2010	2011	2012	2013	2014
Panel A: Schools per million									
Royalties per capita	0.0328**	0.0302**	0.0315*	0.0381*	0.0331*	0.0339**	0.0344*	0.0344**	0.0256*
	(0.0163)	(0.0147)	(0.0162)	(0.0196)	(0.0172)	(0.0171)	(0.0181)	(0.0165)	(0.0145)
Observations	5,600	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900
R^2	0.939	0.948	0.942	0.935	0.934	0.936	0.937	0.941	0.946
Panel B: Staff per million									
Royalties per capita	1.559***	1.530***	1.512***	1.695***	1.584***	1.569***	1.628***	1.681***	1.251***
	(0.524)	(0.575)	(0.573)	(0.640)	(0.518)	(0.547)	(0.564)	(0.447)	(0.413)
Observations	5,600	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900
R^2	0.887	0.905	0.900	0.886	0.881	0.880	0.883	0.891	0.893
Panel C: Classrooms per million									
Royalties per capita	0.220***	0.191***	0.220***	0.241***	0.228***	0.221***	0.210**	0.259***	0.185***
	(0.0675)	(0.0562)	(0.0724)	(0.0846)	(0.0777)	(0.0700)	(0.0855)	(0.0624)	(0.0517)
Observations	5,600	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900
R^2	0.901	0.906	0.901	0.896	0.894	0.896	0.926	0.902	0.905
Panel D: Students per million									
Royalties per capita	6.679***	5.378**	6.226**	6.992**	7.180***	6.465***	6.497**	8.112***	6.563***
	(2.457)	(2.434)	(2.724)	(2.826)	(2.504)	(2.448)	(2.660)	(2.234)	(2.277)
Observations	5,600	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900
R^2	0.921	0.923	0.920	0.919	0.916	0.919	0.922	0.926	0.936

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects. Each column, except column (1), repeats the main analysis using only municipal schools and leaving out one year of data. The year left out is specified in the header at the top of the table.

Table A19: Education provision outcomes, extending sample to all coastal municipalities

	(1)	(2)	(3)	(4)	(5)
School type:	All	Federal	State	Municipal	Private
Panel A: Schools per million					
Royalties per capita	0.0262**	2.30e-05	−0.00460	0.0314**	−0.000565
	(0.0125)	(0.000475)	(0.00624)	(0.0159)	(0.00170)
Observations	6,552	6,552	6,552	6,552	6,552
R^2	0.944	0.742	0.910	0.948	0.900
Panel B: Staff per million					
Royalties per capita	1.547***	−0.00113	0.0169	1.477***	0.0544
	(0.424)	(0.0250)	(0.132)	(0.498)	(0.0904)
Observations	6,552	6,552	6,552	6,552	6,552
R^2	0.839	0.752	0.921	0.884	0.944
Panel C: Classrooms per million					
Royalties per capita	0.170***	−0.00168	−0.0171	0.213***	−0.0245
	(0.0483)	(0.00572)	(0.0265)	(0.0656)	(0.0191)
Observations	6,552	6,552	6,552	6,552	6,552
R^2	0.871	0.819	0.922	0.911	0.949
Panel D: Students per million					
Royalties per capita	3.903*	−0.0137	−1.674	6.165***	−0.574
	(2.359)	(0.153)	(1.868)	(2.295)	(0.410)
Observations	6,552	6,552	6,552	6,552	6,552
R^2	0.846	0.860	0.924	0.920	0.955

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

Table A20: Main results, with two-way clustering

	(1)	(2)	(3)	(4)	(5)
School type:	All	Federal	State	Municipal	Private
Panel A: Schools per million					
Royalties per capita	0.0267*	1.11e-05	−0.00554	0.0328*	−0.000592
	(0.0122)	(0.000425)	(0.00588)	(0.0158)	(0.00143)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.936	0.752	0.906	0.939	0.898
Panel B: Staff per million					
Royalties per capita	1.633***	−0.00282	0.0191	1.559**	0.0570
	(0.401)	(0.0225)	(0.144)	(0.501)	(0.0921)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.848	0.745	0.921	0.887	0.941
Panel C: Classrooms per million					
Royalties per capita	0.172***	−0.00193	−0.0212	0.220**	−0.0248
	(0.0442)	(0.00511)	(0.0246)	(0.0635)	(0.0214)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.866	0.822	0.919	0.901	0.947
Panel D: Students per million					
Royalties per capita	4.355*	−0.0212	−1.709	6.679**	−0.593
	(2.274)	(0.139)	(1.692)	(2.356)	(0.371)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.841	0.856	0.929	0.921	0.953

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are two-way clustered by municipality and year. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

Table A21: Effect of oil royalties on education provision, clustering by microregion

	(1)	(2)	(3)	(4)	(5)
School type:	All	Federal	State	Municipal	Private
Panel A: Schools per million					
Royalties per capita	0.0267**	1.11e-05	−0.00554	0.0328**	−0.000592
	(0.0124)	(0.000464)	(0.00716)	(0.0160)	(0.00150)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.936	0.752	0.906	0.939	0.898
Panel B: Staff per million					
Royalties per capita	1.633***	−0.00282	0.0191	1.559***	0.0570
	(0.297)	(0.0241)	(0.154)	(0.354)	(0.0536)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.848	0.745	0.921	0.887	0.941
Panel C: Classrooms per million					
Royalties per capita	0.172***	−0.00193	−0.0212	0.220***	−0.0248*
	(0.0382)	(0.00544)	(0.0291)	(0.0571)	(0.0146)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.866	0.822	0.919	0.901	0.947
Panel D: Students per million					
Royalties per capita	4.355*	−0.0212	−1.709	6.679***	−0.593
	(2.338)	(0.145)	(1.969)	(2.261)	(0.386)
Observations	5,600	5,600	5,600	5,600	5,600
R^2	0.841	0.856	0.929	0.921	0.953

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered by microregion. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

Table A22: Education provision outcomes, with total royalties instrumented by offshore variable royalties

	(1)	(2)	(3)	(4)	(5)
School type:	All	Federal	State	Municipal	Private
Panel A: Schools per million					
Royalties per capita	0.0611	−0.000867	0.0191	0.0953	−0.0525*
	(0.0984)	(0.00355)	(0.0158)	(0.0986)	(0.0313)
Observations	295	295	295	295	295
R^2	0.951	0.534	0.898	0.948	0.846
Panel B: Staff per million					
Royalties per capita	1.742	0.0225	0.899	1.805	−0.984
	(2.790)	(0.207)	(0.864)	(2.525)	(0.687)
Observations	295	295	295	295	295
R^2	0.906	0.674	0.900	0.926	0.915
Panel C: Classrooms per million					
Royalties per capita	−0.408	−0.000282	0.153	0.0372	0.381
	(0.565)	(0.0554)	(0.215)	(0.534)	(0.513)
Observations	295	295	295	295	295
R^2	0.837	0.569	0.917	0.950	
Panel D: Students per million					
Royalties per capita	0.837	−0.757	−5.212	16.77	−9.967*
	(15.99)	(1.106)	(13.66)	(17.92)	(5.637)
Observations	295	295	295	295	295
R^2	0.837	0.640	0.835	0.918	0.894

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

Table A23: Heterogeneity by offshore variable quota municipalities

	(1)	(2)	(3)	(4)	(5)
School type:	All	Federal	State	Municipal	Private
Panel A: Schools per million					
Royalties per capita	0.0434	−0.000103	0.000489	0.0445	−0.00142
	(0.0356)	(0.000352)	(0.0131)	(0.0341)	(0.00597)
Royalties per capita × variable quota subsample	−0.0260	0.000223	−0.00258	−0.0245	0.000912
	(0.0368)	(0.000757)	(0.0136)	(0.0380)	(0.00759)
Observations	4,200	4,200	4,200	4,200	4,200
R^2	0.959	0.798	0.950	0.962	0.934
Panel B: Staff per million					
Royalties per capita	2.790***	−0.0238	0.375	2.405**	0.0341
	(0.928)	(0.0321)	(0.394)	(0.946)	(0.177)
Royalties per capita × variable quota subsample	−1.372	0.0363	−0.110	−1.316	0.0178
	(1.045)	(0.0507)	(0.443)	(1.160)	(0.277)
Observations	4,200	4,200	4,200	4,200	4,200
R^2	0.893	0.784	0.941	0.926	0.958
Panel C: Classrooms per million					
Royalties per capita	0.166	−0.00382	0.0175	0.167	−0.0152
	(0.188)	(0.00470)	(0.0614)	(0.197)	(0.0464)
Royalties per capita × variable quota subsample	−0.0307	0.00279	−0.0328	0.00809	−0.00871
	(0.187)	(0.00932)	(0.0664)	(0.209)	(0.0707)
Observations	4,200	4,200	4,200	4,200	4,200
R^2	0.885	0.856	0.937	0.912	0.965
Panel D: Students per million					
Royalties per capita	14.67***	−0.0233	3.926	11.01*	−0.239
	(5.391)	(0.150)	(2.884)	(5.660)	(0.979)
Royalties per capita × variable quota subsample	−16.09***	0.0228	−6.479	−9.463	−0.168
	(5.972)	(0.276)	(4.280)	(6.104)	(1.227)
Observations	4,200	4,200	4,200	4,200	4,200
R^2	0.854	0.912	0.946	0.926	0.972

Notes: *** denotes 1% significance, ** denotes 5% significance, * denotes 10% significance. Standard errors are clustered at the municipality level. Royalties per capita are in 2013 Brazilian reals, converted from nominal reals using the Brazilian CPI from FRED, while the dependent variables are the schooling outcome variables per one million people. All regressions include municipality and year fixed effects.

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