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Teaching Practices and Social Capital[†]

By YANN ALGAN, PIERRE CAHUC, AND ANDREI SHLEIFER*

In cross-country data, teaching practices (such as copying from the board versus working on projects together) are related to various dimensions of social capital. In micro-data from three datasets, teaching practices are also strongly correlated with student beliefs about cooperation across schools within countries. To address omitted variable and reverse causality concerns, we show that, within schools, teaching practices also have an independent and sizeable effect on student beliefs. The evidence supports the idea that progressive education promotes the formation of social capital. (JEL D83, I21, Z13)

Since the path-breaking work of Banfield (1958), Coleman (1990), and Putnam (1993, 2000), social scientists have argued that social capital, defined broadly as the capacity of members of a community to cooperate with others outside their family, is an important determinant of social outcomes. The list of such outcomes includes the provision of public goods (Putnam 1993), economic growth (Knack and Keefer 1997; Algan and Cahuc 2010), formation of large firms and organizations (La Porta et al. 1997), financial development (Guiso, Sapienza, and Zingales 2004), trade (Guiso, Sapienza, and Zingales 2009), as well as methods of state intervention (Djankov et al. 2003; Aghion et al. 2010). Many social scientists have also argued that social capital is highly persistent over time (Putnam 1993; Guiso, Sapienza, and Zingales 2007) because the underlying beliefs regarding the benefits of trust and cooperation are transmitted in communities through families (Bisin and Verdier 2001; Tabellini 2008; Guiso, Sapienza, and Zingales 2008).

The emphasis on family transmission leads to a sanguine assessment of the possibility of raising the levels of social capital in a community, since not much scope for action is left for the community itself. But is it really the case that only families play a role? Is there a possibility that a community can raise its own levels of social capital collectively?

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In this paper, we explore an alternative, and complementary, mechanism of how social capital is transmitted in a community, namely schooling. Aghion et al. (2010) and Guiso, Sapienza, and Zingales (2010) note that schools rather than families might contribute to such transmission. There is some evidence that a greater quantity of schooling leads to higher social capital (Milligan, Moretti, and Oreopoulos 2004; Helliwell and Putnam 2007; Glaeser, Ponzetto, and Shleifer 2007) and has other desirable nonpecuniary benefits (Oreopoulos and Salvanes 2011). Our emphasis is not on the quantity of schooling, but on how students are taught.

The idea that how students are taught shapes their beliefs is not new. Teaching ethics and civiness are established goals of school systems in many countries, which also animate the progressive education movement (Dewey 1944). The Marxist critique of capitalist education (Bourdieu and Passeron 1970; Bowles and Gintis 1976) sees these goals as aiming to perpetuate the social order. Our paper is an empirical exploration into the effects of progressive education.

Our starting observation is that the methods of teaching differ tremendously across countries, and between schools and within schools in a country. Some schools and teachers emphasize what we call vertical teaching practices, whereby teachers primarily lecture, students take notes or read textbooks, and teachers ask students questions. The central relationship in the classroom is between the teacher and the student. Other schools and teachers emphasize what we call horizontal teaching practices, whereby students work in groups, do projects together, and ask teachers questions. The central relationship in the classroom is among students. Consistent with the idea that beliefs underlying social capital are acquired through the practice of cooperation, we hypothesize that horizontal practices are conducive to the formation of social capital, whereas vertical teaching practices are not.

To pursue our study, we assemble data on teaching practices across schools from several multi-country data sources. The three databases we examine are the Civic Education Study (CES), run in 1999 in 25 countries to assess the level of civic knowledge of mostly 14-year-olds in the eighth and ninth grades; the Trends in International Mathematics and Science Study (TIMSS), conducted in 1995, 2003, and 2007 for 59 countries and focused similarly on the eighth graders; and the Progress in International Reading Literacy 2006 (PIRLS 2006), dealing with reading achievement of fourth graders. These surveys contain a great deal of student-level information about student beliefs and characteristics, as well as characteristics of their teachers and their schools, including teaching practices. In our empirical work, we emphasize the distinction between “teacher lectures” and “students work in groups” as measures of vertical and horizontal teaching practices.

We find that teaching practices vary systematically across countries. Students work in groups more in Nordic countries (Denmark, Norway, Sweden) and Anglo-Saxon countries (Australia, United States and to a lesser extent Great Britain). This teaching practice is less common in East European countries and in the Mediterranean (Greece, France, Portugal and, to a lesser extent, Italy). In these countries, teachers spend more time lecturing. Moreover, holding constant per capita income and average years of education, vertical teaching is strongly negatively correlated with trust and association membership, the two standard measures of social capital from the World Values Survey.

To get beyond aggregate correlations, we first document a strong correlation between teaching practices and student beliefs at the student level, across schools within countries (i.e., with country fixed effects). Holding constant an extensive list of student, teacher, and school characteristics, including teacher and school levels of social capital, we find a significant relationship between teaching practices and various dimensions of student social capital, including beliefs in cooperation with other students and with teachers, association membership, trust in institutions, and participation in civil society. We also find a strong correlation with various non-cognitive skills, such as self-esteem and positive attitudes.

The within country/between schools estimates raise two main identification issues. First, omitted variables might determine both teaching practices and student beliefs. In particular, differences in teaching practices may reflect differences in beliefs or preferences of the community rather than exert an independent influence on student beliefs. For example, teachers specializing in horizontal teaching might be selected, or self-select, into high social capital communities. Second, there is an issue of reverse causality—teachers might adjust their practices to the social capital of their students. If teaching practices entirely reflect community preferences or student social capital, then one might still argue that only families shape beliefs, while schools merely reinforce what families teach kids already. If, however, teaching practices have an independent influence, there is a possibility that schools can build social capital even in communities where parents lack it.

To address these concerns, we use within-school estimates to identify the causal effect of teaching practices on student beliefs (a classroom is defined as a group of students in a grade that take most of their classes together). By looking at teaching practices and student beliefs across classrooms within a school, we can alleviate concerns regarding omitted variables that could drive self-sorting of parents, students, and teachers into schools. The comparison of between schools (within a country) and within-school estimates provides a sense of the magnitude of the selection bias. Conceivably, students or teachers might still be allocated to specific classrooms within the same school, depending on their test scores, noncognitive skills, or social capital. To control for omitted variables and reverse causality within schools, we include detailed individual and classroom characteristics in the regression. We control for individual cognitive skills of students before entering and during their observed grade. We also control for both the average and the standard deviation of cognitive test performance at the classroom level. Finally, we look at selection of students based on observable characteristics into classrooms. We find no evidence that selection of students and teachers into classrooms is responsible for our results, thus supporting our identifying assumption.

It is still possible (though not entirely plausible) that unobservable variables drive the selection of students and teachers into classrooms. As a check, we use within-classroom variation in teaching practices and student beliefs, based on a subsample of schools for which we can identify classrooms of students who take math and science with each other but with different teachers. The evidence on student attitudes toward different subjects within the same classroom confirms that teaching practices have a significant independent effect on student beliefs.

The within-school (and within-classroom) estimates allow us to address self-selection and reverse causality. A separate concern is that horizontal teaching practices just proxy for a teacher being good or nice. To address this concern, we first show that teaching practices have no effect on cognitive skills, rendering implausible the claim that teachers relying on horizontal practices are better overall. Second, we look at alternative teaching practices, such as providing individual help to students or letting students work on their own projects. These practices correlate with the same “nice” teacher attributes, such as gender (female) or a diploma in psychology, as those predicting the adoption of group activities. Yet these teaching practices have no effect on student social capital.

Section I presents the motivating macro evidence on the cross-country correlation between teaching practices and social capital. Section II describes the data. Section III presents the basic micro evidence on the relationship between teaching practices and student beliefs using variation between schools within countries. To get closer to causality, Section IV focuses on within-school, between classroom estimates, and briefly describes the within-classroom estimates. Section V shows that horizontal teaching practices have an independent effect that cannot be explained by teachers being either good or nice. Section VI concludes.

I. Cross-Country Correlation between Teaching Practices and Social Capital

We illustrate the data on teaching practices at the country level using two main databases devoted to the eighth grade: the 1999 Civic Education Study (CES) and the 1995 Trends in International Mathematics and Science Study (TIMSS). Both databases are described in detail in online Appendix A.

CES is a survey run in 1999 by the International Association for the Evaluation of Educational Achievement (IEA) in 25 countries. We use the following two questions from the teacher survey: “In your class, how often do students work in groups? In your class, how often does the teacher lecture?” “Teacher lectures” is an example of vertical teaching, and “Students work in groups” is an example of horizontal teaching. The second database, also run by the IEA, is TIMSS, a multi-country comparative test of student cognitive achievement in math and science. In TIMSS, teaching practices are measured from the individual student surveys conducted in all classrooms in each selected school (the teacher survey reports working in groups, but not lecturing). We focus on teaching practices in mathematics, which yields observations for the maximum number of countries. The questions most relevant for our analysis are: “In schools, how often do you do these things?, Copy notes from the board during the lessons?, Work together in pairs and small groups in class?” The answers range from 1 for all the time, 2 for often, 3 for sometimes, to 4 for never. We reverse the order of the scores, so that a higher value corresponds to the more frequent use of the teaching practice.

Figure 1 shows a negative cross-country correlation between country average scores of “Students work in groups” and “Teacher lectures” from CES. The coefficient of correlation is equal to -0.418 . Students work in groups more in Nordic countries (Denmark, Norway, Sweden) and Anglo-Saxon countries (Australia, United States and, to a lesser extent, Great Britain). This teaching practice is less common in East

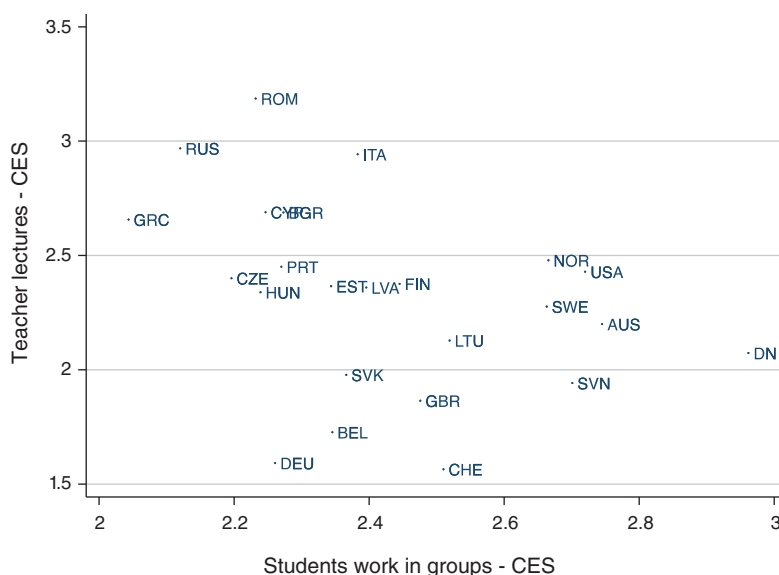


FIGURE 1. AVERAGE COUNTRY SCORES IN TEACHING PRACTICES

Note: Teacher lectures and students work in groups (1 = Never, 2 = Sometimes, 3 = Often, 4 = Always).

Source: CES

European countries and in the Mediterranean (Greece, Cyprus, Portugal, and, to a lesser extent, Italy). In contrast, in East European and Mediterranean countries, teachers spend more time lecturing. In Germany and Switzerland, teachers combine the two practices, or do something else with their class time.

Figure 2 shows a negative cross-country correlation of -0.137 between average scores from TIMSS for “Students copy notes from the board during the lessons” and “Students work together in pairs and in small groups in class.” In all countries, students take notes from the board more frequently than they work in groups, but they do much more so in France, Japan, Turkey, and more generally in most Continental and Mediterranean European countries. In contrast, the gap between country average scores for “Students take notes from the board” and “Students work in groups” is the lowest in Scandinavian and Anglo Saxon countries.

For countries present in both CES and TIMSS, the indicators of teaching practices are significantly correlated with each other. The cross-country correlation between averages of “Teacher lectures” from CES and “Students take notes from the board” from TIMSS is 0.328 . The corresponding correlation between “Students work in groups” from CES and TIMSS is 0.598 . The phrasing of the questions differs between CES and TIMSS, but they appear to capture the same broad contrast between vertical and horizontal teaching. This comparison also suggests that students and teachers share the same perceptions of teaching practices, since the questions are administrated at the teacher level in CES and at the student level in TIMSS. Since TIMSS covers a wider spectrum of countries, we base our cross-country analysis on this database.

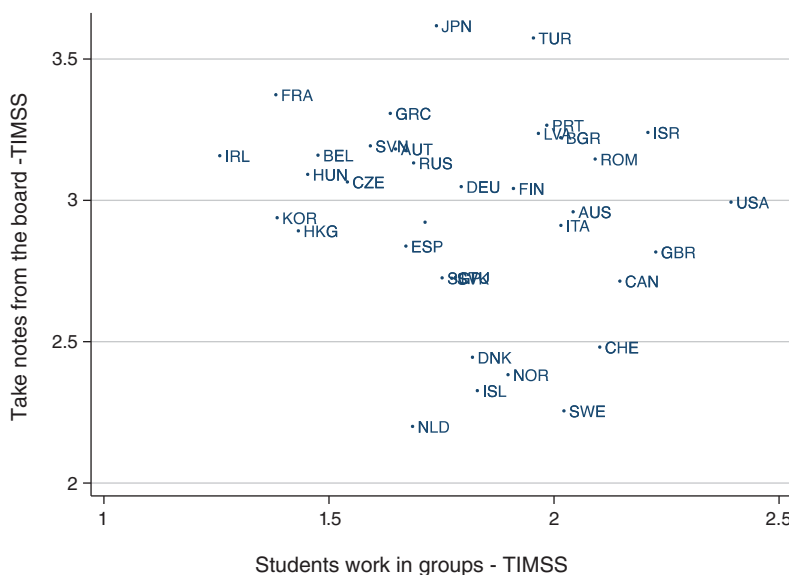


FIGURE 2. AVERAGE COUNTRY SCORES IN TEACHING PRACTICES

Note: "Students take notes from the board" and "Students work in groups" (1 = Never, 2 = Sometimes, 3 = Often, 4 = Always).

Source: TIMSS

Figure 3 shows the relationship between the country level of trust and the difference between vertical and horizontal teaching measures from TIMSS, called Gap. Trust is the country average of the standard question from the World Values Survey: "In general do you think you can trust others or one cannot be too careful?" The answer is 1 if the respondent trusts others, and 0 otherwise. The correlation between Gap and trust is strongly negative; almost one-third of the cross-country variation in trust is explained by the variation in teaching practices. Scandinavian countries (with the exception of Finland), and to a lesser extent Anglo-Saxon countries, combine high levels of trust with teaching practices tilted toward horizontal. Teaching practices of Mediterranean and East European countries are in contrast biased toward vertical; they also have low levels of trust. The big outliers are Japan and Ireland, which tilt toward vertical teaching practices but have high trust.

Table 1 documents the robustness of the relationships between trust and teaching practices by including income per capita, school expenditure per student, and average years of education at the country level. Columns 1–2 show a negative correlation between trust and the share of students who "always take notes from the board" and the share who "never work in groups." The coefficients are statistically significant at the 1 percent level. The relationship is also economically sizeable. Respectively, 33 percent and 32 percent of the cross-country variation in generalized trust is explained by the variation in these teaching practices. An increase by 1 standard deviation in "Always takes notes from the board" is associated with a rise of 5.7 percentage points in trust. Income per capita and average years of schooling are also statistically significant determinants of trust in a cross section of countries.

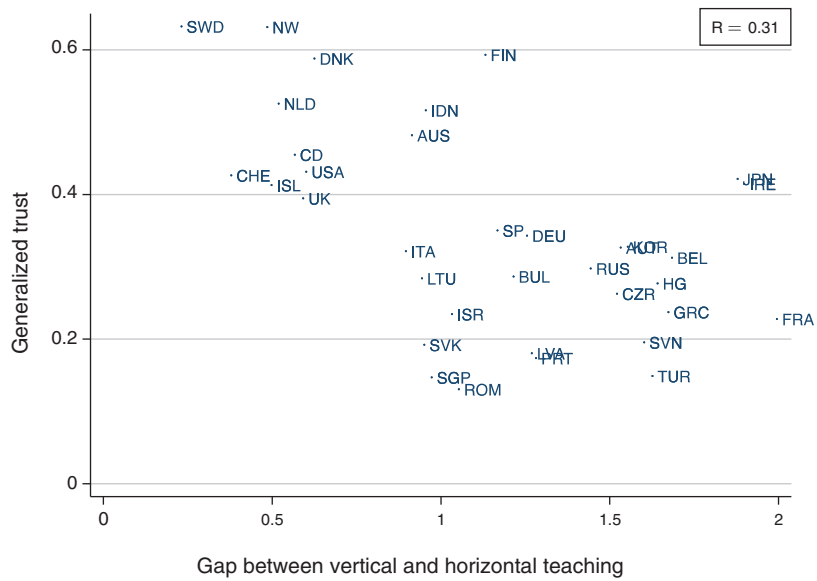


FIGURE 3. TRUST AND THE GAP BETWEEN VERTICAL AND HORIZONTAL TEACHING

Source: TIMSS, WVS

Columns 3–4 of Table 1 show that teaching practices are also significantly related to civic life, measured as the percentage of citizens registered in an association in the 2000 World Values Survey. In particular, there is a negative and statistically significant (at the 1 percent level) relationship between the share who “always take notes from the board” and association membership. Taken alone, this share explains 48 percent of the cross-country variation in association membership.

Columns 5–6 of Table 1 document the relationship between teaching practices and attitudes toward officials. Vertical teaching might fuel a sense of subordination of citizens to officials, breeding distrust in politics and the state. In contrast, horizontal teaching might encourage a feeling of belonging to the same community and an expectation of accountability from officials. The International Social Survey Program 2006, devoted to the role of government, covers a large set of countries for which we also have data on teaching practices. We use the following question: “Most civil servants can be trusted to do what is best for the country.” The answers range from 1 for strongly agree to 5 for strongly disagree. Table 1 shows that country average trust in civil servants is negatively related to the share of students who “always take notes from the board,” and the relationship is statistically significant at the 1 percent level. In contrast, horizontal teaching does not display any significant relationship with trust in civil servants. Other measures of attitudes toward officials, such as perception of fairness of the officials, yield similar results.

II. Data

To move beyond the macro correlations, we examine the relationship between teaching practices and social capital using micro data on student beliefs, as well

TABLE 1—TEACHING PRACTICES, TRUST, AND ASSOCIATION MEMBERSHIP—OLS MACRO ESTIMATES

	Generalized trust		Association membership		Trust in civil servants		Civil servants are fair	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Never work in groups	−0.192*		0.001		−0.217		−0.125	
	(0.107)		(0.160)		(0.541)		(0.433)	
Always take notes from the board		−0.400***		−0.606***		−1.361**		−1.906***
		(0.133)		(0.127)		(0.567)		(0.420)
School expenditure	−0.165	−0.181*	−0.027	−0.086	0.071	−0.047	0.255	0.077
	(0.114)	(0.104)	(0.096)	(0.072)	(0.281)	(0.184)	(0.300)	(0.183)
Income per capita	0.150**	0.151**	0.098	0.116**	0.103	0.137	−0.025	0.013
	(0.066)	(0.062)	(0.066)	(0.044)	(0.226)	(0.142)	(0.246)	(0.147)
Average years of education	0.031	0.023**	0.068***	0.049***	−0.003	−0.035	0.011	−0.037
	(0.010)	(0.008)	(0.013)	(0.012)	(0.024)	(0.024)	(0.044)	(0.034)
Observations	31	31	27	27	20	20	20	20
R ²	0.47	0.59	0.59	0.75	0.118	0.423	0.083	0.556

Source: ISSP, TIMSS, WVS

as school- and classroom-level data on teaching practices. The micro estimates draw on the 1999 CES database introduced above, the 2007 Trends in International Mathematics and Science Study (TIMSS 2007) covering eighth graders, and the Progress in International Reading Literacy Study 2006 (PIRLS 2006) dealing with reading achievement in the fourth grade. Online Appendix A presents the detailed description of the databases, online Appendix B defines and describes the key variables, and online Appendix C presents descriptive statistics. In broad terms, CES provides the richest data but only allows estimation across schools within countries. TIMSS and PIRLS have somewhat more limited information, but allow estimation within a school thanks to sampling two classrooms in each school. Finally, because TIMSS has data on classrooms of students taking different subjects (with different teachers) together, it allows for estimation within a classroom, but with less attractive measures of student beliefs.

CES measures aspects of civic knowledge, including concepts of democracy and citizenship, attitudes toward institutions, trust, and civic behavior, as well as beliefs about cooperation among students and cooperation between students and teachers. In addition to the individual student survey, CES includes school principal and teacher questionnaires. The teacher questionnaire requests detailed information on teaching practices. Each country randomly samples the students to be surveyed using a two-stage stratified sampling design. First, schools are randomly selected in each country. Second, one eighth grade classroom of students is randomly picked from a selected school. The teachers of the selected students complete individual surveys (as do school principals). For students with multiple teachers (up to five in the database), all teachers complete the questionnaire. The sample from CES covers 25 countries; 3,934 schools, with an average of 150 schools per country; 3,413 students per country; and 1.68 teachers per student. Because CES interviews only one eighth grade classroom in each sampled school, it allows within-country, across schools estimates, but not within-school or within-classroom estimates.

We use PIRLS to obtain both across and within-school estimates of the relationship between teaching practices and student social capital. PIRLS provides

internationally comparable data on student reading in the fourth grade. In addition to tests of reading proficiency, PIRLS adds specific questions on beliefs about cooperation among students and with teachers. Although PIRLS covers fewer dimensions of social capital than CES, it generally randomly samples two classrooms of fourth graders per (randomly selected) school, and evaluates all students within the two sampled classrooms. In the fourth grade, each classroom has one principal teacher, so we have data on student beliefs and teaching practices in two separate fourth grade classrooms in the same school, which allows within-school comparisons. PIRLS collects student, parent, teacher, school, and curricular background data for 40 countries, and covers 7,245 schools, 204,631 students, and 10,267 teachers.

From TIMSS, we can get both within-school and within-classroom variation in teaching practices and student beliefs. TIMSS measures trends in mathematics and science achievement in the eighth grade. TIMSS selects a random sample of schools, and then picks two intact eighth grade classrooms from each school. Unlike PIRLS, TIMSS reports teaching practices in at least two different subjects: mathematics and science. We can then focus on classrooms of students who take both of these subjects together, and for each subject look at a student's positive attitude and self-confidence. These attitudes tend to be highly correlated with other dimensions of social capital. We can also control for the cognitive tests of the students to isolate the specific effect of teaching practices on attitudes by looking across subjects. The benefit of TIMSS is that it allows for within-classroom identification of the effects of teaching practices on attitudes; the limitation of within-classroom analysis is that we cannot use broad measures of beliefs or noncognitive skills. We use the last and most comprehensive wave of TIMSS in 2007. The database covers a total of 7,348 schools, 220,909 students, and 25,622 teachers in 59 countries.

III. Between School Estimates Based on CES

We start with OLS regressions of student beliefs on teaching practices with various controls. We estimate the following equation across schools within countries:

$$(1) \quad y_{ijc} = \alpha_0 + \alpha_1 TP_{ik} + \alpha_2 X_i^{ST} + \alpha_3 X_{ik}^T + \alpha_4 X_j^{SC} + F_c + \varepsilon_{ijc},$$

where y_{ijc} are the beliefs of student i in school j in country c ; TP_{ik} is the teaching practice of teacher k of student i ; X_i^{ST} is a vector of student i 's characteristics; X_{ik}^T is a vector of teacher k 's characteristics; X_j^{SC} is a vector of school j 's characteristics; and F_c is the country fixed effect.

When we have data on multiple teachers for the same student, we use each pair as a separate observation. The results are similar when we consider the average characteristics across different teachers of a given student, rather than treating each teacher-student pair as a separate observation. We cluster standard errors at the school level.

We begin with OLS estimates of student social capital from the CES database. We control for student age, gender, immigrant status, highest educational level of the parents, and the number of books at home. We include teacher age, gender, highest level of education, years of experience, subject taught, and classroom size.

We use measures of teacher beliefs in cooperation as proxies for their social capital, which they might transmit to students. We include measures of the educational goals of the teacher to get at the component of the teaching practice separate from the more general teacher belief about cooperation at school. This could also address the concern that student answers about cooperation at school just parrot what the teacher tells them. The school characteristics include a dummy for public school, the fraction of students from low socioeconomic backgrounds, school social capital, and a dummy for urban location.

The results for “Student belief in cooperation with other students” are reported in Table 2. Column 1 shows that this belief is positively related to “Students work in groups,” and the coefficient is statistically significant at the 1 percent level. One might worry that the positive relationship between experience of working in groups and belief in cooperation with other students is a bit mechanical. One can also imagine, however, that repeated exposure to a practice causes students to dislike the practice and the philosophy it represents, in which case the relationship should be negative. Column 2 shows that belief in cooperation with other students is negatively related to “Teacher lectures.” The coefficient is negative and statistically significant at the 1 percent level. Raising “Students work in groups” by 1 point increases the belief in cooperation among students by 0.013, or 2.50 percent of the standard deviation. Raising “Teacher lectures” by 1 point decreases that belief by 0.010, or 2.15 percent of the standard deviation. These effects appear modest, but perhaps not compared to those of the other teacher and school characteristics. For example, class size needs to be reduced by a third to increase the belief in cooperation among students by 0.01 points.

Column 3 shows that “Student belief in cooperation with teachers” is positively and significantly, at the 1 percent level, related to “Students work in groups.” A 1 point increase in this practice is associated with a rise by 0.028 in the belief in cooperation with teachers, or 3.72 percent of a standard deviation. Column 4 shows a negative and statistically significant, at the 1 percent level, relationship between student “Belief in cooperation with teachers” and “Teacher lectures.” Raising “Teacher lectures” by 1 point is associated with a drop of 0.016 in the “Belief in cooperation between students and teachers,” or 1.52 percent of a standard deviation.

There are a number of other effects. Female students are firmer believers in cooperation with other students, as are students from households with more books at home and from public schools. The student gender result is in line with Croson and Gneezy’s (2009) finding of important gender differences in experimental public good games. Other influences on a student’s belief in cooperation include teacher’s age, teacher’s education (which enters negatively!), teacher’s experience (which enters negatively), class size, teacher’s attitude toward promoting cooperation (which enters positively), and school social capital (which enters positively).

Columns 1 and 2 of Table 3 show the relationship between teaching practices and the involvement of students in associations. Student “association membership” is positively related to “Students work in groups”; the coefficient is statistically significant at the 1 percent level. Column 2 shows a negative relationship between association membership and “Teacher lectures,” although the coefficient is not statistically significant. Raising by 1 point “Students work in groups” increases the number of memberships

TABLE 2—STUDENT BELIEFS IN COOPERATION AMONG STUDENTS AND BETWEEN STUDENTS AND TEACHERS. OLS MICRO ESTIMATES—WITHIN COUNTRIES

	Beliefs in cooperation among students		Beliefs in cooperation between students and teachers	
	(1)	(2)	(3)	(4)
<i>Teaching practices</i>				
Students work in groups	0.013*** (0.004)		0.028*** (0.007)	
Teacher lectures		−0.010** (0.004)		−0.016** (0.005)
<i>Controls</i>				
Student gender (female)	0.126*** (0.007)	0.126*** (0.007)	0.206*** (0.008)	0.207*** (0.008)
Father's education	−0.002 (0.003)	−0.002 (0.003)	0.014*** (0.003)	0.014*** (0.003)
Mother's education	−0.007** (0.003)	−0.007** (0.003)	−0.003 (0.003)	−0.003 (0.003)
Number of books at home	0.008*** (0.003)	0.008*** (0.003)	0.026*** (0.004)	0.026*** (0.004)
Immigrant	−0.004 (0.017)	−0.004 (0.017)	−0.029 (0.019)	−0.030 (0.019)
Student age	−0.005 (0.005)	−0.005 (0.005)	−0.010 (0.006)	−0.005 (0.005)
Teacher age	−0.002 (0.005)	−0.002 (0.005)	0.006 (0.008)	0.005 (0.008)
Teacher female	0.012 (0.007)	0.013* (0.007)	−0.013 (0.010)	−0.010 (0.010)
Teacher education	−0.003 (0.005)	−0.003 (0.005)	−0.006 (0.007)	−0.006 (0.007)
Teacher experience	0.001 (0.001)	0.001 (0.001)	−0.001 (0.001)	−0.001 (0.001)
Teacher social capital	0.001 (0.005)	0.003 (0.005)	0.001 (0.005)	0.007 (0.008)
Teacher goal: promote cooperation	0.014** (0.006)	0.018** (0.006)	0.018* (0.011)	0.025** (0.010)
Class size (ln)	−0.038* (0.021)	−0.039* (0.021)	−0.057** (0.027)	−0.055* (0.029)
Public school	0.031* (0.016)	0.029* (0.016)	−0.057** (0.027)	−0.061** (0.027)
School social capital	−0.024 (0.017)	−0.024 (0.017)	−0.060 (0.047)	−0.060 (0.047)
School goal: promote cooperation	0.007 (0.008)	0.007 (0.008)	−0.008 (0.012)	−0.007 (0.012)
Country fixed effects	Yes	Yes	Yes	Yes
Observations	71,617	71,498	71,386	71,266
R ²	0.089	0.089	0.081	0.081

Note: Robust standard errors in parentheses, clustered at the school level.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Source: CES

TABLE 3—ASSOCIATION MEMBERSHIP AND TRUST IN INSTITUTIONS. OLS MICRO ESTIMATES—WITHIN COUNTRIES

	Association membership		Trust in institutions		Index participation political life		Index participation social life	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Teaching practices</i>								
Students work in groups	0.077*** (0.021)		0.009** (0.004)		0.012*** (0.004)		0.010** (0.004)	
Teacher lectures		−0.025 (0.017)		−0.003 (0.004)		−0.002 (0.003)		−0.005 (0.004)
Observations	72,759	72,640	72,098	71,980	72,444	72,323	72,189	72,068
R ²	0.189	0.189	0.05	0.05	0.121	0.120	0.082	0.082

Notes: Controls: country fixed effects. Student characteristics: age, gender, immigrant, number of books at home, and education of the parents. Teacher characteristics: age, gender, education, years of experience, trust, and attitudes toward cooperation. School characteristics: class size, public school, and social capital at the school level. Robust standard errors clustered at the school level.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Source: CES

by 0.077, which is 5.18 percent of a standard deviation. Columns 3 and 4 show that trust is positively related to “students work in groups” but not related to “teacher lectures.” Columns 5–8 present the results on more general beliefs about civic life and cooperation outside the school. Students’ “participation in social life” and “participation in political life” are positively related to “work in groups” and negatively related to “teacher lectures.” The coefficient is statistically significant at the 1 percent level for “work in groups,” and at 5 percent for “teacher lectures.” The association between teaching practices on student social capital goes beyond cooperation at school.

We also examine the relationship between teaching practices and social capital in schools with few versus many students from poor socioeconomic backgrounds. From the school principal surveys, we compute the national average share of students from low socioeconomic backgrounds across schools, and distinguish schools that are above or below this threshold. Table 4 shows that the effect of teaching practices on student beliefs in cooperation among themselves and with teachers is particularly pronounced in schools with a high share of students from poor backgrounds. The coefficients on teaching practices are statistically significant at these schools but not at schools with a below average share of students from poor backgrounds. We get similar results for trust and association memberships. Separately, we find that the effect of teaching practices is larger in private schools, perhaps because teachers have more latitude in choosing their practices.

One might wonder where the variation of teaching practices across countries, schools, and teachers comes from, and how such variation accounts for our results. We have explored this question using all of our datasets, and briefly summarize the findings. They are presented more fully in online Appendix D. First, for a small subsample of 18 countries, we have some data on organization of their school systems. At the cross-country level, countries with greater school autonomy in making staffing decisions have a higher incidence of students working in groups, but so do

TABLE 4—SOCIOECONOMIC FAMILY BACKGROUNDS AND THE RELATION BETWEEN TEACHING PRACTICES AND STUDENT BELIEFS. OLS MICRO ESTIMATES—WITHIN COUNTRIES

	Belief in cooperation among students				Belief in cooperation with teachers			
	Share of low socioeconomic backgrounds < national average		Share of low socioeconomic backgrounds > national average		Share of low socioeconomic backgrounds < national average		Share of low socioeconomic backgrounds > national average	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Students work in groups	0.008 (0.006)		0.012** (0.006)		0.014 (0.009)		0.028*** (0.009)	
Teacher lectures		−0.009* (0.005)		−0.013*** (0.004)		−0.004 (0.005)		−0.019*** (0.005)
Observations	36,142	35,979	29,485	29,489	36,035	35,872	29,401	29,404
R ²	0.094	0.094	0.096	0.096	0.071	0.071	0.093	0.093

Notes: Controls: country fixed effects. Student characteristics: age, gender, immigrant, number of books at home, and education of the parents. Teacher characteristics: age, gender, education, years of experience, trust, and attitudes toward cooperation. School characteristics: class size, public school, and social capital at the school level. Robust standard errors clustered at the school level.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Source: CES

countries with greater accountability of schools as measured by external exams of students. We found no relationship between the variability of teaching practices in a country (as measured by a standard deviation of a teaching practice across schools) and measures of organization of the school system.

We also checked whether our relationship between teaching practices and student social capital differs across countries. The three countries with the highest variability of teaching practices across schools are Israel, Norway, and Sweden. The three countries with the lowest variability are Italy, Singapore, and Taiwan. We find that in countries with high variability the effect of horizontal teaching on social capital is indeed estimated to be significantly higher than in countries with low variability. At the same time, the United States and France, the two countries often suspected of being at opposite extremes in their reliance on horizontal teaching, have very similar, and statistically significant effects of teaching practices on student social capital.

Finally, we have asked which teacher characteristics are correlated with horizontal teaching practices. The two characteristics most reliably associated with horizontal teaching across datasets and specifications are the teacher being female or having a degree in psychology or education. There are no further reliable patterns of predictability of teaching practices that we could identify.

The between-school results point to strong correlations between teaching practices and social capital. In the following analysis, we seek to understand whether the relationship is causal.

IV. Within-School Estimates Based on PIRLS and TIMSS

So far, all the regressions control for country fixed effects, identifying the effects of teaching practices from their variation across schools within countries. This

strategy makes it possible to disentangle the role of the teacher (or the school) from national educational policies or national social capital. But the OLS estimates of equation (1) raise two main identification issues. The first is omitted variables that could influence both teaching practices and student beliefs. The most obvious such bias comes from potential self-sorting of families or teachers into specific schools. Teaching practices might then reflect the beliefs of the parents or of the local community, even after controlling for teacher and school social capital. The second identification issue is reverse causality. Teaching practices might be influenced by student social capital if teachers adjust their practices to their audience. These two identification issues imply that $\text{cov}(TP_{ik}, \varepsilon_{ijc}) \neq 0$ in equation (1) and lead to biased estimates of the effect of teaching practices.

A potential strategy to overcome these identification issues is to use instrumental variables. However, as stressed by Altonji, Elder, and Taber (2005), cross-sectional databases on education provide little room for finding convincing instruments. We could use school characteristics, such as the shortage of instructional time, as an instrument for vertical teaching practice. We do find a statistically significant relationship between the two. Yet, using IV estimates across schools does not solve the issue of omitted variables, such as the self-selection of families into schools. In addition, we have little confidence that any school characteristic does not directly affect student beliefs, violating the exclusion restriction. One way to address the issue of omitted variables is to instrument teaching practices within school, either across or within classrooms. But in this case, the only instruments we could use are teacher characteristics, such as gender or educational specialization. The violation of the exclusion restriction of the absence of a direct effect of the teacher characteristic instrument on student beliefs would be even more severe than using a school characteristic as an instrument.

We follow an alternative strategy by using within-school variation. By looking at within school between classroom variation in teaching practices and student beliefs, we alleviate concerns regarding omitted variables that could drive self-sorting of families or teachers into schools. The comparison of within-country and within-school estimates could also give a sense of the magnitude of this bias. Students or teachers might still be allocated to specific classrooms within the same school, depending on their skills, abilities, or social capital. To control for omitted variables and reverse causality within schools, we include measures of student abilities at the classroom level, namely both the average and the standard deviation of the cognitive test performance in the classroom. In addition, in PIRLS we can measure the abilities of students both before entering and during the fourth grade. We use the entry-grade parent and student characteristics, including initial skills, to control for the sorting of students and reverse causality.

Using both PIRLS and TIMSS, we run within-school estimates since multiple classrooms of the same grade are randomly selected in each school. We estimate an equation similar to equation (1), but which includes school fixed effects:

$$(2) \quad y_{ijc} = \alpha_0 + \alpha_1 TP_{ik} + \alpha_2 X_i^{ST} + \alpha_3 X_{ik}^T + F_j + \varepsilon_{ijc},$$

where y_{ijc} are the beliefs of student i in school j in country c ; TP_{ik} is the teaching practice of the teacher k of student i ; X_i^{ST} is a vector of student i 's characteristics; X_{ik}^T

TABLE 5—TEACHING PRACTICES IN READING ACTIVITIES—PIRLS GRADE 4

Practices during and after reading	Percent of time lecturing to the whole class (1)	Percent of time group activities (2)	Group activities during reading (3)	Group activities after reading (4)	Group activities to help students with difficulty (5)
<i>Panel A. Within schools</i>					
Outcomes					
(1) Student cooperation	−0.102* (0.054)	0.211*** (0.062)	0.039** (0.017)	0.025** (0.010)	0.048*** (0.018)
Observations	62,207	62,207	63,003	64,900	64,790
R ²	0.01	0.01	0.01	0.01	0.01
(2) Teacher cooperation	0.007 (0.049)	0.008 (0.059)	0.028* (0.015)	0.017* (0.009)	0.018 (0.016)
Observations	60,004	60,004	60,751	62,552	62,482
R ²	0.01	0.01	0.01	0.01	0.01
<i>Panel B. Within countries</i>					
Outcomes					
(1) Student cooperation	−0.069 (0.045)	0.182*** (0.045)	0.041*** (0.013)	0.024*** (0.008)	0.053*** (0.014)
Observations	62,207	62,207	63,003	64,900	64,790
R ²	0.01	0.01	0.01	0.01	0.01
(2) Teacher cooperation	−0.014 (0.038)	0.077* (0.044)	0.018** (0.009)	0.021*** (0.005)	0.025* (0.013)
Observations	60,004	60,004	60,751	62,552	62,482
R ²	0.01	0.01	0.01	0.012	0.012

Notes: Controls: Panel A, school fixed effects. Panel B, country fixed effects. Student characteristics: test scores in reading achievement, age, gender, immigrant, parental education, number of books at home, and parental socioeconomic background. Teacher characteristic: age, gender, education, and experience. Class characteristic: class size, average, and standard deviation in reading test scores. Robust standard errors clustered at the school level.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

is a vector of teacher k 's characteristics; and F_j is the school fixed effect. Standard errors are clustered at the school level.

PIRLS is devoted to reading by fourth graders, and reports detailed information on teaching practices by activity, including the reading activity itself, the activities after reading, and the strategies to help students with reading difficulties. Table 5 presents both within-school, and for comparison within-country, relationships between beliefs and the percentage of time the teacher devotes to lecturing during a typical school week. The teacher also reports the frequency with which (s)he organizes the classroom in groups during the reading activities, and after students have done the reading, as well as how often (s)he asks students to talk to each other in groups about what they have read and whether (s)he asks other students to work on reading with a student having a difficulty.

We restrict the analysis to schools with at least two different classrooms and teachers, and control for student and parent characteristics (age, gender, immigration, number of books at home, parents' education, parents' income) and teacher characteristics (age, gender, education, years of experience, field of specialization, training in pedagogical methods and in psychology, and teacher goals). We also

TABLE 6—TEACHING PRACTICES IN MATHEMATICS AND SCIENCE—TIMSS GRADE 8

	Panel A. Within schools		Panel B. Within countries	
	Student self-confidence (1)	Student positive attitude (2)	Student self-confidence (3)	Student positive attitude (4)
Outcomes				
(1) Students work in groups in math	0.020** (0.010)	0.036*** (0.012)	0.009 (0.013)	0.013 (0.005)
Observations	53,521	53,689	53,521	132,417
R ²	0.03	0.01	0.04	0.01
(2) Students work in groups in science	−0.001 (0.015)	0.034* (0.018)	0.006 (0.006)	0.030*** (0.007)
Observations	21,464	21,494	21,464	21,494
R ²	0.03	0.02	0.03	0.02

Notes: Controls: Panel A, school fixed effects. Panel B, country fixed effects. Student characteristics: age, gender, immigrant, parental education, number of books at home, and parental socioeconomic background. Teacher characteristic: age, gender, education, experience, and class size. Robust standard error clustered at the school level.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

control for student reading ability at the individual and classroom level. These variables allow us to control for omitted variables that could codetermine teaching practices and student or classroom characteristics. From the student survey, we have information on reading test scores in the fourth grade that are internationally and nationally standardized and comparable.

The first row of Table 5 shows the effects of teaching practices across classrooms within a school on student belief in cooperation with other students. The second row shows the effects of teaching practices on student beliefs in cooperation with teachers. For nearly all practices, the within-school estimates are highly statistically significant. For comparison, panel B presents within-country estimates similar to those we used with the CES data, but restricted to the subsample of panel A. The coefficients are quantitatively similar, indicating a low bias from potential self-sorting into schools with specific teaching practices in the previous within-country estimates.

Table 6, panel A reports the within-school estimates of the effects of horizontal teaching in mathematics (first row) and science (second row) from TIMSS 2007. We measure the effects of these practices on student's self-confidence in mathematics and science, respectively. For comparison, panel B presents between school estimates. The controls for student, teacher, and classroom characteristics are similar to those used with PIRLS. The within-school effects of horizontal teaching are positive and statistically significant at the 1 percent level for students' positive attitude, and at the 5 percent level for students' self confidence in mathematics. Panel B shows that the estimates without school fixed effects are less statistically significant than the within-school ones. This suggest that, if any, the bias in the within-country estimates runs against our hypothesis that teaching practices have an independent effect on student beliefs.

We can test our key assumption that, within a school, a teacher is no more likely to be assigned to students with high social capital and high noncognitive

abilities, conditional on all the observables. If this assumption fails, the coefficient on teaching practice might pick up differences in student characteristics across teachers and not the causal effect of the practice. We first assess whether the allocation of teachers across classrooms is exogenous with respect to student characteristics. Following Chetty et al. (2011), we regress teaching practices and teacher characteristics: teacher years of experience, highest level of education, certificate in pedagogical methods or in psychology, on predetermined parent and student characteristics. We perform this analysis on PIRLS, which provides comprehensive measures of the student and parent characteristics, including early skills in reading. We still focus on schools with at least two different classrooms, and thus two different teachers in reading to whom students are allocated within a school. Parent characteristics include the reading environment at home, parent interest in reading, the highest education level of parents, and their financial situation. Student characteristics include age, gender, immigration status, and an index of starting reading skills.

Table E1 of online Appendix E shows that almost none of these variables predict characteristics and practices of the teacher a student is assigned to. The only exception is parent education, which is correlated at the 5 percent level with teacher experience and group activity during reading. This characteristic does not, however, predict the overall percentage of class time devoted to working in groups, group activity after reading, or group activity to help a student with difficulty. More remarkably, almost all the predetermined parent and student characteristics have nil coefficient estimates. This result suggests that teaching practices are (quasi) random across classrooms within schools. As an additional robustness check, we have rerun the within-school estimates of Table 5 restricting attention to schools where the correlation between the “group activity during reading” and parent education is insignificant. The effects of teaching practices on this subsample of schools are identical to those reported in Table 5. Estimates of the allocation of math and science teachers to students within school in TIMSS yield similar results. In TIMSS, predetermined characteristics, although more restricted (parent education, number of books at home, student age, student gender, student immigration status), do not predict the teaching practice “work in groups.”

Another way to address selection concerns is to control more extensively for student characteristics. Chetty, Friedman, and Rockoff (2011) have shown in a US sample that the information on observable characteristics, including starting skills, could be rich enough to control for the sorting of children to different teachers/classrooms. We mimic the Chetty, Friedman, and Rockoff (2011) specification, which uses nonlinear effects, including cubics, of lagged test scores at the individual and classroom level as controls. We focus once again on PIRLS, since we have information on the entry-grade skills, and re-estimate Table 5 with a Chetty, Friedman, and Rockoff (2011) specification. We use a cubic polynomial in the student’s entry-grade reading skills and cubics in classroom entry-grade means of reading skills. We also include a cubic polynomial in predetermined parent attitudes toward reading and the home reading environment before entering grade 4. All the other controls at the student and classroom level are similar to those used by Chetty, Friedman, and Rockoff (2011). Table E2 of online Appendix E shows that

the effects of teaching practices are remarkably similar to those reported in Table 5 when controlling for entry-grade characteristics.

We regard the within-school evidence as the most compelling indication of causal effects of teaching practices on student beliefs in this paper. The findings are consistently statistically significant, hold in two different datasets, and reveal very similar parameter estimates as those between schools. In online Appendix F, we also present within-classroom estimates using the fact that, in TIMSS, the same classroom of eighth graders usually takes math and science classes together but with different teachers. We can then examine relative attitudes toward math and science as a function of relative teaching practices of the two teachers, holding the students in the classroom constant. The results again point to an independent role of teaching practices in shaping beliefs.

V. Teaching Practice or Teacher Effect?

A. Are Teaching Practices a Proxy for Better Teachers?

The previous sections have exploited within-school and within-classroom estimates to identify the independent effect of teaching practices on student beliefs. This strategy has allowed us to control for potential self-sorting into school/classroom and reverse causality. However, teaching practices could merely proxy for a deeper teacher attribute that codetermines both practices and student beliefs—teachers who use group activities or lecturing might just be better. We then estimate a teacher fixed effect instead of a teaching practice effect. We address this interpretation by showing that teaching practices we consider are unrelated to student cognitive performance. Neither horizontal nor vertical teaching practices look like stand-ins for a better teacher.

We show the results for the reading test scores from PIRLS. This database is best suited to run this analysis since it provides information on the reading skills prior to entry into the fourth grade that could influence both end of term test scores and teaching practices (TIMSS only provides the end of term tests scores). The pre-entry reading skills also alleviate the reflection problem, whereby the individual end of term test scores influence the test scores of their peers. In the regression, we include the initial classroom reading skills instead of using classroom average end of term scores.

Table 7 shows the main results. We run within-school estimates, including all the previous student and teacher characteristics used in Section III. We consider all the teaching practices used earlier: percentage of classroom time devoted to lecturing or group activities, the frequency of group activities during and after reading, and group activities to help individual students with difficulties. We do not find any statistically significant effect of horizontal or vertical teaching practices on reading skills. We have run the same analysis for eighth grade student achievement in mathematics and science from TIMSS. Although we cannot control for initial test scores prior to entry into the eighth grade, we can still use within-school variation and control for overall classroom performance. We find similar results for mathematics and science as for reading. Teachers who tilt toward horizontal practices achieve neither

TABLE 7—TEACHING PRACTICES AND READING ACHIEVEMENT—WITHIN SCHOOL PERFORMANCE—PIRLS GRADE 4

	Cognitive tests in reading—Grade 4				
	(1)	(2)	(3)	(4)	(5)
Percent of time lecturing to the whole class	0.670 (1.449)				
Percent of time group activities		−0.918 (1.703)			
Group activities during reading			−0.575 (0.448)		
Group activities after reading				−0.049 (0.275)	
Group to help student with difficulty					−0.009 (0.484)
Observations	59,686	59,686	60,473	62,779	62,167
R ²	0.235	0.235	0.234	0.235	0.234

Notes: Controls: school fixed effects. Student characteristics: entry-grade student reading skills (cubic), test scores in reading achievement, age, gender, immigrant, parental education, number of books at home, and parental socioeconomic background. Teacher characteristic: age, gender, education, experience. Class characteristic: entry-grade class reading skills (Cubic in Mean + SD), class size, average, and standard deviation in reading test scores. Robust standard errors clustered at the school level.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

better nor worse student performance. These results suggest that horizontal or vertical teaching practices are not capturing “good” teacher effects.

B. Are Teaching Practices a Proxy for Nicer Teachers?

A second issue is whether horizontal teaching practices could just be a proxy for nice teachers. So far, we have addressed this issue by controlling for a large set of observable teacher characteristics, some of which are positively and statistically significantly correlated with the probability of adopting group activities. These observable characteristics include teacher’s gender, social capital, belief in the importance of education for promoting cooperation, and training in psychology and pedagogy. Yet, it might still be the case that omitted or unobservable characteristics of nice teachers codetermine both teaching practices and student social capital.

We address this issue by looking at alternative teaching practices that might be similarly correlated with observable attributes of a nice teacher. In the PIRLS database, we have data on teaching practices that could proxy for the teacher being nice but not for working in groups. From the teacher survey, the following practices are reported: “During the reading activity, I use individualized instruction for each student,” “Students work independently on a goal they choose themselves,” “After reading, I ask each student to do a project about what he has read,” “If a student begins to fall behind in reading, I spend more time working on reading individually with the student,” “If a student begins to fall behind in reading, I have the student work in the regular classroom with a reading specialist.” The answers range from 1 for “never or

TABLE 8—ALTERNATIVE “NICE” TEACHING PRACTICES IN READING ACTIVITIES—WITHIN SCHOOL ESTIMATES—PIRLS GRADE 4

	Use individualized instruction for reading (1)	Work individually on open plan (2)	Do a project about the reading (3)	Work with the student individually (4)	Work in the classroom with a teacher aide (5)
(1) Student cooperation	0.003 (0.012)	0.033*** (0.013)	0.020 (0.013)	0.001 (0.023)	0.008 (0.026)
Observations	60,978	61,054	61,615	61,766	61,392
R ²	0.01	0.01	0.01	0.01	0.01
(2) Teacher cooperation	0.011 (0.010)	0.006 (0.011)	0.012 (0.011)	0.037 (0.024)	−0.012 (0.024)
Observations	58,760	58,798	59,335	59,499	59,129
R ²	0.01	0.01	0.01	0.01	0.01

Notes: Controls: school fixed effects. Student characteristics: entry-grade, student reading skills (cubic), test scores in reading achievement, age, gender, immigrant, parental education, number of books at home, parental socioeconomic background. Teacher characteristic: age, gender, education, experience. Class characteristic: entry-grade class reading skills (Cubic in Mean + SD), class size, average, and standard deviation in reading test scores. Robust standard errors clustered at the school level.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

almost never” to 4 for “every day or almost every day.” All these practices are correlated in a similar way (both in magnitude and statistical power) with the teacher characteristics that predict group activities (female teacher and training in psychology or pedagogy). Assuming that there is the same selection of teaching practices on observable teacher characteristics as on unobservable ones, all these practices should capture the same “nice” teacher fixed effect. We should then expect an impact of these practices on student beliefs comparable to that of group activities.

Table 8 shows that this is not the case. The effects of these alternative teaching practices are less sizeable than those of working in groups, and usually insignificant. Spending more time individually with students in difficulty, providing individual help with a reading specialist, or asking students to work on their chosen projects have no effect on student beliefs. This result suggests that it is working in groups, and not other practices used by “nice” teachers, that help develop social capital. Importantly, this result is based on the assumption that the selection of teaching practices on unobservable teacher characteristics is the same across those different practices. We cannot exclude the possibility that an unobservable nice teacher trait drives group activities in a different way than the other practices.

VI. Conclusion

We have presented empirical evidence documenting the connection between teaching practices and social capital. In a cross-section of countries, teaching practices are associated with beliefs supporting social capital. In the micro data, across schools within a country, horizontal teaching practices, such as working in groups, are associated with pro-social beliefs, while vertical teaching practices, such as teachers lecturing, are associated with opposite beliefs. Within-school (and

within-classroom) estimates allow us to address the issues of omitted variables and reverse causality. We find that these correlations reflect causal effects, and not omitted “community social capital,” selection of students or teachers, or reverse causality.

The finding that schools, and not just families, can produce social capital, is consistent with the case for progressive education as developed by Dewey (1944). This hopeful conclusion suggests the possibility of altering social capital in the community through teaching practices. In fact, the payoff to progressive education might be higher than we suggest here. Throughout the paper, we have focused only on the social capital payoff. Yet there is a substantial and growing body of thought that non-cognitive skills, which seem intimately related to social capital, have an economic payoff as well (Bowles and Gintis 1976; Heckman 2008; Brunello and Schlotter 2010; Lindqvist and Westman 2011; Oreopoulos and Salvanes 2011). The relationship between teaching practices and economic performance is one of many open areas that remain to be explored.

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