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ESP Working Paper Series

Does Full-day Schooling Reduce Educational Inequality in Vietnam?

Tran Ngo Thi Minh Tam
and
Laure Pasquier-Doumer

2015 No. 72

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This paper is one of a series of policy-oriented research papers on privatisation in education jointly commissioned by the Privatisation in Education Research Initiative (PERI) and Young Lives using school survey data from the Young Lives longitudinal study of childhood poverty in Ethiopia, India, Peru and Vietnam. The findings of these diverse studies reflect on the manner and extent to which the varied supply of schooling types and private tutoring influences the pivotal role education has to play in societal development and building sustainable futures for all.

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Does Full-day Schooling Reduce Educational Inequality in Vietnam?

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About Young Lives

Young Lives is a longitudinal study of childhood poverty following the lives of 12,000 children in Ethiopia, India, Peru and Vietnam over 15 years. It is funded by UK aid from the Department for International Development (DFID) and co-funded by the Netherlands Ministry of Foreign Affairs from 2010 to 2014 and by Irish Aid from 2014 to 2015. The full text of Young Lives publications and more information about its work is available on the Young Lives website: **www.younglives.org.uk**

Young Lives
An International Study of Childhood Poverty

Abstract

Privatization of education sector has recently been observed in many low and middle income countries. Yet public debate remains, specifically on educational inequality associated with the alternatives (non-state) providers. This paper contributes an empirical evidence to the ongoing discourses by looking into the full-day schooling and educational inequality in Vietnam.

Full-day schooling is implemented initially to deal with the current deficiency in primary instructional time in Vietnam. Moreover, as a semi- or purely public schooling, the policy to some extent targets the equality of opportunity in education. Learning outcomes are often high for full-day schooling students, but whether the outcome gap between children of different social background is not yet known. This paper therefore examines whether full-day schooling decreases the educational inequality using the data from the School Survey 2011 under the Young Lives Project in Vietnam. Specifically we conduct descriptive analysis to examine how the transition from private extra classes to full-day schooling and accompanied school resources affect the gap in learning achievement between children with different social background. Then we investigate how full-day schooling relates to student learning achievement applying the Value-added model estimated by Ordinary Least-square with interaction terms of full-day schooling and social background. The estimation of the Quantile Regression is also employed to study the heterogeneity in the extent to which full-day schooling correlates to learning progress across quantile of student learning progress. Analysis results show that full-day schooling improves student learning progress. However full-day schooling does not narrow the inequality in education, and appears to associate with the rising gap in learning progress. Among students that attend full-day schooling, the high social background children have more instructional, better resources and obtain higher learning progress in comparison with the low social background. Higher extent of attendance in full-day schooling magnifies the effect of social background on learning progress. Regarding the heterogeneity of full-day schooling's effect on across quintiles of learning progress, the negative effect is stronger at higher quintile. Meanwhile the positive effect of full-day schooling on learning progress in Vietnamese, and positive effect of better school resources in Math magnifies across the progress distribution.

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1. Introduction

Privatization of education sector has recently been observed in many low and middle income countries. Yet public debate remains, specifically on educational inequality associated with the alternatives (non-state) providers. This paper contributes an empirical evidence to the ongoing discourses by examining the relationship between full-day schooling and educational inequality in Vietnam.

Full-day schooling is a policy option to deal with the current deficiency of instructional time for Vietnamese students at the primary level. Vietnam has actually and significantly expanded full-day schooling at the costs being shared between authorities and communities and with exclusive support to disadvantaged areas. Students' learning outcomes are often high in the schools providing full-day schooling, implying the positive correlation between full-day schooling and learning outcomes (World Bank, 2013; World Bank, 2011). However there is no evidence on the relationship between full-day schooling and educational inequality.

This paper therefore examines whether full-day schooling decreases the educational inequality. It relies on data from the School Survey 2011 under the Young Lives Project in Vietnam. Specifically the paper firstly examines how the transition from private extra classes to semi- or purely-public full-day schooling affects the inequality in educational outcomes, which is measured by the gap in learning achievement between students with different levels of social background. The paper then attempts to identify the school resources for implementing full-day schooling, that may limit the positive effect of full-day schooling on the educational inequality between children with different social background. Section 2 provides the background of full-day schooling and educational inequality as well as the policies and implementation of full-day schooling in Vietnam. Section 3 describes the data and definitions employed in the analysis. Analyses of the relationship between full-day schooling and educational inequality are provided in Section 4. The section firstly examines how full-day schooling substitutes for additional instructional time from attending extra classes. It then investigates whether school resources for full-day schooling differ across schooling type and social background level. Finally the section tries to address how full-day schooling relates to student learning achievement using the Value-added model using Ordinary Least-square and Quantile Regression with interaction terms of full-day schooling and social background. Section 5 summarizes the inferences and policy implications.

2. Background of Full-day Schooling

2.1 Full-day Schooling and Educational Inequality

Schooling attainment, like any human outcome, is the 'manifestation' of student's ability in the context in which it is measured. The ability is formed by student's innate ability, investment and parental environment as well as effort till the time of measurement (Cunha and Heckman, 2009). Differences in educational outcome or *educational inequality* between different students thus come not only from the variance in their own wills (levels of effort) but also from gaps in factors that can not be held accountable to them. These factors are referred to as "circumstances" in Roemer (1998) to distinguish the beyond-the-control elements, including such social milieu as genes, family background, culture, from the "autonomous volition and efforts" in turning resources available into educational outcome. The policy to address the *inequality of opportunity* involves the allocation of resources so that individuals can be compensated for where their abilities are determined by "circumstances", while differences in outcomes due to the "effort" should not be leveled out (Roemer 1998).

Factors of educational outcome include student and family characteristics and educational inputs, which are areas of policy intervention. *Full-day schooling* (FDS) is one among the policies to improve educational inputs for better educational outcomes. Specifically by extending instructional time, the implementation of FDS also arranges more accompanying school resources (facilities, teachers, curriculum) in an attempt to improve the equality of opportunity in education between students of different levels of family background or *social background*. Through these educational inputs—time of instruction and school resources—the relationship between FDS and educational inequality, with a focus on economic aspects, can be investigated.

By providing more instructional time, FDS is expected to narrow down the gap in hours for instruction among children from different levels of social background. Children with high social background can supplement instructional time by taking extra classes, while the social background disadvantaged can not. Implementing FDS on one hand probably limits the lack of instructional hours of students at a much lower cost than extra classes, and even at zero cost to students in supported areas. On the other hand FDS leaves less time spent on the outside of the school, thereby may restrict children from attending extra classes. As a result, FDS may expand instructional time for children from low social background while keeping the time constant for high social background children. This can be investigated by descriptive analysis for comparison of instructional time across student's level of social background and schooling type (with extra class only, with FDS only, and with both FDS and extra classes).

However, FDS has its own price and is well-performing subject to certain conditions. As mentioned above, apart from more instructional hours, FDS requires other school resources such as school's facilities, management, teachers and curriculum. Better school resources magnify while poor resources restrain the positive effect of FDS on achievement. As a consequence, students with more school resources can benefit more from FDS than those with less resources. This channel through which FDS relates to

inequality of opportunity can be examined by comparing school resources between students with FDS and with different average levels of social background.

The impact of FDS on educational inequality should be tested by econometric models rather than descriptive analyses. To the best of our knowledge, except for the paper by DeCicca (2005) that estimates the impact of full-day kindergarten on standardized test scores in mathematics and reading in the first grade, no more empirical evidences on the relationship between FDS and educational inequality are available. Neither of such studies exists for the case of Vietnam.

2.2 Policies on Full-day Schooling in Vietnam

Vietnam has had too low primary instructional time in comparison with other Southeast Asian countries. The time constraint does not allow for ensuring the basic primary curriculum. Concurrently private tutoring has become increasingly widespread, causing inequalities in accessing the quality of basic education. Being aware of the disparities, the Government has been promoting the transition to full-day schooling (FDS) with a minimum national standard of 35 periods per week by 2025. The transition has been conducted, with financial resources from both the authorities and students' parents, and support of SEQAP (School Education Quality Assurance Program[1]). According to the Ministry of Education and Training, the number of schools switching to FDS has been growing quickly, leading to the rise in the share of primary students attending full-day schooling from 60 to 73 percent between 2007 and 2012 (World Bank, 2013).

Apart from abiding to some national standards which will be specified later in next section, FDS is implemented with wide variation across school owning to the fact that the local authority and parents share the cost of infrastructure and additional teachers provided for FDS. A school that adopts FDS can move towards 30 and 35 periods per week (named 30 and 35 period model respectively) in accordance with its level of facilities and human resources, and can have a flexible curriculum with optional subjects as supplement to standard ones at its disposal. The selection of subjects is limited to Math, Language such as Vietnamese or Ethnic Minority Language in the 30 period model. More options are available for the 35 period model, in which schools at their disposition can choose to add new subjects (English, Informatics or Music, Arts) or outdoor activities in the spirit of local culture and context.

2.3 Full-day Schooling for Grade 5 (G5)

In Vietnam, the mandatory instructional time for all G5 students is not less than 25 periods per week. There are 5 periods per schooling day, and each period lasts from 35 to 40 minutes. Of the timetable, a maximum of 20 periods are delivered by class teacher (head teacher). These periods are dedicated to Math, Vietnamese and other subjects (Ethics, Sciences, History and Geography, Engineering) and school or class activities.

1. A multi-donor grant funded program which is co-financed and co-implement by the Government of Vietnam and its partners (World Bank, DFID and Belgium). SEQAP provides support for developing the framework for FDS and ensuring equitable access to quality between different population groups.

Lessons on Music, Arts and Gymnastics are taught by specialized teachers during the remaining time. For full-day schooling, more instructional time is extended to exceed 5 periods per day, with the number of FDS days ranges from 1 to 5 per week subject to the real situation of school. The additional periods are freely arranged by FDS schools for Math, Vietnamese, or other optional subjects in two sessions of a schooling day. The morning session of one day often lasts 4 periods, and the afternoon remains 3 periods.

3. Data and Definitions

3.1 Data

The data source used in this paper is the School Survey conducted in Vietnam during the school year 2011-2012. This is the dedicated survey of the Young Lives Project, a longitudinal study of childhood poverty in Ethiopia, Peru, India and Vietnam based on household surveys of 12,000 children born in 1994-1995 (Older cohort) and 2001-2002 (Younger cohort) in 15 years. Young Lives in Vietnam follows 2000 children in Younger cohort and 1,000 in Older cohort. Both cohorts were selected randomly in 2001 in 36 communes of five provinces—Ben Tre, Da Nang, Hung Yen, Lao Cai and Phu Yen. In each province, four sites in each province were selected to ensure the diversity and pro-poor bias. Each site consists of one or two communes (Caine et al., 2013).

Any school in any Young Lives site that was attended by at least one Younger cohort index child in Grade 5 was included in the school survey sample. The sample of each index child was then expanded to 20 by adding his/her classmates for the purpose of school and class level analyses. Totally the School Survey sample consists of 3,284 Grade 5 students in 176 classes of 52 schools (91 school sites).

The Young Lives School Survey 2011 is very good source of data to investigate the FDS for G5 and the how FDS relates to G5 students' learning outcomes for the following reasons. Firstly, parallel to students', the survey also interviews their school principals and head teachers. Hence it provides rich information on instructional time and on characteristics of schools, principals, teachers and students. Secondly, students' academic achievement recorded at two points in time allows the analysis of student academic progress. Thirdly, the differences in what were reported by the principal, teacher and student on the occurrence of the cost of full-day schooling offer an opportunity to explore what lies beneath the relationship between full-day schooling and academic achievement. Lastly, because there are 20 students on average in the same class were surveyed, the data also allows intra-class analysis for isolating the role of social background ceteris paribus.

3.2 Definitions

3.2.1 Full-day Schooling (FDS)

In the School Survey questionnaires, FDS was translated into Vietnamese as "students are given classes in two sessions per day (morning and afternoon)." All principals, teachers and students were asked whether this FDS was available or not at the level for which they present: principal provides information at school level, teacher at class level, and student for his own. For principal and student module, there was one question after that to distinguish "unofficial/non-compulsory classes" from the second or other session of a FDS day. The principals and head teachers gave identical responses on the availability of FDS for 86 percent of the sample. For the remaining 14 percent, there are discrepancies in the answers of principals and teachers. The share of disagreement is higher at 18 and 25 percent when comparing between students and principal, and between students and teacher respectively (more details in the Appendix A, Table A1).

The dissent is inherent if the school has only some classes with FDS. In this case, the school actually provides FDS for some classes, which do not include the class of the head teacher reported no FDS. For other cases, the discrepancy results from the incorrect interpretation of FDS. *First*, not counting the situation where FDS was wrongly or unclearly explained in the interview, FDS that points to more instructional time during a day can be misunderstood by teachers as additional, extra classes or extracurricular activities. *Second*, it is noteworthy that for some schools, FDS simply means that students have lunch at school. If staying over lunchtime signifies FDS for one of the responders, then there would be dissimilarity between them. For instance the principal declares that FDS is available for all students, but the head teacher denies so by saying that no or some students in the class attend FDS just because all or some of the students go home and return after lunchtime or vice versa. Moreover, discrepancies between school's principal/teacher and students is most possible. Students probably provide imprecise information on FDS because of their inadequate understanding of what FDS is. Table 1 below shows the number of schools, classes and students with or without FDS (panel on the left) and corresponding proportions (right panel) based on different sources of responses. Figures are converted to the same level for each row.[2] Three first columns of each panel show figures that are computed based on the "yes" or "no" of principals, head teachers and students in response to the question if FDS is available. The last ones (the fourth and eighth column) provide figures based on the timetable provided by the head teacher.

Table 1—*Availability of FDS across response by principals, teachers and students*

	Principal's response yes/no	Teacher's response yes/no	Student's response yes/no	Teacher's report on timetable	Principal (%)	Teacher (%)	Student (%)	Teacher's report on timetable (%)
School level								
No FDS	17	6	7	17	32.69	11.54	13.46	32.69
With FDS	35	46	45	35	67.31	88.46	86.54	67.31
Class level								
No FDS	63	50	49	85	35.80	28.41	27.84	48.30
With FDS	113	126	127	91	64.20	71.59	72.16	51.70
Pupil level								
No FDS	1 171	919	1 326	1 483	35.66	27.98	40.49	45.16
With FDS	2 113	2 365	1 949	1 801	64.34	72.02	59.51	54.84

Source: Authors' calculations based on the YLs School Survey 2011

Because FDS can be interpreted in a number of ways, defining FDS based on the responder's declaration can be misleading. Such measurement should rely on objective criteria instead. In order to exclude the inaccurate responses on the availability of FDS as earlier mentioned, a student attended FDS or not in this study is defined mainly based on whether the class timetable reported by his head teacher validates FDS as stated above in Section 2.3. The reasons for using the source of information from head teachers are twofold. Firstly this information is comparable to the above mentioned

2. Response of school principal is applied to all classes and students in the school, and teacher's response is applied to all students in the class. Meanwhile a school is recorded as having FDS if only one teacher (student) reports FDS. Similarly if only one student reports attending FDS, his class is recorded as FDS class.

threshold of G5 periods per week. Secondly the definition of FDS at the class/teacher level is optimal because it (1) reserves the consistency of information at school level, which is represented by the most knowledgeable person—the principal; (2) ensures reliable source of information from head teachers, who is directly responsible for delivering most of instructional periods and administering the class; (3) secures the same level of information—class level, on the availability of FDS, number of days with FDS, real instruction hours for Vietnamese and Math. Specifically one student is considered as *attending FDS* if the class he/she is sitting in has *at least one day with FDS, which lasts for more than 5 periods of instruction* according to head teacher's report on class timetable. For students with missing information on class timetable, the principal's response and the head teacher's report on the time the class spent on studying Vietnamese and Math per week are used to define/recode whether they attend FDS or not. As a result, there are 1444 out of 3284 students attending FDS, accounting for 56 percent of the survey sample.

3.2.2 Extra Classes

Extra classes refer to classes that students take in addition to their formal schooling day. Responses by principals in the survey indicate there were less than 4 percent of the schools which arranged non-compulsory additional classes by the same teacher who taught during the normal schooling day. Head teachers only gave information on their private tuition in general rather than for the students in the class.[3] Hence this study defines a student had extra classes if he/she affirmed so. There are 39 percent of the sample students attended extra classes.

Table 2—*Frequency of FDS and Extra Classes across level*

	School	Class	Student	School (%)	Class (%)	Student (%)
No FDS	17	83	1,444	32.69	47.16	43.97
With FDS	35	93	1,840	67.31	52.84	56.03
No extra classes			2,007			61.11
With extra classes			1,277			38.89

Source: Authors' calculations based on the YLs School Survey 2011

3.2.3 Learning Achievement

Student academic achievement is measured by the test scores in Math and Vietnamese recorded at two points in time, one at the beginning and the other at the end of the school year 2011–2012. Each test is a 45 minute test, which is characterized by 30 multiple-choice items. These tests were designed by the Vietnamese National Institute of Educational Sciences to cover key subject areas of the Grade 5 curriculum at the time of test administration. The first tests cover the Grade 4 curriculum to measure learning

3. For information on extra classes, the principals are asked "Does your school offer non-compulsory additional classes available outside of the normal school day, provided at an additional charge to any students who wish to participate, on the premises?" and "If yes, are these additional classes taught by the same teachers who teach during the normal school day?". Teachers are just asked "Do you do private tuition to supplement your income?". For students, the question is "Do you attend unofficial/non-compulsorily extra classes, whether at school or not?" and "How many hours do you attend classes each week in each of these subjects – Math, Vietnamese and Other subjects".

level at the Grade 5 entry. The second tests reflect G5 curriculum, more advanced G4 questions and common items replicated from the first tests. There are 15 and 12 such common items in the tests in Math and Vietnamese.[4] This allows transforming the test and retest scores to a common interval scale using IRT.[5] The two rounds of test enable tracking student academic achievement during the year.

3.2.4 Instructional Time

Time of instruction that a student has received from his attendance at formal schooling and extra classes constitutes his instructional time. In this study the instructional time is measured by the number of periods per week, which is the sum of per week periods at the student's class (reported by the student's head teacher on class's timetable) and extra classes on Math, Vietnamese and other subjects (reported by the student). Accordingly the instructional time provided for a student is averaged at 33 periods per week.

3.2.5. Social Background

Social background, or family background[6] plays an important role in human outcomes, including on educational outcomes (see for instance Roemer, 1998; Dustmann et al, 2008; Cunha and Heckman, 2009; Gary, 2014).

Empirically social background can be measured by single, multiple single or composite indicators, and each of which has its own pros and cons (Marks, 2014). Single indicators in research on education could be father's occupation, father's or mother's education, household income or wealth, home environment indicators such as educational resources or social network. The composite measures are constructed by combining several of these above-mentioned into single indicators. The composite indicators prove to capture more aspects of socioeconomic background than the each single indicator (ibid).

In this paper, we choose to measure student social background by a composite index for in order to fully represent socioeconomic characteristics of the student. This index, which is taken into account as a single variable, would facilitate our focus on other subjects of reference instead of conducting complex and scattered analysis of individual factors, hence ease the interpretation of the results. Social background level is constructed using information collected in the survey that is related to student's home and family. Because these factors are categorial variables, the social background index is constructed applying the Multiple Correspondence Analysis (MCA) (James, 2008). MCA is a technique to reduce a matrix of categorical variables into a smaller number of dimensions, where each dimension is a linear weighted combination of the original variables. Dimensions are ordered so that the first dimension explains the largest proportion of the total variance in the original data. If this proportion is substantial, the dimension can be used to represent the original variables. The set of weights of this dimension is used to calculate scores or indexes for observations.

4. See Caine et al. (2013) for detailed description of the tests
5. Item Response Theory which is "the model-based measurement in which trait level estimates depends on both person's responses and the properties of the items that were administered" (Embretson and Reise, 2013).
6. Also referred to as socio-economic status in relevant empirical literature

Table 3 details the information included in the index, which encompasses socio-economic characteristics represented by the educational levels of parents, the number of meals per day, and asset-based factors (whether the student's household has mobile phone, television, radio, computer/laptop, internet, bicycle, motorcycle, electric fan, air conditioning, car) as well as factors related to student's learning environment at home (study desk, chair, lamp pocket calculator, whether student has his own place to study, number of books student owns).

Table 3—*Descriptions of variables used for the social background index*

Variable name	Category	Proportion (%)
Mother's educational level	Primary or less	53.12
	Lower secondary	23.15
	Higher secondary	23.73
Father's educational level	Primary or less	52.02
	Lower secondary	20.73
	Higher secondary	27.25
Number of meals per day	1	0.31
	2	16.57
	3 or more	83.12
Home possession		
A television at home	No	5.39
	Yes	94.61
A radio at home	No	73.45
	Yes	26.55
An electric fan at home	No	10.93
	Yes	89.07
A mobile phone at home	No	8.65
	Yes	91.35
A bicycle at home	No	14.40
	Yes	85.60
A motorcycle at home	No	10.99
	Yes	89.01
A car at home	No	91.93
	Yes	8.07
Air conditioner at home	No	88.92
	Yes	11.08
A study lamp at home	No	27.83
	Yes	72.17
A study desk at home	No	12.33
	Yes	87.67
A study chair at home	No	12.70
	Yes	87.30
A pocket calculator at home	No	68.33
	Yes	31.67

Variable name	Category	Proportion (%)
Own place to study at home	No	20.20
	Yes	79.80
Number of books in the home	None	20.68
	1 to 5	20.28
	6 to 10	13.57
	More than 10	45.47
A computer at home	No	77.13
	Yes	22.87
Internet at home	No	81.79
	Yes	18.21

Source: Authors' calculations based on the YLs School Survey 2011

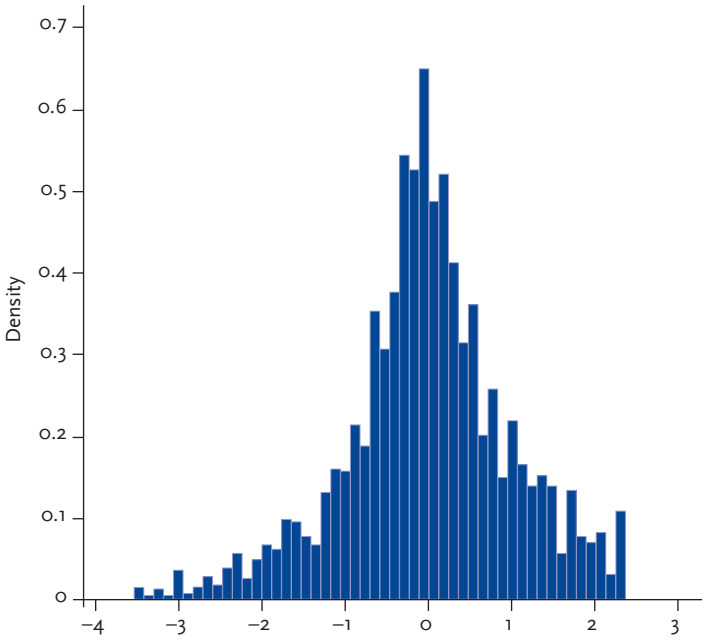
MCA shows that 78% of the variation in social background factors is explained by the first dimension (see Appendix A, Table A2), signaling the justification for using only the first dimension in ranking the levels of student's social background. Almost all factors with highest contribution to social background index have positive impact on the index, including having a computer (explaining 8% of the index), internet (7%), air conditioner (6%) at home, mother or father with higher secondary level of education (4%). The negative impact is observed for factors related to learning environment at home such as no study desk (explaining 7% of the index), no study chair or no study lamp (6%), no study place (5%) (see Appendix 1, Table A1.2). The level of social background of students characterized by the factors having high explanation power to the SB index are reported in highlighted figures in Table 4. Positive values of the index are observed for students in the families owning the assets or with parents having higher level of education, while negative values are of students without these assets or with parents having lower level of education. In other words, the index denotes the student social background advantage. Distribution of social background index is provided in Figure 1.

Table 4—*Level of social background of students characterized by selected factors*

Characteristic	No	Yes
A computer at home	–0.3646	1.1969 ***
Internet at home	–0.3030	1.3198 ***
Air conditioner at home	–0.1887	1.4459 ***
Mother completed higher secondary education	–0.2718	0.8708 ***
Father completed higher secondary education	–0.2937	0.7821 ***
A study desk at home	–1.6068	0.2175 ***
A study chair at home	–1.5065	0.2105 ***
A study lamp at home	–0.9590	0.3594 ***
Own place to study at home	–1.0483	0.2637

Source: Authors' calculations based on the YLs School Survey 2011
Note: Difference significant at 1% (***), 5% (**), 10%(*)

Figure 1—*Distribution of student social background advantage*



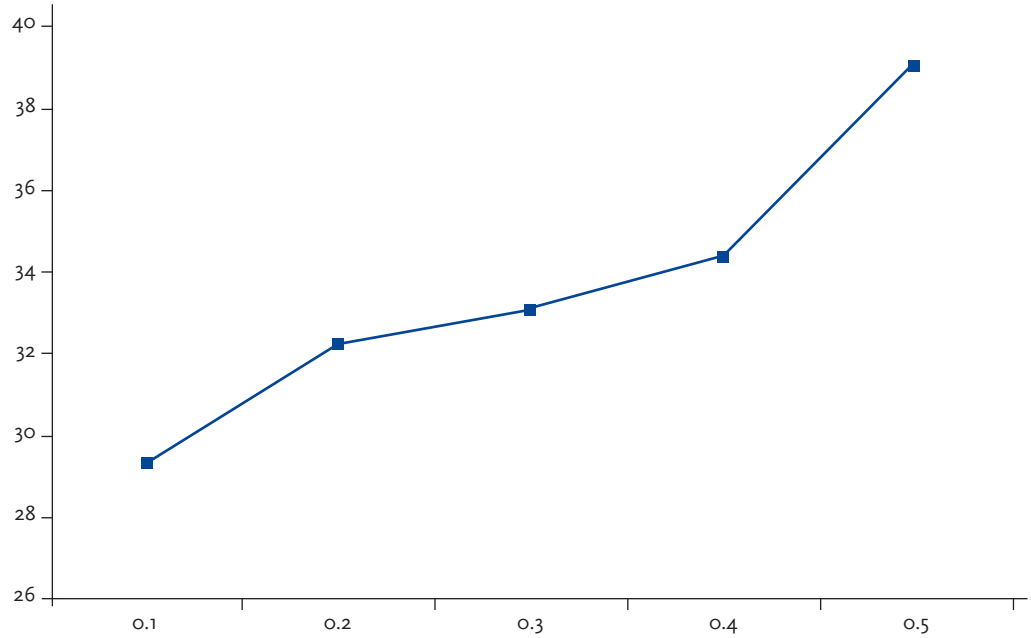
Source: Author's calculation based on the YLs on School Survey 2011

4. Full-day Schooling and Educational Inequality

4.1 Does FDS Reduce the Gap in Instructional Time Coming from Extra Classes?

Calculations from the data show that the instructional time increases with the level of social background among FDS students (Figure 2). The smaller the level of social background a student comes from, the lower the number of periods he/she attends per week. This is obvious evidence for educational inequality in opportunity, and also a signal for further unequal access to school resources associated with FDS.

Figure 2—*Instructional time across quintile of social background (periods)*



Source: Authors' calculations based on the YLs School Survey 2011

In addition, there is a wide variation in instructional time between students subject to whether they attend at least FDS or/and extra classes as indicated in Table 5. Students that participate in both FDS and extra classes have received the highest instructional time of nearly 44 periods per week. Meanwhile the students that do not enroll in FDS schools and do not follow any extra class are put at the most disadvantaged with 25 periods per week. Differences in the number of instructional periods between students attending only FDS and other students are statistically significant at 1 percent. It is evident firstly from Table 5 that FDS helps to limit the students' lack of instructional time. By attending FDS, students have eight more periods in comparison with half-day schooling.

Secondly as shown in Table 5, the appearance of extra classes rather than FDS goes with higher instructional time for students. Students with only extra classes have two

more periods than students with only FDS. In addition, regardless the participation in other type of schooling, the computed instructional time of any student attending extra classes are ranked second at a level of about 40 periods per week, and higher than that of any student attended FDS (less than 38 periods). This could be because extra classes are widespread in more advantaged areas, where FDS is popular, the students that have extra classes also enroll in schools with FDS, leading to more instructional time associating with extra classes. Therefore it is obvious that FDS does not completely restrict students from attending extra classes outside their formal schooling. So it is evident that FDS only partially narrow down the gap in instructional time of students from different level of social background.

Table 5—*Mean instructional time by schooling type*

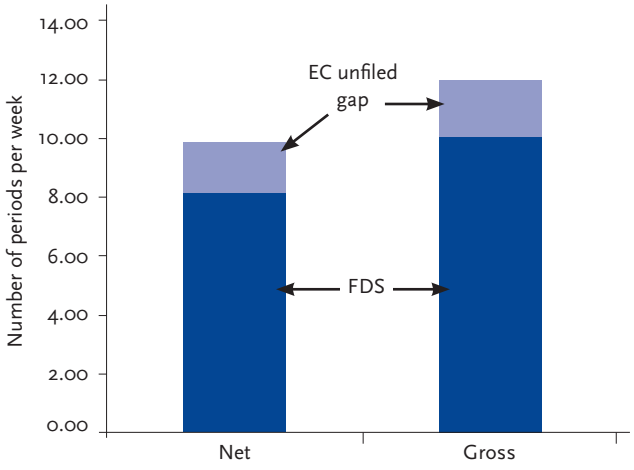
Students attending FDS	Students attending EC	"Number of periods per week"	
no	no	24.91	(1)
no	yes	34.79	(2)
yes	no	32.99	(3)
yes	yes	44.36	(4)

Source: Authors' calculations based on the YLs School Survey 2011

Note: (3) is statistically different from (1), (2), (4) at 1 percent significance level

Figure 3 supports the above explanation by illustrating how FDS substitutes for EC. The 'net' refers to net instructional time from attending only FDS or to only EC in comparison with half-day schooling, while the 'gross' refers to the levels irrespective of whether the student is simultaneously participating in the other type of schooling. It is observed that there is a substitution of FDS for EC, but at an incomplete level. FDS does raise the instructional periods for the students that do not have extra classes, therefore narrows down the gap in instructional time coming from extra classes among students. However these additional periods provided by FDS is not enough to compensate the increase in instructional time obtained by attending extra classes, which is about net 1.8 periods per week (accounting for 7 percent of the original time) and gross 1.9 periods per week.

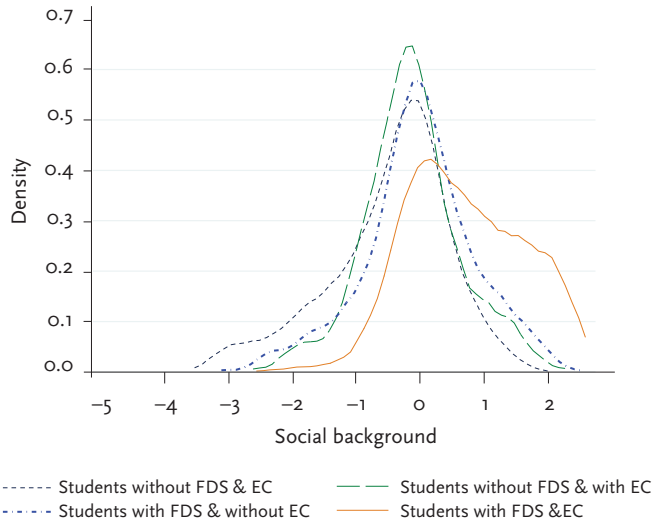
Figure 3—*Substitution of FDS for EC*



Source: Authors' calculations based on the YLs School Survey 2011

Figure 4 presents the levels of student social background across schooling type. Highest social background is observed for students attending both FDS and EC. The students attending only FDS rank second, but with generally small differences from the students attending only EC. Students attending schools without FDS have higher level of SB than that of schools without EC, and higher proportion of students from mean SB attend schools without FDS in comparison with schools without EC.

Figure 4—*Distribution of student social background by schooling type*

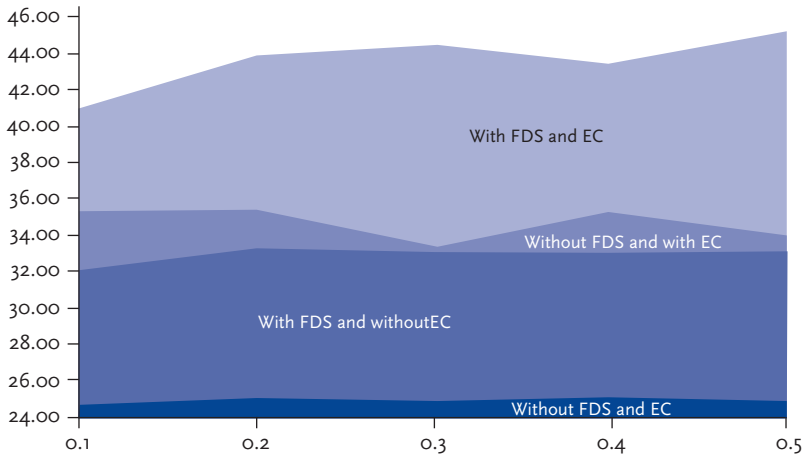


Source: Authors' calculations based on the YLs School Survey 2011

The mean instructional time of students by schooling type and social background quintile is reflected in Figure 5. Differences in instructional between social background quintiles are statistically significant. Students with both FDS and EC have highest number of instructional periods, which increases with social background levels. There are negligible changes in the instructional time across social background level for students attending only FDS or students without both FDS and EC. The trend for students attending only EC is the oddest with least instructional time for the third and fifth quintiles, which could be attributed to the much more instructional time from attending FDS (see "gross" graph in Figure 6).

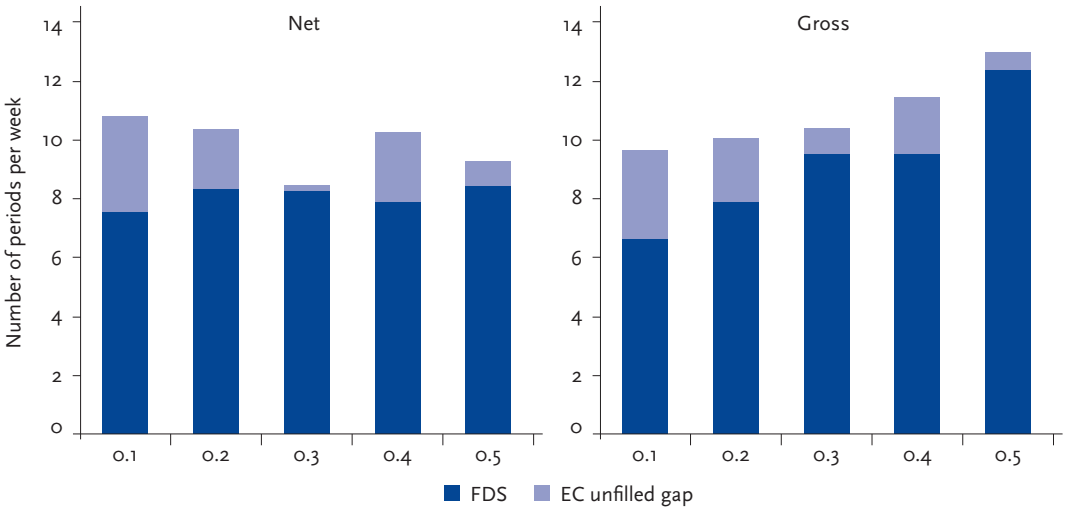
Figure 6 reveals in gross smallest per week instructional time with FDS for students of most disadvantage social background and highest instructional time from attending extra classes for the most advantage social background students. Because FDS students from low SB have less hours of instruction than FDS students from high SB, the substitution is even more partial. FDS does not fill up the gap in instructional time caused by extra classes at any social background level. The disparity varies across level of social background, and is widest for the most disadvantaged group at about three periods per week. As same as shown by Figure 5, the middle group of social background experienced the nearly complete substitution of FDS for extra classes, with less than one period per week gap remaining.

Figure 5—*Mean instructional time by student social background and schooling type*



Source: Authors' calculations based on the YLs School Survey 2011

Figure 6—*Substitution of FDS for EC across quintile of social background*



Source: Authors' calculations based on the YLs School Survey 2011

For extremes cases, in spite of extended instructional time, FDS does not even provide the most disadvantaged students (from lowest level of SB) with the same number of instructional periods as extra classes does for the advantaged students (highest SB), with the gap being about three on average.

In sum, there are three main points from what have been analyzed above. Firstly, students from high level of SB have more instructional time than the low SB students. Secondly, EC provides more instructional than FDS. Thirdly, among students with same schooling type, the high SB group has more instructional time than those from low level of SB. So it is possible to conclude that FDS does narrow down the differences in instructional time from attending EC, but still can not nullify the gap. The gap in instructional time between FDS and EC multiplies when SB is also taken into consideration. Students of

high social background have higher access to both FDS and EC, students with social background disadvantage are lagging behind in the number of instructional hours.

4.2 FDS Does Not Reduce the Educational Inequality of Opportunity

The implementation of FDS requires the enhancement of school quality, inclusive of higher level of school resources, to ensure that FDS is functioning. Better school resources from FDS, including—but not exhaustively—school's more well-equipped facilities, better management, teachers and curriculum would enlarge the positive effects of FDS on student's learning achievement. It is thus important to know whether FDS goes hand in hand with equal access to school resources of students. However it is unfortunate that there are inadequate and no information on school management and curriculum correspondingly. Therefore school resources in this paper refer to school and class facilities, and teacher only.

FDS students are provided with better school resources than non-FDS students

Table 6 presents the levels of resources available to the schools with and without FDS based on what were reported by the school principals and head teachers. It shows the improvement in almost all aspects of school resources in schools with FDS. In comparison with schools that do not provide FDS, higher proportion of students among FDS schools have access to better facilities both at school and class level, implying in nearly a half less in the need for major repair. The share of FDS students in schools equipped with library is over 1.6 times of that in other schools, while the share supplied with computer for student's use and clean drinking water is nearly four times, and internet five times higher. More of the FDS students also have latrines as well as separate latrines for boys and girls. Besides traditional conveniences (for example board, wall map, sufficient light, fan), more classes in FDS schools are also furnished with modern facilities, for instance cabinet for teaching aids, computer and overhead projector rather than video player/DVD or radio.

The training qualification of both principals and head teachers are slightly higher in FDS schools compared with others. The average number of years that principal has been working in the school is one year higher in FDS than in non-FDS type. Meanwhile teacher's number of years on being teacher is one year lower in non-FDS than in FDS. So it is possible to claim that FDS students have access to better school resources than the non-FDS group.

Table 6—*Frequency of students with school resources—FDS vs. Non-FDS (%)*

	No FDS	FDS	
School facilities			
Major repairs needed	30.52%	16.38%	
Separate room for G5	97.23%	96.45%	
Have library	55.00%	89.93%	***
Computers for students	16.82%	62.69%	***
Internet for students	11.88%	58.85%	***
Electricity	94.61%	98.93%	***
Working electricity today	91.67%	94.43%	***
Latrines for students	83.61%	98.14%	***
Separate latrines for boys/girls	80.74%	88.44%	***
Clean drinking water for students	6.53%	22.96%	***
Class facilities			
Black board or white board	98.60%	100.00%	***
Wall map	65.78%	71.69%	***
Teacher's cabinet	79.85%	93.42%	***
Teacher's desks	98.67%	99.27%	
Sufficient electric lights	95.94%	97.92%	***
Electric fan	83.28%	97.41%	***
TV	0.00%	15.70%	***
Video player or DVD	1.40%	0.00%	***
Radio	4.06%	0.00%	***
Overhead projector	5.60%	7.60%	**
Computer	1.40%	17.84%	***
Books other than text books	65.50%	83.01%	***
Principal			
Total years of working in school	24.88	26.44	***
Highest principal training qualification	3.41	3.86	***
Teacher			
Teacher's total years of teaching	18.04	17.11	***
Highest teacher training qualification	3.20	3.33	***

Source: Authors' calculations based on the YLs School Survey 2011

Note: Difference significant at 1% (***),5% (**), 10%(*)

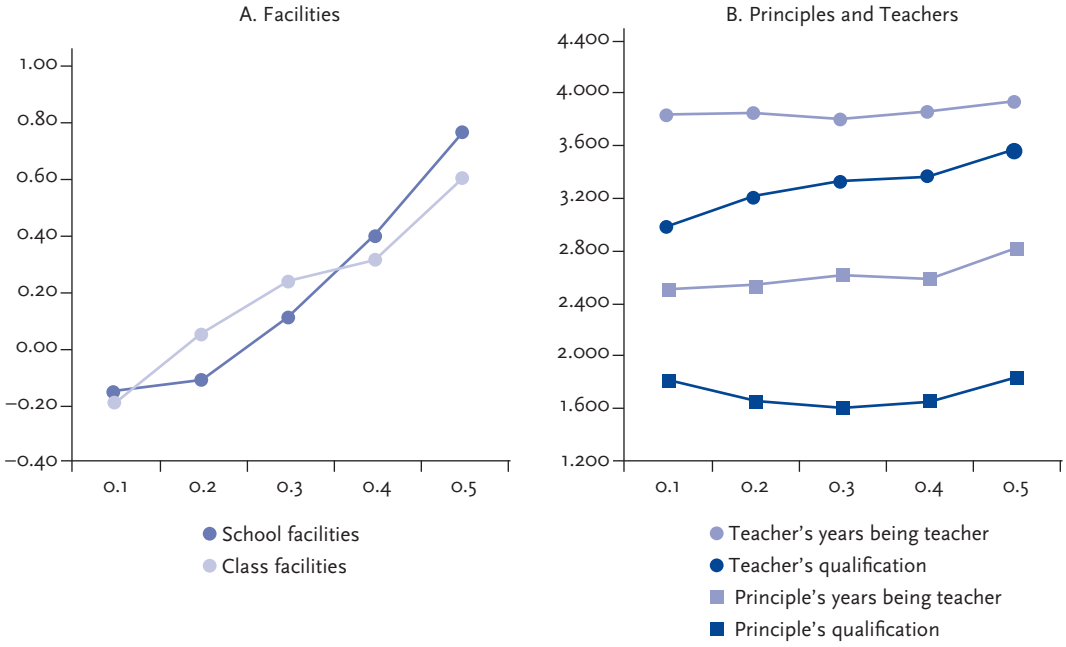
However school resources tend to increase with SB among students with FDS

In order to examine the correlation between school resources as a whole and social background, the individual factors listed under the group "School facilities" and "Class facilities" in Table 6 above are aggregated into the school facilities index and class facilities index using MCA.[7] The higher values of school and class facilities indexes of a student, the more facilities he/she has access to in his/her school and class. Figure 7 shows the

7. See detailed MCA results in Appendix 1, Table A.3 and A.4.

upward trend of school and class facilities across social background—the higher level of social background students are from, the higher level of school and class facilities they have access to. More advantage social background levels also allow students to access teachers with inconsiderably higher training qualification, but principals with nearly the same qualification. Principal's total years of working in school increases with the level of social background, except for the students from the fourth quintile, while teacher's years of being teacher follows an U-shaped trend. These facts generally show the failure of FDS in reducing the inequality of opportunity among students from different level of social background. This agrees with relevant evidences for Vietnam from such researches as World Bank (2011) on link between changes as well as key factors and learning outcome in primary and secondary education, VASS (2012) on inequality of opportunity, and Hoang et al. (2012) on perception of inequality in Vietnam. All the researches observed the inequality in educational opportunity.[8]

Figure 7—*School resources across social background level for student attending FDS*



Source: Authors' calculations based on the YLs School Survey 2011

Note: Unit for years being teacher is 10 years

8. World Bank (2011) mentioned the unequal access to human and physical school resources for FDS of the vulnerable groups (the poorest and ethnic minorities) hinder them to access or benefit from FDS. Both VASS (2012) and Hoang et al. (2012) find inequality in access to better school resources between groups of populuation, which is reffered to as the `quality' aspect of education in their studies. According to VASS (2012) the inequality in educational opportunity is observed in the quality dimension. Hoang et al. (2012) shows that children with rich parents "go to high-quality schools, attend extra classes and private tuition including English and computer with high costs" while the poor ones can not, especially in urban areas.

4.3 Full-day Schooling and Educational Inequality

4.3.1. Model Specification

Because the implementation of FDS is not random and may depend on unobserved characteristics of schools and students, the model specification of achievement on FDS might suffer from the problem of endogeneity due to self-selection and ommited variables. Self-selection causes non-random assignments that break the randomness in examining causality. For instance, students living in wealthy communes (with more resources available for FDS) or students with educated parents (who choose FDS schools for their children for better school resources than half-day school) are more likely to attend FDS and have higher learning outcomes. The impact of FDS on learning outcomes thus can be overestimated because it includes the effect of well-being or parents' education on learning achievement. Because we can not find any valid instrument for FDS, we choose to focus on the relationship rather than the impact of FDS on educational inequality between FDS and educational inequality.

The problem of omitted variables comes from the unavailability of information on the inputs in past periods, which are therefore considered as unobservable factors while they are correlated with FDS and learning achievement, causing the correlation between the error term (for unobservable factors) and both FDS and learning achievement, and leading to biased estimators, including of FDS. Examples for factors that relate to FDS and learning achievement include parental care for students subject to school inputs or student performance in the past, or interaction term between the care and inputs. To deal with the lack of information on past inputs, the relationship between FDS and educational inequality is examined by estimating Value-added models using Ordinary Least Square (OLS). This is based on the assumption of linearity (constant coefficients for all variables except for the intercept, for example the same learning progress of student over time) and the inclusion of idiosyncratic shocks that account for unobserved time-varying current and past inputs in the error terms (further assumption specified below in the section on Value-added model).

Due to the current flexibility in realizing FDS in Vietnam and diverse levels of student social background, how FDS correlates with learning progress vary across group of student. To address the heterogeneous relationship between FDS and learning progress across students from different level of social background, the Value-added model is then estimated using interaction terms between social background and FDS. In addition Quantile Regression is also conducted for investigating the heterogeneity in the extent to which FDS relates to learning progress across quantile of student learning progress.

Value-added model

Value-added (VA) model was initially developed to identify the contribution of school and teacher characteristics to student achievement by assessing the difference in the skill of student at the beginning and the end of a period at school. Given that achievement is produced by a combination of the student's innate ability and all inputs accumulated until the time of reference, the model links current student learning outcome to current educational inputs and lagged outcome, which is assumed to capture all educational inputs in the past. For this reason, VA model has been widely used to deal with the missing data on past inputs of current educational outcome of reference (Mizala and Romaguera, 2002; Todd and Tolpin, 2007).

Applying the review of Todd and Wolpin (2007) on VA model, a retest score in Math or Vietnamese of student *i* is a function of a vector of current inputs , variable on full-day schooling his lagged test score and a residual that sums up unobservable factors as follows:

$$T_{it} = \alpha X_{it} + \beta E_{it} + \gamma T_{i,t-1} + e_{it} \quad (1)$$

The OLS estimation results give inference on student's learning progress, because the value of retest scores are estimated for a constant value of test scores, or the progress students have achieved from the test scores. For consistent OLS estimators of inputs, it is assumed that the effects of all observable and unobservable inputs decrease according to number of years since they are provided and the measurement error follows an independently and identically distribution (Todd and Wolpin, 2007). The estimation method fits the regression of test score in which only one-period lagged test score is available as in this study. Even in case of inconsistency, for instance due to the student innate ability included in unobservable factors is correlated with educational inputs, the estimated effects of education inputs are relatively accurate. This is because the lagged test score is a good proxy for the ability and "explicitly allows for the kinds of dynamic assignment of students to inputs based on prior test scores" (Guarino et al., 2012).

According with this approach, Cunha and Heckman (2009) additionally provides empirical evidences on cross-productivity effects of skills, in other words different skills substitute for each other. This feature implies ability in Math might contribute to capability in Vietnamese and vice versa, so (1) can be specifically expressed as:

$$T_{Mit} = \alpha_M X_{it} + \beta_M E_{it} + \gamma_M T_{Mi,t-1} + \theta_M T_{Vi,t-1} + e_M \quad (2)$$

$$T_{Vit} = \alpha_V X_{it} + \beta_V E_{it} + \gamma_V T_{Vi,t-1} + \theta_V T_{Mi,t-1} + e_V \quad (3)$$

in which the subcripts M and V stand for Math and Vietnamese respectively, and other symbols hold the same meaning as in (1).

The vector of current inputs include two groups, which are (1) characteristics of student and his/her family including student's gender, ethnicity,[9] level of social background, number of student's siblings, number of student's older siblings, location (urban/rural area), and (2) school and class inputs include student's attendance in FDS, school and class facilities, qualification and experience of teacher and principal. The situation of student's FDS attendance is alternatively (i) whether or not the student attend FDS class, (ii) number of days with FDS that he attend per week, and (iii) number of FDS instructional periods that he attend per week in order to examine to how different levels of extent of participation in FDS relates to the learning progress. The corresponding model is labeled as Model (1), (2) and (3) for FDS variable (i), (ii) and (iii). The remaining variables on school/class inputs are proxy for school 'human resource' inputs represented by teacher's and principal's qualification and experience. Qualification is referred to the highest level of teacher training qualification that the principal/teacher received. Teacher's experience is defined by the number of years the teacher has been teaching, and principal's experience is the number of years the principal has been working in school.

9. Based on self-identification.

The heterogeneity in the effect of inputs on student achievement for students from different level of social background could be addressed by including interaction terms between explanatory variables in the achievement production function or applying quantile regression analysis (presented in next section). Therefore the interaction term between student social background and FDS will be added as additional variables of the VA model to deal with possible omitted variables on the effect of interaction between FDS and social background on learning progress. This enables examining how FDS relates to learning progress of students from different level of social background.

Tests of correlation, multicolinearity between FDS and social background, interaction term as well as other variables on school and class inputs prove there is no such problem for these models. Robustness check is also conducted, and FDS remains statistical significant in all estimation results (see Appendix, Table A.5 to A.7).

Interaction Terms between Student Social Background and FDS

Quantile regression (QR)

Employing conditional mean function, OLS approach only describes how the mean test score is for each fixed value of the predictors. It fails to show the lower or upper tails of the distribution of test scores. In other words, the relationship between FDS and learning progress for low or high performance students can not be explored using OLS. The quantile regression[10] (QR), the natural extension of the linear regression, is an alternative to OLS in this sense. For its strength in shaping changes in response to different quantile of dependent variable rapidly, QR becomes a favor methodology in empirical researches on various disciplines inclusive of inequality and quality of schooling since first introduced by Koener and Bassett in 1978 (Koener and Hallock, 2001; Hao and Naiman, 2007; Khandker et al., 2010).

Because quantile regression describes changes in the conditional quantile of test scores, modeling multiple quantiles provides richer illustration of test score distribution rather than conditional mean only. QR enables the understanding of how inputs relates to the learning progress across quantiles of learning progress.

To examine the distribution of student learning progress across student social background and FDS situation, learning progress in Math or Vietnamese can be predicted by estimating the following equation using quantile regression:

$$Q_{M\tau}(T_{Mit}) = \alpha_{M\tau}X_{it} + \beta_{M\tau}E_{it} + \gamma_{M\tau}T_{Mi,t-1} + \theta_{M\tau}T_{Vi,t-1} + e_{M\tau}, \tau\epsilon(0,1) \quad (4)$$

$$Q_{V\tau}(T_{Vit}) = \alpha_{V\tau}X_{it} + \beta_{V\tau}E_{it} + \gamma_{V\tau}T_{Vi,t-1} + \theta_{V\tau}T_{Mi,t-1} + e_{V\tau}, \tau\epsilon(0,1) \quad (5)$$

whereas is the quantile of learning progress of student *i*; , and is coefficients of explanatory variables associated with the quantile.

10. See Koener and Hallock (2001), Hao and Naiman (2007) for detailed concept of QR.

4.3.2 Estimation Results

Table 7 to and Table 10 provide the empirical results obtained from estimating the above-mentioned VA models of student learning achievement. For each estimation method, including OLS and QR, one of three variables that present student attendance in FDS is in turn included in the regressions of test scores in Math and Vietnamese. The FDS variables as well as variable on social background, which form the interaction terms, are centered to ease the interpretations of the results.

The OLS estimation results of VA models of learning achievement with the interaction terms of attending FDS and social background are shown in Table 7. The left panel of the table exhibits the regressions of retest score in Math, and the right panel for retest score in Vietnamese. For both Math and Vietnamese, attending FDS at all levels does not means higher learning progress. However the higher extent the student attend FDS, the lower the negative relationship between FDS and learning progress Specifically for learning progress in both Math and Vietnamese, students attending in FDS have around 16–17 points lower. If the number of days with FDS is more than three,[11] each additional FDS day leads to around five to six points less. In term of FDS instructional time per week, any additional period starting from 29 FDS periods is accompanied by just two points decrease for both subjects.

The level of student social background is associated with higher learning progress in Vietnamese. This excludes Model (1) for non-FDS students where each higher-than-mean rise in social background five points lower in learning progress in both Math and Vietnamese. For *non-FDS* students and Model (2) and (3), one unit increase in their social background level starting from its mean value is associated with two points higher for Math, and 10 points higher respectively for Vietnamese. The figure for non-FDS Model (1) is five points lower in both subjects. For *FDS students*, the effects of social background are stronger with corresponding figures being three for Math and around 13–14 for Vietnamese in Model (2) and (3), and three for Math and even 22 for Vietnamese in Model (1).

11. Number of days with FDS, FDS instructional time are centered.

Table 7—*VA model of learning achievement with interaction terms (OLS)*

	Retest score in Math			Retest score in Vietnamese		
	(1)	(2)	(3)	(1)	(2)	(3)
Attend FDS	−16.7372***			−14.2371***		
	(3.3452)			(3.5482)		
FDS x Social background	11.7266***			27.1802***		
	(3.1816)			(3.3863)		
Number of days with FDS per week		−5.9863***			−5.4156***	
		(0.7421)			(0.7948)	
FDS day x Social background		1.2310**			4.1966***	
		(0.7578)			(0.8113)	
Instructional time			−2.1827***			−2.4349***
			(0.3262)			(0.3489)
Instructional time x Social background			0.7987*			1.5412***
			(0.3454)			(0.3702)
Social background	−4.7688*	1.7975**	1.7310**	−5.2405*	10.3482***	10.8848***
	(2.6742)	(1.7699)	(1.7730)	(2.8435)	(1.8993)	(1.8992)
Boy	0.3965	0.1271	0.0530	−17.3311***	−17.3298***	−17.1063***
	(2.8044)	(2.7985)	(2.8072)	(2.9700)	(2.9937)	(2.9980)
Minority	15.7020***	14.8602***	13.8018***	15.4389***	15.7969***	16.0877***
	(5.0860)	(5.0787)	(5.1047)	(5.4068)	(5.4534)	(5.4725)
Number of siblings	−0.0778	1.3689**	1.1583	2.0859**	3.5935*	3.7760*
	(1.9195)	(1.9084)	(1.9116)	(2.0388)	(2.0470)	(2.0474)
Number of older siblings	−5.9863***	−5.6492***	−5.8320***	−2.8471**	−2.4659**	−2.4649**
	(1.7937)	(1.7868)	(1.7925)	(1.9009)	(1.9119)	(1.9149)

	Retest score in Math			Retest score in Vietnamese		
	(1)	(2)	(3)	(1)	(2)	(3)
Math test score	0.5583***	0.5542***	0.5546***	0.0347*	0.0338*	0.0346*
	(0.0156)	(0.0155)	(0.0156)	(0.0164)	(0.0165)	(0.0166)
Vietnamese test score	0.0487***	0.0455***	0.0484***	0.3995***	0.3953***	0.3984***
	(0.0162)	(0.0161)	(0.0161)	(0.0172)	(0.0173)	(0.0173)
School facilities	3.0167*	4.4607***	3.6676*	0.5067	2.1177**	2.0142**
	(1.4760)	(1.4630)	(1.4573)	(1.5647)	(1.5664)	(1.5576)
Class facilities	7.2264***	7.5179***	6.9805***	4.4000*	4.1728*	3.4926*
	(1.6869)	(1.6718)	(1.6730)	(1.7865)	(1.7891)	(1.7875)
Teacher's qualification	4.3159*	6.8266***	6.1503***	7.9808***	11.0267***	10.8109***
	(2.0600)	(2.0609)	(2.0625)	(2.1826)	(2.2057)	(2.2039)
Teacher's experience	0.5605***	0.6188***	0.6290***	1.0837***	1.1511***	1.1199***
	(0.1848)	(0.1853)	(0.1866)	(0.1960)	(0.1985)	(0.1996)
Principal's qualification	16.1719***	15.5755***	14.1313***	2.3192**	2.2368**	1.3413
	(2.9247)	(2.8651)	(2.8573)	(3.0994)	(3.0681)	(3.0555)
Principal's experience	−0.5156*	−0.4614*	−0.5970***	0.0448	0.1742**	0.0322
	(0.2075)	(0.2073)	(0.2071)	(0.2199)	(0.2219)	(0.2214)
Urban areas	−2.7235**	2.8864**	−4.7462**	−6.4220**	−0.7880	−7.2135*
	(4.0022)	(4.0703)	(4.0673)	(4.2415)	(4.3554)	(4.3472)
Constant	183.9170***	164.7507***	180.4446***	260.9770***	236.9716***	248.9767***
	(19.2189)	(19.1088)	(19.0999)	(20.3404)	(20.4303)	(20.3976)
Number of observations	3 072	3 039	3 039	3 073	3 040	3 040
Adjusted R2	0.391	0.398	0.394	0.290	0.286	0.284

Note: *** p<0.01, ** p<0.05, * p<0.1

The multiplicative effects of the interaction terms are significantly positive. For FDS students from high level social background, FDS is associated with 12 and 27 point higher in learning progress Math and Vietnamese. If the number of FDS days is more than two, each additional FDS day increases progress by one and four points higher, and each unit of instructional time starting from 29 periods increase progress by one and two points respectively. It is observed that for students from high social background,[12] the higher the level of FDS attendance, the weaker the effect of FDS on learning progress. This might result from the fact that high social backgrounds students could benefit from less but high quality instructional time, or they prefer to have more instructional time from extra classes.

Other school resources have significantly positive relationship with learning progress. Students have access to better school and class facilities have higher learning progress, with stronger effect of class facilities as expected. Students taught by higher qualified and more experienced teachers often obtain more learning progress than others. Qualified principals also helps to increase learning progress.

Students of ethnic minorities have higher learning progress than majority—9 to 11 points higher for Math and 12 points higher for Vietnamese. This matches what was observed in Rolleston et al. (2013) on more learning progress of ethnic minority students. The reason might be attributed to the minorities' lower starting point in comparison with the majority's, which leaves them more space for progress, especially when the Government supports their FDS attendance. Boys seem to have lower progress in Vietnamese than girls as intuitively observed in real situation. For each additional older sibling of a student, he/she has five and three points less in learning progress in Math and Vietnamese, which might be a consequence of the lower level of parental investment or care devoted to him/her. And students living in rural areas obtain higher progress than urban group of students, probably due to the same reason as students from minorities—rural students have more room for progress and they could be beneficiaries of support from the Government for their FDS attendance.

Both test scores in Math and Vietnamese positively correlate with learning progress in each individual subject. The cross-productivity effects—the test score of one subject positively contributes to the learning progress of the other subject are observed with much smaller, being one tenth of the self-productivity effects.

Mostly similar to the results of QR without interaction terms (Appendix A, Table A7), heterogeneity in the estimated coefficients of regressors, including for FDS alone, social background alone is observed across the distribution of retest scores as shown in Table 9 (see Appendix B, Figure B3–B6 for illustration of Table 9).

Negative effect of FDS on learning progress increases across retest score, irrespective of the level of attendance in FDS. In other words, the higher the retest score an FDS student has, the lower his learning progress.

Contrarily, the level of social background seems not to relates to learning progress in Math, except for students with retest score in the 0.4 quantile. Regarding the learning progress in Vietnamese, higher social background slightly raises learning progress across

12. Which is higher than mean level of social background (because level of social background is centered)

quantile of retest score. The trend in the relationship between learning progress and social background might explain for insignificant effect of interaction terms on learning progress in Math in most regressions and significantly positive effect of interaction term on learning progress in Vietnamese. *For Vietnamese,* the gaps in learning progress from attending FDS between high and low social background students follow an U inverted shaped line over the score distribution, ranging from 19 to reach its peak of 32 points for students with retest scores in quantile 0.6. One unit increase in the number of FDS days above two and in the number of FDS periods above 29 attended by high social background students is associated with 3 to 5 points and one point in retest score in Vietnamese respectively. *For Math*, only among high performance group with retest score at the quantiles starting from 0.8—higher social background students have higher learning progress from attending FDS than low social background students, with the progress gap between high and low social background students increasing from nine to 16 points. Each additional period then raises retest scores in Math of high social background students by approximately one point only for the FDS students with highest retest score.

Effect of school facilities become insignificant for most group of students, while class facilities hold significant and increasing effect on learning progress across level of retest performance for both subjects, but these effects are much stronger and more heterogeneous for Math than for Vietnamese.

While there is ambiguous trend of ethnicity effect on learning for Math (insignificant effect in some quantiles of retest score), the trend for Vietnamese seems to increasingly relates to learning progress across quantile. The level of heterogeneity is observed for the estimated coefficients of lagged learning achievement in Math only. So are the effects of principal's experience on learning progress in Math and teacher's qualification and experience on learning progress in Vietnamese.

So the estimation results give the following evidences. Firstly the higher level of FDS attendance, the higher learning progress the student obtains. The effect of FDS seems to decrease across retest score distribution. Secondly students from high social background are likely to have higher learning progress, but this does not hold for their higher extent of attendance in FDS. This correlation is much stronger and more heterogeneous for Vietnamese than for Math across quantile of retest scores. Thirdly, better school resources, including school and class facilities, qualification and experience of principals and teachers, would likely to raise learning progress. Fourthly, the disadvantaged group, which are students form minorities and rural areas prove to achieve higher learning progress than their counterparts from majority and urban areas. Higher performance students from minorities have higher progress in Vietnamese. Fifthly, students living in families with more older siblings have less learning progress. And lastly male students often have less progress than female group in Vietnamese.

Table 8—*Quantile regressions of learning achievement—Retest score in Math*

	(1)				(2)				(3)			
	τ=0.20	τ=0.40	τ=0.60	τ=0.80	τ=0.20	τ=0.40	τ=0.60	τ=0.80	τ=0.20	τ=0.40	τ=0.60	τ=0.80
Attend FDS	−9.1795*	−18.0594***	−18.1242***	−20.2203***								
	(5.0672)	(4.1577)	(4.8079)	(4.9537)								
FDS x Social background	6.2522	3.5393	9.0229**	16.0322***								
	(3.8173)	(5.3355)	(3.7122)	(4.2122)								
Number of days with FDS per week					−3.9702***	−5.0828***	−5.6164***	−7.9249***				
					(1.0589)	(1.0892)	(0.9340)	(1.1682)				
FDS day x Social background					−0.0152	0.5249	1.0654	1.4339				
					(0.9272)	(1.0358)	(1.0402)	(1.0101)				
Instructional time									−1.5460***	−1.6778***	−1.8153***	−2.5990***
									(0.5302)	(0.4470)	(0.2898)	(0.4497)
Instructional time x Social background									0.1893	0.2866	0.6663	1.1015**
									(0.5309)	(0.5527)	(0.4163)	(0.4921)
Social background	−0.7722	1.1264	−4.2591	−7.9367*	2.2834	3.0568*	−0.1153	2.6846	1.8605	2.6747*	0.7831	1.3205
	(2.9785)	(4.0729)	(3.6051)	(4.5436)	(2.5517)	(1.6934)	(1.8649)	(2.5674)	(1.7235)	(1.5421)	(2.3640)	(2.5297)
Boy	−1.2091	0.7696	1.8217	−0.2065	0.6257	1.7146	0.0354	0.5376	−0.1834	0.5687	0.9391	−0.1809
	(3.6166)	(3.4175)	(3.2024)	(4.0272)	(3.6375)	(2.7904)	(2.7735)	(3.1386)	(3.4948)	(2.7043)	(2.8909)	(3.7588)
Minority	13.7545**	8.9511	12.5067*	21.1721**	11.7712**	9.3919	12.5790**	17.0163***	11.0608	8.7865	10.8268**	14.1632**
	(5.5153)	(5.5067)	(6.8919)	(8.8182)	(5.2217)	(5.7731)	(6.1755)	(6.5800)	(6.9011)	(5.3841)	(4.7849)	(5.8114)
Number of siblings	1.9413	−0.4765	−2.3812	−1.9933	3.2910	1.0751	−1.1079	1.4211	3.0783	1.1682	−1.2698	−0.0513
	(2.3954)	(1.9912)	(2.1884)	(2.5454)	(2.6607)	(2.4856)	(3.4607)	(3.3043)	(2.6423)	(1.7924)	(1.9559)	(3.6680)
Number of older siblings	−5.1322**	−3.4088	−6.0368***	−7.6064***	−4.3557*	−4.2674*	−4.8998**	−6.2469*	−4.2359	−3.7455	−5.4207**	−7.2171***
	(2.5388)	(2.1309)	(1.6968)	(2.1370)	(2.5658)	(2.4554)	(2.3267)	(3.2512)	(3.4405)	(2.5666)	(2.4968)	(2.4212)

	(1)				(2)				(3)			
	τ=0.20	τ=0.40	τ=0.60	τ=0.80	τ=0.20	τ=0.40	τ=0.60	τ=0.80	τ=0.20	τ=0.40	τ=0.60	τ=0.80
Math test score	0.6565***	0.6387***	0.5958***	0.5260***	0.6588***	0.6308***	0.5914***	0.4946***	0.6549***	0.6325***	0.5906***	0.5174***
	(0.0205)	(0.0213)	(0.0281)	(0.0332)	(0.0224)	(0.0311)	(0.0239)	(0.0352)	(0.0329)	(0.0250)	(0.0244)	(0.0300)
Vietnamese test score	0.0402*	0.0397***	0.0394**	0.0653**	0.0370	0.0476***	0.0452**	0.0609**	0.0414*	0.0539***	0.0418**	0.0593***
	(0.0212)	(0.0121)	(0.0194)	(0.0254)	(0.0244)	(0.0177)	(0.0202)	(0.0276)	(0.0214)	(0.0194)	(0.0174)	(0.0189)
School facilities	0.9170	0.9062	1.5371	3.2991	1.8368	0.1672	2.7417*	7.8382***	1.5063	0.9427	1.5310	6.8194***
	(1.5264)	(1.9598)	(1.5911)	(2.8781)	(2.0276)	(2.6161)	(1.5357)	(2.9074)	(2.1071)	(1.8543)	(1.3763)	(1.9454)
Class facilities	4.1456*	3.8177*	4.8567***	8.8370***	3.5705*	4.5402**	5.5548***	6.9076***	3.4819	2.5215	4.9771**	7.2423***
	(2.2959)	(1.9714)	(1.5883)	(2.3590)	(1.8235)	(2.2587)	(2.0152)	(2.1578)	(2.3338)	(2.1213)	(2.0781)	(1.7796)
Teacher's qualification	2.3560	5.8673**	2.4679	7.6393***	4.7521*	7.0935***	5.0097***	11.2341***	3.4764	6.7802***	4.2070*	10.7784***
	(2.6979)	(2.3352)	(2.5210)	(2.7589)	(2.5521)	(2.3137)	(1.5401)	(3.5871)	(2.1376)	(2.5042)	(2.3871)	(2.5237)
Teacher's experience	−0.0803	0.3584**	0.5869**	1.3649***	0.0227	0.3871**	0.6255**	1.3617***	−0.0796	0.3960*	0.6868***	1.4559***
	(0.2813)	(0.1776)	(0.2513)	(0.3025)	(0.2134)	(0.1931)	(0.2776)	(0.2814)	(0.2834)	(0.2202)	(0.2421)	(0.2618)
Principal's qualification	−0.3999	−0.2635	−0.4315**	−0.5809**	−0.3477	−0.3104	−0.5640**	−0.2915	−0.3758	−0.5014**	−0.5566**	−0.5853**
	(0.2921)	(0.2104)	(0.1874)	(0.2425)	(0.2526)	(0.2504)	(0.2485)	(0.4121)	(0.2345)	(0.1950)	(0.2363)	(0.2681)
Principal's experience	14.2475***	14.4046***	15.3117***	16.7650***	13.9702***	14.4544***	14.9756***	13.9903***	13.7189***	11.5277***	13.6236***	10.7706***
	(4.1720)	(3.0960)	(3.2962)	(3.8157)	(4.1651)	(3.1500)	(3.1241)	(4.3064)	(4.2852)	(3.0248)	(4.1997)	(3.9677)
Urban areas	2.7127	4.2707	−5.2768	−5.8173	7.8077	4.3765	0.2070	1.0528	4.4827	−1.6903	−5.2734	−9.9785
	(7.2171)	(6.2173)	(5.8986)	(4.6761)	(6.5665)	(5.8046)	(6.3409)	(5.4410)	(5.3700)	(7.5356)	(7.3494)	(7.4439)
Constant	90.7660***	123.8762***	198.0048***	238.7381***	70.4684***	108.1819***	177.7527***	227.7486***	80.7270***	125.0060***	190.7476***	247.3829***
	(22.9964)	(21.0573)	(19.9665)	(25.3037)	(21.2968)	(21.9098)	(19.6544)	(39.8697)	(29.5811)	(17.4763)	(23.7108)	(33.3596)
Number of observations	3,072				3,039				3,039			

Notes: *** p<0.01, ** p<0.05, * p<0.1

Table 8—*Quantile regressions of learning achievement—Retest score in Vietnamese*

	(1)				(2)				(3)			
	τ=0.20	τ=0.40	τ=0.60	τ=0.80	τ=0.20	τ=0.40	τ=0.60	τ=0.80	τ=0.20	τ=0.40	τ=0.60	τ=0.80
Attend FDS	−12.4062**	−12.2590**	−9.4683**	−17.2595***								
	(5.7112)	(4.7649)	(4.6685)	(5.2671)								
FDS x Social background	18.5865***	25.0379***	31.5725***	26.4519***								
	(5.9946)	(6.1923)	(6.2403)	(3.8314)								
Number of days with FDS per week					−5.1326***	−5.3322***	−5.9657***	−6.8262***				
					(1.0827)	(0.9161)	(1.0635)	(0.8604)				
FDS day x Social background					2.8059**	3.6625***	3.9835***	4.4183***				
					(1.2829)	(0.9958)	(0.7840)	(0.8176)				
Instructional time									−2.5587***	−2.2623***	−2.5560***	−2.6044***
									(0.4160)	(0.6274)	(0.5263)	(0.5658)
Instructional time x Social background									0.8882	1.3862*	1.7560***	1.6796***
									(0.5528)	(0.7253)	(0.6025)	(0.5088)
Social background	−1.5224	−3.7086	−8.0357	−2.1560	10.1376***	10.8138***	11.2691***	12.8316***	10.2857***	11.1877***	11.4480***	13.5565***
	(5.5092)	(6.1544)	(5.3693)	(4.8894)	(2.5267)	(2.0177)	(2.4701)	(2.6769)	(3.0490)	(2.9292)	(2.5762)	(3.6536)
Boy	−20.7515***	−14.0448***	−13.2976***	−14.3183***	−19.9060***	−14.2736***	−14.7813***	−14.5016***	−20.0299***	−13.2287***	−15.7786***	−14.1772***
	(3.6176)	(4.7930)	(3.2833)	(3.9274)	(4.4970)	(4.2368)	(3.2384)	(2.6262)	(3.8167)	(4.5599)	(3.3824)	(2.9322)
Minority	12.4853*	19.1938**	21.8160***	19.6632**	16.2381*	23.3046***	23.2608***	19.8460**	11.5252	23.0416***	16.2836***	21.8798**
	(6.8731)	(8.5596)	(7.4170)	(8.8527)	(9.0897)	(6.4523)	(7.9542)	(9.5360)	(8.7730)	(8.6406)	(5.3868)	(10.3647)
Number of siblings	3.0377	2.6523	3.7005*	0.7299	2.6811	2.6577	5.1253**	2.6639	2.2956	2.4147	5.9152*	3.0132
	(2.3743)	(2.7549)	(2.0596)	(2.4920)	(2.9700)	(2.6040)	(2.5719)	(3.4501)	(2.7052)	(3.4548)	(3.1011)	(4.2254)
Number of older siblings	−3.3559	−3.1111	−2.0002	−1.9754	−2.9920	−0.5489	−0.6731	−0.3874	−4.2496*	−1.6609	−0.4400	−0.9070
	(2.5043)	(2.6704)	(2.5765)	(3.1266)	(2.6407)	(3.2428)	(2.8193)	(2.8092)	(2.2080)	(3.1853)	(2.2730)	(3.2424)

	(1)				(2)				(3)			
	τ=0.20	τ=0.40	τ=0.60	τ=0.80	τ=0.20	τ=0.40	τ=0.60	τ=0.80	τ=0.20	τ=0.40	τ=0.60	τ=0.80
School facilities	0.0480*	0.0105	0.0143	0.0203	0.0451*	0.0265*	0.0134	0.0151	0.0538**	0.0247	0.0111	0.0151
	(0.0257)	(0.0185)	(0.0243)	(0.0253)	(0.0239)	(0.0157)	(0.0153)	(0.0272)	(0.0237)	(0.0213)	(0.0166)	(0.0262)
Class facilities	0.4684***	0.4786***	0.4684***	0.3823***	0.4668***	0.4583***	0.4473***	0.3686***	0.4602***	0.4681***	0.4456***	0.3603***
	(0.0336)	(0.0286)	(0.0343)	(0.0289)	(0.0293)	(0.0226)	(0.0183)	(0.0274)	(0.0285)	(0.0256)	(0.0261)	(0.0342)
Math test score	0.0399	1.0792	−0.1641	3.1259	2.3701	2.8304	3.7520*	4.6529	3.1260	2.7029	3.5926**	4.3645*
	(2.6267)	(2.6172)	(1.9948)	(2.1145)	(2.6826)	(2.2762)	(2.1223)	(2.9413)	(1.9608)	(2.1815)	(1.4417)	(2.5467)
Vietnamese test score	6.0434**	3.9884	2.4741	0.7367	5.8881*	5.7768*	2.9097	2.5395	5.2713***	3.3819	1.6409	2.1305
	(2.9867)	(3.5478)	(2.7815)	(1.7944)	(3.1833)	(2.9570)	(2.3143)	(2.6665)	(1.9915)	(2.7092)	(2.2804)	(2.7228)
Teacher's qualification	9.7980***	7.8869**	7.8059**	9.5309***	10.9748***	13.2856**	12.9777***	12.0973***	10.7559***	12.3698***	12.2941***	12.4907***
	(3.4317)	(3.8275)	(3.2623)	(3.2273)	(3.4328)	(5.3146)	(4.4267)	(3.4533)	(3.8821)	(4.3272)	(3.5351)	(4.0647)
Teacher's experience	1.4306***	0.9995***	1.0914***	0.7191***	1.5112***	1.2872***	1.0973***	0.7237***	1.4670***	1.1860***	1.0723***	0.7984***
	(0.3084)	(0.3836)	(0.2892)	(0.2620)	(0.2698)	(0.2920)	(0.2038)	(0.2518)	(0.3013)	(0.2872)	(0.2947)	(0.2655)
Principal's qualification	0.1843	0.3762	0.0452	−0.4583	0.3803	0.3947*	0.2201	−0.3711	0.1815	0.1993	0.0479	−0.6250**
	(0.2562)	(0.2347)	(0.2494)	(0.2896)	(0.3824)	(0.2337)	(0.2458)	(0.3688)	(0.3162)	(0.4101)	(0.2711)	(0.3144)
Principal's experience	1.6955	3.7488	−1.0727	1.7476	0.2759	4.0578	0.3136	1.4651	−1.0363	4.5255	−1.8038	−2.0306
	(5.7052)	(3.5756)	(5.9226)	(4.9798)	(5.1280)	(4.0917)	(4.3037)	(2.7170)	(4.0464)	(4.0724)	(4.3979)	(3.4850)
Urban areas	−13.5528*	−1.3907	−6.4876	−5.1599	−8.9394	2.3359	1.5566	−1.4326	−14.0306**	−3.7345	−3.8585	−8.8448**
	(7.1494)	(6.1165)	(5.9194)	(5.8826)	(5.7191)	(4.4860)	(4.3182)	(3.7754)	(5.5062)	(6.6788)	(5.7090)	(3.9380)
Constant	144.6519***	196.3087***	263.7869***	362.6283***	132.6974***	163.6529***	237.0481***	348.3667***	149.3651***	173.7032***	259.0579***	375.5847***
	(32.4534)	(23.1206)	(25.4804)	(34.0407)	(37.7707)	(28.4276)	(27.4305)	(31.2646)	(28.5983)	(28.1027)	(31.0953)	(37.9135)
Number of observations	3,073				3,040				3,040			

Notes: *** p<0.01, ** p<0.05, * p<0.1

5. Conclusions and Discussion

In the same way as for general education, FDS for G5 students has been applied to move forwards higher quality of education by increasing instructional time and restraining the negative effects of widespread extra classes in Vietnam. While it is still far from being able to say whether the strategy approaches its target or not, there are undoubtedly lots of tasks ahead in the transition process to FDS on national scale with at least 35 periods per week by 2025.

As the nature of a transition process, the implementation of FDS has been widely differing subject to the FDS school's physical and human resources, which are mainly based the affordability of community and student parents. Consequently, the instructional time varies a great deal among FDS students, whatever with or without attending extra classes at the same time. Though FDS is obviously accompanied by more instructional time, extra classes are still predominating. The rise in the number of periods provided for FDS students does reduce, but is not strong enough to cancel out the gap in instructional time by attending extra classes.

The inequality of opportunity is apparent among students for the two following evidences. Firstly, students from advantaged social background seem to attend both FDS and extra classes, and the time of instruction among FDS students increases with the level of social background that student comes from. Both imply disparities in instructional time between students from different levels of social background. Secondly in spite of more or even better school resources provided by implementing FDS, the positive benefits that FDS brings on in practice come to students from high rather than low level of social background. The extent to which students access to more well-equipped school and class facilities, more qualified and more experienced teachers grows with student social background level. Briefly speaking, FDS students with social background disadvantage have lower access to school resources compared with their counterparts from more advantaged social background.

Estimation results of the value added model with interaction terms using both the OLS and QR provide consistent evidences as follows. First of all, there is strong relationship between student's attendance in FDS and higher learning progress in both Math and Vietnamese. The relationship is magnified for the FDS student of social background advantage, which often have access to better school resources. These two evidences prove that FDS in this context is still associated with the inequality in education among G5 students. Second, the result give evidence on the better progress of students from disadvantaged group (from minorities and rural areas), implying to some extent the Government's effort in supporting the implementation of FDS for these group has brought about positive effect and the potentially higher effect for further and appropriate support program. Third, regarding student and family characteristics, students who are living in families with more older siblings have less learning progress, and boys often have less progress than girls in Vietnamese.

These above evidences suggests the further implementation of FDS for educational equality. This requires higher level of State's commitment to financial support for FDS schools and priorities given to schools where insufficient resources currently hinders the 'full' application of FDS. By that means, the movement towards minimum 34 periods per

week on national scale would be accelerated, hence minimizing disparities in access to instructional time among students. This involves concerted efforts of State management agencies in forming a set of criteria for school resources to ensure FDS is functioning in that context, identification of policy beneficiaries, legal framework and management capacity to strictly monitor national standards for FDS and so on.

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Appendices

A. Tables

Table A1—*Agreement/Disagreement in reporting on the availability of FDS (%)*

Availability of FDS provided by principals and teachers			
	Teacher's response		
Principal's response	No FDS	With FDS	Total
No FDS	25.03	10.63	35.66
With FDS	2.95	61.39	64.34
Total	27.98	72.02	100

Availability of FDS provided by principals and teachers			
	Student's response		
Principal's response	No FDS	With FDS	Total
No FDS	29.13	6.56	35.69
With FDS	11.36	52.95	64.31
Total	40.49	59.51	100

Availability of FDS provided by principals and teachers			
	Student's response		
Teacher's response	No FDS	With FDS	Total
No FDS	21.53	6.44	27.97
With FDS	18.96	53.07	72.03
Total	40.49	59.51	100

Source: Authors' calculations based on YLs School Survey 2011

Table A2—*MCA results for student's social background*

Dimension	Principal inertia	Percent	Cummulation percent
dim1	0.033287	78.31	78.31
dim2	0.003861	9.08	87.40
dim3	0.000396	0.93	88.33
dim4	0.000127	0.30	88.62
dim5	0.000058	0.14	88.76
dim6	0.000005	0.01	88.77
dim7	0.000001	0.00	88.78
dim8	0.000000	0.00	88.78
Total	**0.042505**	**100.00**	

Source: Authors' calculations based on the YLs School Survey 2011

Table A2—*MCA Statistics of columns—Social background index*

		Overall			Dimension 1			Dimension 2		
		mass	quality	%inert	coord	sqcorr	contrib	coord	sqcorr	contrib
Mother's educational level	Primary or less	0.0279	0.7307	0.0216	0.8489	0.7302	0.0201	0.0645	0.0005	0.0001
	Lower secondary	0.0122	0.4128	0.0093	−0.0537	0.0030	0.0000	−1.8530	0.4098	0.0420
	Higher secondary	0.0125	0.8274	0.0441	−1.8465	0.7553	0.0425	1.6746	0.0721	0.0350
Father's educational level	Primary or less	0.0274	0.7056	0.0203	0.8179	0.7053	0.0183	0.0469	0.0003	0.0001
	Lower secondary	0.0109	0.3878	0.0086	0.1328	0.0176	0.0002	−1.7880	0.3702	0.0349
	Higher secondary	0.0144	0.8182	0.0404	−1.6595	0.7660	0.0395	1.2709	0.0521	0.0232
Number of meals per day	1	0.0002	0.3561	0.0004	1.1020	0.3559	0.0002	0.0684	0.0002	0.0000
	2	0.0087	0.9319	0.0059	0.8832	0.8948	0.0068	−0.5282	0.0371	0.0024
	3 or more	0.0438	0.9314	0.0012	−0.1792	0.8961	0.0014	0.1045	0.0353	0.0005
A television at home	No	0.0027	0.9232	0.0338	3.5435	0.7996	0.0345	4.0906	0.1236	0.0460
	Yes	0.0499	0.9232	0.0019	−0.1951	0.7996	0.0019	−0.2252	0.1236	0.0025
A radio at home	No	0.0387	0.9904	0.0061	0.4399	0.9659	0.0075	−0.2059	0.0246	0.0016
	Yes	0.0140	0.9904	0.0168	−1.2181	0.9659	0.0207	0.5702	0.0246	0.0045
An electric fan at home	No	0.0057	0.9672	0.0294	2.3915	0.8672	0.0325	2.3840	0.1000	0.0323
	Yes	0.0469	0.9672	0.0036	−0.2899	0.8672	0.0039	−0.2890	0.1000	0.0039
A telephone at home	No	0.0045	0.9145	0.0214	2.2753	0.8509	0.0233	1.8269	0.0636	0.0150
	Yes	0.0481	0.9145	0.0020	−0.2125	0.8509	0.0022	−0.1707	0.0636	0.0014
A bicycle at home	No	0.0076	0.9547	0.0195	1.5931	0.7710	0.0192	2.2831	0.1837	0.0395
	Yes	0.0451	0.9547	0.0033	−0.2676	0.7710	0.0032	−0.3835	0.1837	0.0066
A motorcycle at home	No	0.0057	0.9067	0.0238	2.1655	0.8823	0.0268	1.0576	0.0244	0.0064
	Yes	0.0469	0.9067	0.0029	−0.2642	0.8823	0.0033	−0.1290	0.0244	0.0008
A car at home	No	0.0484	0.9067	0.0021	0.1983	0.7088	0.0019	−0.3076	0.1979	0.0046
	Yes	0.0042	0.9067	0.0240	−2.2658	0.7088	0.0217	3.5153	0.1979	0.0523
Air conditioner at home	No	0.0467	0.8952	0.0073	0.3865	0.7530	0.0070	−0.4932	0.1422	0.0114
	Yes	0.0059	0.8952	0.0573	−3.0500	0.7530	0.0551	3.8922	0.1422	0.0897

		Overall			Dimension 1			Dimension 2		
		mass	quality	%inert	coord	sqcorr	contrib	coord	sqcorr	contrib
A study lamp at home	No	0.0146	0.9363	0.0505	1.9943	0.9008	0.0581	1.1621	0.0355	0.0197
	Yes	0.0380	0.9363	0.0194	−0.7668	0.9008	0.0224	−0.4468	0.0355	0.0076
A study desk at home	No	0.0064	0.8423	0.0759	3.3351	0.7338	0.0711	3.7660	0.1085	0.0907
	Yes	0.0462	0.8423	0.0105	−0.4611	0.7338	0.0098	−0.5207	0.1085	0.0125
A study chair at home	No	0.0066	0.8621	0.0670	3.1183	0.7503	0.0642	3.5351	0.1118	0.0826
	Yes	0.0460	0.8621	0.0096	−0.4475	0.7503	0.0092	−0.5074	0.1118	0.0118
A pocket calculator at home	No	0.0358	0.9758	0.0142	0.6911	0.9462	0.0171	−0.3589	0.0296	0.0046
	Yes	0.0168	0.9758	0.0302	−1.4730	0.9462	0.0365	0.7649	0.0296	0.0098
Own place to study at home	No	0.0107	0.9234	0.0477	2.2064	0.8542	0.0520	1.8440	0.0692	0.0363
	Yes	0.0420	0.9234	0.0121	−0.5615	0.8542	0.0132	−0.4693	0.0692	0.0092
Number of books in the home	None	0.0109	0.9778	0.0305	1.8304	0.9357	0.0364	1.1403	0.0421	0.0141
	1 to 5	0.0106	0.8872	0.0032	0.3556	0.3238	0.0013	−1.3771	0.5634	0.0201
	6 to 10	0.0072	0.6487	0.0014	−0.1655	0.1099	0.0002	−1.0757	0.5388	0.0083
	More than 10	0.0240	0.9779	0.0173	−0.9381	0.9563	0.0211	0.4145	0.0217	0.0041
A computer at home	No	0.0405	0.8434	0.0241	0.7595	0.7601	0.0233	−0.7382	0.0833	0.0221
	Yes	0.0121	0.8434	0.0802	−2.5308	0.7601	0.0778	2.4600	0.0833	0.0735
Internet at home	No	0.0430	0.8339	0.0182	0.6273	0.7277	0.0169	−0.7034	0.1062	0.0213
	Yes	0.0096	0.8339	0.0811	−2.7951	0.7277	0.0754	3.1345	0.1062	0.0948

Source: Authors' calculations based on the YLs School Survey 2011

Table A3—*MCA results for School Facilities index*

Table A3.1—*Multiple/Joint correspondence analysis—School facilities index*

Dimension	Principal inertia	Percent	Cummulation percent
dim1	0.043530	62.92	62.92
dim2	0.007214	10.43	73.35
dim3	0.000758	1.10	74.44
dim4	0.000030	0.04	74.49
Total	**0.040056**	**100.00**	

Source: Authors' calculations based on the YLs School Survey 2011

Table A3.2—*MCA Statistics for column categories in standard normalization—School facilities*

		Overall			Dimension 1			Dimension 2		
		mass	quality	%inert	coord	sqcorr	contrib	coord	sqcorr	contrib
Major repairs needed	No	0.0814	0.8740	0.0036	0.1804	0.4688	0.0026	0.4120	0.4052	0.0138
	Yes	0.0186	0.8740	0.0156	–0.7906	0.4688	0.0116	–1.8052	0.4052	0.0605
Separate room for G5	No	0.0022	0.6273	0.0207	–2.8603	0.5569	0.0183	2.4969	0.0703	0.0140
	Yes	0.0978	0.6273	0.0005	0.0656	0.5569	0.0004	–0.0573	0.0703	0.0003
Have library	No	0.0230	0.8092	0.1206	–2.5556	0.7846	0.1504	1.1102	0.0245	0.0284
	Yes	0.0770	0.8092	0.0361	0.7646	0.7846	0.0450	–0.3322	0.0245	0.0085
Computers for students	No	0.0580	0.7155	0.0955	–1.3108	0.6567	0.0997	–0.9637	0.0588	0.0539
	Yes	0.0420	0.7155	0.1320	1.8113	0.6567	0.1377	1.3318	0.0588	0.0745
Internet for students	No	0.0601	0.7197	0.0878	–1.2377	0.6592	0.0920	–0.9215	0.0606	0.0510
	Yes	0.0399	0.7197	0.1320	1.8608	0.6592	0.1383	1.3854	0.0606	0.0767
Electricity	No	0.0008	0.5742	0.0434	–5.6986	0.3842	0.0265	9.8453	0.1900	0.0790
	Yes	0.0992	0.5742	0.0004	0.0468	0.3842	0.0002	–0.0809	0.1900	0.0006
Working electricity today	No	0.0042	0.6756	0.0535	–3.1637	0.4958	0.0422	4.6798	0.1798	0.0922
	Yes	0.0958	0.6756	0.0024	0.1391	0.4958	0.0019	–0.2058	0.1798	0.0041
Latrines for students	No	0.0028	0.7740	0.0611	–4.7584	0.6570	0.0638	4.9329	0.1170	0.0686
	Yes	0.0972	0.7740	0.0018	0.1380	0.6570	0.0019	–0.1431	0.1170	0.0020
Separate latrines for boys/girls	No	0.0117	0.7851	0.1270	–3.5429	0.7290	0.1471	2.4155	0.0562	0.0684
	Yes	0.0883	0.7851	0.0169	0.4703	0.7290	0.0195	–0.3206	0.0562	0.0091
Clean drinking water for students	No	0.0817	0.6327	0.0091	0.0430	0.0105	0.0002	0.8132	0.6222	0.0540
	Yes	0.0183	0.6327	0.0403	–0.1915	0.0105	0.0007	–3.6204	0.6222	0.2404

Source: Authors' calculations based on School Survey 2011

Table A3.3—*School facilities index by facility*

Facility	No	Yes
Major repairs needed	−0.0087	−0.6770
Separate room for G5	−2.3537	−0.0924
Have library	−1.6952	0.3552
Computers for students	−0.9065	0.8829
Internet for students	−0.8651	0.9841
Electricity	−3.8004	−0.0540
Working electricity today	−2.5800	0.0094
Latrines for students	−2.7507	0.0675
Separate latrines for boys/girls	−1.5159	0.2523
Clean drinking water for students	−0.1639	−0.1592

Source: Authors' calculations based on the YLs School Survey 2011

Table A4—*MCA results for Class Facilities index*

Table A4.1—*Multiple/Joint correspondence analysis—Class facilities index*

Dimension	Principal inertia	Percent	Cummulation percent
dim1	0.013994	50.60	50.60
dim2	0.003327	12.03	62.63
dim3	0.001765	6.38	69.01
dim4	0.000013	0.05	69.06
dim5	0.000000	0.00	69.06
Total	**0.040056**	**100.00**	

Source: Authors' calculations based on the YLs School Survey 2011

Table A4.2—*MCA Statistics for column categories in standard normalization—Class facilities*

		Overall			Dimension 1			Dimension 2		
		mass	quality	%inert	coord	sqcorr	contrib	coord	sqcorr	contrib
Black board or white board	No	0.0005	0.1064	0.0304	1.1121	0.0105	0.0006	6.9081	0.0959	0.0242
	Yes	0.0828	0.1064	0.0002	–0.0068	0.0105	0.0000	–0.0423	0.0959	0.0001
Wall map	No	0.0252	0.8983	0.0345	–1.5174	0.8529	0.0581	0.7181	0.0454	0.0130
	Yes	0.0581	0.8983	0.0150	0.6596	0.8529	0.0253	–0.3121	0.0454	0.0057
Teacher's cabinet	No	0.0109	0.8406	0.0976	–3.8067	0.8157	0.1574	1.3636	0.0249	0.0202
	Yes	0.0725	0.8406	0.0146	0.5705	0.8157	0.0236	–0.2043	0.0249	0.0030
Teacher's desks	No	0.0008	0.7895	0.0669	–10.5465	0.6831	0.0903	8.5399	0.1065	0.0592
	Yes	0.0825	0.7895	0.0007	0.1038	0.6831	0.0009	–0.0840	0.1065	0.0006
Sufficient electric lights	No	0.0025	0.7803	0.1174	–8.1539	0.7057	0.1636	5.4397	0.0747	0.0728
	Yes	0.0809	0.7803	0.0036	0.2482	0.7057	0.0050	–0.1656	0.0747	0.0022
Electric fan	No	0.0074	0.8269	0.0696	–3.8683	0.8086	0.1113	1.1921	0.0183	0.0106
	Yes	0.0759	0.8269	0.0068	0.3789	0.8086	0.0109	–0.1168	0.0183	0.0010
TV	No	0.0762	0.4830	0.0121	–0.3096	0.3067	0.0073	–0.4814	0.1762	0.0177
	Yes	0.0071	0.4830	0.1293	3.3218	0.3067	0.0784	5.1643	0.1762	0.1895
Video player or DVD	No	0.0828	0.1064	0.0002	–0.0068	0.0105	0.0000	–0.0423	0.0959	0.0001
	Yes	0.0005	0.1064	0.0304	1.1121	0.0105	0.0006	6.9081	0.0959	0.0242
Radio	No	0.0819	0.5150	0.0001	–0.0113	0.0573	0.0000	0.0655	0.4577	0.0004
	Yes	0.0015	0.5150	0.0051	0.6281	0.0573	0.0006	–3.6405	0.4577	0.0195
Overhead projector	No	0.0779	0.3372	0.0064	–0.1575	0.1540	0.0019	–0.3525	0.1833	0.0097
	Yes	0.0055	0.3372	0.0907	2.2489	0.1540	0.0276	5.0323	0.1833	0.1382
Computer	No	0.0748	0.5498	0.0191	–0.4096	0.3323	0.0125	–0.6796	0.2175	0.0345
	Yes	0.0086	0.5498	0.1665	3.5701	0.3323	0.1093	5.9237	0.2175	0.3010
Books other than text books	No	0.0209	0.7757	0.0621	–2.0254	0.6995	0.0859	1.3712	0.0762	0.0394
	Yes	0.0624	0.7757	0.0208	0.6795	0.6995	0.0288	–0.4600	0.0762	0.0132

Source: Authors' calculations based on School Survey 2011

Table A4.3—*Class facilities index by facility*

Class facilities	No	Yes
Black board or white board	0.4870	−0.0030
Wall map	−0.6645	0.2888
Teacher's cabinet	−1.6670	0.2498
Teacher's desks	−4.6185	0.0454
Sufficient electric lights	−3.5707	0.1087
Electric fan	−1.6940	0.1659
TV	−0.1356	1.4547
Video player or DVD	−0.0030	0.4870
Radio	−0.0049	0.2751
Overhead projector	−0.0690	0.9848
Computer	−0.1794	1.5634
Books other than text books	−0.8869	0.2976

Source: Authors' calculations based on the YLs School Survey 2011

Table A5—*Correlation matrix*

	FDS	SB	FDS x SB	School facilities	Class facilities
FDS	1				
SB	0.3248	1			
FDS x SB	0.1923	0.7741	1		
School facilities	0.4268	0.3856	0.2947	1	
Class facilities	0.3028	0.4254	0.2459	0.4107	1

	FDS days	SB	FDS days x SB	School facilities	Class facilities
FDS days	1				
Social background	0.2663	1			
FDS x SB	0.008	−0.0691	1		
School facilities	0.4135	0.3877	−0.0238	1	
Class facilities	0.2776	0.4278	−0.1261	0.4109	1

	FDS instructional time	Social background	FDS instime x SB	School facilities	Class facilities
FDS instime	1				
SB	0.2177	1			
FDS instime x SB	0.0182	−0.1566	1		
School facilities	0.3315	0.3877	−0.0741	1	
Class facilities	0.2219	0.4278	−0.1539	0.4109	1

Table A6—*Multilinearity test*

Table A6.1—*Math*

(1)		
Variable	**VIF**	**1/VIF**
SB	3.77	0.265029
FDS x SB	2.86	0.349077
School facilities	1.64	0.611524
Class facilities	1.5	0.665551
Principal's qualification	1.49	0.673353
FDS	1.48	0.673924
Minority	1.44	0.692667
Vietnamese test score	1.37	0.727883
Teacher's qualification	1.27	0.787188
Math test score	1.25	0.802072
Teacher experience	1.23	0.812198
Principal experience	1.22	0.821385
Urban	1.17	0.852328
No of sibling	1.06	0.941973
No of older sibling	1.04	0.961268
Boy	1.03	0.974341
Mean VIF	1.55	

(2)		
Variable	**VIF**	**1/VIF**
SB	1.67	0.598692
School facilities	1.63	0.613125
Class facilities	1.5	0.668087
Principal's qualification	1.49	0.67107
FDS	1.44	0.693414
Minority	1.37	0.729673
Vietnamese test score	1.34	0.744181
Teacher's qualification	1.27	0.788746
Math test score	1.25	0.799966
Teacher experience	1.24	0.806616
Principal experience	1.23	0.814446
Urban	1.19	0.839328
FDS days x SB	1.14	0.879926
No of sibling	1.06	0.947301
No of older sibling	1.04	0.960689
Boy	1.03	0.97385
Mean VIF	1.31	

(3)		
Variable	**VIF**	**1/VIF**
SB	1.67	0.60031
School facilities	1.61	0.621702
Class facilities	1.5	0.668385
Principal's qualification	1.49	0.671291
FDS	1.43	0.701509
Minority	1.37	0.731927
Vietnamese test score	1.27	0.785621
Teacher's qualification	1.26	0.792432
Math test score	1.25	0.799996
Teacher experience	1.25	0.80062
Principal experience	1.22	0.820451
Urban	1.18	0.845803
FDS instime x SB	1.15	0.871418
No of sibling	1.05	0.950053
No of older sibling	1.04	0.960564
Boy	1.03	0.973855
Mean VIF	1.3	

Note: The variance inflation factor (VIF) measures the impact of multicollinearity among the explanatory variables in a regression model on the precision of estimation. If an explanatory variable is highly correlated with the remaining variables, its VIF will be very large. A general rule is that the VIF should not exceed 10 (Belsley, Kuh and Welsch 1980). In this table, VIF values of the model ranged from 1.02–1.52, which are an acceptable level.

Table A6.2—*Vietnamese*

(1)		
Variable	**VIF**	**1/VIF**
SB	3.76	0.265784
FDS x SB	2.87	0.348376
School facilities	1.64	0.611275
Class facilities	1.5	0.66679
Principal's qualification	1.48	0.674036
FDS	1.48	0.677691
Minority	1.45	0.691666
Vietnamese test score	1.38	0.724176
Teacher's qualification	1.27	0.787423
Math test score	1.24	0.803627
Teacher experience	1.23	0.811734
Principal experience	1.22	0.821866
Urban	1.17	0.852784
No of sibling	1.06	0.943062
No of older sibling	1.04	0.961384
Boy	1.03	0.975519
Mean VIF	1.55	

(2)		
Variable	**VIF**	**1/VIF**
SB	1.66	0.6015
School facilities	1.63	0.612992
Class facilities	1.5	0.668819
Principal's qualification	1.48	0.674946
FDS	1.44	0.693563
Minority	1.38	0.725593
Vietnamese test score	1.34	0.743766
Teacher's qualification	1.27	0.78884
Math test score	1.25	0.801546
Teacher experience	1.24	0.80624
Principal experience	1.23	0.814271
Urban	1.19	0.840547
FDS days x SB	1.13	0.88256
No of sibling	1.05	0.948915
No of older sibling	1.04	0.961733
Boy	1.03	0.975
Mean VIF	1.3	

(3)		
Variable	**VIF**	**1/VIF**
SB	1.66	0.603372
School facilities	1.61	0.621794
Class facilities	1.49	0.672032
Principal's qualification	1.49	0.672263
FDS	1.43	0.70135
Minority	1.37	0.727651
Vietnamese test score	1.27	0.784774
Teacher's qualification	1.26	0.792489
Math test score	1.25	0.800228
Teacher experience	1.25	0.801614
Principal experience	1.22	0.820574
Urban	1.18	0.846269
FDS instime x SB	1.14	0.873539
No of sibling	1.05	0.951423
No of older sibling	1.04	0.961627
Boy	1.03	0.975149
Mean VIF	1.3	

Note: The variance inflation factor (VIF) measures the impact of multicollinearity among the explanatory variables in a regression model on the precision of estimation. If an explanatory variable is highly correlated with the remaining variables, its VIF will be very large. A general rule is that the VIF should not exceed 10 (Belsley, Kuh and Welsch 1980). In this table, VIF values of the model ranged from 1.02–1.52, which are an acceptable level.

Table A7—*VA models of learning achievement (robustness check)*

Table A7.1—*Test score in Maths*

	(1)					(2)					(3)				
	Model I	Model II	Model III	Model IV	Model V	Model I	Model II	Model III	Model IV	Model V	Model I	Model II	Model III	Model IV	Model V
Attend FDS	−12.4758*** (3.1486)	−14.2093*** (3.2185)	−16.9334*** (3.3494)	−17.5325*** (3.3451)	−16.7372*** (3.3452)										
FDS x Social background					11.7266*** (3.1816)										
Number of days with FDS per week						−4.7207*** (0.7086)	−4.9486*** (0.7136)	−5.7447*** (0.7425)	−5.9299*** (0.7415)	−5.9863*** (0.7421)					
FDS day x Social background										1.2310** (0.7578)					
Instructional time											−1.7434*** (0.3141)	−1.8188*** (0.3157)	−2.0793*** (0.3256)	−2.1076*** (0.3248)	−2.1827*** (0.3262)
Instructional time x Social background															0.7987* (0.3454)
Social background		4.4656* (1.7526)	3.6849* (1.7767)	2.5452** (1.7963)	−4.7688* (2.6742)		4.3896* (1.7204)	3.2385* (1.7487)	1.9260** (1.7686)	1.7975** (1.7699)		3.9317* (1.7204)	2.8803** (1.7522)	1.6395** (1.7739)	1.7310** (1.7730)
School facilities			4.6477*** (1.4446)	3.4208* (1.4750)	3.0167* (1.4760)			5.8909*** (1.4347)	4.5512*** (1.4623)	4.4607*** (1.4630)			5.0497*** (1.4263)	3.7449* (1.4580)	3.6676* (1.4573)
Class facilities				6.5781*** (1.6811)	7.2264*** (1.6869)				7.3580*** (1.6693)	7.5179*** (1.6718)				6.8331*** (1.6729)	6.9805*** (1.6730)
Boy	0.8926 (2.8048)	0.6375 (2.8041)	0.6869 (2.8146)	0.7893 (2.8081)	0.3965 (2.8044)	0.4812 (2.7980)	0.2318 (2.7972)	0.2304 (2.8048)	0.3331 (2.7964)	0.1271 (2.7985)	0.4448 (2.8042)	0.2198 (2.8039)	0.2513 (2.8135)	0.3460 (2.8063)	0.0530 (2.8072)
Minority	11.5568* (4.7022)	14.8943*** (4.8772)	17.3206*** (4.9347)	19.8982*** (4.9671)	15.7020*** (5.0860)	8.0582* (4.7244)	11.3786* (4.8963)	13.8808*** (4.9357)	16.6402*** (4.9604)	14.8602*** (5.0787)	8.5329* (4.7419)	11.5276* (4.9165)	13.7532*** (4.9588)	16.3594*** (4.9870)	13.8018*** (5.1047)
Number of siblings	0.0283 (1.9000)	0.3417 (1.9023)	0.4278 (1.9084)	0.8485 (1.9069)	−0.0778 (1.9195)	0.6946 (1.8932)	1.0416 (1.8964)	1.1879 (1.9004)	1.6980** (1.8981)	1.3689** (1.9084)	0.6482 (1.8975)	0.9569 (1.9010)	1.0923 (1.9063)	1.5640** (1.9049)	1.1583 (1.9116)
Number of older siblings	−5.6650*** (1.7927)	−5.6629*** (1.7911)	−5.7328*** (1.7996)	−5.6859*** (1.7955)	−5.9863*** (1.7937)	−5.5563*** (1.7831)	−5.5219*** (1.7815)	−5.5230*** (1.7883)	−5.4470*** (1.7830)	−5.6492*** (1.7868)	−5.6268*** (1.7876)	−5.5990*** (1.7864)	−5.6302*** (1.7944)	−5.5574*** (1.7899)	−5.8320*** (1.7925)
Math test score	0.5706*** (0.0154)	0.5653*** (0.0155)	0.5612*** (0.0156)	0.5592*** (0.0156)	0.5583*** (0.0156)	0.5683*** (0.0153)	0.5627*** (0.0155)	0.5569*** (0.0156)	0.5545*** (0.0155)	0.5542*** (0.0155)	0.5670*** (0.0153)	0.5619*** (0.0155)	0.5569*** (0.0156)	0.5548*** (0.0156)	0.5546*** (0.0156)

	(1)					(2)					(3)				
	Model I	Model II	Model III	Model IV	Model V	Model I	Model II	Model III	Model IV	Model V	Model I	Model II	Model III	Model IV	Model V
Vietnamese test score	0.0695*** (0.0157)	0.0597*** (0.0161)	0.0560*** (0.0162)	0.0521*** (0.0162)	0.0487*** (0.0162)	0.0651*** (0.0156)	0.0558*** (0.0160)	0.0514*** (0.0161)	0.0470*** (0.0161)	0.0455*** (0.0161)	0.0656*** (0.0156)	0.0573*** (0.0161)	0.0537*** (0.0161)	0.0498*** (0.0161)	0.0484*** (0.0161)
Teacher's qualification	6.9264*** (2.0211)	6.2906*** (2.0347)	6.1819*** (2.0383)	5.3863*** (2.0437)	4.3159* (2.0600)	8.6094*** (2.0376)	7.9701*** (2.0511)	7.9377*** (2.0517)	7.1088*** (2.0541)	6.8266*** (2.0609)	7.9213*** (2.0383)	7.3189*** (2.0539)	7.2216*** (2.0566)	6.4319*** (2.0604)	6.1503*** (2.0625)
Teacher's experience	0.5935*** (0.1852)	0.5708*** (0.1853)	0.5573*** (0.1856)	0.5696*** (0.1852)	0.5605*** (0.1848)	0.6347*** (0.1858)	0.6155*** (0.1858)	0.5973*** (0.1859)	0.6157*** (0.1854)	0.6188*** (0.1853)	0.6352*** (0.1869)	0.6180*** (0.1869)	0.6030*** (0.1871)	0.6234*** (0.1867)	0.6290*** (0.1866)
Principal's qualification	20.4200*** (2.7812)	19.3223*** (2.8119)	17.0491*** (2.9224)	15.9168*** (2.9299)	16.1719*** (2.9247)	21.1611*** (2.6726)	19.7621*** (2.7259)	16.5811*** (2.8524)	15.2642*** (2.8594)	15.5755*** (2.8651)	19.0623*** (2.6184)	17.7184*** (2.6819)	14.7933*** (2.8344)	13.4781*** (2.8454)	14.1313*** (2.8573)
Principal's experience	−0.3546* (0.2047)	−0.4213* (0.2061)	−0.3939* (0.2066)	−0.5016* (0.2079)	−0.5156* (0.2075)	−0.3252** (0.2036)	−0.3975* (0.2053)	−0.3686* (0.2055)	−0.4875* (0.2067)	−0.4614* (0.2073)	−0.4628* (0.2025)	−0.5335*** (0.2047)	−0.5248* (0.2050)	−0.6401*** (0.2065)	−0.5970*** (0.2071)
Urban areas	1.6052 (3.9142)	1.0005 (3.9179)	−1.5651 (3.9961)	−1.1672 (3.9880)	−2.7235** (4.0022)	5.8216** (4.0208)	5.3856** (4.0208)	2.8022** (4.0665)	3.4464** (4.0568)	2.8864** (4.0703)	−0.8780 (3.9683)	−1.5581 (3.9767)	−4.7655** (4.0756)	−4.3394** (4.0665)	−4.7462** (4.0673)
Constant	133.9620*** (16.8174)	150.6137*** (18.0286)	166.7360*** (19.0174)	178.0612*** (19.1925)	183.9170*** (19.2189)	116.5150*** (16.9941)	133.1305*** (18.1847)	152.1615*** (18.9709)	164.2662*** (19.1117)	164.7507*** (19.1088)	136.0134*** (16.5438)	151.7389*** (17.9072)	170.0432*** (18.9369)	181.7715*** (19.1050)	180.4446*** (19.0999)
Number of observations	3 092	3 092	3 072	3 072	3 072	3 059	3 059	3 039	3 039	3 039	3 059	3 059	3 039	3 039	3 039
Adjusted R2	0.382	0.384	0.386	0.389	0.391	0.389	0.390	0.394	0.397	0.398	0.387	0.387	0.390	0.393	0.394

Table A7.2—*Test score in Vietnamese*

	(1)					(2)					(3)				
	Model I	Model II	Model III	Model IV	Model V	Model I	Model II	Model III	Model IV	Model V	Model I	Model II	Model III	Model IV	Model V
Attend FDS	−9.5866*** (3.3726)	−14.5710*** (3.4284)	−15.7291*** (3.5751)	−16.0025*** (3.5779)	−14.2371*** (3.5482)										
FDS x Social background					27.1802*** (3.3863)										
Number of days with FDS per week						−4.0602*** (0.7623)	−4.7003*** (0.7632)	−5.1264*** (0.7963)	−5.2187*** (0.7972)	−5.4156*** (0.7948)					
FDS day x Social background										4.1966*** (0.8113)					
Instructional time											−1.8916*** (0.3371)	−2.1258*** (0.3367)	−2.2726*** (0.3481)	−2.2859*** (0.3480)	−2.4349*** (0.3489)
Instructional time x Social background															1.5412*** (0.3702)
Social background		12.6795*** (1.8736)	12.1963*** (1.9020)	11.7033*** (1.9247)	−5.2405* (2.8435)		12.1960*** (1.8468)	11.4505*** (1.8811)	10.8272*** (1.9051)	10.3482*** (1.8993)		11.9934*** (1.8418)	11.2750*** (1.8787)	10.7129*** (1.9039)	10.8848*** (1.8992)
School facilities			2.0416** (1.5407)	1.4902** (1.5760)	0.5067 (1.5647)			3.1132* (1.5385)	2.4532** (1.5717)	2.1177** (1.5664)			2.7947* (1.5242)	2.1816** (1.5613)	2.0142** (1.5576)
Class facilities				2.9678* (1.7960)	4.4000* (1.7865)				3.6398* (1.7938)	4.1728* (1.7891)				3.2206* (1.7912)	3.4926* (1.7875)
Boy	−15.6279*** (3.0025)	−16.4341*** (2.9832)	−16.4795*** (2.9995)	−16.4717*** (2.9987)	−17.3311*** (2.9700)	−15.7664*** (3.0081)	−16.5583*** (2.9897)	−16.6498*** (3.0051)	−16.6473*** (3.0035)	−17.3298*** (2.9937)	−15.7276*** (3.0067)	−16.5094*** (2.9889)	−16.5860*** (3.0045)	−16.5843*** (3.0034)	−17.1063*** (2.9980)
Minority	13.4530*** (5.0546)	22.8618*** (5.2073)	23.7844*** (5.2775)	25.0121*** (5.3281)	15.4389*** (5.4068)	10.0897* (5.1010)	19.2360*** (5.2516)	20.3628*** (5.3060)	21.8072*** (5.3508)	15.7969*** (5.4534)	9.5940* (5.1060)	18.6467*** (5.2587)	19.6669*** (5.3131)	20.9652*** (5.3600)	16.0877*** (5.4725)
Number of siblings	3.0278** (2.0395)	3.9761* (2.0297)	4.0655* (2.0396)	4.2435* (2.0419)	2.0859** (2.0388)	3.3158** (2.0411)	4.3468* (2.0329)	4.4638* (2.0421)	4.7024* (2.0444)	3.5935* (2.0470)	3.2318** (2.0402)	4.2372* (2.0323)	4.3462* (2.0417)	4.5562* (2.0443)	3.7760* (2.0474)
Number of older siblings	−2.1088** (1.9204)	−2.1916** (1.9066)	−2.1622** (1.9189)	−2.1313** (1.9184)	−2.8471** (1.9009)	−1.9497** (1.9182)	−1.9317** (1.9049)	−1.8629** (1.9167)	−1.8130** (1.9159)	−2.4659** (1.9119)	−2.0790** (1.9178)	−2.0696** (1.9049)	−2.0144** (1.9169)	−1.9688** (1.9164)	−2.4649** (1.9149)
Math test score	0.0548*** (0.0164)	0.0403* (0.0164)	0.0379* (0.0166)	0.0370* (0.0166)	0.0347* (0.0164)	0.0548*** (0.0164)	0.0399* (0.0164)	0.0361* (0.0166)	0.0349* (0.0166)	0.0338* (0.0165)	0.0541*** (0.0164)	0.0392* (0.0164)	0.0358* (0.0166)	0.0347* (0.0166)	0.0346* (0.0166)
Vietnamese test score	0.4368*** (0.0168)	0.4081*** (0.0173)	0.4079*** (0.0174)	0.4061*** (0.0174)	0.3995*** (0.0172)	0.4300*** (0.0169)	0.4031*** (0.0172)	0.4021*** (0.0173)	0.3998*** (0.0174)	0.3953*** (0.0173)	0.4299*** (0.0169)	0.4035*** (0.0172)	0.4028*** (0.0173)	0.4009*** (0.0174)	0.3984*** (0.0173)

	(1)					(2)					(3)				
	Model I	Model II	Model III	Model IV	Model V	Model I	Model II	Model III	Model IV	Model V	Model I	Model II	Model III	Model IV	Model V
Teacher's qualification	12.6052*** (2.1657)	10.8518*** (2.1657)	10.8009*** (2.1732)	10.4454*** (2.1832)	7.9808*** (2.1826)	14.1534*** (2.1930)	12.4258*** (2.1934)	12.3956*** (2.1992)	11.9898*** (2.2072)	11.0267*** (2.2057)	13.5966*** (2.1877)	11.8055*** (2.1903)	11.7341*** (2.1971)	11.3655*** (2.2058)	10.8109*** (2.2039)
Teacher's experience	1.1720*** (0.1986)	1.1104*** (0.1974)	1.1032*** (0.1980)	1.1091*** (0.1980)	1.0837*** (0.1960)	1.1974*** (0.2001)	1.1470*** (0.1988)	1.1351*** (0.1994)	1.1446*** (0.1994)	1.1511*** (0.1985)	1.1617*** (0.2007)	1.1120*** (0.1995)	1.1012*** (0.2001)	1.1112*** (0.2001)	1.1199*** (0.1996)
Principal's qualification	6.3079* (2.9780)	3.2138** (2.9917)	2.2072** (3.1152)	1.6852 (3.1303)	2.3192** (3.0994)	7.3661* (2.8745)	3.4869** (2.9144)	1.7848 (3.0575)	1.1194 (3.0734)	2.2368** (3.0681)	6.4103* (2.8085)	2.3193** (2.8595)	0.6669 (3.0283)	0.0344 (3.0476)	1.3413 (3.0555)
Principal's experience	0.2912** (0.2193)	0.1098 (0.2194)	0.1223 (0.2202)	0.0733 (0.2222)	0.0448 (0.2199)	0.3184** (0.2192)	0.1248 (0.2196)	0.1397 (0.2203)	0.0804 (0.2221)	0.1742** (0.2219)	0.2071** (0.2174)	−0.0017 (0.2183)	0.0022 (0.2190)	−0.0526 (0.2211)	0.0322 (0.2214)
Urban areas	−0.0924 (4.1930)	−1.8980 (4.1714)	−2.9794** (4.2610)	−2.8070 (4.2611)	−6.4220** (4.2415)	3.3473** (4.3257)	2.0589 (4.3002)	0.7657 (4.3584)	1.0765 (4.3589)	−0.7880 (4.3554)	−2.7820 (4.2587)	−4.9431** (4.2431)	−6.6499** (4.3553)	−6.4561** (4.3551)	−7.2135* (4.3472)
Constant	189.2420*** (17.9666)	236.2834*** (19.1439)	242.9410*** (20.2461)	248.1801*** (20.4871)	260.9770*** (20.3404)	174.0059*** (18.2353)	219.9705*** (19.4006)	229.8416*** (20.3018)	235.9886*** (20.5162)	236.9716*** (20.4303)	188.5155*** (17.7017)	236.3027*** (19.0526)	246.3537*** (20.2024)	252.0215*** (20.4395)	248.9767*** (20.3976)
Number of observations	3 093	3 093	3 073	3 073	3 073	3 060	3 060	3 040	3 040	3 040	3 060	3 060	3 040	3 040	3 040
Adjusted R2	0.264	0.275	0.275	0.275	0.290	0.269	0.279	0.280	0.280	0.286	0.269	0.279	0.280	0.280	0.284

Table A8—*Quantile regressions of learning achievement without interaction terms between FDS and SB*

Table A8.1—*Retest score in Maths*

	(1)				(2)				(3)			
	τ=0.20	τ =0.40	τ =0.60	τ =0.80	τ =0.20	τ =0.40	τ =0.60	τ =0.80	τ =0.20	τ =0.40	τ =0.60	τ =0.80
Attend FDS	−10.0588** (3.9859)	−18.1593*** (3.7545)	−18.0646*** (4.0304)	−21.9271*** (3.8796)								
Number of days with FDS per week					−3.9741*** (1.0774)	−5.0672*** (1.0022)	−5.4723*** (0.7800)	−8.0811*** (0.9091)				
Instructional time									−1.5399*** (0.5014)	−1.6435*** (0.3654)	−1.8063*** (0.3704)	−2.6797*** (0.5161)
Social background	3.3740 (2.0949)	4.0053** (2.0055)	1.4433 (2.1131)	2.4517 (2.3941)	2.3007 (2.1063)	3.1359 (2.1883)	0.7814 (2.3080)	2.6296 (2.6133)	2.1547 (1.6837)	2.2553 (2.3009)	0.2793 (2.2095)	1.1091 (2.3367)
Boy	−1.1548 (3.6779)	0.0015 (2.5455)	1.6515 (3.2875)	1.5995 (3.8688)	0.6358 (3.9715)	0.8148 (3.2142)	0.5660 (3.7274)	0.3854 (3.9304)	−0.5802 (3.8616)	0.4928 (2.8004)	1.2127 (3.4884)	1.1858 (4.6177)
Minority	17.0323*** (5.7471)	10.9478* (6.3491)	17.0352** (7.1417)	24.9823*** (8.6866)	11.5621 (7.8235)	9.2729 (6.4974)	12.4084 (8.4332)	20.1949** (8.1806)	13.0325* (7.1865)	9.0353 (6.4430)	12.8489* (6.7315)	16.6234* (9.5730)
Number of siblings	2.1353 (2.9159)	−0.2760 (3.0229)	−1.0986 (2.9593)	−0.6893 (2.2875)	3.2955	1.0191	−0.4202 (3.1369)	1.6909 (3.2453)	3.3786 (3.0753)	0.7367 (2.3773)	−0.7263 (2.6906)	0.8323 (3.0789)
Number of older siblings	−4.9281* (2.7410)	−2.6311 (1.9423)	−5.7236*** (1.9592)	−5.7046** (2.7797)	−4.3345** (2.1046)	−3.8588** (1.5209)	−4.9776** (2.2802)	−7.1298** (3.5930)	−3.9797 (3.2364)	−3.6168 (2.5588)	−4.7378 (2.9212)	−7.0379*** (2.6260)
Math test score	0.6629*** (0.0282)	0.6380*** (0.0193)	0.5905*** (0.0264)	0.5196*** (0.0282)	0.6596*** (0.0227)	0.6277*** (0.0191)	0.5816*** (0.0197)	0.5126*** (0.0238)	0.6514*** (0.0231)	0.6367*** (0.0191)	0.5843*** (0.0173)	0.5030*** (0.0238)
Vietnamese test score	0.0380** (0.0182)	0.0416*** (0.0138)	0.0415*** (0.0156)	0.0649*** (0.0213)	0.0362* (0.0219)	0.0488*** (0.0164)	0.0477** (0.0215)	0.0549** (0.0235)	0.0407* (0.0227)	0.0515*** (0.0155)	0.0453*** (0.0160)	0.0570*** (0.0197)
School facilities	0.8208 (1.5961)	0.3487 (1.2402)	2.2111 (1.4028)	5.5357* (2.8587)	1.7946 (1.6313)	0.3472 (1.9446)	3.0239** (1.3640)	8.7671*** (1.8480)	1.5147 (1.4031)	0.4083 (1.5036)	2.0132 (1.4434)	6.7476*** (1.9667)
Class facilities	3.5881 (2.9030)	3.7633* (1.9414)	5.0299** (2.3403)	7.8893*** (2.8660)	3.5799 (2.4904)	4.4895* (2.3569)	5.0015** (2.4359)	6.1743** (2.4669)	3.6622 (2.3064)	2.6944* (1.5931)	5.3065*** (1.9167)	7.4861*** (2.0540)
Teacher's qualification	2.8878 (1.9016)	5.7392** (2.5262)	3.5497 (3.0237)	9.5246*** (3.3750)	4.7323*** (1.4186)	6.7330*** (2.0118)	4.8241** (2.1670)	12.1899*** (3.0203)	3.3414 (2.6210)	6.2399* (3.3616)	4.4551 (2.7365)	10.2973*** (2.4864)
Teacher's experience	−0.1094 (0.2195)	0.3529 (0.2215)	0.6483** (0.2786)	1.3672*** (0.2581)	0.0224 (0.2134)	0.3245 (0.2363)	0.6382** (0.2543)	1.3558*** (0.1921)	−0.1046 (0.1692)	0.3538* (0.1811)	0.5818*** (0.2182)	1.3801*** (0.1989)

	(1)				(2)				(3)			
	τ=0.20	τ =0.40	τ =0.60	τ =0.80	τ =0.20	τ =0.40	τ =0.60	τ =0.80	τ =0.20	τ =0.40	τ =0.60	τ =0.80
Principal's qualification	−0.3218 (0.2365)	−0.2466 (0.2178)	−0.5163 (0.3382)	−0.5301* (0.2833)	−0.3498 (0.2655)	−0.3322 (0.2135)	−0.5726** (0.2459)	−0.2529 (0.2867)	−0.4393* (0.2386)	−0.4971*** (0.1293)	−0.6384*** (0.2053)	−0.5600** (0.2278)
Principal's experience	14.8734*** (3.8381)	15.1699*** (2.5440)	14.6833*** (3.8621)	15.9161*** (4.0176)	13.9760*** (4.5971)	14.2104*** (2.8618)	14.2138*** (3.2283)	13.0705*** (2.3737)	13.9906*** (3.2711)	11.8667*** (3.2486)	12.8308*** (3.4082)	10.2918*** (3.1837)
Urban areas	5.4972 (4.4390)	5.9155 (4.6306)	−4.4791 (5.1633)	−3.8790 (5.0232)	7.9795 (7.4074)	5.2478 (5.1799)	0.3981 (5.6497)	1.7972 (5.0627)	3.1252 (4.7172)	−0.9032 (5.1804)	−4.3356 (6.0097)	−8.7375 (6.9617)
Constant	81.1950*** (23.7353)	119.1391*** (16.1706)	198.2568*** (25.4508)	235.4540*** (33.0854)	70.3483** (28.2762)	112.9923*** (18.1278)	184.3127*** (19.8853)	221.3325*** (25.5022)	85.4352** (20.0305)	124.9464*** (20.8178)	196.8736*** (23.5867)	258.3660*** (26.1621)
Number of observations	3,072				3,039				3,039			

Notes: *** p<0.01, ** p<0.05, * p<0.1

Table A8.2—*Retest score in Vietnamese*

	(1)				(2)				(3)			
	τ=0.20	τ =0.40	τ =0.60	τ =0.80	τ =0.20	τ =0.40	τ =0.60	τ =0.80	τ =0.20	τ =0.40	τ =0.60	τ =0.80
Attend FDS	−15.4559** (6.0411)	−12.8232** (5.3686)	−13.6127** (5.4743)	−14.5202** (5.8534)								
Number of days with FDS per week					−4.4720*** (1.0174)	−4.6462*** (1.1709)	−5.5416*** (0.9481)	−6.3725*** (1.3714)				
Instructional time									−2.2724*** (0.6550)	−2.3223*** (0.5040)	−2.3968*** (0.5281)	−2.5947*** (0.5535)
Social background	10.4504*** (2.7623)	11.0481*** (2.6221)	12.4904*** (1.9131)	12.4897*** (2.8912)	10.2587*** (2.1316)	11.2321*** (3.1190)	12.6228*** (3.0395)	11.9047*** (3.3822)	9.7448*** (2.3120)	10.1376*** (2.8751)	12.0613*** (2.2601)	12.2424*** (2.4672)
Boy	−20.3499*** (3.5925)	−15.0350*** (4.8625)	−13.5760*** (4.5004)	−15.5815*** (4.4772)	−21.4374*** (3.6979)	−13.8835*** (4.5341)	−15.8794*** (3.5176)	−14.8022*** (3.8144)	−20.9803*** (4.2569)	−12.3512** (5.9990)	−16.2649*** (4.4595)	−13.5708*** (4.3514)
Minority	18.9631** (8.2290)	28.8585*** (6.8729)	26.3984*** (8.2897)	33.7624*** (8.0752)	16.0025** (7.4514)	27.5523*** (8.1980)	22.7536*** (7.0251)	29.6017*** (7.7207)	15.0889 (10.6128)	26.3940*** (7.0693)	22.1044*** (7.9921)	28.5346*** (9.0011)
Number of siblings	4.8990** (2.3883)	3.8511 (2.8383)	4.8034** (2.4250)	2.4002 (3.3658)	3.4587 (2.1751)	4.2097 (2.9383)	7.1484*** (2.1483)	4.2341 (3.0069)	2.8449 (3.0888)	3.8317 (2.5640)	6.5406** (3.2085)	3.1615 (3.8624)
Number of older siblings	−2.8347 (2.6076)	−0.9747 (2.2922)	−0.3642 (2.5596)	−0.7465 (3.4232)	−3.3795 (2.1127)	−0.3104 (2.9272)	0.0747 (2.2870)	−0.3127 (2.6503)	−4.1283 (2.7549)	−0.5687 (2.1049)	−0.7873 (2.0732)	−0.4603 (2.2560)

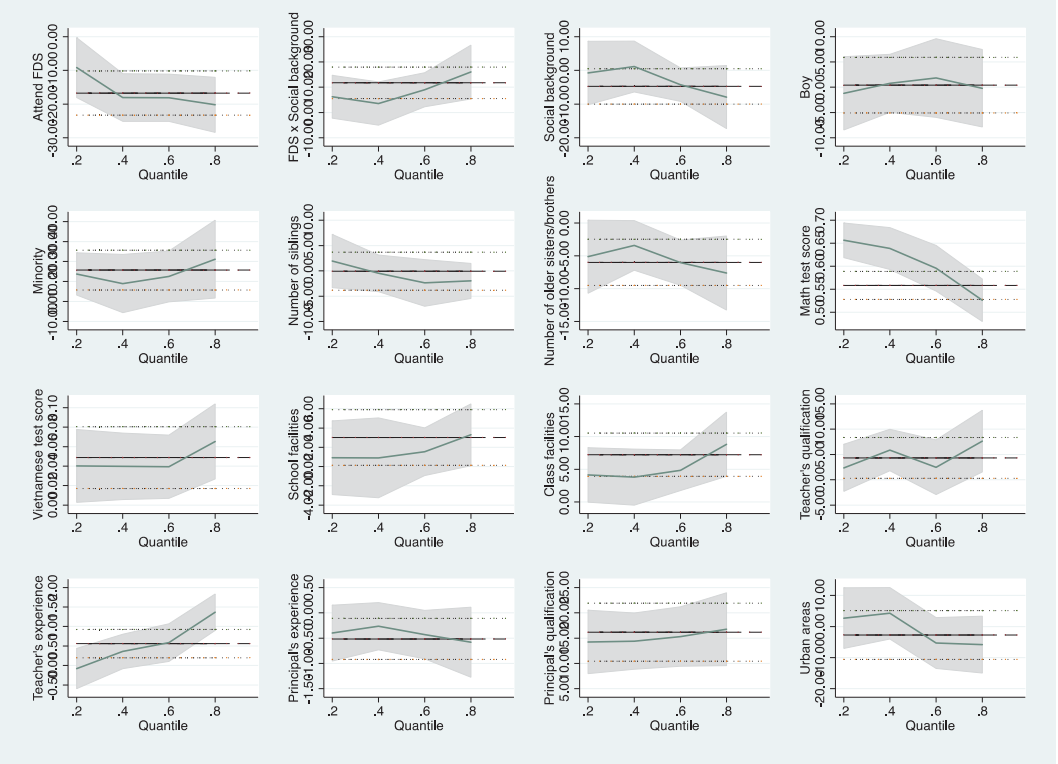
	(1)				(2)				(3)			
	τ=0.20	τ =0.40	τ =0.60	τ =0.80	τ =0.20	τ =0.40	τ =0.60	τ =0.80	τ =0.20	τ =0.40	τ =0.60	τ =0.80
School facilities	0.0563*	0.0210	0.0196	0.0215	0.0580***	0.0244	0.0104	0.0207	0.0622**	0.0217	0.0134	0.0261
	(0.0289)	(0.0233)	(0.0174)	(0.0284)	(0.0224)	(0.0232)	(0.0163)	(0.0221)	(0.0280)	(0.0233)	(0.0171)	(0.0201)
Class facilities	0.4774***	0.4763***	0.4556***	0.3792***	0.4659***	0.4720***	0.4436***	0.3623***	0.4634***	0.4694***	0.4419***	0.3549***
	(0.0233)	(0.0288)	(0.0259)	(0.0359)	(0.0260)	(0.0258)	(0.0291)	(0.0368)	(0.0336)	(0.0201)	(0.0260)	(0.0315)
Math test score	1.9872	1.3147	2.7859	2.5132	2.3634	1.4557	5.1896**	4.9677**	2.3632	1.9539	4.9020*	4.1556
	(2.5591)	(2.2940)	(2.1157)	(4.0312)	(2.1415)	(2.4448)	(2.1927)	(2.3671)	(2.4081)	(1.7880)	(2.7582)	(4.1125)
Vietnamese test score	5.8599**	2.6589	2.2117	1.0895	5.2280**	4.0528*	2.4278	3.5903	5.5530**	3.5261	2.0796	2.5875
	(2.9315)	(3.9141)	(2.5731)	(3.1592)	(2.4313)	(2.1991)	(2.8931)	(2.4695)	(2.2180)	(3.9017)	(2.4508)	(3.0171)
Teacher's qualification	9.2218***	10.7851**	11.1189***	10.9543***	11.2620***	12.4670***	12.7668***	14.6081***	10.8227**	13.2260***	11.6779***	14.3064***
	(2.9770)	(4.7507)	(3.3502)	(3.5547)	(2.8713)	(4.3832)	(3.6909)	(2.6286)	(4.2934)	(2.6815)	(2.9354)	(2.8708)
Teacher's experience	1.3417***	1.1624***	0.9982***	0.6937**	1.4304***	1.1894***	0.9670***	0.8639***	1.3792***	1.1671***	1.0698***	0.8779***
	(0.3374)	(0.4033)	(0.3154)	(0.3461)	(0.2721)	(0.1900)	(0.2168)	(0.2309)	(0.3809)	(0.2527)	(0.3025)	(0.2940)
Principal's qualification	0.2522	0.3702	−0.0762	−0.3727	0.2722	0.3925	0.0129	−0.6483**	0.1465	0.1691	−0.0769	−0.7216**
	(0.3342)	(0.3570)	(0.2975)	(0.5225)	(0.2983)	(0.3310)	(0.2410)	(0.2577)	(0.2953)	(0.2473)	(0.2735)	(0.2967)
Principal's experience	−0.5754	5.8099	−1.3450	3.0523	−0.7289	6.0957	−2.6348	−0.8025	−2.1596	4.3536	−4.4433	−2.8419
	(3.7671)	(4.1455)	(5.1748)	(4.0505)	(3.7045)	(3.7158)	(5.1010)	(3.3067)	(5.8123)	(4.0517)	(4.2852)	(4.1423)
Urban areas	−10.6179**	1.6731	1.2143	1.6337	−6.7770	5.6053	4.3475	−0.8742	−10.7137**	−2.1653	−2.6476	−8.6030
	(5.0850)	(6.0267)	(4.9982)	(6.2392)	(6.1570)	(6.6382)	(4.8282)	(4.3062)	(5.1881)	(3.7591)	(6.3692)	(6.7833)
Constant	146.3350**	170.0384	260.3773	347.7640	134.0359*	151.4851	257.6556	353.1998	147.8797***	169.8734	275.3268	371.0729
	(30.8743)	(34.8299)	(31.3149)	(38.8873)	(21.6278)	(28.5593)	(31.6658)	(30.5052)	(40.5362)	(30.7362)	(25.7338)	(31.6853)
Number of observations	3 073				3 040				3 040			

Note: *** p<0.01, ** p<0.05, * p<0.1

B. Figures

Figure B1—*Effects of regressors on learning achievement across quantile—Model (1)*

Retest score in Math



Retest score in Vietnamese

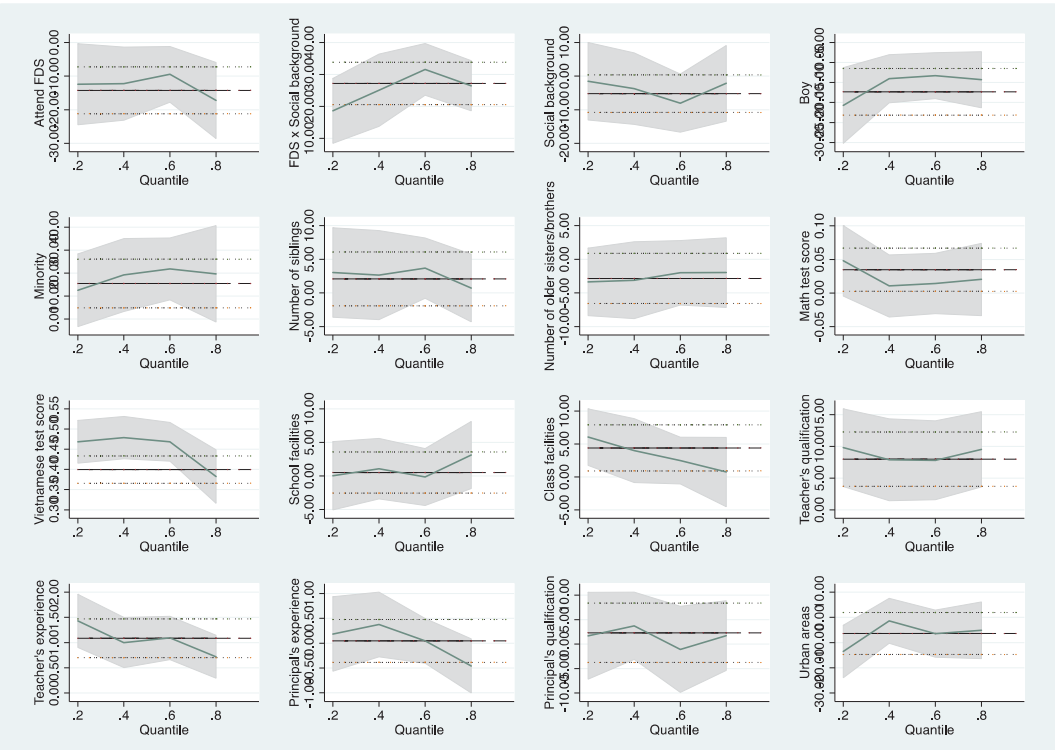
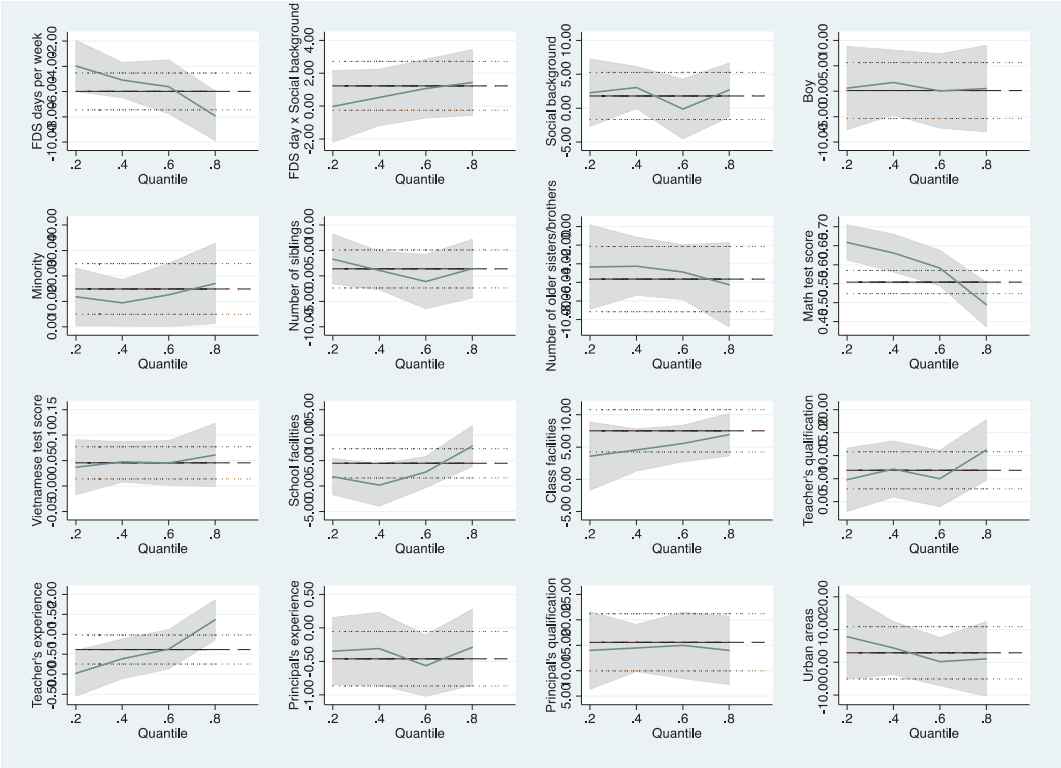


Figure B2—*Effects of regressors on learning achievement across quantile—Model (2)*

Retest score in Math



Retest score in Vietnamese

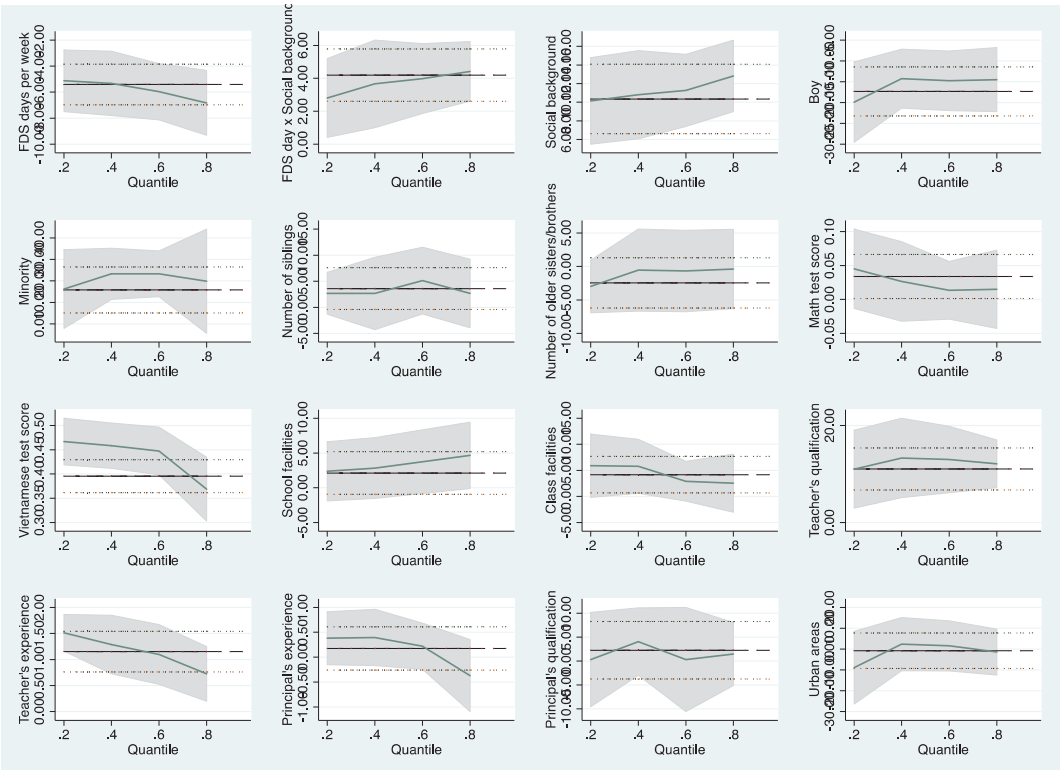
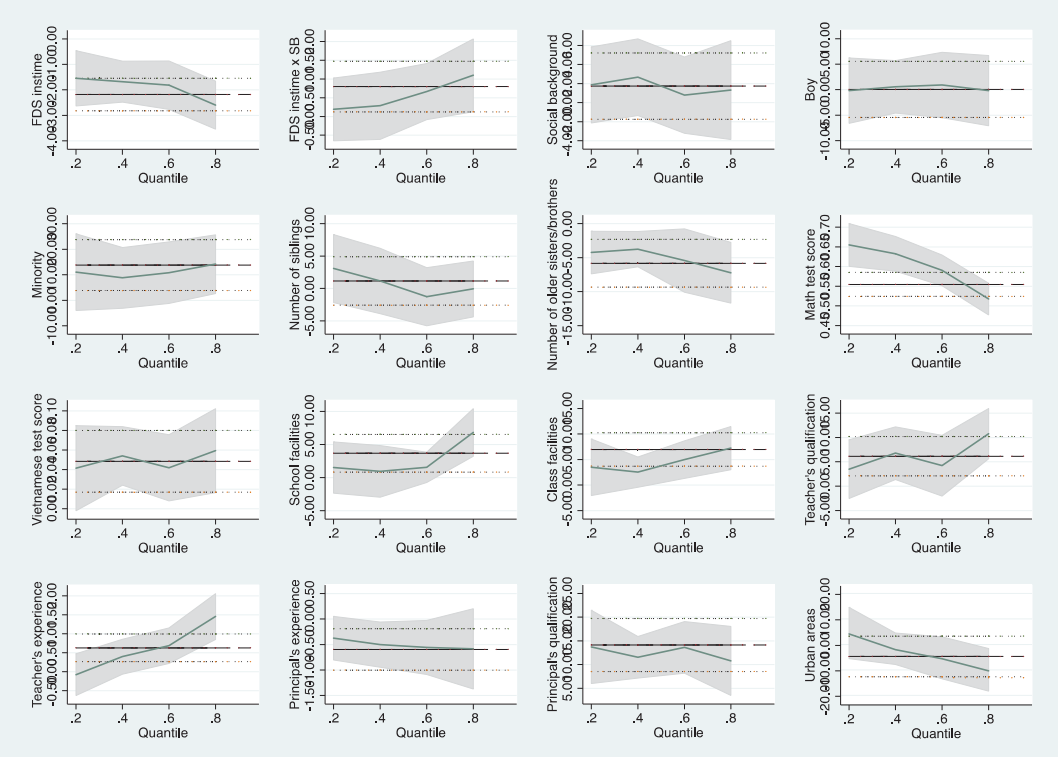
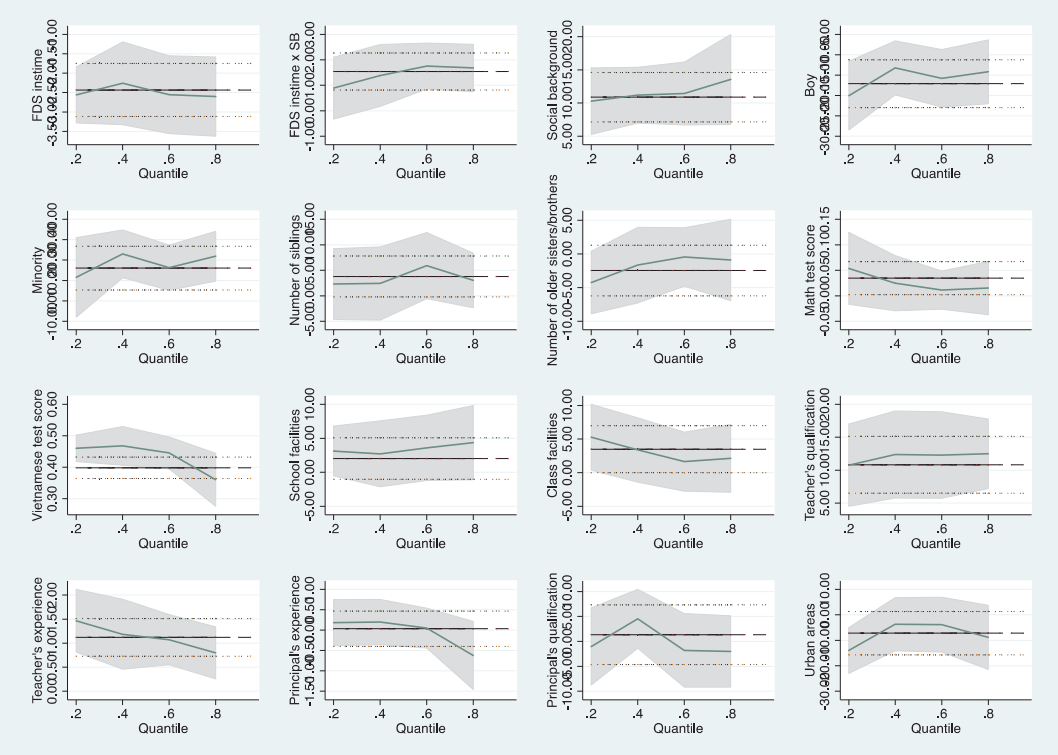


Figure B3—*Effects of regressors on learning achievement across quantile—Model (3)*

Retest score in Math



Retest score in Vietnamese



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