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The education divide in Indonesia

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Organizational and ideological differences between private Islamic schools in Indonesia and their effects on student achievement and the achievement gap[10]

Abstract

The expansion of private secondary schools in Indonesia is a double-edged sword, particularly when inequality is high on the development agenda. On the one hand, private secondary schools are becoming more important providers and are thus important in improving access to education. On the other hand, the quality of private schools is lower than that of public schools. In our study, one of the first to examine the effects of different types of private Islamic schools on student achievement and achievement gaps, we develop a typology of Indonesian private Islamic schools, divided along track and stream. We formulate hypotheses, drawing on an education production function approach that outlines differences in investment and resource allocation decisions across these tracks and streams. We contend that devoting more time, money and attention to students will lead to greater numbers of students learning, and to higher student performance and smaller achievement gaps. We tested our hypotheses using Indonesian data collected in 2013 on 156,952 students nested in 3,150 schools in 366 municipalities. Using multilevel regression analyses, we found that student achievement and achievement gaps vary over private Islamic school tracks and streams. Even though student achievement and achievement gaps are strongly determined by student and family characteristics, our findings suggest that differences between school tracks and streams also play an important role. Moreover, our study revealed a large variability in student achievement and achievement gaps between municipalities.

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[10] This chapter is co-authored with Rafael Wittek, Liesbet Heyse and Marijtje van Duijn and is currently under review at an international peer-review journal.

5.1   Introduction

The number of private secondary schools in Indonesia is growing. Almost 60 percent of Indonesian secondary schools are private in nature, as are more than half of junior secondary schools and almost 70 percent of senior secondary schools (Bappenas, 2015). Private secondary schools are thus becoming more important education service providers in Indonesia.

Within the group of private secondary schools, more than 90 percent are Islamic in nature, meaning that there is explicit attention to the spirit of Islam in the curriculum (calculated from the MoEC, 2013). Private Islamic schools are argued to be popular because they are less expensive and have a higher level of religious instruction than public schools (Woodward, Rohmaniyah, Amin, & Coleman, 2010). This is illustrated by the fact that in Indonesia the number of private madrasah schools (a particular kind of private Islamic school) annually increases by an average of 3.9 percent while the average growth of public schools is only 1.5 percent (USAID, 2007).

However, students' achievement in Indonesian private schools is lower than students' achievement in public schools. For example, Newhouse and Beegle (2006) examined the impact of school type on the academic achievement of junior secondary school students in Indonesia. After controlling for a variety of other characteristics, the conclusion was that private school students' scores in the national exam were 0.15 to 0.3 standard deviations lower than those of their comparable public school peers. These lower students' scores are puzzling as well as challenging because of their potential negative impact on student achievement in general.

Studies on differences in student achievement focus predominantly on the difference between public and private schools (*e.g.* Bernando *et al.*, 2015; Braun *et al.*, 2006). Interestingly, there is little attention to differences *between* private schools in general, and between Islamic private schools in particular, even though these differences are quite pronounced and might matter for explaining differences in student achievement, as we will later argue. This study therefore asks whether and how differences between private Islamic schools in Indonesia affect student achievement as well as achievement gaps for boys and girls, and for groups of different social economic status (SES).

Though inequalities have decreased during the past years, the achievement gap across SES and gender in Indonesia is still large (Tobias, Wales, Syamsulhakim, & Suharti, 2014; World Bank, 2013). Our study defines the achievement gap as: the observed differences in student achievement, measured by cognitive test scores between groups of students, especially groups defined by socioeconomic status (SES) and gender (Reardon, 2011; Kafir, 2007). Seminal studies examined achievement gaps across SES and gender, also in the Indonesian context. For instance, high SES is linked to higher student achievement (Suharti, 2013). According to the OECD international benchmark with a 1000-point scale, the average scores of students from families in the bottom

income quintile are 350 in mathematics and 400 in reading (Tobias *et al.*, 2014; World Bank, 2013) whereas average scores of their peers in the top income quintile are 390 and 420, respectively (Tobias *et al.*, 2014). Interestingly, in Indonesia, girls perform better than boys in all subjects (Suharti, 2013; Suryadarma, 2010). However, there is no study that examines the possible effects of differences between various types of Islamic private schools on student achievement and the student achievement gaps across SES and gender in Indonesia.

This paper identifies two key differences in private Islamic schools in Indonesia that might affect student achievement and achievement gaps. First, there are ideological differences relating to how private Islamic education providers interpret their religion in the Indonesian social and educational context. These ideological differences are reflected in three *streams* in Indonesian private Islamic schools, which we will elaborate in the remainder of this paper: Traditionalists, Modernists and Integrationists (Ishomudin, 2014; Bryner, 2013; Hassan, 2009). Second, there are organizational differences related to the role of the government in managing private Islamic schools. Here the distinction between madrasah and non-madrasah is relevant, resulting in two *tracks* in private Islamic schools. Non-madrasah private Islamic schools are coordinated by the Ministry of Education and Cultre (MoEC), whereas madrasah private Islamic schools are managed by the Ministry of Religious Affairs (MoRA).

Based on the above two distinctions, this paper identifies six types of private Islamic schools: (1) Traditional madrasah; (2) Traditional non-madrasah; (3) Modernist madrasah; (4) Modernist non-madrasah; (5) Integrationist madrasah; and (6) Integrationist non-madrasah. More specifically, this paper addresses the question: *How do various tracks and streams in Indonesian Islamic private schools affect students' academic achievements and achievement gaps across gender and parental SES?*

We base the answer to our research question on an education production function approach, which assumes that student achievement is a function of a school's investment in teaching-related activities and resources (Hanushek, 2007; Coates, 2003; Bowles, 1970). Hence the amount of time, money and attention devoted to students will affect how much they learn, as well as their performance and the gaps in their achievements. Using this point of departure, we reason that the above-mentioned ideological and organizational differences between Islamic private schools have consequences for investment and resource allocation decisions within the six different types of schools.

We specify our theoretical expectations by distinguishing four dimensions of investments: (1) investments in the primary process, such as the amount of time spent on teaching and the amount of emphasis on particular subjects; (2) investments in teachers, including selection of high quality teachers and improving teachers by training; (3) investments in students by financially supporting poorer students and implementing single sex classrooms; and (4) investments in organization and coordination. We categorize the six types of private Islamic schools with regard to these investment dimensions and analyze which school type makes most investments and thus can be

expected to have better student achievements and smaller achievement gaps. Multilevel regression analyses (*e.g.* Snijders and Bosker, 2012) are used to test to what degree the six types of private Islamic schools, and the associated differences in investments and resource allocation decisions, affect student achievement and the achievement gap in Indonesia. The focus is on junior secondary schools in 2013.

Our study enriches the current literature in at least three respects. First, this is to our knowledge the first quantitative study that systematically compares differences *within* the Islamic private school sector in Indonesia, the country with the highest Muslim population in the world. While several systematic reviews on track and stream differences between private Islamic schools in Indonesia have been undertaken (see *e.g.* Ishomudin, 2014; Barton, 2014; Hassan, 2009), none directly tested the relation between these differences and student achievement and achievement gaps in terms of gender and parental SES. Second, by testing the education production function construct in relation to track and stream differences between various types of Islamic private schools in Indonesia, we enrich the literature that deals with how investment and resource allocation differences between schools affect student achievement. Third, by offering a more fine-grained understanding of the effect of organizational and ideological differences in private Islamic schools this study may contribute to the development of policy recommendations aimed at strengthening the Indonesian national education system (Kingham & Parsons, 2013).

The next section describes Indonesia's school system. Section 3 sketches our theoretical framework and derives testable hypotheses. Then it follows an explanation of our data, method and results. We conclude with a discussion of policy recommendations and avenues for future research.

5.2   Organizational and ideological differences in private Islamic school

The school system in Indonesia consists of nine years of compulsory basic education, combining six years of primary school (grades 1-6) and three years of junior secondary school (grades 7-9). After completing their basic education, students follow three years of senior secondary school (grades 10-12).

As stated previously, schools in Indonesia are either private or public. Within the private education sector, most schools are Islamic. Islamic private schools can be under management of the MoRA or the MoEC, resulting in two possible private Islamic school tracks: *madrasah versus non-madrasah.* Next to this organizational difference, private Islamic schools also differ ideologically. This is reflected in the presence of three streams in private Islamic education, which are coordinated and run by three large non-governmental Muslim organizations that play an important role in the delivery of educational services: *a Modernist stream, a Traditionalist stream and an Integrationist stream* (USAID, 2007; Hasan, 2009).

The *modernist* stream is run by Muhammadiyah, Indonesia's oldest Muslim mass organization. It was established in 1912 in Yogyakarta based on the principles of modernist and moderate Islam (Suharto, 2014). It is called *modernist* because it rejects local customs in favor of the universal practices of modern Islam (Palmier, 1954). For instance, it initially established modern schools replicating Dutch schools by implementing graded classes with a curriculum of secular subjects by including religious education (Burhani, 2005). Currently, it is the largest private education provider, running 4,623 preschools and 5,691 educational institutions from primary to higher education[11].

The *traditionalist* stream, called Nahdatul Ulama (NU), which means the awakening of Islamic scholars, has played a significant role in the provision of education in Indonesia since the late colonial era (USAID, 2007). NU is the largest Muslim mass organization in the country and was established on 31 January 1926 in Surabaya. It is called *traditionalist* because it emphasizes the traditional meaning of Islam in the Indonesian context. It manages and coordinates about 6.000 educational institutions from preschools to universities and colleges.[12]

The *integrationist* stream is the third stream. This stream is represented by the network of Integrated Islamic schools (*Jaringan Sekolah Islam Terpadu*/JSIT), a fairly new consortium that was established on 31 July 2003 in Yogyakarta. Integrationist schools offer an integrated secular curriculum within an Islamic moral framework (Bryner, 2013). They integrate general and religious subjects by incorporating religious values in almost all subjects. Currently, the JSIT consortium includes 1,926 member schools and more than 500 affiliated schools (interview with Chairman JSIT, 16/12/2015).

While the Modernist movement is primarily a social welfare organization devoted to serving the community in education and healthcare and is characterized by egalitarian and non-hierarchical relations (Palmer & Burgess, 2012; Thachil, 2014), the Traditionalists are dedicated to protecting the interests of clerical elites (Thachil, 2014; Millie, 2013). The new- comers, the Integrationists, resemble the Traditionalists with their focus on clerical elites; however, this is combined with a modern agenda that is slightly similar to that of the Modernist movement (Hasan, 2009).

Based on the above-mentioned ideological and organizational differences we can distinguish six types of private Islamic schools: (1) Traditionalist non-madrasah; (2) Traditionalist madrasah; (3) Modernist non-madrasah; (4) Modernist madrasah; (5) Integrationist non-madrasah; (6) Integrationist madrasah.

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[11] Data available at http://www.muhammadiyah.or.id/content-8-det-amal-usaha.html

[12] Available at http://www.maarif-nu.or.id/Profil.aspx

5.3   Theory

In order to answer the research question of how the various private Islamic school tracks and streams affect student achievements and achievement gaps, we use an input-based or "production function" approach. This assumes that student achievement is a function of the school's investments in activities and resources related to teaching, like time for instruction (Hanushek, 2007): the higher these investments, the more students will learn, and the better they will perform (Coates, 2003). Our study uses the typology of school tracks and streams to assess variations in such investments, and relates them to achievement of individual students as output (Hanushek, 2007; Bowles, 1970).

Hanushek (2007) distinguished two inputs that significantly contribute to student achievement: investments directly controlled by policy makers, such as teachers, and inputs not controlled by policy makers, such as those provided by families (e.g. parental education and income). Most research focuses on inputs like school resources, such as the effects of teacher qualification and experience, or financial resources, on student achievement (Hanushek, 2007).

Next to schools and families, there is another level of input. These are investments that are partly determined by the individual schools but also by the streams, as represented by the three Muslim umbrella organizations. This includes, for example, the choice of whether to have boys and girls together in the classroom, or decisions about how much time is spent on religious education next to the examination subjects. Beside the stream, schools also are divided by two tracks, madrasah versus non-madrasah. This track relates to government policy, which also influences the schools' investment and in turn affects student achievement. For instance, in the US, the way state governments provide sources of funding and regulate rules for certification affects student achievement (Hanushek, 2007). Likewise, the central and local governments in Indonesia play a very crucial role in educational policy and practice.

Adopting Hanushek's classification of inputs and organizational approaches, we distinguish four dimensions of school investments: (1) investments in the primary process, such as how much time is spent on teaching and whether particular subjects receive more attention than others (Coates, 2003); (2) investments in teachers, including selecting high quality teachers and training teachers; (3) investments in students by financially supporting poorer students and implementing single sex classrooms; and (4) investments in organization and coordination.

Our main argument is that tracks and streams of Indonesian private Islamic schools differ in their decisions with regard to these four types of investment. Consequently, we expect that they also are the primary factor explaining between-school variations in student achievement and gender and SES achievement gaps.

5.3.1 School track differences and student achievement

If we look at *investments in the primary process*, all Islamic private schools, both madrasahs and non-madrasahs, follow the national curriculum. However, madrasahs teach a core curriculum of general subjects supplemented by an additional 30 percent of religious education subjects (*SKB Tiga Menteri* No. 6/1975). In non-madrasah schools, there is less attention to religious subjects. Consequently, students in non-madrasah schools spend more time on National Examination subjects. More teaching significantly enhances student performance (Stinebrickner & Stinebrickner, 2008), especially in mathematics and science (Grave, 2010). Consequently, we expect student achievement in madrasahs to be lower than in non-madrasahs.

In terms of *investments in teachers*, the Ministry of Education and Culture (MoEC), as well as local governments, facilitate both public and private non-madrasah teachers to enhance their professional skills and qualifications (USAID, 2007). The Ministry of Religious Affairs (MoRA) fully supports public madrasah schools, but does not provide as much funding and training for private madrasahs (Kingham & Parsons, 2013).

Moreover, Law 14/2005 concerning Teachers and University Lecturers states that all teachers at the junior secondary level must have a four-year post-secondary diploma or a bachelor's degree in the relevant subject. The fulfillment of this teachers' qualification in non-madrasah schools is higher, with 61 percent as compared with 55 percent of teachers meeting this qualification in madrasahs; this means that almost 45 percent of madrasah teachers do not have a four-year post-secondary diploma (USAID, 2007). Teacher development and qualification may influence subject matter knowledge and pedagogical skills, which in turn may bolster or undermine teacher performance and student achievement (Darling-Hammond, 2000). Consequently, lower teacher qualifications are assumed to be related to lower teacher performance and lower quality of learning in madrasahs (Kingham & Parsons, 2013).

Concerning *investments in students*, private Islamic madrasahs invest less in their students than private Islamic non-madrasahs, with an average annual cost per pupil of IDR 9,706,000 (US$970,6) compared to IDR 10,930,000 (US$1,093) in their non-madrasah counterparts. In addition, parents of students in Islamic private non-madrasah schools contribute a higher proportion to learning budgets than their counterparts in madrasahs (USAID, 2007). The more money a school has, the better the teaching can be, and the better the achievement (Hanushek & Raymond, 2005).

In terms of *investments in organization and coordination*, while madrasahs are centrally managed by the MoRA, non-madrasahs are decentralized from the MoEC to the municipalities (Permani, 2009). This means that non-madrasahs are able to focus more on local conditions and government arrangements, whereas madrasahs also need to coordinate with the central government. Such coordination may divert money to bureaucracy, decreasing a school's investment in teaching, which in turn may negatively

affect student performance (ACDP, 2013). Conversely, decentralization has a positive impact on teachers' working environments because it enables teachers to connect and share their motivation and skills (Louis, Dretzke, & Wahlstrom*,* 2010). Competent and motivated teachers improve the quality of teaching and learning and thus advance student achievement (Darling-Hammond, 2000). Therefore, we expect the centralized system of madrasahs to have a negative impact on student achievement.

Overall, due to their focus on religious subjects, private madrasah schools in Indonesia – as compared to private non-madrasah schools – devote fewer hours to teaching on the national curriculum. Furthermore, investments in teachers and students and the quality of teachers are lower. Madrasahs also receive fewer parental monetary contributions and need to divert resources into coordination tasks. All these factors are expected to affect students' learning and achievement. Based on these arguments, we expect that *students who attend private madrasah schools will have a lower level of achievement than students who attend private non-madrasah* schools (H1).

5.3.2 *School streams differences and student achievement*

With regard to *investments in the primary process*, the integrationists teach more hours, with 35 hours a week, compared to the traditionalists and the modernists, who each teach 30 hours. Teaching time is more productive than time spent on self-study (Dolton, Marcenaro, & Navarro, 2003) and more teaching time has been found to improve students' performance (Stinebrickner & Stinebrickner, 2008), particularly in mathematics and science (Grave, 2010).

In addition, the integrationists pay extra attention to the national exam subjects, especially to English, mathematics and science, whereas the traditionalists and the modernists do not (Hasan, 2009). Integrationists also teach religious subjects, but only as an extracurricular activity. This extra attention to national exam subjects helps to advance the understanding of the students in those specific subjects to be tested. This can be expected to lead to an increase in their test scores.

In terms of *investments in teachers*, as mentioned above, the law requires that all teachers at the junior secondary level must have a four-year post-secondary diploma or a bachelor's degree in the relevant subject. Fulfillment of this qualification in the integrationist stream is higher (76%) than in the traditionalist (71%) and modernist (70%) schools (MoEC, 2010), resulting in slight variations in knowledge and pedagogical skills, which might contribute to the variation in achievements across streams (Darling-Hammond, 2000).

Likewise, in the integrationist stream school personnel and teachers spend more time mainly to implement the full-day school system. This means that schools have to pay additional salary for overtime teaching by their teachers, leading to a general increase in school costs. Because private school operation costs rely mainly on parental

contributions, they increase school fees to cover their operational costs (USAID, 2007). For instance, the average integrationist tuition fee is IDR 1,973,000 ($197) per student per year while the average tuition fee in the modernist and traditionalist streams is IDR 983,000 ($98) and IDR 676,000 ($67), respectively (calculated from MoEC, 2010). These additional investments in teaching time may improve student achievement (Hanushek, 2006).

Overall, the integrationist schools devote more teaching time and provide extra attention to national exam subjects. Additionally, they also invest more in teachers' development and qualification, and have greater budgets for teaching. These arguments lead us to predict that *students in integrationist streams will attain higher academic achievement than those in modernist and traditionalist streams* (H2).

5.3.3 *The gender achievement gap across school tracks and streams*

Gender differences in student achievement have been subject of extensive study and debate (Stoet & Geary, 2013; Suryadarma, 2010; Machin & Pekkarinen, 2008). There are stereotypes that girls are superior in reading skills but inferior in mathematics skills. Findings from the United States on eighth graders, for instance, confirm that girls consistently had lower mathematics scores but higher scores in reading (Stoet & Geary, 2013; Machin & Pekkarinen, 2008). Similarly, a cross-country study in 2003 using data from PISA among 15-year-old students showed that girls performed better in reading while boys performed better in mathematics (Machin & Pekkarinen, 2008). However, findings from Indonesia reveal that girls perform better than boys in numeracy (Suryadarma, 2010). Suryadarma (2010) argues that the girls' superiority in numeracy can be explained because there is a higher labor market return for female-led families to invest more resources in girls. It is also because teachers are mainly females, which may stimulate girls to perform better and lead to increased female achievement (Suryadarma, 2010).

In relation to the gender achievement gap, an important difference between the various types of private Islamic schools is the choice to implement single sex education (SSE). Compared to non-madrasahs, in terms of teaching and learning rules, madrasahs tend to be stricter (Woodward, 2015). They also have a tradition of single sex education (SSE), which has been found to make girls freer and more competitive (Woodward 2015). The same holds for integrationist schools: they also implement single sex education, which can minimize distractions and reduce discipline problems (Gurian & Henley, 2001). Although the standards of discipline in a single sex environment (Jeffrey, Jeffery, & Jeffery, 2008) are similar, girls tend to be more closely supervised than boys (Parker & Raihani, 2009), which may enable girls to focus more on learning than when they are in a mixed class. In addition, single sex education has been shown to benefit girls because it

boosts their self-esteem and confidence (Bracey, 2006), which is linked to educational achievement (Piper, 2008; March, Byrne & Yeung, 1999).

Based on these arguments related to single sex education, we assume that in the madrasah track and the integrationist stream, girls will perform better than boys, reinforcing the gender achievement gap in both the madrasah track and the integrationist stream, compared to the non-madrasah track, the traditionalist and the modernist streams. Overall, girls attending madrasah and integrationist schools are expected to profit more from implementation of single sex education than are boys. In these school types this is expected to widen the gender gap in favor of the girls. We thus predict that *gender based achievement gaps in private madrasahs are greater than in private non-madrasah (H3a) and that gender-based achievement gaps in the integrationist stream are greater than in traditionalist and modernist streams (H3b).*

5.3.4 The SES achievement gap across school tracks and streams

Unlike madrasahs that are centrally managed by the Ministry of Religious Affairs (MoRA), non-madrasahs are decentralized and fall under the Ministry of Education and Culture (MoEC) and local governments (Permani, 2009). This has consequences for investments in education, since non-madrasahs have more resources than madrasah because they receive investments from both the central and local governments.

Since the non-madrasah schools have more resources they can provide more financial support to low SES students. For instance, scholarships for low SES students are more adequate in non-madrasahs than in madrasahs because, as mentioned above, non-madrasahs have at least two sources of resources, namely the MoEC and the district education office (USAID, 2007). Financial support via scholarships for low SES students could prevent them from leaving school for a temporary job, such as harvesting. This can improve the attendance of low SES students, which may advance their learning; this would reduce the SES achievement gap more in non-madrasah schools than in madrasah schools. Moreover, although the MoRA fully supports public madrasahs, it does not provide sufficient scholarships to private madrasahs (Kingham & Parsons, 2013). This could make it difficult for private madrasahs to boost the motivation and opportunity of low SES students to heighten their achievements.

In addition, although there are contradicting opinions as to the effect of decentralization in the education sector (e.g. Devins, 1987), in the Indonesian context decentralization has influenced local governments to respond better to local needs for educational services (Sumarto, Suryahadi, & Arifianto, 2004; UNDP, 2002; Usman, 2001). When decentralization leads local governments to respond to the local people's needs and people's aspirations for children's education are high, the municipality may invest more in education. This investment leads to improved learning environments and

may equalize the performance of low SES students in non-madrasahs. Thus, it can lead to improved educational outcomes (Simatupang, 2009).

With regard to financial or other support for low SES pupils, unlike integrationist schools, traditionalist and modernist schools financially support low SES students. Both traditionalist and modernist schools collect Islamic alms (*zakat*) and donations from their members (Burhanudin, 2015). These financial resources are partly distributed amongst low SES students. This may increase the daily school attendance of low SES students and in this way improve their learning and performance, in turn reducing the advantage of the high SES students over low SES students and thus the SES achievement gap in modernist and traditionalist schools becomes smaller.

Based on these reasons, we predict that *the SES achievement gap in private madrasahs is greater than in private non-madrasahs (H4a) and the SES achievement gap in the integrationist stream is greater than the gaps in both the traditionalist and modernist streams (H4b).*

5.3.5 *Context variables*

In the educational production function approach, family backgrounds are important determinants of student achievements (Grave, 2010). Generally, highly educated parents and certain professional occupations, such as public servants and private workers, are associated with high expectations towards education. These groups of parents have a better capacity to support and motivate their children, which may improve their school performance as compared to peers from low-educated parents with unskilled occupations. Also in the Indonesian context, parental education and occupation are still determinant factors in student achievement (Suharti, 2013). We therefore include parents' educational background and occupation in our analyses.

Furthermore, as reviewed by Hanushek (2007), school characteristics and municipality factors need to be included as inputs in the education production function. At the school level, this paper takes into account the average school test score, the average student age, the proportion of female students, the school size, the proportion of parents with a professional occupation and a high educational background. At the municipality level, we also include the average scores on this level, as well as the average of students' age, proportion of females, school size, proportion of parents with a professional occupation and high educational background, poverty rate, and the average number and proportion of schools located on Java Island. Figure 5.1 illustrates our conceptual framework.

Figure 5.1 The effect of school stream and track on achievement and achievement gap
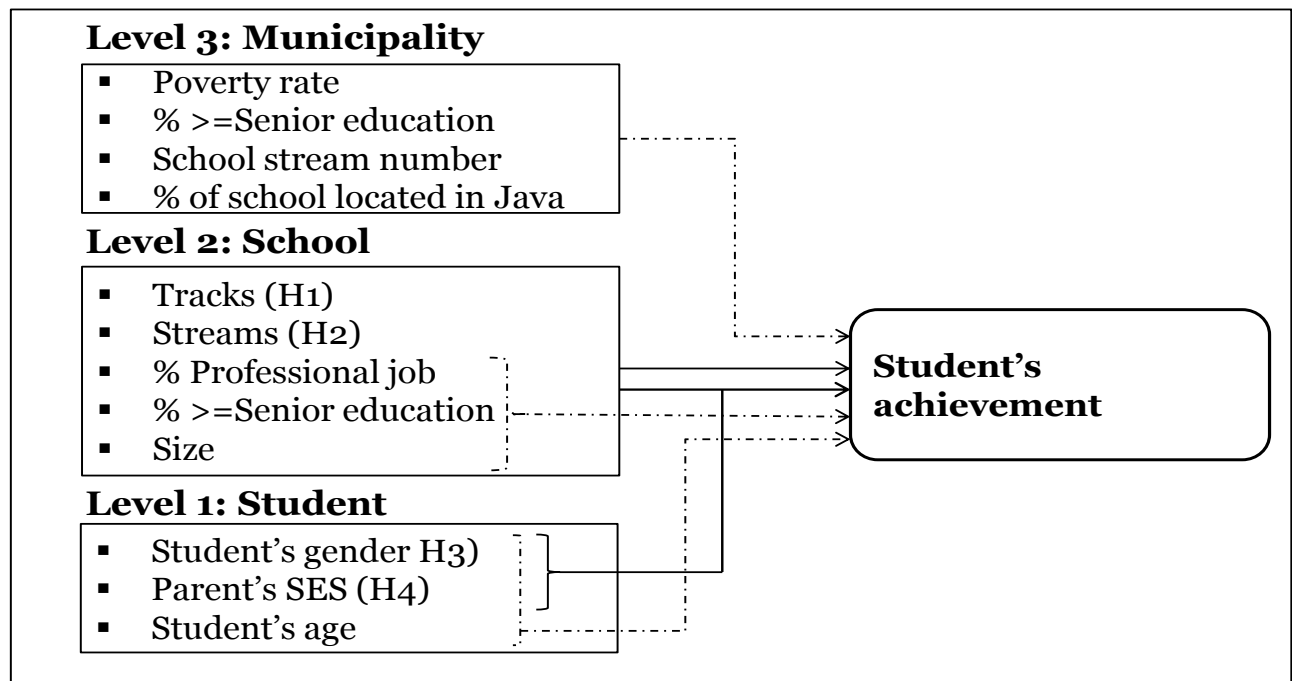
Context variables: average student age and proportion of females at the school-level; and at municipality-level: average student age, average school size, proportion of females, proportion of professional parents

5.4 Data and methods

5.4.1 Data collection

We mainly used the National Examination dataset of junior secondary education from the MoEC (2013). It consists of data of 3,671,863 students nested in 48,962 schools, both public and private, and madrasah and non-madrasah. The dataset consists of national examination scores on four subjects: Indonesian language, mathematics, science and English. Since the variation on the Indonesian language score is low (1.89), this study focuses on mathematics (4.31), science (3.12) and English (2.90).

The dataset also includes student age, gender and parent's education and occupation for each school. The junior secondary schools in the dataset are divided into three categories: *madrasah tsanawiyah*, junior secondary school and open junior secondary school, the latter two representing our non-madrasah category. We combined junior secondary school and open junior secondary school into a non-madrasah school category because the numbers of these schools are very small and exist only in the modernist stream.

To categorize the various schools according to the three streams of private Islamic schools, we consulted with and interviewed a number of experts in three rounds, i.e. the chairperson or vice chairperson of the modernist, the traditionalist and the integrationist umbrella organizations. First, based on an initial consultation and interview, we selected data from all private non-madrasahs as well as madrasahs from the MoEC dataset and coded "1" for *Traditionalist*, "2" for *Modernist*, "3" for *Integrationist* and "4 for other, which could be traditionalist, modernist or integrationist if the identity could not be verified. This category consists of 39.4 percent of all schools in the dataset (16,436).

Second, using the selected data of the three streams of Islamic schools, we again consulted the chairperson or vice chairperson of each umbrella organization. They partially confirmed the first school list and provided an additional school list to be checked with the MoEC dataset. Based on this data confirmation, we included additional school information calculated from *Data Pokok Pendidikan* (Dapodik) 2010 and linked this to the MoEC dataset 2013. Finally, we sent the new selected school data to the chair or vice chair of the organizations for a final reliability check.

The modernist and traditionalist informants confirmed that the new school data sets were correct but the integrationist informant proposed dropping some madrasahs in the dataset because they were not part of the integrationist madrasahs. Based on this confirmation, we constructed the final dataset consisting of 156,952 students nested in 3,150 schools. Those students are distributed over three school streams: 47.2 percent in *the traditionalist*, 47.0 percent in *the modernist*, and 5.8 percent in *the integrationist* institutions.

Furthermore, three experts (Vice Chairman of Primary and Secondary Education Council of Muhammadiyah/*Modernist*; Vice Chairman of LP Maarif NU/*Traditionalist*, and the Chairman of JSIT/*Integrationist*) were approached to elicit background information about each stream's unique features as indicated by their vision and mission and how the schools incorporate the national curriculum, as well as issues such as the number of teaching hours, teacher training, teaching qualification, extra attention for specific subjects, investments in coordination, financial or other support for low SES pupils, and implementation of single sex classes.

5.4.2 Data description

The dataset is described in terms of variables and levels (student/family, school and municipality). Summaries of the variables (means, standard deviations and proportions) and distributions over the school tracks and streams are given in Table 5.1, at all three levels; of these the most important findings are mentioned in the text.

Table 5.1 Descriptive statistics at student, school and municipality-level variables

Variables	Overall	Traditionalist		Modernist		Integrationist	
		Madrasah	School	Madrasah	School	Madrasah	School
Student-level (N=156,952)	μ (SD)	n=50,618 (32,3%)	n=23,540 (15%)	n=18,188 (11,6%)	n=55,547 (35,4%)	n=375 (.2%)	n=8,684 (5.5%)
1. Math score	5.55 (2.12)	5.74 (2.06)	5.66 (2.21)	5.39 (2.07)	5.28 (2.09)	6.34 (2.05)	6.26 (2.17)
2. Science score	5.79 (1.83)	5.95 (1.82)	5.93 (1.99)	5.67 (1.74)	5.53 (1.78)	6.20 (1.45)	6.31 (1.67)
3. English score	5.45 (1.70)	5.52 (1.65)	5.46 (1.76)	5.31 (1.63)	5.28 (1.68)	6.39 (1.44)	6.36 (1.71)
4. Student age	15.56 (0.85)	15.58 (0.84)	15.63 (0.86)	15.57 (0.87)	15.55 (0.86)	15.17 (0.57)	15.23 (0.62)
5. Student gender (1=female)		.51	.47	.50	.46	.45	.49
6. Parent education:							
(0) Unknown	25.20%	27.7%	18.4%	22.7%	26.6%	7.2%	25.8%
(1) Primary or below	34.40%	43.6%	44.1%	36.8%	25.6%	1.1%	6.8%
(2) Junior secondary	16.10%	15.5%	17.0%	18.6%	17.0%	1.6%	7.2%
(3) Senior secondary	17.50%	10.9%	16.2%	17.0%	23.0%	22.4%	25.4%
(4) Higher education	6.80%	2.3%	4.2%	4.8%	7.7%	67.7%	34.7%
7. Parent job:							
(0) Unknown	23.00%	25.1%	16.0%	21.4%	24.7%	4.8%	23.0%
(1) Farmer/worker	36.10%	41.3%	39.8%	43.8%	31.0%	.3%	12.9%
(2) Civil servant/professional	5.30%	3.2%	3.4%	5.4%	5.7%	40.0%	17.4%
(3) Private workers	12.00%	9.4%	13.9%	7.5%	13.1%	21.3%	23.4%
(4) Self-employed	17.50%	15.1%	19.8%	15.6%	19.1%	25.6%	18.5%
(5) Other	6.20%	5.8%	7.1%	6.2%	6.4%	8.0%	4.8%

Sources: *National exam 2013, Ministry of Education and Culture; Susenas 2010, Central Bureau Statistics (CBS).*

Table 5.1 Descriptive statistics at student, school and municipality-level variables **(Continued)**.

Variables	Overall	Traditionalist		Modernist		Integrationist	
		Madrasah	**School**	**Madrasah**	**School**	**Madrasah**	**School**
School-level (N=3,150)		n=924 (29.3%)	n=456 (14.5%)	n=502 (15.9%)	n=1,087 (34.5%)	n=3 (0.1%)	n=178 (5.7%)
1. Math score average	2.33 - 9.90	5.90 (1.65)	5.90 (1.83)	5.53 (1.71)	5.28 (.160)	5.68 (1.13)	5.85 (1.45)
2. Science score	3.14 - 9.63	6.11 (1.44)	6.15 (1.60)	5.79 (1.45)	5.54 (1.36)	5.96 (0.86)	6.03 (1.11)
3. English score	2.71 - 9.24	5.64 (1.24)	5.63 (1.36)	5.38 (1.27)	5.22 (1.17)	6.15 (1.01)	6.01 (1.12)
4. Proportion of senior/higher education *parents*	0 - 1	0.03 (0.09)	0.03 (0.10)	0.05 (0.12)	0.05 (0.09)	0.41 (0.42)	0.03 (0.09)
5. Proportion of professional parents	0 - 1	0.12 (0.17)	0.17 (0.21)	0.21 (0.24)	0.26 (0.26)	0.65 (0.56)	0.15 (0.18)
6. Average age	14.0 - 18.9	15.64 (0.33)	15.73 (0.42)	15.61 (0.37)	15.64 (0.35)	15.24 (0.38)	15.29 (0.32)
7. Proportion of females	0 - 1	0.49 (0.13)	0.46 (0.14)	0.49 (0.15)	0.45 (0.13)	0.52 (0.09)	0.46 (0.14)
8a. School size	1 - 476	58.44 (49.56)	55.09 (54.77)	38.62 (28.60)	54.53 (47.52)	133.67 (203.83)	52.01 (46.31)
8b. School size (*categorical*)							
1. *Smallest [<20]*	20.4%	15.9%	21.1%	24.7%	21.7%	66.7%	20.8%
2. *Small [=>20]*	27.7%	27.1%	25.9%	36.1%	25.3%	0.0%	28.1%
3. *Medium [>36 and <108]*	41.4%	44.3%	41.7%	36.1%	41.8%	0.0%	38.8%
4. *Large [=>108 and <325]*	10.3%	12.7%	10.7%	3.2%	11.1%	0.0%	12.4%
5. *Largest [>=325]*	.2%	.1%	.7%	0.0%	.1%	33.3%	0.0%
Municipality-level (N=366)		n=22 (6%)	n=39.1 (10.7%)	n=30 (8.2%)	n=244.9 (66.9%)	n=0 (0%)	n=30 (8.2%)
1. Math score average	3.04 - 9.78	5.88 (1.45)	5.43 (1.52)	5.48 (1.57)	5.39 (1.52)	5.68 (1.13)	6.00 (1.36)
2. Science score	3.45 - 8.98	6.00 (1.26)	5.47 (1.37)	5.71 (1.33)	5.58 (1.25)	5.96 (0.86)	6.11 (1.04)
3. English score	3.43 - 8.54	5.59 (1.12)	5.33 (1.17)	5.37 (1.17)	5.27 (1.16)	6.15 (1.01)	6.08 (1.03)
4. Average age	14.9 - 17.2	15.67 (0.29)	15.72 (0.29)	15.61 (0.32)	15.64 (0.34)	15.24 (0.38)	15.28 (0.27)
5. School size	3 - 164.5	47.08 (33.75)	50.17 (40.07)	37.28 (22.13)	48.64 (35.90)	133.67 (203.83)	54.29 (46.26)
6. Proportion of female	0 - 0.84	0.49 (0.12)	0.46 (0.12)	0.49 (0.11)	0.45 (0.11)	0.52 (0.09)	0.48 (0.12)
7. Poverty rate	0.02 - 0.48	0.14 (0.12)	0.14 (0.07)	0.14 (0.06)	0.13 (0.06)	0.14 (0.09)	0.12 (0.06)
8. Proportion of senior edu. parent	0 - 1	0.14 (0.16)	0.17 (0.21)	0.25 (0.26)	0.27 (0.23)	0.65 (0.56)	0.50 (0.40)
9. Proportion of professional parent	0 - 1	0.03 (0.09)	0.04 (0.11)	0.05 (0.10)	0.06 (0.09)	0.41 (0.42)	0.15 (0.17)
10. Average number of school	1 - 47	5.47 (7.92)	3.93 (5.32)	2.95 (3.42)	3.58 (4.30)	1.00 (0.00)	1.80 (1.57)
11. Java versus non-Java	0 - 1	0.81 (0.39)	0.87 (0.34)	0.50 (0.50)	0.61 (0.49)	0.670 (0.58)	0.59 (0.49)

Sources: *National exam 2013, Ministry of Education and Culture; Susenas 2010, Central Bureau Statistics (CBS).*

5.4.3 Variables

Student/family

National examination (NE) scores. NE results on mathematics, science and English are scored from 0 to 10.

Age. In years. Students are mostly 15 years old when taking the exams, with ages ranging from 14 to 28. We use centered age for the analysis, meaning that a value within the age is equal to zero.

Parental education. Five categories are distinguished: "1" for primary education or lower (34.4%), "2" for junior secondary education (16.1%), "3" for senior secondary education (17.5%), and "4" for higher education (6.8%). If parental educational level was unknown, it was coded "0".

Parental occupation. Six categories are distinguished: "1" for farmer/worker (36.0%), "2" for civil servant/professional (5.3%), "3" for private worker (12.0%), "4" for self-employed (17.5%), and "5" for other (6.2%). If parent's occupation was unknown, it was coded "0".

School

Size. In number of students. School size ranges from 1 to 476, with an average of 53.

School size category. Based on the MoEC standard of class and school, five categories are distinguished: "1" for <20; "2" for =>20 and <36; "3" for >36 and <108; "4" for =>108 and =<325; "5" for >325.

Average age. Computed as the mean student age, ranging from 14 to 18.9.

Proportion of female students. Ranges from 0 to 0.84.

Proportion of well-educated parents. Computed as the number of parents with senior secondary and higher education (summing categories "3" and "4").

Proportion of parents with high-status jobs. Computed as the number of parents who are civil servants or have a professional job like lawyer or doctor (category "2").

Municipality

Poverty rate. Calculated from the national socio-economic survey (CBS, 2010), ranging from 2.48 percent to 48 percent with an average of 13.3 percent.

Location. Categorical variable, distinguishing municipalities on Java Island vs non-Java municipalities.

Average school size. Mean over all schools in the municipality, ranging from 3 to 164.5.

Mean school proportion of female students. Mean over all schools in the municipality, ranging from 0 to 0.84

Mean school proportion of well-educated parents. Ranges from 0 to 1, with an average of 27.8 percent.

Mean school proportion of parents with high-status jobs. Ranges from 0 to 1, with an average of 24.9 percent.

The exam scores of modernist madrasahs and schools are the lowest at student, school and municipality levels. These schools are, more than the other streams, located outside Java. Parental education and job status is highest in integrationist institutes, and in the traditionalist and modernist non-madrasah schools somewhat higher than in the same stream madrasahs, also at all three levels. Pupils in madrasahs have higher test scores in the traditionalist and modernist streams and in all subjects. School and municipality average exam score differences between madrasahs and non-madrasahs are similar for the modernist streams, whereas the average school score differences in the traditionalist stream almost vanish but the average municipality score differences increase.

5.4.4 Analytical strategy

As a preparatory step to a multivariate analysis, bivariate association measures were computed at the three levels. The hypotheses set forth in the previous sections were investigated using multilevel analysis (see, e.g. Snijders & Bosker, 2012). Multilevel analysis is appropriate because it takes into account the inherent dependent nature of scores of students in the same classroom or school, in the same region, allowing proper testing of the hypotheses formulated at the student, school, and municipality levels.

For each of the three National Exam subject scores, in math, science, and English, a model is built in four steps, using a forward selection strategy to take into account more potential confounders. The first model contains student-level variables, i.e., age and parental SES characteristics education and occupation. In the second step school-level variables, i.e. school type as characterized by stream and track, school size and aggregated SES variables are added, followed by district-level characteristics, i.e., poverty rate and aggregated SES variables expressed as percentage of well-educated parents and percentage of parents working as professionals (including civil servants), in the third step.

To investigate whether the model parameters are constant across school type and to test hypotheses 3 and 4, within-level and cross-level interactions are added in a final step of which significant effects are retained.

5.5 Results

Table 5.2 gives a description of the correlations between factors at the student, school and municipality levels. Not surprisingly, the three NE scores are highly correlated at all levels, with the strongest association between math and science. Most correlations are in the expected direction, but rather low. Overall, the correlations for all subjects at the school and municipality levels are about equal and higher than those correlations at the student level. This confirms that it is important to distinguish effects of explanatory factors at all levels in the multilevel modelling as laid out in the analytical strategy.

Table 5.2 Correlations at student, school and municipality-level variables

Variables	1	2	3	4	5	6	7
Student $^{(N=156,952)}$							
1. Math score and its average		.677**	.596**	-.107**	.036**	.076**	.056**
2. Science score and its average	.895**		.575**	-.105**	.027**	.079**	.050**
3. English score and its average	.828**	.817**		-.139**	.087**	.120**	.068**
4. Student age and its average	-.150**	-.155**	-.213**		-.124**	-.118**	-.055**
5. Student gender (1=girl and proportion of girl)	.047**	.042*	.059**	-.169**		-.018**	-.009**
6. Parent education (1=senior/higher and its proportion)	.045*	.051**	.112**	-.235**	-.059**		.284**
7. Parent job (1=professional and its proportion)	.073**	.093**	.122**	-.167**	-.035*	.548**	
8. School size (continuos)	-.048**	-.057**	-.022	-.208**	.082**	.123**	.146**

(School $^{(N=3,150)}$ labels the lower triangle)

Municipality-level variables $^{(N=366)}$	1	2	3	4	5	6	7
1. Math score average	1						
2. Science score average	.878**	1					
3. English score average	.842**	.805**	1				
4. Municipality poverty rate	.122*	.090	.046	1			
5. Student age, average	-.181**	-.162**	-.222**	.130*	1		
6. Proportion of females	.051	.060	.065	-.014	-.225**	1	
7. Proportion of senior/higher education parents	-.063	-.045	.004	-.176**	-.285**	-.026	1
8. Proportion of professional parents	-.022	.003	-.015	.039	-.174**	.066	.553**

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

5.5.1 Multilevel analysis

We started our analysis by estimating a Null Model with the intercept variances at the student, school and municipality levels. The intercept-only model from the Null Model estimates the intercept as 5.58, 5.76 and 5.43, which are simply the weighted average scores for mathematics, science and English across students, schools and municipalities and (almost) equal to the means represented in Table 5.1. The variances of the student, school and municipality-level residual errors for all subjects are highest at the individual level with 1.96 for math, 1.54 for science and 1.50 for English. The lowest variances at the school level are 1.08, 0.74 and 0.61, respectively. Calculated from the school variance divided by the total variance, i.e. the sum of the student, school and municipality variances, the intra-class correlation at the school level equals 0.32 for mathematics, 0.32 for science and 0.28 for English. These numbers can be considered substantial, and an extra justification for using multilevel analysis. In the final model, the total variance is only slightly reduced, which implies that although the variables included in the model significantly contribute to explaining the variance, the total explained variance is low.

Table 5.3 displays the estimation results for the four different specifications of the educational production function: Model 1 includes only the student-level variables: age, gender, parental education and occupation. Model 2 additionally includes the school-level variables: track, stream, proportion of students from at least a senior educational background, proportion of parents in a professional occupation and school size categorization. Model 3 takes into account the municipality-level characteristics: poverty rates, proportion of students from at least a senior educational background, and proportion of parents in a professional occupation. Finally, Model 4 also includes the cross-level interactions between the student and school-level factors, and between the municipality and school-level factors.

From Model 1 in Table 5.3 it becomes clear that female students have significantly higher scores than male students in all subjects. The largest score differences between girls and boys are in English by 0.3 points, and the smallest difference is in science by 0.1 points. Similarly, children of higher educated parents and professional parents have significantly higher scores, leading to a difference of about 0.2 points and 0.1 points, respectively. However, scores for all subjects decrease as students become older. These results are stable after taking into account the variables at the school level (Model 2), the municipality level (Model 3) and the within- and between-level interactions (Model 4).

Table 5.3 Multilevel results on student achievement: student and school-level factors
$N_{level1}=156,952$; $N_{level2}=3,150$; $N_{level3}=366$.

Variables	Model 1						Model 2					
	Math		Science		English		Math		Science		English	
	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.
Fixed Part												
Intercepts	5.510	0.071	5.703	0.061	5.268	0.054	5.944	0.112	6.097	0.095	5.889	0.084
Student-level variables												
Age	-0.136	0.004 ***	-0.121	0.004 ***	-0.139	0.004 ***	-0.136	0.004 ***	-0.120	0.004 ***	-0.139	0.004 ***
Gender: Boy *(ref.)*												
Girl	0.108	0.007 ***	0.065	0.006 ***	0.259	0.006 ***	0.108	0.007 ***	0.065	0.006 ***	0.259	0.006 ***
Parent's education: Junior and below *(ref.)*												
- Senior/higher edu	0.101	0.011 ***	0.112	0.010 ***	0.184	0.010 ***	0.101	0.011 ***	0.112	0.010 ***	0.182	0.010 ***
Parent's occupation: Non-professional *(ref.)*												
- Professional	0.138	0.018 ***	0.084	0.016 ***	0.134	0.016 ***	0.137	0.018 ***	0.083	0.016 ***	0.132	0.016 ***
School-level variables												
Track: Non madrasah *(ref.)*												
- Madrasah							0.278	0.046 ***	0.238	0.038 ***	0.227	0.034 ***
Stream: Integrationist *(ref.)*												
- Tradisionalist							-0.486	0.104 ***	-0.454	0.086 ***	-0.715	0.077 ***
- Modernist							-0.639	0.097 ***	-0.565	0.080 ***	-0.799	0.072 ***
Random Part												
- Municipality-level	1.445	0.134	1.089	0.100	0.817	0.076	1.454	0.134	1.098	0.100	0.841	0.077
- School-level	1.068	0.030	0.729	0.021	0.593	0.017	1.030	0.029	0.702	0.020	0.556	0.016
- Student-level	1.938	0.007	1.526	0.006	1.465	0.005	1.938	0.007	1.526	0.006	1.465	0.005
*-2*loglikelihood:*	559,538		521,682		514,785		559,445		521,586		514,627	

*Note: * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.*

The first hypothesis predicts that *students who attend private madrasahs attain a lower level of achievement than students who attend private non-madrasahs.* Results provide evidence contradictory to our expectation. Data show that children attending madrasahs perform better than their non-madrasah counterparts. The findings in Model 2 Table 5.3 reveal that scores of students attending private non-madrasahs generally have significantly *lower* scores in math, science and English compared to those enrolled in private madrasahs, by 0.3, 0.2 and 0.2 points, respectively.

These findings are quite stable, as shown in Model 3 and Model 4. For instance, after controlling for municipality factors (Model 3) and adding interaction effects (Model 4), the effects of attending madrasahs remain similar. Moreover, in madrasahs, girls perform better in science than boys, whereas children of well-educated parents perform slightly less well in English compared to children of parents with lower education (see Table 5.4).

Interestingly, whereas in municipalities with a higher poverty rate, student performance in non-madrasahs is higher in math and science, in madrasahs this effect is absent in science and less strong in math. Student achievement in English in municipalities with a higher poverty rate is higher in traditionalist and modernist madrasahs and non-madrasahs, and lower in integrationist madrasahs (compared to integrationist non-madrasahs). Municipalities with a large number of schools have higher math and English student performance.

Table 5.4 School track and stream on student achievement: student, school, municipality-level factors and their interaction effects N_{level1}=156,952; N_{level2}=3,150; N_{level3}=366.

Variables	Model 3						Model 4					
	Math		Science		English		Math		Science		English	
	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.
Fixed Part												
Intercepts	6.419	0.189	6.540	0.163	5.948	0.096	5.791	0.216	6.044	0.185	5.479	0.131
Student-level variables												
Age	-0.136	0.004 ***	-0.120	0.004 ***	-0.139	0.004 ***	-0.136	0.004 ***	-0.121	0.004 ***	-0.139	0.004 ***
Gender: Boy *(ref.)*												
- Girl	0.108	0.007 ***	0.065	0.006 ***	0.259	0.006 ***	0.389	0.030 ***	0.238	0.027 ***	0.359	0.026 ***
Parent's education: Junior and below *(ref.)*												
- Senior/higher edu	0.101	0.011 ***	0.113	0.010 ***	0.183	0.010 ***	0.101	0.011 ***	0.112	0.010 ***	0.208	0.012 ***
Parent's occupation: Non-professional *(ref.)*												
- Professional	0.137	0.018 ***	0.083	0.016 ***	0.132	0.016 ***	0.138	0.018 ***	0.084	0.016 ***	0.133	0.016 ***
School-level variables												
Track: Non madrasah *(ref.)*												
- Madrasah	0.269	0.046 ***	0.231	0.038 ***	0.223	0.034 ***	0.267	0.046 ***	0.202	0.039 ***	0.243	0.035 ***
Stream: Integrationist *(ref.)*												
- Tradisionalist	-0.507	0.104 ***	-0.472	0.087 ***	-0.727	0.078 ***	0.209	0.174	0.154	0.145	-0.146	0.134
- Modernist	-0.671	0.097 ***	-0.589	0.081 ***	-0.813	0.072 ***	0.014	0.154	-0.058	0.128	-0.344	0.121 **
Municipality-level variables												
Poverty rate	2.179	1.082 *	1.319	0.934	0.625	0.835	2.944	1.134 **	2.434	0.983 **	-1.930	1.519
Parents with senior education	-0.393	0.322	-0.365	0.278	-0.247	0.249	-0.364	0.322	-0.170	0.287	-0.197	0.248
Number of schools	0.010	0.006	0.012	0.005 **	0.006	0.004	0.009	0.006	0.011	0.005 *	0.007	0.004
Region: Non Java *(ref.)*												
Java	-0.622	0.166 ***	-0.475	0.144 ***	-0.271	0.129 *	0.212	0.240	0.208	0.204	0.215	0.183

*Note: * P < 0.05; ** P < 0.01; *** P < 0.001.*

Table 5.4 School track and stream on student achievement **(Continued)**.

Math	Model 3						Model 4					
	Math		Science		English		Math		Science		English	
	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.
Cross-level interaction effects												
School and student-level												
- Madrasah x Girl									0.047	0.015 ***		
- Madrasa x well-educated parent											-0.068	0.019 ***
- Tradisionalist x Girl							-0.316	0.032 ***	-0.222	0.030 ***	-0.103	0.028 ***
- Modernist x Girl							-0.282	0.032 ***	-0.190	0.028 ***	-0.111	0.028 ***
Municipality and school-level												
- Municipality poverty rate x Madrasah							-1.580	0.819	-2.358	0.741 ***	-1.313	0.639 *
- Municipality poverty rate x Traditionalist											3.548	1.491 **
- Municipality poverty rate x Modernist											3.320	1.361 **
- Proportion of well-edu. parents x Madrasah									-0.510	0.234 **		
- School number at municipality x Madrasah							0.003	0.001 **	0.003	0.001 **		
- Java x Tradisionalist							-0.920	0.210 ***	-0.818	0.175 ***	-0.653	0.158 ***
- Java x Modernist							-0.924	0.195 ***	-0.730	0.162 ***	-0.507	0.147 ***
Random Part												
- Municipality-level	1.348	0.126	1.031	0.095	0.821	0.076	1.348	0.126	1.027	0.094	0.810	0.075
- School-level	1.030	0.029	0.702	0.020	0.556	0.016	1.019	0.029	0.693	0.020	0.550	0.016
- Student-level	1.938	0.007	1.526	0.006	1.465	0.005	1.936	0.007	1.526	0.006	1.465	0.005
*-2*loglikelihood:*	559,422.7		521,567.9		514,619.2		559,294.9		521,474.0		514,561.1	

*Note: * P < 0.05; ** P < 0.01; *** P < 0.001.*

The second hypothesis assumes that *students in the integrationist stream attain higher academic achievement than those in modernist and traditionalist streams*. In general, our findings are in line with the hypothesis that the scores of students in the integrationist stream are higher than those of their peers in modernist and traditionalist streams in all subjects, where the differences between the streams depend on student's gender and municipality location and poverty. Consequently, the results partially support hypothesis 2. The results also reveal a complex interplay between individual, school and municipality-level factors that we need to bear in mind when testing the hypotheses and interpreting the model parameters.

Taking into account the cross-level interactions: (1) between school types and student characteristics, and (2) between school types and municipality factors, a difference in English student achievement is found only between the modernist stream and the integrationist stream. Although girls perform better in all subjects than boys, their achievement is somewhat lower in traditionalist and modernist schools compared to integrationist schools.

Note that by carefully investigating the first two hypotheses, the third hypothesis reading *gender-based achievement gaps in private madrasahs are greater than in private non-madrasah (H3a)* and *gender-based achievement gaps in the integrationist stream are greater than those in traditionalist and modernist streams (H3b)* has been addressed and mostly supported.

Figure 5.2 shows that the gender achievement gap in private madrasahs is higher than in private non-madrasah counterparts in science, but there are no differences for math and English. This finding thus partially supports hypothesis 3a. Figure 5.2 also reveals that for all subjects, the gender achievement gap in the integrationist stream is larger than the gap in the traditionalist and modernist streams, which supports hypothesis 3b.

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Figure 5.2 Gender achievement gaps across tracks and streams
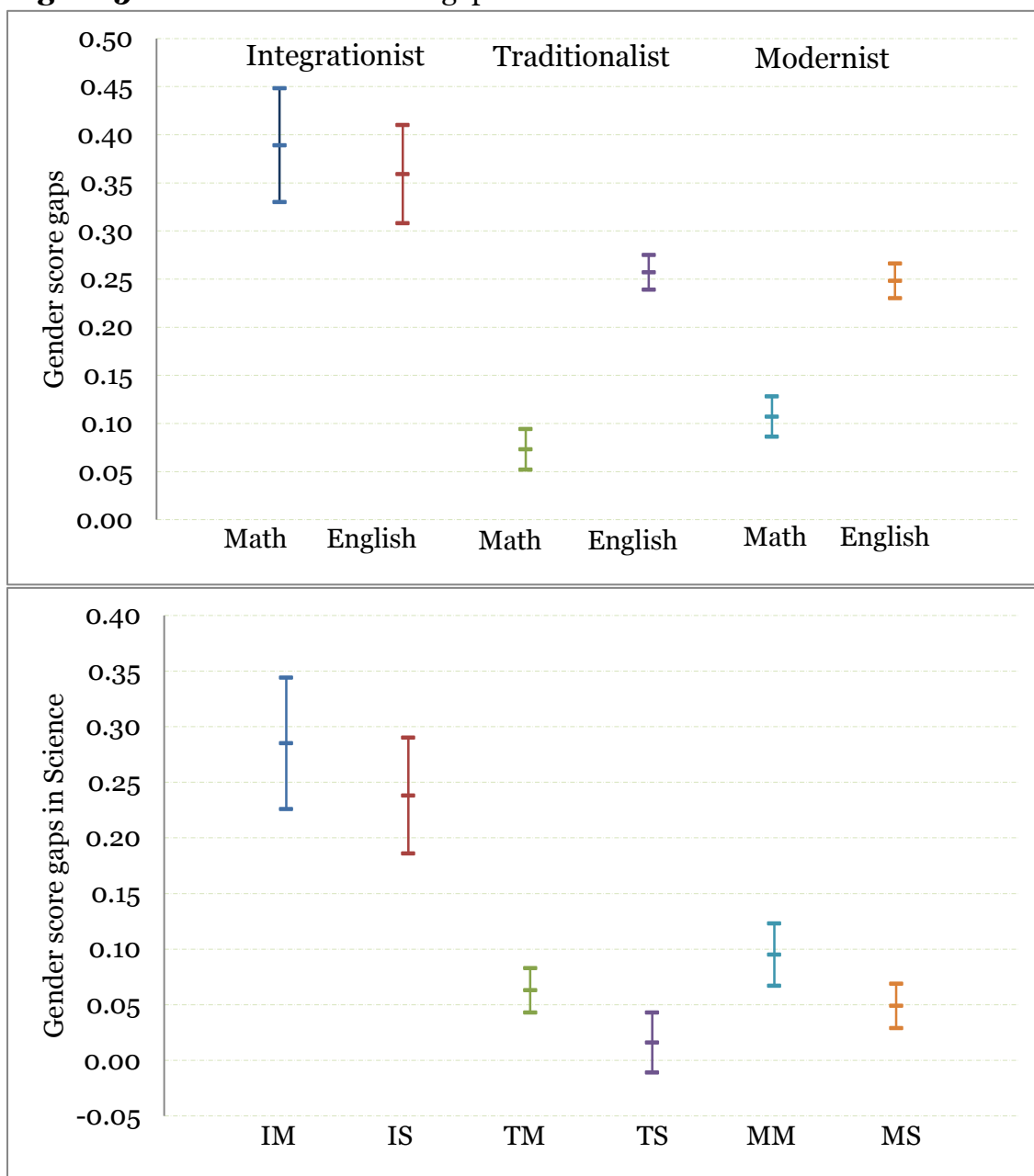
Notes:
*IM=Integrationist madrasah; IS= Integrationist school/non-madrasah; TM= Traditionalist madrasah; TS= Traditionalist school; MM= Modernist madrasah; MS=Modernist school.
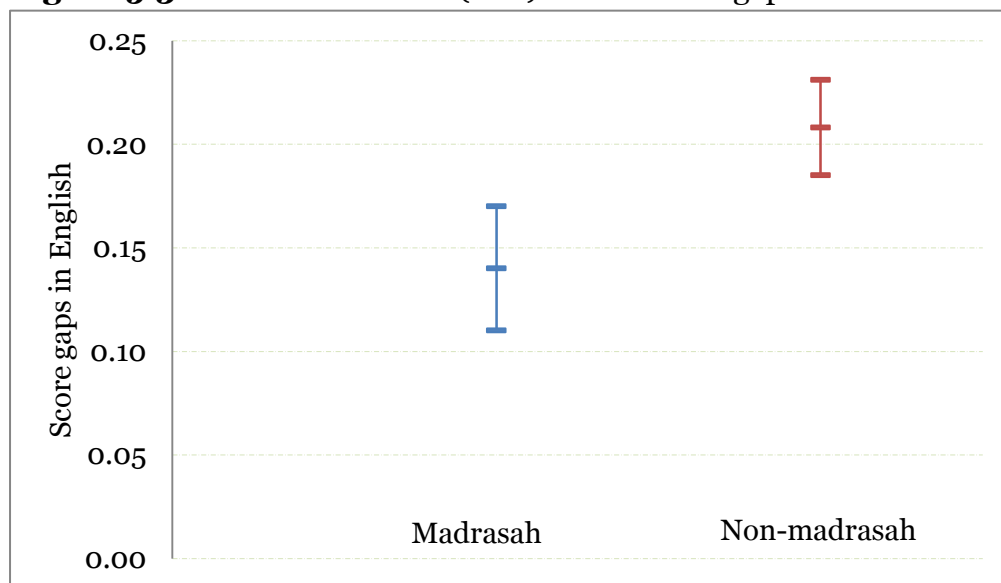**Figures are based on Model 4 in Table 5.4.

The difference in student performance between the traditionalist and modernist streams and the integrationist stream is greater on Java (in favor of integrationist schools) compared to schools in other regions.

The final hypothesis postulates that *the SES achievement gap in private madrasahs is greater than in private non-madrasahs (H4a) and the SES achievement gap in integrationist schools is greater than those gaps in both traditionalist and modernist schools (H4b)*. The results fully refute this set of hypotheses as represented in Model 4 in Table 5.4 and Figure 5.3.

Model 4 in Table 5.4 illustrates that the effects of SES as represented by parental education and occupation are significantly positive for all subjects. Enrolling in private madrasahs significantly reduces the advantage of students from well-educated parents over those from low-educated parents. Thus, the SES achievement gaps in private madrasahs are smaller than in private non-madrasahs as shown in Figure 5.3, which is contradictory to our hypothesis (H4a).

**Figure 5.3** Parental education (SES) achievement gaps across tracks

Note:
*Figures is based on Model 4 in Table 4.

Figure 5.4 and 5.5 reveal that there ares no cross-level interaction between parental SES and school streams, implying that there are no differences in SES achievement gaps between students in integrationist streams and their other counterparts for all subjects, which contradicts our hypothesis (H4b).
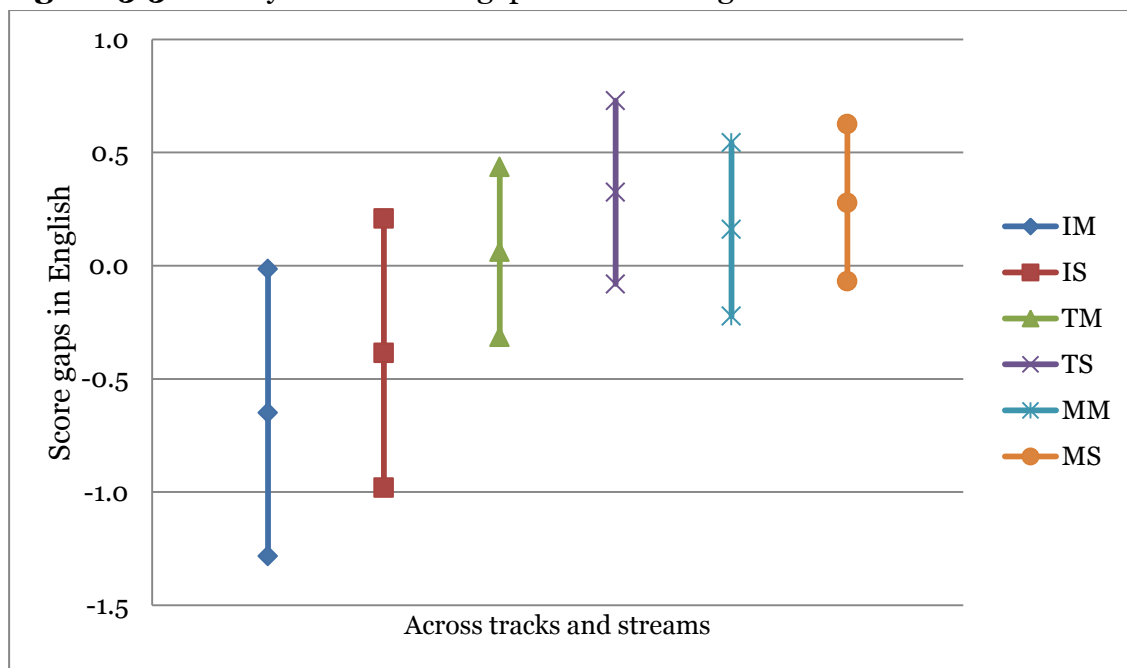
Figure 5.4 Poverty achievement gap of 20% for Math and Science across track
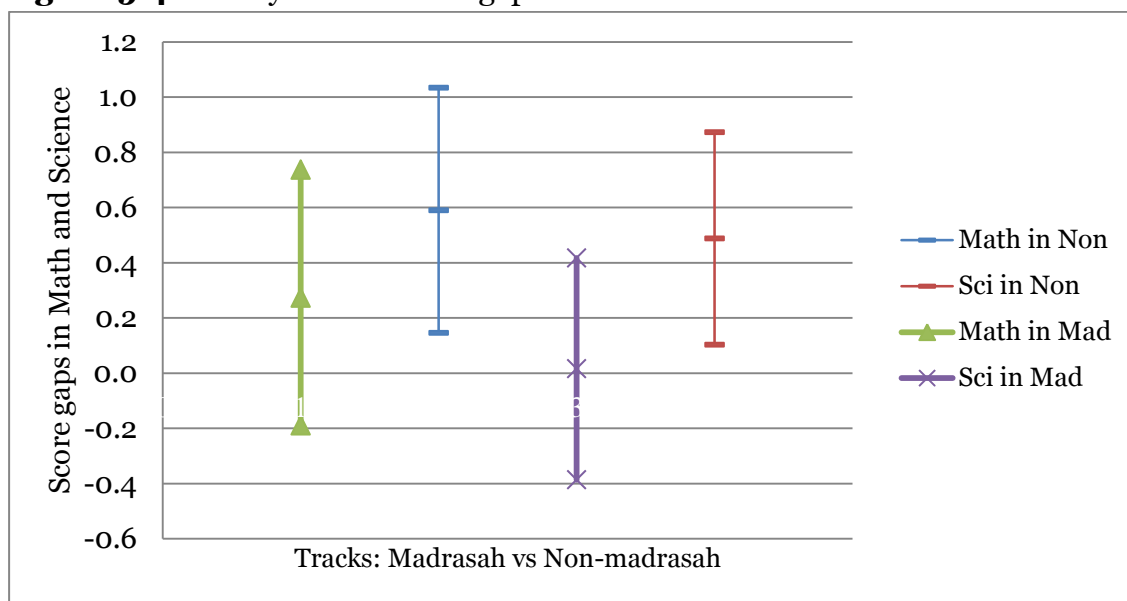
Note:
*Figures are based on Model 4 in Table 4.

Figure 5.5 Poverty achievement gap of 20% in English across track and stream

Notes:
*IM=Integrationist madrasah; IS= Integrationist school/non-madrasah; TM= Traditionalist madrasah; TS= Traditionalist school;   MM= Modernist madrasah; MS=Modernist school.
**Figures are based on Model 4 in Table 4.

A summary of the results of the six hypotheses is provided below, in Table 5.5.

Table 5.5 Overview of hypotheses and findings of our analyses

No.	Hypotheses	Results
1	Students who attended the private madrasahs have a lower level of achievement than students who attended private non-madrasahs (H1).	Refuted (X): *students in madrasah attain a higher level than their peers in non-madrasah.*
2	Students in Integrationist stream have higher academic achievement compared to those in Modernist and Traditionalist streams (H2).	Partially supported (√): *girls in Integrationist stream attain higher.*
3	Gender-based achievement gaps in private madrasahs are greater than in private non-madrasahs (H3a) and gender gaps in Integrationist stream are greater than in Traditionalist and Modernist streams (H3b).	Mostly supported (√): *Gender gap in madrasah is greater in science, and gender gap in Integrationist stream is greater in all subjects.*
4	SES achievement gaps in private madrasahs are greater than those in private Islamic schools (H4a) and SES achievement gaps in Integrationist stream are greater than those in Traditionalist and Modernist streams (H4b)	Refuted (X): *SES gaps in madrasah are smaller and there are no differences in SES gaps across streams.*

Finally, although no hypotheses were formulated at the district level, the findings regarding municipality characteristics deserve further attention and interpretation, which will be offered in the discussion section.

5.6   Discussion and conclusion

In this study, we assessed the effects of various organizational (tracks) and ideological (streams) in Indonesian private Islamic schools on students' academic achievement and achievement gaps across gender and parental SES. Adopting an education production function approach, it was expected that student achievement is a function of a school's investment in teaching-related activities and resources (Hanushek, 2007; Coates, 2003; Bowles, 1970). We discussed four dimensions of investments including: investments in the primary process, teachers, students, and in organization and coordination. We argued that the more time, money and attention that are devoted to students, the more they will learn, and the higher their performance and the smaller their achievement gaps are likely to be.

The results of the multilevel analyses, confirming that investments in teaching time, more qualified teachers and financial incentives are related to higher student performance, echo results from educational studies outside Indonesia (Grave, 2010; Stinebrickner & Stinebrickner, 2008; Darling-Hammond, 2000; Hanushek, 2006). In addition, findings prove that gender achievement gaps in the integrationist stream are higher than in other streams for all subjects. The gender achievement gap in private madrasahs is higher than in private non-madrasahs in science, but this does not hold for math and English. It could be concluded that investment decisions indeed matter, but that their effects are largely contingent upon the context in which the investments were made.

This study also resulted in some contradictive findings, for which we will offer some tentative explanations. In terms of organizational perspective (track), we predicted in agreement with general perceptions on madrasahs and resource investments, that student achievement in madrasahs is lower than in non-madrasahs, but we found contradictive evidence for this. This contradictive finding is not easy to interpret. Perhaps it can be explained by the selection of the proxy variables at the student level that could not fully assess prior student achievement. It may be that students in madrassah schools are overall better students than students in non-madrassah schools. In the present study, however, we were unable to control for prior student achievement.

A second contradictive finding is that the SES achievement gap for English in private madrasahs is smaller than in private non-madrasahs. This unexpected finding is difficult to interpret. We previously assumed that decentralization only benefited non-madrasahs and not madrasahs. This could be true for public non-madrasahs, which are directly managed by the local government, but not for private non-madrasahs, which are owned by non-government organizations. A previous study by Ghozali, Mudjahid and Hayati (2013) showed that local governments 1) do not treat private non-madrasahs equally as independent institutions and 2) provide scholarships and school grants for both non-madrasahs and madrasahs to reduce political risk in direct elections. The smaller gap found only for English in private madrasahs could be related to effects of parental SES and region. Student achievement in traditionalist and modernist streams in all subjects is lower on the island of Java than in other regions of the Indonesian archipelago. In addition, compared to

learning math and science, learning English can also be influenced by learning outside school, such as attending extra language courses or having media access to English materials. High-SES parents have more possible access to English courses and to resources like multimedia, especially on Java.

The expected better performance of students in integrationist streams compared to their traditionalist and modernist counterparts was found to be highly dependent on gender and municipality. Female students have a pronounced advantage in integrationist schools, which are characterized by single sex education. This may be in line with findings from other studies showing single sex education to minimize distractions, reduce discipline problems, and boost the self-esteem and confidence of girls, thus leading to high performance (Piper, 2008; Bracey, 2006; Gurian & Henley, 2001; March, Byrne & Yeung, 1999).

In addition to some contradictive findings, the study also revealed an unexpected finding. No differences were found between the Integrationist stream and the two other streams with regard to SES achievement gaps. This implies that ideological views, which are operationalized by financial or other support for low SES pupils in traditionalist and modernist streams, do not appear to help to narrow the SES achievement gap. Perhaps the financial and other support for students from families with low SES increase their daily attendance. The resultant improvement is too small to adequately reduce the SES achievement gap.

As noted before, in terms of organization (track), the role of municipalities became very important after the implementation of a decentralized education system. Even though the effects of municipality poverty rate differ across subjects, these effects are significant, with similar patterns for math and science, which differ from English. To facilitate interpretation, we calculated the effects of a municipality poverty rate gap of 20 percent. For math and science, Figure 5.4 reveals that the student achievement gap is lower in madrasahs than in non-madrasahs. For English, Figure 5.5 shows that the gap is smaller in the integrationist stream than in the traditionalist and modernist streams.

To summarize, the findings in this study confirm the value of the education production function approach and reveal the importance of municipality factors. Before discussing the implications of our findings, however, we acknowledge some limitations of this study.

First, the modest degree of explained variance at all levels might be partly due to our use of aggregate variables at the school-level. The results revealed important significant effects at the student-level, such as age and gender. In view of the substantial variability at the municipality-level, it would be worthwhile to include more variables related to municipality, like sub-district and village characteristics. The development of more fine-grained variables and measurements may help to unravel the mechanisms underlying the relation between private Islamic school types and student achievement and achievement gaps.

Second, in spite of the consistency with our theoretical reasoning, in the study we used cross-sectional data that impede causal inferences. Further studies, therefore, would profit from a longitudinal design to disentangle causality relations between resource investment and student achievement. Moreover, such a design could account for the effect of prior student achievement.

Apart from these limitations, our study discloses several general implications for research and policy. It refines current research on student achievement and achievement gaps in three ways. *First,* our study provides insights into strengths and weaknesses across school tracks and streams. Such insights can enable local governments to develop better and more equal interventions to improve education in Islamic private madrasahs and non-madrasahs, both in the domains of school funding and teacher development. The patterns seem to indicate that the government's interventions to improve Islamic private schools need to be focused on the traditionalist and modernist streams. Both streams predominantly serve children from low SES parents, and are thus associated with limited parental resources, leading in turn to inadequate school incomes. In addition, the presence of modernist schools in all provinces and almost all municipalities indicates that they reach diverse students across the country, including remote areas where public schools do not exist. Therefore, improving the quality of modernist and traditionalist schools would lead to improved quality of learning for underprivileged and underserved students.

Second, our study suggests that although school tracks and streams matter, student and family characteristics are still strong determinants of student achievement and achievement gaps. Examination of the cross-level interaction between gender and school streams shows that the effects of school streams are only significant for girls in the integrationist stream, implying that differences across streams affect girls and boys differently. This result provides new insight into the conditions under which students perform better in the Islamic private school. For instance, girls seem to profit from the implementation of single sex education in private Islamic schools but boys do not have those benefits.

Third, to our knowledge, this study is the first empirical attempt to test the relation between characteristics of private Islamic school tracks and streams and student achievement and achievement gaps in Indonesia, one of the largest Muslim countries in the world. Most research in student achievement and achievement gaps has been conducted in schools in general (Suharti, 2013; Suryadarma, 2010) or comparing public and private schools (Newhouse & Beegle, 2006). This study, therefore, fills a gap to enrich the literature on the education production function approach by adding information about organizational and resource investments in a specific context of private Islamic school tracks and streams.