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Master's Thesis of Arts

**The school type effect on students'
academic performance in Indonesia:
Focusing on the private secondary school**

인도네시아의 학교유형이
학업성취도에 미치는 영향에 관한 연구

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Focusing on the private secondary school

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ABSTRACT

The school type effect on students' academic performance in Indonesia: Focusing on the private secondary school

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This study aims to draw policy implications by examining the school type effect on students' academic performance in Indonesia. Research focused on the contributing role of private schools in educational development and providing educational opportunities. The 2018 data of the program for international student assessment (PISA) was used for analysis, and a propensity score matching (PSM) method was employed to control for preexisting differences between students who attend a private school and their public school counterparts. Then, multilevel model analysis was conducted.

Extant literature generally recognizes that, in Indonesia, the quality of education provided by private schools was lower than that of public schools. This disparity leads to low achievement of students attending private schools. The study results partly proved this concern. In the multilevel analysis, there were significant school sector differences, even after controlling for student background characteristics. That is, private schools had a negative impact on students' reading literacy scores. Further analysis was carried out to prove if differences exist in academic achievement between government-dependent

and independent private schools, a distinction defined by the degree of financial assistance received from the government. The results suggested variation in the effect of private schools based on their types. On one hand, the impact of school types on academic performance was not statistically significant for private government-dependent schools. The results suggest the importance of schooling, as attending certain types of schools does not affect a student's reading literacy scores. However, the characteristics of the school itself have a more significant impact. On the other hand, students in independent private schools showed significantly lower reading literacy scores than students attending public schools. The study results showed that the impact on a student's reading scores varies depending on the type of private school they attend. The difference in reading scores between types of schools was influenced by students' background characteristics. However, a substantial part of the difference was explained by school-related factors. Therefore, this finding suggests the need for careful consideration of the role and quantitative expansion of private schools.

This study contributes to providing empirical evidence about the school type effect in Indonesia. In particular, it fills a gap in existing literature by suggesting different outcomes according to the subtype of private school. It also suggests policy implications for educational development in Indonesia. The study concludes by suggesting areas for further research regarding school type effect and school choice, and it suggests data suitable for Indonesia's context and qualitative research methodologies that can contribute to educational development.

Keyword: School effectiveness, private school effect, PISA 2018, Propensity score matching (PSM), Multilevel, Private schools in Indonesia
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CHAPTER I. INTRODUCTION

1.1 Study background

Education plays an important role in national development. This is particularly true for developing countries, where education is considered as a means to end poverty and where a large portion of the aid given by the international community to developing countries is used to provide education to the citizens of these countries. Besides, since the UN declaration of rights, education is considered a basic human right. Since the 1990s, the Education for All (EFA) movement, as well as the Millennium Development Goals (MDGs), were implemented in the global discourse. As a result, the school enrollment rate has risen sharply around the world. The enrollment rate, which was 83% for primary education, reached 91% by the end of the MDGs. The secondary school enrollment rate rose sharply from 49% in 2001 to 78% in 2013 (UN, 2015; UNESCO, 2015). Since 2015, many countries have adopted the objective of education mentioned in the Sustainable Development Goals (SDGs), as their new education development objective. This objective aims to provide quality education to all the children in the world by 2030. Therefore, the international community's efforts to increase quantitative school expansion to provide educational opportunity to children has improved the quality of education around the world.

During the EFA period, quantitative growth was also achieved in developing countries. To this end, some countries actively encouraged the involvement of private schools by providing vouchers and subsidies. Doing so demonstrated that they would devolve their authority to the private sector

if governments did not have the capacity to implement the initiative's provisions for quality public education (Heyneman et al., 2011). Therefore, private schools played a role as a provider of educational opportunities. The Indonesian government is following the global discourse aimed at improving the quality of education and implementing education reform policies (UNESCO, 2014). However, due to the severe regional disparities, they still face challenges, such as low educational outcomes of students (OECD, 2015).

After meeting the demand for universal primary education, demands for secondary education are increasing in Indonesia, but there are no public secondary schools in many towns and villages. The government cannot fulfill these demands. Thus, the private education sector is becoming more important as a provider of education. National data reflects this reality and indicates the number of private schools continues to grow (MOEC, 2016; Rahman, 2016).

As previously noted, Indonesian private schools contribute to greater access to education, especially serving remote areas and low-income families. Despite the positive role and impact of private schools, there is debate and controversy regarding both their low quality of education and state responsibility for providing basic education to its citizens (Heyneman & Stern, 2014; Mcloughlin, 2013). Regarding this debate, private school advocates argue that private school is more effective (Tooley 2009; Tooley & Dixon, 2003). Others claim that private school ultimately undermines public education (Lewin, 2007; Watkins, 2004) Thus, in the late 1990s, studies examining the private versus public school effect began to draw researchers' attention in developing countries.

The concerns regarding low quality of private education are worthy of notice because the Indonesian education system has a high portion of private

schools; they account for approximately 50% of secondary schools. Unlike in other countries, private schools in Indonesia do not need to follow regulations or guidelines regarding land ownership and teacher qualifications; they are only subject to national curriculum compliance and tuition fee restrictions (Heyneman & Stern, 2014). Thus, it is valid to assume that there will be differences between public and private school resources, and teaching and learning conditions that affect students' achievement.

Although the low quality of private school education is supported by several studies that examine the school type effect in Indonesia (Newhouse & Beegle, 2009; Stern & Smith, 2016), existing literature lacks an understanding of private schooling in Indonesia. For example, Bedi and Garg (2000) and Fahmi (2009b) estimated the school effect as future income. These studies took an economic perspective rather than educational approach. Also, studies suggested inconsistent results (Stern & Smith, 2016). Further, there are few studies on the different types of schools in countries such as Indonesia, where various types of private schools exist and the private sector plays a major role in the development of education. The lack of consistency in the findings of the studies mentioned above is also irrelevant to the selection bias (Byun & Kim, 2011). The Ordinary Least Square (OLS) regression analysis method has many limitations to drawing a causal inference in school effectiveness studies (French & Kingdon, 2010; Morgan, 2001). In this regard, Riddell (1989) suggested a more rigorous statistical approach when dealing with the difference in the educational outcomes of different school types in developing countries. After eliminating selection bias by propensity score matching, Stern and Smith (2016) attempted to compare the effectiveness of private and public schools. However, they analyzed the data using OLS regression analysis and ignored the hierarchical nature of individual students

nested within each school. Furthermore, they used the PISA 2009 data to conduct their research. Considering the steady increase in private schools, and the dispute over their role and impact, there is a need to examine the effectiveness of private and public schools using recent data.

1.2 Research purpose and questions

Most of the research regarding the effects of different types of schools on students' cognitive outcomes is derived from western countries. In general, their concern is whether a different type of school, e.g., catholic schools or private schools, has beneficial educational outcomes. However, this discourse may not be applicable to the Indonesian context. Because in Western countries it is general perception that student from affluent families tend to attend to private school, while private schools serve underprivileged students in Indonesia (Stern & Smith, 2016). Thus, this study intends to draw policy implications by examining the school type effect between private and public schools in Indonesia. This study attempts to examine not only the difference between private and public schools but also the difference between the different types of private secondary schools (government-dependent private and independent private schools).

To achieve these objectives, this study aims to answer the following questions:

1. Is there any difference in academic performance between public and private schools?
2. If there is a difference in academic performance depending on the school type, what factors could explain the difference?
3. Even after controlling for preexisting differences in student background

characteristics, does the difference between public and private schools still exist?

1.3 Study method

This study used the PISA 2018 (the Program for Student Assessment) data from the OECD (Organization for Economic Cooperation and Development) to examine the effects of different school types on student achievement.

The dependent variable of this study is the reading literacy score, and the main independent variable is school type, which was further classified into private and public schools according to the terms of funding and the management structure of the various school types. To further analyze the effect of private schools on the academic achievement of students, private schools were subdivided according to the degree of government funding, i.e., government-dependent private schools and independent private schools.

Student and school-level variables were selected as control variables for this study. The student-level variables consist of the demographic variables of each student, such as his/her family background and attitude toward learning. The school-level variables consist of variables regarding school composition, teaching and learning conditions, and school climate.

In order to estimate the effect of school type on the students' academic performance, it is necessary to minimize the selection bias, so as not to distort the effect of the school as a preexisting effect. Thus, the propensity score matching model was adopted to eliminate the selection bias in this study. The propensity score for a subject is the probability of the subject belonging to the treatment group. Propensity score matching is a method used for verifying the school type effect after removing the differences between the groups by

matching control cases and treatment groups with similar propensity scores. This method was applied in this study. Then, due to the hierarchical nature of individual student clusters within each school, the multilevel model was applied.

The t-test and cross-tabulation analysis were used to examine whether there was a difference in the student and school-level variables between the different school types. A comparison between the two types of schools confirmed the existence of the selection bias. Later, to examine whether the effect of school type exists even after controlling variables at the student and school-level, propensity score matching was used to eliminate the selection bias and a multilevel model was applied based on matched cases.

1.4 Organization of the Thesis

This thesis consists of six chapters. In Chapter 1, the necessity and purpose of this study are specified by briefly reviewing the previous studies regarding school type effect. The chapter consists of the research purpose and questions, and also includes the introduction of the methods for answering these questions.

In Chapter 2, the literature review is divided into two sections. The first section reviewed the context of the education system in Indonesia. This part introduces the trajectory of the development of the education system. The second section examines the differences between the existing literature on school effectiveness and school effect on students' educational outcomes. Furthermore, this study explores the factors causing differences in achievement according to the school type.

Chapter 3 presents the research design to examine the differences in

students' academic performance according to the type of school. The data source and key variables are described in this chapter. The statistical models applied in this study are propensity score matching and multilevel models.

Chapter 4 presents the results of the analysis. In this chapter, descriptive statistics of private and public schools were presented first. Second, the differences at the student and school-level between public and private schools were verified by t-test and cross-tabulation analysis. After this, the propensity score matching model was employed to reduce the selection bias and to examine the net effect of school type on students' reading literacy scores. In further analysis, the types of private schools were subdivided into government-dependent private schools and independent private schools to assess if the different types of private schools have an effect on students' academic performance.

Chapter 5, based on the result, this study discusses the effect of the different school types on students' reading literacy scores in Indonesia. This section also suggests the implications regarding result of the study and educational policy.

Chapter 6 summarizes the results of this study and provides answers to the research questions. It also provides the implications and limitations of the study and makes suggestions for future research.

CHAPTER II. LITERATURE REVIEW

This section examines the overall education system framework of Indonesia and reviews the role of private schools in developing countries and examines their impact on the students' academic performance. This section provides the discourse regarding the effect of private schools on the students' academic performance in developed countries as well as developing countries. By investigating the prior studies that deal with the differences in the students' academic achievement due to the different school types, this section provides information about the factors that affect the students' educational outcome.

2.1 Background of Educational System in Indonesia

2.1.1 Indonesia's Education system

Indonesia is the fourth most populous country in the world. It is also the largest archipelago in the world. There are a total of 340,000 educational institutions in the country, which provide education to 60 million students and employ four million teachers. The Indonesian education system is the third-largest education system in Asia and the fourth-largest education system in the world (OECD, 2015, p. 69) Indonesia adopts a 6-3-3-4 schooling system, which consists of primary, lower secondary, upper secondary and higher education. The official school ages by the level of education are as follows: early childhood education (5–6 years), primary education (7–12 years), secondary education which consists of three years of junior and senior education (13–18 years), and higher education (19–23 years). Education is compulsory and is provided free of charge to students studying in public

schools from grade one to grade nine (Suryadarma & Jones, 2013).

The Indonesian education system is classified into seven categories as follows: general education consisting of basic and secondary education programs, vocational education in secondary education program, academic education in higher education program, professional education in higher education after the graduate program, vocational and technical education in higher education program, religious education in basic, secondary and higher education program, and special education for disabled or gifted learners (organized inclusively or exclusively at the primary and secondary level of schooling) (MOEC, 2016).

Two ministries oversee the education system. The Ministry of Education and Culture (MOEC) controls 84% of the schools in the country, and the remaining 16% of schools are under the supervision of the Ministry of Religious Affairs (MORA) (OECD, 2015). MOEC is in charge of the development of the curriculum, the hiring of teachers, and conducting the national examination. Thus, Indonesia has two kinds of public and private schools: a regular (non-religious) public school, a public school with a religious affiliation public school, a regular (non-religious) private school, and a private school with a religious affiliation private school.

The number of public schools is higher than the number of private schools in Indonesia, particularly at the elementary and junior secondary levels. However, the number of private schools is higher than that of the public schools at the senior secondary and vocational school levels (MOEC, 2015). While only 7% of primary schools are private, the percentage of private schools increases to 56% at the junior secondary level and to 67% at the senior secondary level (OECD, 2015). The religion-based schools (many of them based on Islam), is a major feature of the Indonesian education system, and

the proportion of private Islamic schools is higher than that of Islamic public schools. About 90% of the religion-based schools are private schools.

The number of private secondary schools in Indonesia is increasing. In 2009, the number of private secondary schools was 11,879, and in 2014, the number further increased to 13,132. Due to the government's priority to increasing the number of primary schools, the rate of increase in the number of private secondary schools is relatively lower. Thus, the number of private secondary schools is steadily increasing and private secondary schools are becoming prominent education providers to disadvantaged children in rural and remote areas (Stern & Smith, 2016; MOEC, 2016).

2.1.2 Major policies for education reform and challenges

Before the modern education system was introduced in Indonesia during the era of Dutch colonial rule, the traditional Islamic boarding schools (*Pesantren*) were the only educational institutions in the country. Indonesia has achieved notable progress in education since its independence in 1945. The 1945 Constitution declared that every citizen has the right to an education, the country sought to establish a more egalitarian and inclusive educational system (Suharti, 2013).

In 1973, the government launched a plan to build a primary school in every village. Due to this plan, the primary school enrollment rate increased rapidly since the early 1970s and reached universal by 1995 (Ahuja & Filmer, 1998). The primary school enrollment rate was boosted by the large expansion of the availability of primary schools in the early 1970s.

In 1985, the government declared that six years of primary education was mandatory for children aged 7 to 12 years, and by 1994, the period of

mandatory basic education was extended to nine years (UNESCO, 2006). Recently, there is a demand to extend the mandatory education period to 12 years.

When Indonesia was under the dictatorship from 1967 to 1998, the education system became exceedingly centralized and was administered by the Ministry of Education and Culture and the Ministry of Religious Affairs (Suharti, 2013). During the process of democratization of the country after the dictatorship regime, the government departments were decentralized, and their authority was transferred to the local district government.

Since the mid-2000s, the Indonesian government has implemented a broader range of education reforms such as the decentralization of the school system, improvement in teacher qualification standards, and making sizable increases in the education expenditure. In 2003, The Law on National Education System (No.20/2003) and the Constitution Amendment III were enacted, and this law stated that all Indonesian citizens have the right to an education. The law stated that the government was obligated to provide free basic education and that the government was mandated to allocate 20% of its expenditure to education (OECD, 2015). Indonesia also began the decentralization of its education system in terms of the management of schools and their governance (UNESCO, 2006).

In 2005, the government launched a school operational grant, the *Bantuan Operasional Sekolah* (BOS), as a way of providing funds directly to schools in order to reduce the dropout rate of the students and give schools some flexibility to manage their funds. In addition, provincial governing bodies assist some schools through the regional BOS scheme, known as BOSD (BOS Daerah). The BOS and BOSD schemes sometimes represent the only primary sources of funding that cover almost all the operational costs of the schools

in the rural and remote areas (Heyneman et al., 2011; OECD, 2015).

The quality of teachers is a concern in both the public and private education sectors of Indonesia (Weston, 2008; World Bank, 2010). This concern stems from the fact that teachers in private religious schools are likely to be less qualified than the teachers in public and other private schools (Weston, 2008). In order to improve the quality of education, the teacher law (NO. 14/2005) was enacted in 2005. This law introduced significant changes in the qualification requirements and employment conditions of teachers (OECD, 2015). Also, the mid-term strategies (during 2005-2009 and 2010-2014) of the Ministry of Education and Culture have been implemented consistently and focus on three main objectives: increasing the citizens' access to education, improving the quality of teaching and learning, and strengthening the governance, management and accountability of schools (OECD, 2015).

Thus, while the government policies are macro efforts to improve the administration and system of schools, efforts are also being made for the micro improvement of schools in terms of the teaching and learning content. The new curriculum is developed with the aim to foster critical thinking and creativity in students.

However, despite these efforts, several challenges remain. Indonesian government struggles to provide improved and high quality education to its citizens (OECD, 2015). Indonesian public education system is considered as an inadequate public education with regard to its outcome and regional and district disparities. (Heyneman et al., 2011; Suryadarma & Jones, 2013). The national data indicates severe provincial disparities regarding the distribution of public schools (MOEC, 2016). Disparities between the western and eastern regions, urban and rural regions, and regional and district areas remain in the

country. Due to Indonesia's diverse population, the education system needs to accommodate the geographically dispersed areas, and consider a wide variation in terms of the students' socioeconomic status and the education opportunities of citizens (OECD, 2015). Indonesia has improved with regard to its students' reading scores for the first time since its participation in PISA 2000. However, Indonesia's reading score average is still much lower than the other countries participating in the international assessment. In the international assessment of Indonesia's student achievement (the 2011 TIMSS), ranked 38th out of 45 countries. Also, the previous PISA data showed that the academic performance of Indonesian students is about three years lag behind by the OECD average (OECD, 2015, p. 19).

2.1.3 Private schools in Indonesia

The increasing enrolment rate in primary education in Indonesia has led to increasing demand for secondary level education. Indeed, there has been significant improvement in junior secondary school enrollment during the EFA movement. National data indicates that the net enrolment rate increased from 58.6% in 2001 to 76.5% in 2013 (OECD, 2015). However, there is still a lack of school infrastructure at the secondary school levels. Especially in remote areas, public schools do not serve particular regions (Heyneman et al., 2011; Hendajany 2016). Due to the very diverse population, religion, and geographical positions, the provision of education service is challenging for the state (Suharti, 2013). Yet, the education law declares that the state is obligated to provide opportunities for all citizens to be educated (NO. 20/2003). Therefore, the government has to ensure the availability of education – not only in terms of quantity, but also quality. However, the state

alone cannot achieve this grand goal. Thus, private schools fill gaps in educational service provision.

Along with India, Tanzania, Kenya, Uganda, the Philippines, Thailand, and some countries in Latin America, Indonesia is said to have contributed to the achievement of EFA by expanding private schools (Heyneman et al., 2011). Private schools' contribution to providing educational opportunities is illustrated by the high proportion of private schools in the education system. While private primary schools account for only 7% of the schools in Indonesia's education system, the share increases to 56% among junior secondary and 67% of senior secondary schools (OECD, 2015). In addition, Indonesia has a wide range of private schools, from expensive international schools to low-cost private schools, which serve impoverished students in remote areas (King, 1997; Stern & Smith, 2016).

Another distinctive feature of private schools in Indonesia is that the boundaries between the public and private sectors of education are blurred (Heyneman et al., 2011). In most countries, the distinction is made between public and private schools according to the degree of management and funding (Chakrabati et al., 2009). The majority of private schools in the other countries mentioned above are privately funded and operated. However, Indonesian private schools are privately operated but partially publicly funded (Heyneman et al., 2011). One form of public funding is through school operating subsidies. In 2005, the Indonesian government launched a BOS program to relieve the financial burden on families and schools. Funding was directly injected into the school unit covering all public and private secondary schools. All public schools are required to receive the BOS funding. Yet, private schools have opportunities to opt out.

Although the state is making policy attempts to support private schools,

Indonesia is one of the few countries where students attending private schools achieve lower academic scores than their public school counterparts (OECD, 2012). This disparity is puzzling, considering the general perception of private schooling in Western countries that private schools have greater educational advantages. From existing literature, private schooling in Indonesia differs from western countries; a common misunderstanding about private schools in Indonesia is that they are only for affluent families (Heyneman & Stern, 2014; Stern & Smith, 2016). On the contrary, a private school is not the best option for Indonesian parents. When the choice is available, students and their parents opt to attend public school, while private schools are generally considered a last resort (Asian Development & Republic of Indonesia, 1995). Despite the general negative perception of private schools, there is still high demand for private schools in Indonesia (Stern & Smith, 2016). Indonesian parents who want to raise their children to follow their cultural and religious heritage may send their children to private schools. Parents may choose private schools because they prefer religious instruction, religious-based moral education, and other non-academic activities (Newhouse & Beegle, 2006). Some parents choose private schools because they do not have alternatives. A high score on national exit exams in primary school is a pre-requisite to enter public schools at higher levels, and public school enrollment is rationed. Another reason students attend private schools is that there are no public schools in their residential area. Consequently, in Indonesia, private school selection is sometimes made by preference, but there are many students and their parents who have no choice. Thus, the significance of private schooling in Indonesia is rather multi-faceted.

2.2 School effectiveness and School type

2.2.1 School effectiveness

Coleman (1968) argued that the students' academic performance is mainly affected by their family background and is not significantly affected by their school. Since then, studies like the “ Plowden report” by Peaker (1971) and Jencks (1972) supported the argument of Coleman and his colleagues, stating that the impact of schools on the students' academic performance is always less than the impact of the students' family background. However, due to the methodological approach employed in the Plowden report, the study was heavily criticized. Bowles and Levin (1968) pointed out the quality of poor samples in the Plowden report and stated that the study did not allow for causal inference. Summers and Wolfe (1977) also criticized the study as it did not control the prior achievement of students.

Meanwhile, the study by Heyneman and Loxley (1982, 1983) on developing countries has begun to attract the attention of the researchers to the school effectiveness research as this study also shows conflicting results with regard to the effect of schools on the students in the United States'. The result of the study by Heyneman and Loxley (1982, 1983) is supported by many subsequent studies (Buchman, 2002; Gamoran & Long, 2007; Heyneman, 2015). The main finding of this study is that the variance between schools in developing countries is large as compared to that of the developed countries. Therefore, considering the factors affecting the students' academic performance, the factor of the school's impact on the students is a crucial factor.

Moving on to a relatively recent discussion, unlike the previous study by

Heyneman and Loxley (1982, 1983), Baker et al. (2002) found that even in developing countries, schools did not have a significant effect on the academic performance of students. The study explained that this is due to the rapid economic development of the countries in the world (including developing countries). Due to the economic development, the school resources and infrastructure provided by the government have been meeting the minimum standard for the past 20 years. This suggests that the effect of schools on the students' academic performance may not be detected by making the variance between the schools smaller. In other words, school-related factors have not played a significant role in predicting the students' academic performance. However, as compared to developed countries, there is still a possibility for improvement in schooling in developing countries. Thus, the school effectiveness study is important as it can alleviate the educational inequality between students (caused by the deepening impact of the students' family background on their academic performance).

2.2.2 The School type effect on students' educational outcome

This earlier study on the difference in the effects of different school types on the students' academic performance was expanded from the school effect study (Coleman et al., 1982), which examines the influence of family background as well the influence of schools on the students' academic performance. In other words, the school type is considered as a school-level factor that affects the students' academic performance.

In this context, in the field of school effectiveness research, the school type has been considered as one of the major school-related factors. This factor is also known to have an undeniable impact on the students' academic

performance (Lubienski & Lubienski, 2006). The research on the difference between the academic performances of the students of private and public schools by Coleman, Hoffer and Kilgore (1982) has reported that even after controlling the characteristics and background of students, the students attending private schools have a better academic performance than their counterparts attending public schools.

The two trends in these studies lead to discussions regarding which type of school is more favorable for enhancing the academic achievement of students. The first of these studies show that private schools have an advantage over public schools (Evans & Schwab, 1995; Jimenez et al., 1991; Levin, 2004). On the other hand, some studies report that there is no evidence that private school students especially do well in terms of their academic performance (Lubienski & Lubienski, 2006; Vandenberghe & Rubin, 2004). However, it is a general perception that students attending private schools have a better family background than students attending public schools. This compositional difference between school type leads to private school advantage (Jimenez et al., 1991; Park & Sandefur, 2006; Sakellariou, 2017). For the past few decades, subsequent studies have not shown any consistent conclusion regarding the effectiveness of different types of schools.

Furthermore, the effectiveness of private schools may vary depending on the context of the region or the country. Thus, private schooling in developing countries has a different context from that of the developed countries (Jansen, 1995; Vanderberghe & Rubin, 2004). For example, Park and Sandefur (2006) mentioned that there is an apparent difference between the role that private schools play in Asia and Latin America with regard to their effect on student learning. In Latin American countries, on average, a student who attends private school outperforms his or her counterpart who attends public schools,

whereas the exact opposite is true in Asian countries. This difference can be explained by the increasing number of studies on school effectiveness in developing countries considering the increase in the number of private schools during the late 1990s (the period of EFA implementation). In particular, low-cost private schools played an important role in providing educational opportunities to poor and students in remote areas, and this role of private schools in Asia is different from the discourse of general private schools in developed countries.

Existing literature is available regarding the comparison between private and public schooling in Indonesia. This literature concludes that public schools have higher quality inputs than private schools (Ashley et al., 2014; Newhouse & Beegle, 2006; Rahman, 2016; Strauss et al., 2004). Although early studies on educational effectiveness have shown favorable results regarding the effectiveness of private schools (Bedi & Garg, 2000; James et al., 1996), the quality of private schooling is generally perceived to be lower than that of public schooling in Indonesia.

James et al. (1996) found that private school superiority in terms of educational outcome in math scores, students attending private schools reported higher scores than those attending public schools. They did not control for selection bias. However, it has significance in that the earliest study on school type effect on Indonesian private and public schools.

Bedi and Garg (2000) and Fahmi (2009b) examining the effectiveness of school type in terms of estimating the future income of private school students as compared to their public school counterparts in Indonesia, and these two studies showed directly opposing results. The former study reported that if a student attending public school, his/her future income would be higher than his/her counterpart. On the contrary, the latter study reported that if a student

attended private school, his/her future income would be higher than his/her counterpart

Some studies have analyzed the effectiveness of private schools in terms of student achievement. Stern and Smith (2016) used the PISA 2009 data to show that private-dependent school student achievement was much lower than that of the public school. They interviewed educators to explore the reason for the demand for private schools, despite the low quality education offered by private schools. Stern and Smith (2016), using the PISA 2009 data, analyzed the school effectiveness by school type in Indonesia. They subcategorized private schools into private government-dependent and private independent schools (depending on the degree that a private school was financially assisted by the government or public resources). They predicted that the achievement of students attending private dependent schools is lower than that of students attending public schools. The study supported the predominant concern about the low quality of private schools in developing countries.

Similarly, Sakellariou (2017), and Park and Sandefur (2006) conducted a cross-national study on student achievement, including Indonesia. Park and Sandefur (2006) estimated the family and school effect on the students' reading scores in Latin America and Asia using the PISA 2000 data. They reported that private schooling is negatively associated with the students' educational outcomes even after controlling students' background variables. On the other hand, Sakellariou (2017) examined the private school effectiveness of 40 countries using the PISA 2012 data. The private school divided into private government-dependent schools and private government-independent schools according to the degree of financial support from public sources. With the comparison with the public in mathematics scores, private

independent school students outperformed those of public schools.

In contrast to the study by Park and Sandefer (2006), this study reported that Indonesian private schools are superior to the country's public schools in terms of the students' achievement.

The above researches compare private and public schools. Another distinction between the types of schools in school effectiveness research is the comparison with religious and non-religious schools. Islamic schools are a distinctive feature of the Indonesian education system. Newhouse and Beegle (2006), and Muttaqin et al. (2019) attempted to examine the effect of schooling by classifying the several types of schools, and they distinguished religious schools. Newhouse and Beegle (2006) found that public junior secondary school students have higher academic achievement even after controlling the variables of the family background, location, and student characteristics. Muttaqin et al. (2019) assessed the effects of various organizational (tracks) and ideological (streams) factors in Indonesian Islamic private schools on the students' academic achievement. He also assessed the achievement gaps of students by considering their gender and parental SES. The finding of this study regarding the difference between the effects of religious and non-religious schools as well as the difference between the effects of private and public schools on the students' achievement, was contradictory to a certain extent. From the contradictory result, they concluded that with regard to the organization of Indonesian Islamic schools, the role of municipalities has become very important after the implementation of a decentralized education system.

Additionally, OECD (2012) reported every cycle of PISA result with private-public differences in raw scores, Indonesia is one of few countries that private school has lower academic achievement than public schools, across

the countries. Further, the size of the private-public school achievement gap is substantial compared to other participant countries.

2.2.3 Factors causing the difference in student achievement due to school type

There is extensive literature on the possible causes of educational achievement differences between school types. Several school effectiveness researches reported that the differences in the students' academic achievement due to different school types stem from the school climate. Bryk, Lee and Holland (1993) and Coleman and Hoffer (1987) argue that the school climate of public and private schools is different and this results in a difference in the students' educational outcome. According to the Coleman, Hoffer and Kilgore (1982), as compared to public schools, private schools tend to emphasize the students' learning to a larger extent. The study also emphasizes the importance of the academic atmosphere, such as the students' proper attitude toward studying. Lee et al. (1998) also revealed that students in private schools tend to choose a higher level of academic courses than their counterparts in public schools.

Chubb and Moe (1990) reported that private schools had a positive impact on the students' academic performance due to the autonomous nature of these schools. The effect of school autonomy is generally positively associated with students' outcome (Wößmann, 2003). To be specific school autonomy regarding personnel management is higher on average reading scores (Maslowski et al., 2007). However, Hanushek et al. (2013) reported that it could have a negative effect on students' achievement according to the degree of economic development and educational development (Hanushek et al.,

2013).

Lubienski and Lubienski (2008) attempted to explain the difference in the students' achievement regarding the factor of school type along with other school factors. The impact of the factors of school size, class size, school climate, parent intervention, teacher certification, and teaching practice on the students' academic performance was analyzed by using the HLM analysis for fourth-grade and eighth-grade students. They found that the factors of teacher certification, reform-oriented teaching methods, and smaller class sizes have a positive effect on the students' achievement and that these factors are more prevalent in public schools than in private schools.

Another factor that causes differences between the types of schools is the composition of the school body. This means that the students of public and private schools come from different backgrounds. In western countries, as private schools generally have higher tuition fees, students with affluent family backgrounds tend to attend these schools. As a result, the students' academic achievement in private schools in western countries tends to be better than average. In other words, the schools which consist of students having a relatively higher academic performance have a good reputation, and this leads to an influx of quality teachers in these schools. This process of enhancement is repeated to fill the private schools with more and more excellent students and teachers (Corten & Dronkers, 2004). The difference in the composition of these schools ultimately differentiates them from public schools and leads to the improvement of their students' educational results.

This phenomenon can be explained by the study on social capital, authored by Coleman and Hoffer (1987). They explained the reason behind the observation that private schools, especially Catholic private schools, are more effective than public schools and other private schools, because of the

existing social capital among the school members. Social capital is a social network in which students, parents, and teachers share a sense of community. Sharing a sense of community and forming social networks allows students to obtain social support that is not easily available at home. This sense of belonging felt by the students results in a low dropout rate of students. In addition, social capital is related to the concept of contextual effect, which is an additional positive or negative effect expected when a student attends a school with a high or a low socioeconomic status (SES). A number of studies that reported results favorable to a particular type of school in school effectiveness studies reported when the effect of variable of individual students' family SES background is aggregated at the school-level as overall SES of a school is called contextual effects (Willms, 2010). At the student-level is aggregated in the school, along with the factor of the SES of the school, had a significant impact on the students' academic performance (Gamoran, 1992; Willms, 1986). Similarly, Somers et al. (2004) found that the positive effect of private schools on the students' achievement disappeared when the school-level of mean SES was controlled, indicating that any benefits of private education are due to peer effects.

Lastly, the family background of each student as well as the school type a student attends can cause a difference in students' academic performance. Coleman et al. (1982) reported that private school students perform better than public school students because of their family background. Since then, it has been suggested that the difference in the composition and characteristics of the student groups in each type of school leads to the differences in the students' academic performance. In other words, a school is a space where a group of students is divided according to their background, and that there is no difference in their academic performance due to their efforts (Bidwell &

Kasarda, 1980).

There are various discourses regarding the effects of schools on students. The advantages of private schools, mostly reported in discourses on developed countries, may not be applicable to private schools in Indonesia. In order to examine the effects of the factor of school type on the students' academic performance, a statistically rigid method must be applied (Buchmann, 2002; Riddell, 1989). Moreover, school effectiveness research in developing countries is approached from a production and function perspective or an economic perspective (Fuller, 1987; Lockheed et al., 1987). In Indonesia, Stern and Smith (2016) examined the difference between the effects of private and public schools on the students' achievement in a recent study by using the PISA 2009 data. However, the study needs to be updated with the latest data. Furthermore, considering that the results may vary depending on the type of private school (Dronkers & Robert, 2008a; 2008b; 2009), it is suggested that the results should be carefully examined by subdividing the types of private schools.

2.2.4 Selection Bias in School effectiveness studies

Studies conducted in developed countries show that proper control of the variables of the student family background is critical to conduct a rigorous examination of the effectiveness of schools by considering the factor of the school type. If the variables of students' family background are not properly controlled, it is difficult to tell whether the effectiveness of a particular school is due to the background characteristics of its students or due to the characteristics of the school. It can also be said that depending on advantageous family background, privileged students attend certain types of

schools. This gives the privileged students an endogenous advantage and it may lead to their having a higher academic performance. Thus, in this case, school effectiveness can be overestimated (French & Kingdon, 2010). This is the reason behind the frequent occurrence of the problem of selection bias in school effectiveness studies.

Moreover, previous studies that show the opposite results before and after eliminating the selection bias indicate how vital the selection bias is in analyzing the effectiveness of schools. For example, the study of Coleman, Hoffer and Kilgore (1982) discussed the achievement gap between students of different types of schools. However, this study was also criticized for methodological reasons as the study did not consider the selection bias while analyzing the research data (Murnane et al., 1985). Gamoran (1996) also found that there were some differences in the effectiveness of magnet schools and catholic private schools and that these differences were dependent on whether the selection bias was controlled (Byun & Kim, 2011).

The previous studies have modified their methods to correct the error of not eliminating the selection bias during the analysis of research data. According to Byun and Kim (2011), the propensity score matching technique can be adopted to eliminate the selection bias effectively. This process is expected to help researches in drawing a causal inference in school effectiveness studies. Therefore, this study attempts to expand the discussion regarding the effectiveness of schools considering the factor of school type by controlling the individual characteristics of the students and exploring the effects of the different types of schools on the students' achievements.

To summarize this chapter, even in countries such as Indonesia, where private schools have played a major role in providing educational opportunities, there is a lack of consistency in the research on school

effectiveness, and it is necessary to provide empirical evidence to this field of research. Therefore, this study corrects these deficiencies, eliminates the selection bias by propensity score matching, employs a multilevel modeling approach, and uses the latest PISA 2018 data to estimate the net effect of private schools on students from the perspective of their educational progress. Consequently, this study provides empirical evidence regarding the concern about the low quality of private schools in Indonesia.

CHAPTER III. METHODOLOGY

3.1 Data and Sample

The Program for International Student Assessment (PISA) is an international study that was initially introduced by the Organization for Economic Cooperation and Development (OECD) in 2000. PISA consists of a student, parents, school questionnaires and cognitive assessment. The questionnaires provide useful information based on the response of students, their parents and school principals. Student and their parents were asked about their demographics, family background, educational experiences. School principals were required to respond to information about school characteristics, their staff and resources.

The assessment is conducted every three years with testing major domain reading, math or science for 15 years olds (OECD, 2019, p.34-35). In PISA 2018, reading was a major domain. In this cycle, 79 countries, including 42 partner countries and economies and all OECD countries and about 32 million 15-year-olds students in the schools, participate.

PISA is an age-based assessment, regardless of the grade level or type of school, the target population for PISA is 15-year-olds students in each country. PISA samples students aged 15 years, at this age in most countries near the end of compulsory education (Fuchs & Wößmann, 2008). Also, in Indonesia, this age corresponds to the end of compulsory education for junior secondary schools which making it an ideal measure of academic performance for this study.

PISA uses a two-stage stratified sampling design. First, the sample of

schools is chosen by probability proportional to the size of the student population of interest. Then, within selected schools, students are drawn by simple random sampling method. To be specific, from the target population, 35 students are selected at random in the school. If the selected school has fewer than 35 students, all students will be asked to participate (OECD, 2009, p.51). Each country is required to collect a minimum sample size of 4500, 150 schools within 35 students (Park, 2013). Through this process, in PISA 2018, 12,908 Indonesian student and 398 schools (public 224, private 179) have participated. The final dataset 8,194 students and 285 schools (public 179, private 106), were included in the analysis.

3.2 Variables

3.2.1 Dependent variable

The dependent variable is the reading literacy score^①. OECD (2019) defines reading literacy in PISA 2018 as follows:

An individual's capacity to understanding, using, evaluating, reflecting on and engaging with texts in order to achieve one's goals, to develop one's

^① Some researchers argue that mathematics achievement is regarded as a better indicator of school effects because it is less influenced by cultural and family background, more associated with individual's cognitive ability while reading score is more dependent on parental capital (Bryk et al., 1993; Dronkers & Robert, 2008b; Heyneman, 2005). Therefore, in school effectiveness research, there are studies using mathematics as a dependent variable (Sakellariou, 2017; Dronkers & Robert, 2008b), or taken together with reading literacy scores (Stern & Smith, 2016). Although the results of the analysis were not presented in this paper, using same data and method (PSM and multilevel model) taking mathematics literacy score as dependent variables, the private school has negative effect on mathematics literacy score ($B=-15.95, p<0.05$) as the same results of this study. Therefore, in this study the reading literacy score was taken as the proxy variable for the students' achievement.

knowledge and potential, and to participate in society. (p. 27)

Literacy skills have been found to be positively related to educational outcomes and occupational status (Kerckhoff et al., 2001; Park & Sandefur, 2006). Using item response theory (IRT), each student's score has ten plausible values. All plausible values should be taken into analysis for correctly estimating population parameters (OECD, 2009; Park, 2013). The student reading literacy score was scaled to have a mean of 500 and a standard deviation of 100.

3.2.2 Independent variable

The independent variable is school type, private school and public school. According to the classification of PISA, the school type is divided into whether public or private schools. Public schools refer to managed directly and indirectly by government agencies or authorities while private school is managed directly or by non-government organizations such as religious institutions, business or other types of private institution (OECD, 2012).

The school type variable was set as a dummy variable that represents private or public schools in the school-level equation. The private school has a value of 1; the public has a value of 0.

In further analysis, the private school type is subdivided into private government-dependent and private independent schools. The former receives financial assistance from the government agency more than 50%. The latter receives less than 50% of their funding from the government.

3.2.3 Control variables

In order to rigidly assess the effectiveness of school types, controlling for a variable is critical. If students' background variables are not properly controlled, it is difficult to tell whether the effectiveness of the school is due to the background characteristics of the students attending the school or whether the results of schooling.

In this study, some of the control variables consist of a combination of indices developed by PISA to predict students' academic performance. These variables are applied by weighted maximum likelihood estimates (WLE) and standardized to have a mean of 0 and a standard deviation of 1 at each country level (Dronkers & Robert, 2008a). If the WLE variable presents positive value, that means higher than the average student across the participants' countries, reversely if it represents a negative value on this scale means that lower than the average in OECD (OECD, 2019, p. 218).

At the student-level, the variables consist of individual characteristics, family background and educational variables. Gender, age, and grade are variables that represent individual characteristics. The gender variable is a dummy variable with a value of 0 for males, 1 for females. Student age and grade were added as continuous variables.

Indices for family background variables related to SES are including parental education, parental occupational status, home possession and home educational resources are controlled. Parental education is an index of the highest parental education years in schooling. Parental occupational status is the highest occupational status, which is measured with the ISEI scale according to the classification of international labor organization. Home possession is constructed with household items, including country-specific wealth items. The index of home educational resources considers whether or not a student has a desk, a quiet place to study, and a dictionary, a textbook,

and a calculator in their home.

For educational variables, the enjoyment of reading, value of the school and family support for learning were controlled. The enjoyment of reading variable is a continuous variable measured by based on student responses to 5 question (“I read only if I have to”; “Reading is one of my favorite hobbies”; “I like talking about books with other people”; “For me, reading is a waste of time”; and “I read only to get information that I need.”) with a 4-point scale to the degree of agreement (“strongly disagree”, “disagree”, “agree”, “strongly agree”). The index of the value of the school is measured based on the responding to the following three statements related to the school on a 4-point scale (“strongly disagree”, “disagree”, “agree”, “strongly agree”): “Trying hard at school will help me get a good job”, “Trying hard at school will help me get into a good college”, and “Trying hard at school is important”. Family support for learning variable is a combination of indices regarding parents support for the students’ learning activity, students are asked to the question “my parents support my educational efforts and achievement”, “My parents support me when I am facing difficulties at school”, “My parents encourage me to be confident” with a 4-point scale according to the degree of agreement (ranging from “strongly disagree” to “strongly agree”).

The control for prior achievement is a critical factor in school effectiveness research. However, PISA does not collect information about prior achievement; instead, educational variables are controlled.

In school-level social composition and teaching and learning, variables are controlled. There have been several studies reported that the private school effect stems from the composition of the school population (Park & Sandefur, 2006; Dronkers & Robert, 2008a; 2008b). This study aims to examine school effectiveness on students’ academic performance; thus, at the

school-level, the social composition of the school body should be controlled. That is to examine the contextual effect, the SES related variables in the student-level are computed as aggregated variables. The school average of parental education, parental occupational status, home possession, and the home educational resources indices are controlled.

Then, the number of female students in total enrollment among total students is considered. The school location is coded as dummy variables a village, hamlet or rural area (fewer than 3,000 people), a small town (3,000 to about 15,000 people) and a town (15, 000 to about 100,000 people) has a value of 0, a city (100,000 to about 1,000,000 people) and a large city (with over 1,000,000 people) have a value of 1.

The school context and climate of the school were also identified as factors affecting the students' academic achievement (Coleman & Hoffer, 1987; Dronkers & Robert, 2008b). Considering in developing countries, the influence of school-level factors is greater than that of developed countries (Heyneman & Loxley, 1982; 1983), to examine the impact of school type, teaching and learning conditions related variables should also be controlled. The proportion of certified teacher index derived from the number of fully certified teachers within the school. School size refers to the total number of students enrolled in the school, and the teacher-student ratio is calculated by dividing the total number of teachers by the number of students. The index of a shortage of educational staff and educational resources are based on the school principal's responses, indicate the extent to which educational staff shortages and the schools' educational resources shortages hinder student learning. In terms of school choice, whether there are schools nearby can affect private school attendance. Therefore, on the basis of student response, if there is more than one school that can attend other than the school nearby,

a value of 1 is given, and if there is no, it has a value of 0.

At the school-level, the factors associated with school climate is also an effect on educational outcomes. In the existing literature, the favorable atmosphere toward learning is the factor pointed out that causes differences in achievement by school type. Thus, disciplinary climate and teacher misbehavior variables are added in the full model. The disciplinary climate index is based on students' responses, including the aspects affecting the learning atmosphere among teacher-student interactions that occur during class. Lastly, the school principal evaluated the frequency of teacher's misbehavior that could hinder students' learning.

Table 3. 1 Variables and their descriptions

Variables	Description
<i>Dependent variable</i>	Reading literacy score
<i>Independent Variables</i>	
Student-level	
Gender	Female=1, male=0
Grade	School grade
Age	Student age
Parental education	An index of highest parental education in years of schooling
Parental Occupational status	An index of the highest occupational status of parents
The index of home possession	An index of all household and possession items
The index of home educational resources	An index of educational resources that students have at home (a desk, a quiet place for study, dictionaries, textbooks, and calculators)
Enjoyment of reading	An index computed based on questions related to reading interest
Value of school	An index calculated based on the response of questions about attitudes toward school
Family support for learning	An index with 4-point scale questions relating to parental support for a student's educational activities.
School-level	
School type	private=1, public=0
Urbanity	city=1, non-city=0

Number of female students	Number of girls in school
School size	The total number of enrolment student in that school
Teacher-student ratio	The number of students divided by the total number of teachers
The index of the shortage of educational staff	The index of a shortage of educational staff is based on a report of the principal's perception with a 4-point scale using four items: a lack of teaching staff, inadequate or poorly qualified teaching staff, a lack of assisting staff, inadequate or poorly qualified to assist staff.
The index of the shortage of educational resources	The index of a shortage of educational material is based on the report of principal's perception with 4-point scale using four items: a lack of educational material and inadequate or poor quality educational material (e.g., textbooks, IT equipment, library or laboratory material); a lack of physical infrastructure and inadequate or poor quality physical infrastructure (e.g., building, grounds, heating/cooling, lighting and acoustic systems).
The proportion of certified teacher	An index proportion of all teachers fully certified
Nearby school	If there are other schools nearby where students can attend (more than one)=1, if not=0
Disciplinary climate	The index was constructed using students' responses to question about how often (4-points scales) the following happened in their language of instruction lessons "Students do not listen to what the teacher says"; "There are noise and disorder"; "The teacher has to wait a long time for students to quiet down"; "Students cannot work well"; and "Students do not start working for a long time after the lesson begins."
Teachers' misbehavior	The index of teacher behavior hindering learning was constructed using school principals' responses with 4-points scale about "Teachers not meeting individual students' needs"; "Teacher absenteeism"; "School staff resisting change"; "Teachers being too strict with students"; and "Teachers not being well-prepared for classes."

3.3 Analytic plan

This study intends to examine the differences in academic performance between the different school types. In order to examine differences in student characteristics and their family background, school characteristics, t-test, and cross-tabulation are adopted. The results of the t-test and cross-tabulation analysis show the difference between groups statistically significant; it implies that the selection bias issue exists, which can distort the results of the

study. Thus, the propensity score matching model will be employed to reduce the selection bias. Finally, multilevel with a linear hierarchical model is adopted to investigate the private school effect after controlling for students and schools background. STATA 16, SPSS 23.0, and HLM 8.00 were used for analyzing data.

3.3.1 Propensity score matching model

Propensity score matching is a method of estimating the treatment effect by matching a treatment case with a control case that has a similar propensity. Propensity score means the probability that an individual case belongs to a treatment group based on observed variables (Rosenbaum & Rubin, 1983). Therefore, in school effectiveness studies, if using the propensity score matching model, it is possible to effectively solve the selection bias issue by eliminating significant differences between treatment groups and control groups by matching cases with similar propensity scores. In this study, the students who attend private school are defined as the treatment group; the students who attend public school are defined as a control group.

In order to create a propensity score, covariate variables are selected from previous studies as determinants of school choice (Dronkers & Robert, 2008b; Park and Sandefur, 2006; Stern & Smith, 2016).

In Indonesia, students with better SES family backgrounds are likely to attend public schools (Stern & Smith, 2016). For causal inference of private school attending and students' academic performance, student-level educational variables were selected as covariate variables. That is, parental education, parental occupational status, home possession, home educational resources, enjoyment of reading, the value of school and family support for

learning are selected.

The propensity score is created by logistic regression analysis, private school attending is dependent variables and covariates are independent variables at the student-level. The equation for calculating the propensity score is as follows:

$$\text{Logit}(P_i) = \ln\left(\frac{P}{1-P_i}\right) = \beta_0 + \beta_1 X_{1i} + \dots + \beta_k X_{ki}$$

Logit(P_i) is the logit of the probability that student i attending a private school. β_0 is constant and $\beta_1 \dots \beta_k$ are student-level covariates. In this study, to match the treatment and control group with the same or similar propensity scores, as suggested by Rosenbaum and Rubin (1983), 0.25 standard deviation of propensity score caliper with one to one nearest neighbor matching is used.

3.3.2 Multilevel model

The structure of PISA data, which is the student is clustered in school, thus, the multilevel approach is recommended (OECD, 2009). In this structure, PISA expresses student are nested in schools (Park, 2013). Therefore, students in the same school are expected to share same school characteristics that affect achievement. The analysis that does not allow for clustering leads to overestimate the standard error of the regression coefficients (Sakellariou, 2017).

Another reason for using multilevel is occurred the dilemma in selecting analysis units. There are factors affecting a students' academic performance include student characteristics such as family background, learning time and school characteristics such as school climate. In the case of student-level

analysis, students in the same school have no variance. Therefore, the standard error of the regression coefficients is underestimated, which leads to an increase in type 1 errors. For school-level analysis, bias from the aggregation of data at a group level rather than at an individual level is assumed to be higher than that of individual variables when aggregating by group variables are more correlated than individual variables. There is also the possibility of distortion of research problems

Therefore, if the researcher estimates the school effect with OLS regression, it makes to neglect of the hierarchical structure of achievement data (Riddell, 1989). Since the late 1980s, multilevel model has been introduced, they widely used for conducting educational research in developing countries as well as developed countries (Park & Sandefur, 2006). However, Riddell (1997) pointed out that school effectiveness research in developing countries, the multilevel technique is not fully utilized. Therefore, the PISA data used in this study, which aims at examining the school type effect, has a hierarchical structure so that a multilevel model is employed to address the nature of nested data.

3.3.3 Model specification

The analysis begins with an unconditional model, which only includes the dependent variable. It provides the information the extend of between-school variance and within school variance among total variance of reading literacy score. If the unconditional model of variance in school-level (τ_{00}) is statistically significant; it means that reading literacy scores vary from school to school. Hence, it is necessary to analyze with the student and school-level variables in subsequent models. The equation for the unconditional model as follows.

Level-1 model: $Y_{ij} = \beta_{0j} + r_{ij}$, $r_{ij} \sim N(0, \sigma^2)$

Level-2 model: $\beta_{0j} = \gamma_{00} + u_{0j}$, $u_{0j} \sim N(0, \tau_{00})$

In the level-1 equation, where j refers to the schools and i refers to the student.

Y_{ij} : the reading literacy score of the student i in school j

β_{0j} : the mean of reading literacy score of school j

r_{ij} : the variance of students within school j

γ_{00} : the grand mean of reading literacy score

u_{0j} : the error term in this equation means school effect

Table 3. 2 The restricted and the full model

	Student-level	School-level
Model 1 School type		Private school or public school
Model 2 Individual characteristics, family background, and educational variables	Gender, Age, Grade, Parental education, Parental occupational status index of home possession, index of home educational resources Enjoyment of reading value of school Family support for learning	
Model 3 The social composition of the school		School mean of parental education School mean of parental occupational status School mean of home possession School mean of educational resources Number of female students Urbanity
Model 4 Teaching and learning		School size Teacher-student ratio

conditions	Shortage of educational staff Shortage of educational resources The proportion of certified teacher Nearby school
Model 5 School climate	Disciplinary climate Teacher misbehavior

Model 1 is extended from the unconditional model. In model 1, without any control variables, the school type variable is added at the school-level. This model shows which type of school students have high or low reading scores. In other words, it indicates whether the private school effect is negative, positive or does not exist on students' reading literacy scores.

Based on this model, at the student-level, student demographic characteristics and family SES variables, indicated by parental education, parental occupational status, home possession, home educational resources are added in Model 2. Also, student educational variables indicated by the enjoyment of reading, value of school and family support for learning are added. Thus, Model 2 predicts students' reading scores by student characteristic, their family background and educational related variables of a student, which can examine if the private school effect exists after controlling for student and family backgrounds.

In Model 3, the social composition of school variables indicated by the overall SES of school, the number of girls and the dummy variable of urbanity are added in the equation at the school-level. The contextual effect can be examined for Model 3. In other words, if a student attends a school where the school SES is better than average, it would present how high the predicted reading score is. Furthermore, it will reveal whether there is a difference in reading scores depending on school types caused by the composition of students who are from better family SES background.

Model 4 is extended to Model 3. In Model 4, teaching and learning condition related variables indicated by school size, teacher-student ratio, shortage of educational staff, shortage of educational resources, the proportion of certified teachers, and nearby school are added.

Model 5, which is the full model of this study, school climate variables indicated by disciplinary climate and the frequency of teacher's misbehavior, are taken into account at the school-level equation.

Furthermore, with a restricted and full model, which domain could explain the variance of reading literacy scores of students. The equation for the full model is as follows:

Level-1 model:

$$\begin{aligned}
 Y_{ij} = & \beta_{0j} + \beta_{1j}(\text{female}) + \beta_{2j}(\text{Grade}) + \beta_{3j}(\text{Age}) \\
 & + \beta_{4j}(\text{Parental education}) + \beta_{5j}(\text{Parental occupation}) \\
 & + \beta_{6j}(\text{Home possession}) \\
 & + \beta_{7j}(\text{Home educational resources}) \\
 & + \beta_{8j}(\text{Enjoyment of reading}) \\
 & + \beta_{9j}(\text{Attitude for schooling}) \\
 & + \beta_{10}(\text{Family support for learning}) + r_{ij}, r_{ij} \sim N(0, \sigma^2)
 \end{aligned}$$

Level-2 model:

$$\begin{aligned}
\beta_{0j} = & \gamma_{00} + \gamma_{01}(\text{Private}) + \gamma_{02}(\text{MEAN}(\text{parental education})) \\
& + \gamma_{03}(\text{MEAN}(\text{Parental occupation})) \\
& + \gamma_{04}(\text{MEAN}(\text{home possession})) \\
& + \gamma_{05}(\text{MEAN}(\text{home educational resources})) \\
& + \gamma_{06}(\text{Urbanity}) + \gamma_{07}(\text{School size}) \\
& + \gamma_{08}(\text{Number of girls}) + \gamma_{09}(\text{Teacher-student ratio}) \\
& + \gamma_{10}(\text{Shortage of educational staff}) \\
& + \gamma_{11}(\text{Shortage of educational resources}) \\
& + \gamma_{12}(\% \text{ of a certified teacher}) \\
& + \gamma_{13}(\text{Nearby school}) + \gamma_{14}(\text{Disciplinary climate}) \\
& + \gamma_{15}(\text{Teacher misbehavior}) + u_{0j}, \quad u_{0j} \sim N(0, \tau_{00})
\end{aligned}$$

$$\beta_{1j} = \gamma_{10}$$

...

$$\beta_{10j} = \gamma_{100}$$

In the full model, each coefficient is interpreted as follows.

β_{0j} : the adjusted mean of reading literacy score

$\beta_{1j} \dots \beta_{10j}$: the effect of each control variable on the reading literacy

score at the student-level

γ_{00} : the mean of all school for the adjusted mean

$\gamma_{10} \dots \gamma_{100}$: the effect of each control variable at the school-level

In the level-2 model, β_{0j} was set to random effect, which varies from school to school, and the rest of student-level variables, from β_{1j} to β_{10j} were set to fixed effect. Excepting dummy variables, all continuous variables are centered on the grand mean. Thus, each model estimates the difference achievement between private and public schools at the mean level. In each model, the final student weight (W_FSTUWT) and ten plausible values were applied.

CHAPTER IV. RESULT

4.1 Descriptive statistics

Table 4.1 shows the results of the descriptive statistics analysis of the variables used in the data. Regarding reading literacy score, which is a dependent variable, the score of public schools is 397.03 and the score of students attending private schools is 378.27 points, indicating that the reading literacy score of students attending public schools is higher than that of private schools. Female students are 49% of all students. The proportion of female students in private is higher than in the public school, the proportion of female students is less than 50%, while that of private schools is more than 50%.

As noted earlier, PISA is an age-based assessment for 15-year-olds, so it sampled students from 15-year-olds and three months to 16-year-olds and two months. Depending on the education system of each country, the participating grade may vary. While most countries participate in the upper secondary level, Indonesia has a nearly equal percentage of ninth-graders and 10th graders in junior secondary schools. Although there is a slight difference between grade and age, the public sector is found to be higher.

The family background characteristics of students showed that the parental education levels were higher in public than in private. The parental education level is an index that is converted of the schooling year to continuous variables, so the overall average of 11.36 years is the level that means did not complete the upper secondary school. On the other hand, the parental occupational status of a student attending public school tends to be

higher than that of private schools.

In the variables of home possession and home educational resources, both public and private indices are negative, which means that both variables are lower than the OECD average. The home possession index indicates a lower degree in private at -1.94 points and -1.81 points in public school. Educational resources are likewise -1.05 for public and -1.25 for private schools, indicating that students attending private schools have fewer educational resources at home.

At the student-level, the descriptive statistics of education-related variables are as follows. Students attending public schools have a reading interest of 0.53, which is higher than the overall average of 0.50. On the other hand, students attending private schools had a reading interest rate of 0.45, which is lower than that of public schools. The value of school means the attitude of students toward school, is similar. For public schools, the value is higher than the overall average, while private schools show slightly lower figures than for public schools.

Table 4. 1 Descriptive statistics at the student-level variables

	Total (N=8,194)	Public (n=5,731)	Private (n=2,463)
Reading			
M	391.39	397.03	378.27
SD	75.41	77.65	68.14
Gender			
M	0.49	0.48	0.51
SD	0.50	0.50	0.50
Grade			
M	9.36	9.31	9.50
SD	0.76	0.70	0.87
Age			
M	15.82	15.80	15.85
SD	0.278	0.28	0.28
Parental education			
M	11.36	11.43	11.22
SD	3.04	3.04	3.07

Parental Occupational status			
M	39.49	39.43	39.64
SD	18.26	18.54	17.59
Home possession			
M	-1.85	-1.81	-1.94
SD	1.07	1.07	1.04
Home educational resources			
M	-1.10	-1.05	-1.25
SD	1.00	1.00	0.99
Enjoyment of reading			
M	0.50	0.53	0.45
SD	0.01	0.61	0.62
Value of school			
M	0.24	0.25	0.21
SD	0.97	0.97	0.98
Family support for learning			
M	3.32	3.34	3.33
SD	0.01	0.01	0.01

Table 4.2 depicts the results of descriptive statistics at the school-level. The ratio of private schools located in cities over public schools was 37%, compared with 26% in public schools. The size of schools, represented by the overall student enrollment rate, is about 762 students in public schools, which is significantly larger than about 500 students in private schools. The number of girls attending private schools was lower than that of private schools, with earlier student-level variables showing a slightly different result from descriptive statistics at the school-level. This can be inferred from the large number of students in public schools. The number of girls at the student-level was analyzed at the school-level apart from the student-level because it is a variable for understanding in the school composition context.

Among the variables regarding the teaching and learning condition, an index indicating the degree of the shortage of educational staff means that the higher the value, the more the shortage. Therefore, it is 0.21 points for the public and 0.51 points for private, representing that there is a greater lack of

educational staff in public schools. The higher the value of the educational resource shortage index, the more resources are lacking. Thus, 0.63 points for private schools and 0.52 points for public schools, demonstrate that private schools more lack educational resources. For the proportion of qualified teachers, 74% for public schools and 43% for private schools, suggesting that public schools are ahead of private schools in teacher quality. Variables indicating whether there are any schools to replace nearby showed that in most cases, both public and private schools have other schools near them. It is 0.92 for public schools and 0.98 for private schools, although it is a small difference, private schools are higher than public schools.

For the two variables representing the school climate, the discipline climate was 0.20 for public schools and 0.21 for private schools. This means that the academic atmosphere of public schools is better established. In the case of teacher misbehavior, the public is -0.46 and private is -0.26, all showing negative values. The higher the value, the higher the frequency of behavior of teachers that hinders the learning of students.

As a result of the analysis of student-level descriptive statistics, there are differences between students attending public and private schools. It can be seen that family background of students attending private schools is relatively poor compared to those attending public schools. Also, students attending private school lag far behind in terms of academic achievement. Furthermore, with respect to educational variables show lower records for private students compared to public ones.

At the school-level, in terms of school size and teaching and teaching conditions, the proportion of qualified teachers was also high in the public sector, and the lack of educational resources was lower than that of the private. The teacher shortage index showed that private schools had lower than public

schools. However, in general public school climate is higher than private and the frequency of teacher's misbehavior was lower than private. Thus, public schools were favorable in learning. At the school-level, differences between public and private schools were also found yet did not yield a certain tendency, as the student-level.

Table 4. 2 Descriptive statistics at the school-level variables

	Total (N=8,194)	Public (n=5,731)	Private (n=2,463)
Urbanity			
M	0.29	0.26	0.37
SD	0.45	0.44	0.48
School size			
M	683.20	761.93	499.99
SD	405.44	381.24	400.94
Number of girls			
M	347.49	395.49	235.79
SD	223.74	208.41	218.29
Teacher-student ratio			
M	18.23	18.57	17.43
SD	6.61	5.86	8.04
Shortage of educational staff			
M	0.20	0.21	0.15
SD	1.07	1.06	1.08
Shortage of educational resources			
M	0.55	0.52	0.63
SD	1.26	1.23	1.32
The proportion of certified teacher			
M	0.65	0.74	0.43
SD	0.30	0.25	0.31
Nearby school			
M	0.94	0.92	0.98
SD	0.24	0.27	0.15
Disciplinary climate			
M	0.18	0.20	0.12
SD	1.02	1.01	1.04
Teacher misbehavior			
M	-0.40	-0.46	-0.26
SD	1.04	1.01	1.09

4.2 Multilevel analysis before propensity score matching

Table 4.3 sets out the result from the t-test and cross-tabulation analysis to statistically verify the differences between public and private schools at the student-level. There is a significant difference between public and private schools in reading literacy score, the proportion of females, age, grade, parental education, home possession, home educational resources, enjoyment of reading, value of school. The proportion of females, age, and the grade was higher in private schools than in public. While reading literacy scores, parental education level, home possession, home educational resources, enjoyment of reading, the value of school present a higher figure than private schools.

Table 4. 3 Differences between school type at the student-level

	Public (n=5,731)		Private (n=2,463)		t or χ^2
	M	SD	M	SD	
Reading literacy	397.03	77.65	378.27	68.14	10.39***
Gender	0.48	0.50	0.51	0.50	9.80**
Age	15.80	0.28	15.85	0.28	-6.88***
Grade	9.36	0.76	9.50	0.87	-10.41***
Parental education	11.43	3.04	11.22	3.07	2.78**
Parental occupation	39.43	18.54	39.40	17.59	-0.48
Home possession	-1.81	1.07	-1.94	1.04	5.32***
Home educational resources	-1.05	1.00	-1.25	0.99	8.30***
Enjoyment of reading	0.53	0.61	0.45	0.62	5.06***
Value of school	0.25	0.97	0.21	0.98	1.70 [†]
Family support	3.34	0.01	3.33	0.01	0.59

[†] $p < .1$ * $p < .05$. ** $p < .01$. *** $p < .001$

Table 4.4 sets out the result from the t-test and cross-tabulation analysis to statistically verify the differences between public and private schools at the school-level. There is a significant difference between public and private schools in urbanity, school size, number of female students, teacher-student ratio, shortage of educational staff index, shortage of educational resources index, the proportion of certified teachers, nearby school. The proportion of schools located in cities, the shortage of educational resources index, the proportion of other schools nearby and the frequency of teachers' misbehavior showed higher values for private schools. In contrast, school size, number of girls, the shortage of educational resources index, the proportion of certified teachers and disciplinary climate indicated higher value for the public schools.

Table 4. 4 Differences between school type at the school-level

	Public (n=5,731)		Private (n=2,463)		t or χ^2
	M	SD	M	SD	
Urbanity	0.26	0.44	0.37	0.48	115.27***
School size	76.93	381.24	499.99	400.94	38.07***
Number of female student	395.46	208.41	235.79	218.29	31.35***
Teacher-student ratio	18.57	5.86	17.43	8.04	7.18***
Shortage of educational staff	0.21	1.06	0.15	1.08	1.48**
Shortage of educational resources	0.74	0.25	0.43	0.31	-3.61***
Proportion of certified teacher	0.74	0.25	0.43	0.31	47.92***
Nearby school	0.92	0.27	0.98	0.15	89.38***
Disciplinary climate	0.20	1.01	0.12	1.04	3.21***
Teacher misbehavior	-0.46	1.01	-0.26	1.09	-7.76***

* $p < .05$. ** $p < .01$. *** $p < .001$

Before multilevel analysis, the unconditional model which only contains a dependent variable was statistically examined. This model provides the proportion of the total variance between schools and within schools. Table 4.5 provides variance in the student and school- level, respectively. Intra class correlation (ICC) is computed with each level of variance where the equation $\frac{\tau_{00}}{\tau_{00}+\sigma^2} = \frac{2975.45}{2975.45+3043.54} = 0.494$, between-group variance is 0.494, within groups variance = 0.506. That is not controlling for other variables, 49.4% of the variance in reading literacy score stems from school. Therefore, 50.6% (100-49.4) is related to within schools. The size of the between-school variance is substantially larger than in other countries, compare to that of Korea 37%, Thailand 31% and Nordic country 10% (Park & Sandefur, 2006).

Through the unconditional model, it can be confirmed that about half of the total variance in reading literacy scores occurs between schools and there are significant differences among schools in reading literacy scores. Thus, the substantial differences between schools indicate that the need for adding school-level variables to explain these differences. Although compared to the variance of school, there is a small difference between students it seems necessary for adding students-level explanatory variables.

Table 4. 5 The result of unconditional model analysis (Unmatched data)

Fixed effect	Reading literacy
Intercept(β_{00})	397.27*** (3.38)
Random effect	
School-level(τ_{00})	2975.45***
Student-level(σ^2)	3043.54

Table 4.6 shows the result of multilevel analysis with unmatched data. Model 1 provides the effect of school type on reading literacy score, without any student and school-level variables. Regarding school type variables, the value of 0 represents public schools and the value of 1 stands for private schools. The reading literacy scores of students attending private schools are 22.04 points lower than those of public schools and this difference was statistically significant.

In Model 2, control variables are added at the student-level. The control variables include the students' demographic characteristics, family SES background and educational variables. In Model 2, the negative impact of private schools was still statistically significant. The variables that have a statistically significant effect on predicting reading literacy scores at the student-level are gender, grade, age, parental occupational status, enjoyment of reading, the value of school, and family support for learning. For female students, the reading score was -22.14 points lower than for male students, the higher the grade, and the younger the reading score was higher. Among the variables related to the family SES, only the parental occupational status was statistically significant, indicating that the one level increases in parental occupational status means 0.22 points increase in reading literacy scores for students. Besides, the more positive the attitude of individuals and families related to education is, the higher the reading literacy score is.

In Model 3, variables related to the school composition are added. The coefficient of school type is increased by 36% (from -22.04 to -14.15). This explains that the negative influence of private schools is occurred by school-level variables. In Model 3, the variables that affect reading performance at the student-level are still statistically significant. At the school-level, the

average of parent education at school, the occupational status, home possession, urbanity and the number of female student were statistically significant. In particular, parents' educational level and home possession were not significant any longer at the student-level. However, it has a significant effect on reading literacy scores at the school-level. That means the contextual effects exist. Stated differently, if a student with an average reading achievement level attends a school with a higher home possession than average, the expected reading achievement score is 31.77 points higher than that of a student attending a school below average. This contextual effect was also founded in the level of parental education and parental occupational status. The reading literacy score of schools with higher parents' education level than average was 8.13 points lower, while the reading literacy score of schools with higher parents' occupational status than average was 1.25 points higher. When a student is attending a school where it is a city, reading scores gets 13.99 higher. The more female students attend school, the higher the reading literacy score is by 0.02 points.

In Model 4, school variables associate with teaching and learning conditions were added, and among the predicted variables that were added in Model 3 still statistically significant, except for the number of female students. Among the newly added variables, other variables were not statistically significant except for the shortage of educational resources. When the shortage of educational resources increases by 1 level, the reading literacy score decreases by 5.17 points.

In Model 5, variables related to the school climate were added, further increased the coefficient of school type (from -22.04 to -13.10). Compared to model 4, the predictors added before were still hold statistically significant.

If the disciplinary climate of school increases by 1 level, the student's reading literacy score increases by 16.79 points. As a result, after controlling student-level and school-level variables to explain the difference in reading literacy scores between public and private schools, the reading literacy score of private schools was still 13.10 points lower than public school.

Table 4. 6 The result of multilevel analysis (Unmatched data)

Fixed effect	Model 1		Model 2		Model 3		Model 4		Model 5	
	B	Robust SE	B	Robust SE	B	Robust SE	B	Robust SE	B	Robust SE
Cons	379.27 ***	3.38	396.41 ***	3.89	289.28 ***	3.12	390.50 ***	9.01	390.02 ***	8.76
Private (Ref: Public)	-22.04 **	6.67	-22.14 ***	5.63	-14.15 **	5.17	-13.84 *	5.68	-13.10 *	5.51
Female (Ref: male)			14.33 ***	2.79	14.14 ***	2.79	-14.12 **	2.79	-14.06 ***	2.79
Grade			15.63 ***	2.80	14.21 ***	2.60	14.21 ***	2.61	13.98 ***	2.61
Age			-6.06 †	3.40	-6.19 †	3.38	-6.20 †	3.38	-6.23 †	3.38
Parental education			-0.17	0.42	-0.33	0.42	-0.22	0.42	-0.22	0.42
Parental occupation			0.22 **	0.07	0.19 **	0.07	0.19 **	0.07	0.19 **	0.07
Home possession			2.26	1.87	0.92	1.86	0.92	1.86	0.92	1.86
Home educational resources			0.99	1.66	1.10	1.66	1.10	1.66	1.11	1.66
Enjoyment of reading			13.27 ***	1.93	13.36 ***	1.93	13.37 ***	1.94	13.25 ***	1.93
Attitude for schooling			4.00 ***	1.11	3.96 ***	1.11	3.96 ***	1.11	3.96 ***	1.11
Family support			4.09 **	1.47	4.08 **	1.46	4.05 **	1.46	4.03 **	1.46
School mean of parental education					-8.13 ***	2.51	-7.68 **	2.45	-7.04 **	2.31
School mean of parental occupation					1.25 **	0.45	1.37 **	0.46	1.27 **	0.45
School mean of home possession					31.77 **	10.03	27.58 **	9.89	29.28 **	9.69
School mean of home educational resources					15.22	10.57	14.80	10.26	13.68	9.86
Urbanity					13.99 **	4.95	11.18 *	4.84	12.45 *	4.87
Number of girls					0.02 *	0.01	0.02	0.02	0.01	0.02
School size							-0.002	0.01	-0.002	0.02
Teacher-student ratio							0.26	0.32	0.43	0.33
Shortage of educational staff							-0.13	2.27	-0.05	2.22
Shortage of educational resources							-5.17 **	1.97	-4.46 *	1.95
% of a certified teacher							2.19	7.51	4.01	7.31
Nearby school							-5.42	7.04	-3.87	6.76
Disciplinary climate									16.79 **	5.83
Teacher misbehavior									-0.98	1.92
Random effect										
School		2853.67***		1939.51***		824.29***		781.49***		734.92***
Student		3043.62		2837.43		2827.32		2827.16		2827.47
ICC		0.484		0.406		0.23		0.216		0.206

† $p < .1$ * $p < .05$. ** $p < .01$. *** $p < .001$

4.3 Multilevel analysis after propensity score matching

As a result of analyzing the differences between public and private schools, students attending public schools had a better family background than their counterparts in private, and their attitude toward education was also more favorable.

To examine school type effect after controlling for preexisting student background, the propensity score matching model was employed. The propensity score was generated by logistic regression analysis. In order to explore the factors affecting the attending private school, all of the student-level variables are chosen as covariate variables.

Table 4.7 sets out the result of the logistic regression analysis for generating the propensity score. It shows female students more likely to attend to private schools than male students. Also, the older they are, the higher their parental occupational status, the less educational resources they have, and less interested in reading more likely to attend private school. Meanwhile, parental education level, home possession, the value of school, and family support for learning did not affect attending private schools.

Table 4. 7 The result of logistic regression

	Coef.	SE	Odds ratio
Female (Ref: Male)	0.150**	0.050	1.16
Age	0.357***	0.091	1.43
Grade	0.372***	0.036	1.45
Parental education	-0.014	0.010	0.99
Parental occupational status	0.005**	0.002	1.00
Home Possession	-0.062	0.040	0.94
Home educational resources	-0.212***	0.038	0.81

Enjoyment of reading	-0.151***	0.041	0.86
Value of school	-0.033	0.026	0.97
Family support	-0.008	0.034	0.34
Cons	-10.351***	1.405	0.0005

* $p < .05$. ** $p < .01$. *** $p < .001$

As a result of propensity score matching, 2401 students from private and public schools were selected. Figure 4.1 to 4.4 represents the distribution of propensity score before and after matching, respectively. The treatment group refers to students attending private schools; the Control group refers to students attending public schools. And in figure 4.2 and 4.4, the value of 1 represents the distribution of students' propensity scores attending private school, the value of 0 indicates the distribution of students' propensity scores attending public schools.

Table 4.8 and figures 4.3 and 4.4 indicate that the propensity scores between groups are equally composed.

Table 4. 8 The propensity score differences between public and private schools

	Public	Private	t
Unmatched data	0.924 (N=5,731)	0.753 (N=2,463)	16.57***
Matched data	0.782 (N=2,401)	0.786 (N=2,401)	-0.34

*** $p < .001$

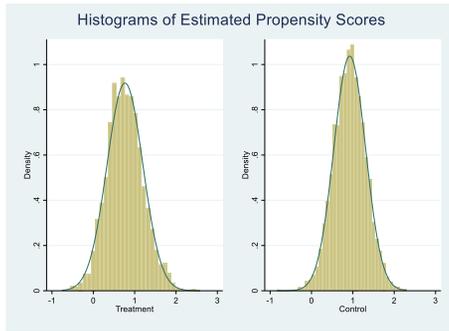


Figure 4. 1 The distribution of propensity scores (Unmatched data)

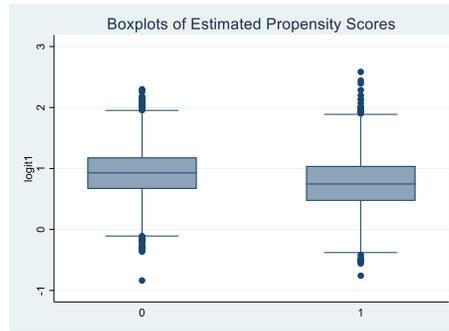


Figure 4. 2 The boxplot of propensity scores (Unmatched data)

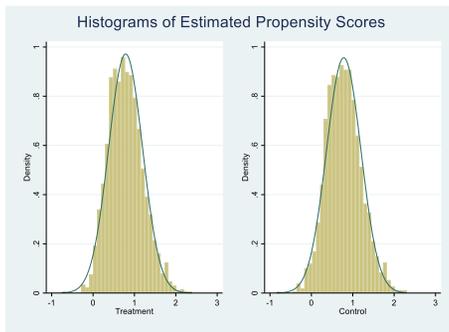


Figure 4. 3 The distribution of propensity scores (Matched data)

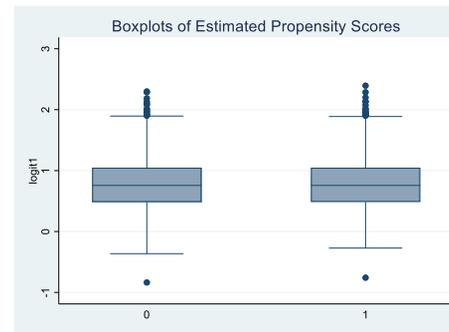


Figure 4. 4 The boxplot of propensity scores (Matched data)

Table 4.9 and Table 4.10 show the result of t-test and cross-tabulation analysis to examine the difference between school types in the matched data. The result of the student-level in table 4.9 shows that all differences in school type have disappeared at the student-level except for the reading literacy, which was not applied to generate the propensity score. The proportion of female students attending private schools was higher in unmatched data. However, in matched data, the proportion was 52% for public and 51% for private schools, accounting for a similar ratio between public and private.

Moreover, in the unmatched data, family SES relevant variables such as parental education, parental occupational status, and home possession index, as well as an attitude toward education, were also higher in public school. Nevertheless, in the matched data, the differences were not statistically

significant.

Table 4. 9 Differences between school type at the student-level (matched data)

	Public (n=2,401)		Private (n=2,401)		t or χ^2
	M	SD	M	SD	
Reading literacy	396.18	76.61	378.26	68.16	8.56***
Gender	0.52	0.50	0.51	0.50	0.37
Age	15.85	0.28	15.85	0.28	0.23
Grade	9.46	0.75	9.47	0.85	-0.52
Parental education	11.20	3.15	11.24	3.05	-0.44
Parental occupation	39.39	18.59	39.55	17.52	-0.29
Home possession	-1.94	1.05	-1.93	1.03	-0.33
Home educational resources	-1.23	0.99	-1.22	0.96	-0.52
Enjoyment of reading	0.44	0.61	0.46	0.62	-0.95
Value of school	0.20	0.98	0.21	0.98	-0.25
Family support	3.31	0.74	3.33	0.74	-0.54

$\dagger p < .1$. * $p < .05$. ** $p < .01$. *** $p < .001$

Table 4.10 sets out the differences in school characteristics according to school types in matched data. Unlike all the differences between student-level variables have disappeared, variables representing school characteristics all exhibit statistically significant differences between public and private schools. As with the unmatched data, teaching and learning conditions were to be superior in the public school, except for the teacher-student ratio and shortage of educational staff index. It was also confirmed that the public has a favorable atmosphere for learning compared to private schools.

Table 4. 10 Differences in between school type at the school-level

	Public (n=2,401)		Private (n=2,401)		t or χ^2
	M	SD	M	SD	
Urbanity	0.24	0.43	0.37	0.48	94.22***
School size	790.92	403.92	501.78	401.96	28.86***
Number of girls	407.00	218.74	237.53	218.70	26.85***
Teacher-student ratio	18.48	5.85	17.45	8.03	5.10***
Shortage of educational staff	0.23	1.07	0.14	1.08	3.05*
Shortage of educational resources	0.55	1.24	0.63	1.32	-2.20*
The proportion of certified teacher	0.74	0.25	0.44	0.31	37.58***
Nearby school	0.92	0.27	0.98	0.16	76.32***
Disciplinary climate	0.21	1.00	0.12	1.05	2.92*
Teacher misbehavior	-0.39	1.05	-0.28	1.09	-3.84**

* $p < .05$. ** $p < .01$. *** $p < .001$

Before the multilevel analysis, the unconditional model was examined to determine the degree of variance between schools and within schools without explanatory variables. Table 4.11 provides the variance composition. The result represents the variance occurred by between school is $\frac{\tau_{00}}{\tau_{00} + \sigma^2} = \frac{2816.32}{2816.32 + 2994.84} = 0.484$, which means 48.4% of reading literacy score variance is accounted for by schools and 51.6% is associated with the students. It can be seen that between school variance is slightly decreased from 49.4 % before matching.

Table 4. 11 The result of unconditional model analysis (matched data)

Fixed effect	Reading literacy
Intercept(β_{00})	375.88*** (3.47)
Random effect	
School-level(τ_{00})	2816.32***
Student-level(σ^2)	2994.84

*** $p < .001$

Using matching data school type effect on students' reading literacy score is as follows. In Model 1, to estimate school effect on reading literacy score by adding only school type without control variables. The reading score of students attending private schools is 18.07 points lower than students attending public schools. Compared to the coefficient of unmatched data (-22.04), the reading score gap according to the school type is decreased after matching.

In model 2, student-level variables are added. The consequence is similar to unmatched data except for the age that had a negative effect was no longer statistically significant in the matched data. After controlling for student-level variables, the school type effect is still significantly negative ($B = -18.82$, $p < .01$). Female students were 14 points lower than male students, and reading score increases by 16.40 as the grade increases. Moreover, the parental occupational status, enjoyment of reading, value of school, and family support has a positive effect in predicting students' reading literacy scores.

In model 3, school composition variables are added; the coefficient of school type is increased by 31.7% (from -18.82 to -12.84). Compared to the unmatched data (36 %), it showed the explanatory power at the school-level has decreased in matched data. However, it still yields that the school

composition variables considerably account for the school type effect. All of the student-level variables added to Model 2 holds statistical significance. At the school-level, the school mean of parental education, school mean of parental occupation, and the school mean of home possession index are all statistically significant. The school mean of parental education had a negative effect, contrary to the school mean of parental occupational status, and the school mean home possession had a positive effect, which means that the contextual effect exists as before matching. For example, the higher the school average home possession is, the higher the reading literacy score of 42.97 points. State differently, the private school is less effective than public schools with the same social composition. This suggests that the characteristics of the students who make up the school body can affect academic achievement. Besides, urbanity and the number of girls are positively associated with reading literacy scores. The result of Model 3 did not differ from the unmatched data.

In Model 4, where teaching and learning condition variables are added. The statistical significance of the variables in the previous model remains unchanged. Compared to the previous model, only the shortage of educational resources showed significantly but negatively associated with reading literacy score ($B=-4.26$, $p<.05$), which means a level increase in the shortage of educational resources, 4.26 points decrease in reading literacy scores.

In Model 5, all school characteristic variables are added, including school climate variables. The disciplinary climate is positively associated with reading literacy score ($B=17.25$, $p<.01$). The noticeable change before matching in Model 5 is the contextual effect of the mean of home possession. The coefficient in unmatched data increased significantly from 29.28 to 42.97

after matching.

After eliminating selection bias, controlling for student and school-level variables, the negative private school effect still statistically significant. Compared to unmatched data, the school type coefficient is increased from -13.10 to -11.59, about 11.5%. In other words, the reading literacy score of students attending private schools is about 11.6 points lower than those in public schools

The result highlights consistent effect of school type on student's reading literacy scores. Students who attend public schools in average outperform their counterparts attending private schools, which is a significant difference compared with the effect of other familial variables.

Table 4. 12 The result of multilevel analysis (matched data)

Fixed effect	Model 1		Model 2		Model 3		Model 4		Model 5	
	B	Robust SE	B	Robust SE	B	Robust SE	B	Robust SE	B	Robust SE
Cons	383.49 ***	4.69	393.02 ***	4.40	385.89 ***	3.75	385.61 ***	6.13	384.11 ***	6.47
Private (Ref: Public)	-18.07 **	6.88	-18.82 **	5.84	-12.84 *	5.18	-11.97 *	5.61	-11.59 *	5.44
Female (Ref: male)			-14.00 ***	3.38	-13.91 ***	3.36	-13.92 ***	2.62	-13.81 ***	3.36
Grade			16.40 ***	2.80	14.93 ***	2.60	14.92 ***	2.62	14.61 ***	2.60
Age			-5.45	4.31	-5.76	4.28	-5.73	4.29	-5.67	4.30
Parental education			-0.14	0.51	-0.23	0.51	-0.23	0.51	-0.23	0.51
Parental occupation			0.21 *	0.09	0.17 †	0.09	1.71 †	0.09	0.17 †	0.09
Home possession			1.57	2.48	-0.60	2.47	-0.60	2.47	-0.60	2.47
Home educational resources			1.43	1.93	1.71	1.93	1.70	1.93	1.70	1.93
Enjoyment of reading			11.49 ***	2.18	11.60 ***	2.17	11.64 ***	2.18	11.46 ***	2.17
Attitude for schooling			3.88 **	1.28	3.76 **	1.28	3.77 **	1.28	3.77 **	1.28
Family support			4.51 *	1.75	4.51 *	1.74	4.48 *	1.74	4.44 *	1.74
School mean of parental education					-8.04 ***	2.29	-7.17 **	2.28	-6.52 **	2.01
School mean of parental occupation					0.85 †	0.45	0.87 †	0.45	0.75 †	0.44
School mean of home possession					46.52 ***	9.60	40.80 ***	9.79	42.97 ***	9.50
School mean of home educational resources					-0.43	9.22	0.03	9.40	-1.40	8.96
Urbanity					14.98 **	5.32	12.13 *	5.33	13.15 *	5.30
Number of girls					0.03 *	0.01	0.02	0.02	0.01	0.02
School size							0.001	0.01	0.002	0.01
Teacher-student ratio							0.22	0.38	0.40	0.38
Shortage of educational staff							-1.40	2.28	-0.40	2.28
Shortage of educational resources							-4.62 *	2.15	-4.26 *	2.09
% of a certified teacher							4.14	7.64	5.44	7.55
Nearby school							1.04	5.85	1.62	6.21
Disciplinary climate									17.25 **	5.54
Teacher misbehavior									-0.39	1.97
Random effect										
School	2739.42 ***		1829.19 ***		803.49 ***		759.70 ***		696.33 ***	
Student	2994.24		2818.47		2795.02		2794.55		2794.60	
ICC	0.478		0.392		0.223		0.213		0.199	

† $p < .1$ * $p < .05$. ** $p < .01$. *** $p < .001$

4.4 Further analysis

According to PISA's classification of the private school, they are divided into private government-dependent schools and private independent schools, depending on the degree of financial support they receive from public sources.

The private government-dependent schools are schools with 50 to 100% financial support from public sources. While the private independent schools receive financial support from 0% to 50% less from the government. Although this classification is an operational definition by OECD, this criterion is considered proper for further analysis. Because Stern and Smith (2016) reported that socioeconomically disadvantaged students tend to attend government-dependent school which receives school operating fund (BOS program). Therefore, the distinction between private government-dependent schools and private independent schools reflects the policy and socio-economical aspects.

Therefore, further analysis will examine the negative effects of private schools in Indonesia more carefully. As with the previous analysis, the same variables are added at the student and school-level. If there are differences in reading literacy scores between types of schools, even after controlling for variables at the individual and school-levels, an analysis also is provided on which factors explain these differences. The data analysis procedure is the same as the previous analysis.

4.4.1 Private government-dependent school versus public school

As table 4.13 shown before matching, the difference between a private government-dependent and public schools presents more considerable

differences both at the student and school-level than in the analysis of overall private and public schools. In the previous analysis, the reading literacy difference was 18.27 (public schools 397.03, overall private schools 378.02). However, the difference increases to 30.88 in comparison with public schools (397.03) and private government-dependent (366.15) schools.

The ratio of female students was 48% for public schools, compared with 52% for private government-dependent schools, which showed a higher percentage of female students. It also showed that private government-dependent school students' age is older than students attending public school, however, lower in grade, indicating that students at private schools, as Stern and Smith (2016) pointed out, were attending lower grades at a higher age.

Among the variables related to family backgrounds were parental education, parental occupational status, home possessions, and the home educational resources turned out to be higher than the private government-dependent schools. When it comes to students' attitudes toward learning, private government-dependent school students showed a more positive attitude than public school students. At the student-level, the differences except for family support were statistically significant.

Table 4. 13 Differences between school type at the student-level (unmatched data)

	Public (n=5,731)		Private government- dependent (n=1,063)		t or χ^2
	M	SD	M	SD	
Reading literacy	397.03	77.65	366.15	63.43	12.23***
Gender	0.48	0.50	0.52	0.50	5.41*
Age	15.80	0.28	15.83	0.28	-2.38*
Grade	9.31	0.70	9.12	0.84	7.65***

Parental education	11.43	3.04	10.37	3.11	10.42***
Parental occupation	39.43	18.54	35.62	16.41	6.27***
Home possession	-1.81	1.07	-2.24	0.93	12.39***
Home educational resources	-1.05	1.00	-1.44	0.95	12.01***
Enjoyment of reading	0.53	0.61	0.49	0.58	1.96*
Value of school	0.25	0.97	0.17	0.98	2.33*
Family support	3.34	0.73	3.29	0.75	1.67

*†p < .1 *p < .05. **p < .01. ***p < .001*

Table 4.14 depicts the differences between public and private schools at the school-level. At the school-level, all variable was statistically significant except for the shortage of educational staff and teacher-student ratio. The size of public school was larger than that of the private sector, with more female students. The shortage of educational resources index indicates that private schools were higher than in public schools. The percentage of certified teachers seems to be substantially different, 74% for public schools, while 40% for private government-dependent schools. Public school is a more favorable atmosphere for students' learning, given that the disciplinary climate index is higher than private government-dependent school, and the teacher misbehavior value is lower than private government-dependent school.

Table 4. 14 Differences between school type at the school-level (unmatched data)

	Public (n=5,731)		Private government- dependent (n=1,063)		t or χ^2
	M	SD	M	SD	
Urbanity	0.26	0.44	0.13	0.34	73.96***
School size	761.93	381.24	454.53	367.92	24.28***

Number of girls	395.49	208.41	217.87	176.42	26.11***
Teacher-student ratio	18.57	5.86	18.88	8.59	-1.44
Shortage of educational staff	0.21	1.06	0.25	0.27	-1.03
Shortage of educational resources	0.52	1.23	1.26	1.13	-18.22***
The proportion of certified teacher	0.74	0.25	0.40	2.89	40.73***
Nearby school	0.92	0.27	0.98	0.13	54.40***
Disciplinary climate	0.20	1.00	0.13	1.03	2.08*
Teacher misbehavior	-0.46	0.10	-0.35	1.04	-3.08*

* $p < .05$. ** $p < .01$. *** $p < .001$

Table 4.15 provides the result of multilevel analysis to examine the difference between a private dependent and public school before and after matching. In the unmatched data, including 5,731 students in public schools, and 1,063 students in private government-dependent school. In the matched data, 1,063 students in public and private government-dependent schools are included.

According to the analysis data before matching, there is no difference in academic performance depending on school type. At the student-level, female students scored lower than male students, as in previous analyses. The grade has positive effects on reading literacy. Also, age showed a negative effect. Education-related variables show that the higher the enjoyment of reading, the more value of school, and the higher the support for family learning, the higher the reading literacy score.

The impact of school-level variables on reading literacy score is as follows. Regarding school composition, there is a contextual effect with variables related to family SES background. The higher the school average of the

parental education level, the more negative the impact on reading literacy score, while the school average of home possession and parental occupational status positively associated with reading literacy scores. For students whose schools are located in cities, they have higher reading literacy than those in non-city. With respect to teaching and learning condition shortage of educational resources statistically negative effect. In other words, attending schools with a severe shortage of educational resources has a negative impact on academic achievement. In terms of school climate, the only disciplinary climate was found to be positively significant.

Even after controlling for student and school-level variables, among total variance in reading literacy score, the variance occurred by schools was relatively high at 21.5%. Before matching the proportion of variance explained by school-levels is 75.9%, the student-level is 7.2 %, respectively, indicating that the variables added accounted for a substantial portion of the variance between schools.

In the results of the multilevel analysis after matching, the school type effects were not statistically significant as before matching. The lower performance of female students was still statistically significant compared to male students, but the coefficient was increased by about 34.3% $[(12.04 - 7.91)/12.04]$. Moreover, the grade was shown to have a positive effect, but the age was no longer statistically significant. In educational variables, only enjoyment of reading is positively associated with reading literacy.

Regarding school relevant variables, the contextual effect existed before, are maintained in terms of the social composition of the school. As before matching, the remaining family SES relevant variables, except for home educational resources, were shown to affect statistically significant. Also, the

urbanity, which was noted before matching, was no longer statistically significant. Besides, the degree of the shortage of educational resources was still a negative effect on reading literacy scores. Among the total variances in reading literacy score after matching, the proportion of variances that occurred by schools was 25.7%, this is even higher than before matching. Moreover, the variables added in the model account for 63% of the school-level variance and about 5.8% of student-level, presenting the proportion of explanation was slightly reduced compared to before matching.

Table 4. 15 The result of a multilevel analysis of private government-dependent versus public schools

Fixed effect	Unmatched		Matched	
	B	Robust SE	B	Robust SE
Cons	392.79 ***	7.02	384.61 ***	11.19
Private (Ref.: public)	-9.23	7.16	-4.18	8.24
Female (Ref.: male)	-12.04 ***	2.95	-7.91 †	4.46
Grade	15.47 ***	3.20	16.14 ***	3.46
Age	-6.11 †	3.65	-6.43	5.98
Parental education	-0.20	0.46	0.16	0.69
Parental occupational status	0.15 †	0.08	0.10	0.13
Home possession	0.84	2.13	-0.03	-0.01
Home educational resources	1.95	1.93	2.40	2.83
Enjoyment of reading	14.37 ***	2.29	10.72 ***	2.72
Values of school	4.07 ***	1.22	3.02	1.86
Family support	3.74 **	1.62	3.88	2.75
School mean of parental education	-7.76 **	2.68	-5.48 *	2.33
School mean of parental occupation	1.52 **	0.49	1.36 *	0.52
School mean of home possession	25.43 *	10.99	18.12 †	10.93
School mean of home educational resources	16.25	11.21	4.85	9.88

Urbanity	9.78 †	9.78	7.31	8.63
School size	-0.0003	0.02	0.004	0.01
Number of girls	0.01	0.03	0.02	0.02
Teacher-student ratio	0.13	0.38	0.49	0.48
Shortage of educational staff	0.64	2.55	1.21	3.71
Shortage of educational resources	-4.32 *	2.14	-4.84 †	2.89
% of a certified teacher	10.83	8.86	14.98	12.114
Nearby school	-7.27	6.81	-11.57	11.05
Disciplinary climate	16.27 *	6.82	17.14 *	7.45
Teacher misbehavior	-0.60	2.26	-0.04	3.14
Random effect				
School		766.80***		889.37***
Student		2799.39		2576.05
ICC		0.215		0.257
% explained school		75.9		63
% explained student		7.2		5.9

† $p < .1$. * $p < .05$. ** $p < .01$. *** $p < .001$.

4.4.2 Private independent school versus Public school

Table 4.16 depicts differences in student-levels between school types. The difference between private independent and public reading literacy scores was 397.03 points for public and 388.89 points for the private independent school, far less than for comparison in public and private government-dependent schools. The proportion of female students also presents a slight difference of 48% in public and 50% in a private independent school, which was not statistically significant. Contrary to previous analyses, private independent schools tended to be younger than public schools. Students attending private independent schools are found to be in higher grades than those attending public schools.

The variables related to family background present a different pattern from the comparison of private overall and private government-dependent school. Except for home educational resources, private independent schools were all found to be better family background than public schools. However, among educational variables, only enjoyment in reading was statistically significant, as with the previous analysis, the public was ahead of the private independent school.

Table 4. 16 Differences between school type at the student-level (unmatched data)

	Public (n=5,731)		Private independent (n=1,177)		t or χ^2
	M	SD	M	SD	
Reading literacy	397.03	77.65	388.89	66.82	3.35**
Gender	0.48	0.50	0.50	0.50	2.70
Age	15.80	0.28	15.56	0.28	-6.15***
Grade	9.30	0.01	9.77	0.02	-20.56***
Parental education	11.43	3.04	11.95	2.78	-5.45***
Parental occupation	39.43	18.54	42.87	17.42	-5.86***
Home possession	-1.81	0.01	-1.70	0.30	-3.18**
Home educational resources	-1.05	1.00	-1.08	1.00	0.94
Enjoyment of reading	0.53	0.61	0.41	0.02	5.72***
Value of school	0.25	0.97	0.28	0.96	-0.98
Family support	3.34	0.73	3.36	0.72	-1.14

† $p < .1$ * $p < .05$. ** $p < .01$. *** $p < .001$

Table 4.17 shows the differences in the school-level between public and private independent schools. For school-level variables, the differences between both school types were statistically significant. 58% of private independent schools and 26% of public schools are located in cities. The size

of schools and the number of girls were all large in public schools, as was the previous analysis. Regarding teaching and guidance conditions, the number of students per teacher was found to be smaller in private schools. Both shortages of educational staff and material were found to have better for private independent schools than public schools. However, in terms of the proportion of certified teachers, the public school was higher, with 74% for public and 50% for private independent schools. This result that private schools do not lack teachers because they have autonomy in hiring teachers, but the proportion of certified teachers appears to be lower than the public schools.

Both types of schools had different schools nearby, and the proportion was slightly higher for private independent schools. Regarding teaching and learning conditions, it can be seen that private independent schools have better conditions. When it came to school climate, it showed that public schools had a higher disciplinary climate than private schools, and the frequency of teacher's misbehavior in private schools had higher than their counterparts in public.

Table 4. 17 Differences between school type at the school-level (unmatched data)

	Public		Private independent		t or χ^2
	(n=5,731)		(n=1,177)		
	M	SD	M	SD	
Urbanity	0.26	0.44	0.58	0.49	473.22***
School size	761.93	381.24	556.66	422.17	16.51***
Number of girls	395.49	208.41	261.96	244.99	19.40***
Teacher-student ratio	18.57	5.86	17.06	7.47	7.66***
Shortage of educational staff	0.21	1.06	0.09	1.20	3.71**

Shortage of educational resources	0.52	1.23	0.03	1.17	12.58***
The proportion of certified teacher	0.74	0.25	0.50	0.32	29.44***
Nearby school	0.92	0.27	0.96	0.19	28.28***
Disciplinary climate	0.20	1.01	0.11	1.03	2.70*
Teacher misbehavior	-0.46	1.01	-0.13	1.03	-9.98***

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4.18 provides the result of multilevel analysis to examine the difference between private independent and public schools before and after matching. In the unmatched data, 6,908 cases (public 5,731, private independent 1,177), and in the matched data each 1,153 students in public and private independent were included for analysis. The results of the multilevel analysis before matching are as follows. The school type is significant but negatively associated with reading literacy. It is a similar result in the comparison between overall private and public schools. As with previous analyses, the reading literacy score is positively associated with school grade. The parental occupational status, which was not significant in the comparison of private government-dependent school and public school, however positively affects reading literacy. In the educational variables, enjoyment of reading, the value of school, and family support had a positive effect on students' reading literacy scores. Among the variables related to school composition, parental education, parental occupational status, and educational resources, except for home possession, have a contextual effect. Students attending a school located in the city showed 14.76 points higher than those who did not. Moreover, as shown in the previous analysis, the

shortage of educational resources index negatively affects students' reading literacy. Regarding the school climate, unlike previous analysis, the disciplinary climate is statistically insignificant.

Among the total variance of the reading literacy score before matching, the proportion of variances that occurred between school is 18%, and the gap between schools was smaller than that of the private government-dependent school. The variables added into the study model accounted for 78.9% of the variance among schools, and 8.6 % of the student-level variance, indicating that the proportion of explaining variance was considerably higher than that of private government-dependent schools.

In the post-matching results, the negative effect of private schools was still statistically, but negatively significant. Also, as before matching in student-level variables, the reading literacy score of females was 12.61 points lower than that of male students. Parental occupational status was positively associated with reading literacy scores. The family support was no longer statistically significant among education-related variables, compared to before matching, and the enjoyment of reading and value of school still had positive effects on reading literacy scores.

School mean of parental education and School mean of parental occupational status were no longer statistically significant among family SES related variables of the school-level. In addition, the school average of home possession, which was not significant before matching, was positively associated with students' reading literacy scores. It did not affect the student-level as in the previous analysis but was significant at the school-level. It implies students attending a school with a higher home possession than average, gets 38.33 points advantage of reading score. State differently, a

negative sign for private independent school indicates that the reading literacy score of students in these schools is lower than those of students in public schools with the same social composition.

The reading score was 11.22 points higher when attending a school in the city. As unmatched data, the shortage of educational resources index has a negative impact. As with the data before matching, the school climate was not statistically significant.

After matching, the portion of the total variance of the reading literacy score occurred by schools was 0.166, which decreased slightly compared to before matching (0.180). The proportion at which the model explained variance among schools was almost similar at 78.5%, and the proportion of variance explained at the student-level increased from 8.6 to 9.4 %.

Table 4. 18 The result of multilevel analysis of private independent versus public school

Fixed effect	Unmatched		Matched	
	B	Robust SE	B	Robust SE
cons	400.33 ***	6.62	394.04 ***	9.88
Private independent (Ref: Public)	-18.08 **	6.83	-19.18 *	7.57
Female (Ref: male)	-15.80 ***	2.93	-12.61 **	4.23
Grade	14.08 ***	3.27	23.06 ***	4.14
Age	-4.45	3.47	-4.62	8.17
Parental education	0.09	0.47	-0.49	0.86
Parental occupational status	0.21 *	0.08	0.26 *	0.12
Home possession	0.60	1.92	-1.26	3.01
Home educational resources	1.41	1.92	1.79	2.53
Enjoyment of reading	14.63 ***	2.32	12.98 ***	3.50
Value of school	4.86 ***	1.34	5.99 **	2.30
Family support	4.54 **	1.69	4.44	3.01
School mean of parental education	-4.76 †	2.56	2.56	3.36
School mean parental	1.45 **	0.47	-0.06	0.47

occupation						
School mean of home possession	11.81	11.59	38.33	**	13.11	
School mean of home educational resources	35.52	**	12.55	-8.11	13.64	
Urbanity	14.76	**	5.03	11.22	†	6.39
School size	-0.01	0.01	-0.01		0.02	
Number of girls	0.004	0.02	0.01		0.03	
Teacher-student ratio	0.37	0.42				
Shortage of educational staff	0.76	2.29	-2.24		3.23	
Shortage of educational resources	-6.46	***	1.91	-5.86	**	2.96
% of a certified teacher	-1.36	7.93	-1.35		9.83	
Nearby school	-4.88	6.80	6.29		8.54	
Disciplinary climate	8.72	6.19	-2.21		6.42	
Teacher misbehavior	-0.02	2.13	-0.56		2.67	
Random effect						
School		630.99***		565.68***		
Student		2876.41		2847.62		
ICC		0.180		0.166		
% explained school		78.9		78.5		
% explained student		8.6		9.4		

† $p < .1$. * $p < .05$. ** $p < .01$. *** $p < .001$.

CHAPTER V. DISCUSSION

5.1 Different effects of school type on students' academic performance

In this study, the achievement gap between private and public schools was statistically significant, indicating that the effect of private schools on students' educational performance was negative. This supports existing literature where expressed concerns about the low quality of private schooling in Indonesia (Heyneman & Stern 2014; Newhouse & Beegle, 2006; Stern & Smith, 2016). However, the further analysis that the private school is divided into subtypes found results somewhat different than expected. The school type effect of private government-dependent schools, which underprivileged students tend to attend, was statistically insignificant. The private government school-public school achievement gap disappeared after inclusion of student related variables, the social composition of school variables, suggesting that these variables explain the differences in reading literacy scores between public and private government-dependent school.^② This result implies that the characteristics of the school itself are more important in students' academic performance than attending a particular type of school. In other words, Students' reading literacy score is not low because they attend private government-dependent schools, but it can vary according to the school

^② Only the full model is presented in this paper, after propensity score matching school type coefficients of restricted and full model are as follow (the school type variables dummy variables, reference group is student attending public school). For estimation with private government and public school, in Model 1: -25.00 (p<0.01), Model 2: -20.66 (p<0.01), Model 3: -11.37 (insignificant), Model 4: -5.46 (insignificant), Model 5: -4.18 (insignificant) for independent school, in Model 1: -7.08 (insignificant), Model 2: -14.33 (insignificant), Model 3: -14.89 (p<0.05), Model 4: -19.24 (p<0.05), Model 5: -17.18 (p<0.05).

context. And, this result is consistent with the existing literature (Stern & Smith, 2016).

At the student-level, it was found that male students than female students, the higher the grade and the higher the interest in reading, the higher the reading score. Therefore, the more positive a student's attitude is toward learning, the higher the pupil's achievement. Muttaqin et al. (2019) and Suharti (2013) claim that family SES is a key predictor of students' academic achievement in Indonesia, however, this study suggests that family SES does not affect student achievement, which is a positive finding in terms of educational inequality.

On the one hand, at the school-level, there is a positive relationship between parental occupation, and home possession and reading scores, and the school mean of parental education, the lack of an educational resources index indicates a negative impact. Overall SES of school generally has a positive effect on academic achievement (Park & Sandefur, 2006). Thus, in Indonesia, careful investigation is needed to examine why attending a school with a high education level of parents has a negative effect. Moreover, the disciplinary climate has a positive effect on a reading literacy score, confirming prior studies that student's achievement is associated with the learning environment of the school (Dronkers & Robert, 2008a; 2008b; Park & Sandefur, 2006). This study also found that, contrary to assertions made by private school advocates (Tooley, 2009), teaching and learning conditions regarding teachers, who are considered to be an advantage of private schools, are less likely to misbehave; the small number of students per teacher was not affected.

Contrary to the result that private government-dependent school type does not affect academic achievement, private independent schools were found to

have a negative effect. This was inconsistent with the result of Dronkers and Robert's study (2008a), who applied the same analysis criterion to European countries, reaffirming that private school discourse may differ from that in developing countries, as discussed in the existing literature (Buchmann & Hannum, 2001; Byun & Kim, 2011). However, the differential effect of private schools on reading scores in Indonesia does not mean low quality of public education, a finding that supports the existing literature regarding the higher quality of public schools than private schools. The negative effect of private independent schools indicates that the difference in reading scores is not accounted for by the added variables in the research model.

This differential results among private school types reflect the Indonesian context, which has a varied range of private schools. PISA 2015 was referenced in an effort to explain this result. The previous PISA cycle provides more information about private schools by its collection of data on school operating organizations. In PISA 2015, a total of 236 schools participated (131 publics and 105 private schools). The participating schools' principals were asked whether their school operating organizations were religious (Christian or other religion), non-profit, or for-profit. Excluding missing values, the number of private government-dependent schools was 49 and the number of private independent schools was 34. There are 33 religious and 16 secular schools for government-dependent schools. Private independent schools consist of 17 religious and 17 secular schools. In the case of private independent schools, the proportion of religious schools and secular schools is equal to 50%.

In the case of private government-dependent schools, the proportion of religiously-affiliated schools is 67.3%, while that of secular schools is 32.7%. As for private independent schools, when compared to the private

government-dependent school, the composition ratio of secular schools is higher, while there are more religious schools in private government-dependent schools. This finding is expected to interpret the differential effect of private schooling. According to Newhouse and Beegle (2006), only 10% of Indonesian private school attendees attend non-Islamic schools (i.e. Catholic, Christian, or other religions); most of religiously-affiliated schools are known as Islamic schools.

The education law (NO. 20/2003) states that regardless of school type, every school recommended should comply with the national curriculum. However, compared to public schools, private religiously-based schools are more flexible to government regulation, a necessary curriculum can be easily added. They are allowed to supplement the curriculum with religious instruction. For example, the Curriculum of *Madrasah* (the traditional religious school) consists of 40% of religious content, while 60% are in compliance with the curriculum of the public schools as developed by the MOCE (Hendajany, 2016). The religious contents cover the Qur'anic studies, Arabic language, and Muslim history (Muttaqin et al., 2019). Thus, there are concerns that Islamic schools will be more disadvantageous than other types of schools in terms of academic achievement (Stern & Smith, 2016). However, Hendajany (2016) reported that secular private schools have lower academic performance than Islamic or non-Islamic religious schools. The results of this study help to understand the private school choice discourse in Indonesia. The factors affecting private school attendance are religion, national exit score, gender, and family SES background (Newhouse and Beegle, 2016; Hendajany, 2016; Muttaqin et al., 2019). Among these, the national exit score is the most predictable factor to determine the type of school students attend. The higher the national exit score, the higher the probability of attending public school

(followed by private Islamic schools and private secular schools [Newhouse & Beegle, 2006]). Moreover, rather than religious reasons, parents send their children to private schools due to the quota of public schools, low national exit scores, and the lack of public schools. In other words, the fact that Indonesian parents choose private secular schools out of necessity rather than as the best alternative to public schools supports the poor academic performance of students in private schools (Heyneman & Stern, 2014; Stern & Smith, 2016; Rahman, 2016).

This study also showed that there is no significant difference in the reading of the literacy scores between public and private government-dependent schools (which can be presumed to contain more religious schools). Thus, the inferiority of secular private schools seems to be convincing. These results can be expected to be related to the educational policies which mandate private religiously-based schools to meet national standards reduce the risk that religious schools can be academically less successful. On the other hand, this could be explained by the climate of religious schools emphasizing discipline and moral behavior (PISA 2018 data showed the disciplinary climate for private government-dependent schools was more intense than that of private independent schools) (Coleman et al., 1982).

In this study, referencing PISA 2015 provided the tentative explanation that findings may be related to religion (with the careful assumption that private independent schools share the characteristics of private secular schools) and the private government-dependent school will have the characteristics of a religious school. However, Newhouse and Beegle (2006) suggested that private schools and Islamic schools had lower academic performance than private non-Islamic schools and public schools. This contradictory finding can be explained by the fact that the PISA 2015 data

does not distinguish between religions; thus there is a limit to the provision of sufficient explanation for the results of this study. Therefore, other than the characteristic of private independent schools presented in this study (that its social composition is better than that of public schools), while the attitudes related to individual learning, the characteristics of school-related teaching and learning condition, and the school climate are similar to public schools, it is necessary to examine how actual teaching and learning are carried out in each class. Further studies are needed to investigate which characteristics, teaching, and learning practices contribute to the low academic achievement of private independent schools.

Another possible explanation for differential effect of private school type is school autonomy. Public funding of private school entails restrictions on the autonomy of funded private schools. Many private schools have more autonomy in terms of administration and operations than public schools, which is considered an advantage of private schools (Chubb & Moe, 1990; Wößmann, 2003). On average, the effect of school autonomy regarding personnel management is higher on average reading scores than in schools with less autonomy (Maslowski et al., 2007). The result of this study that is inconsistent with the negative effects of private independent schools. However, school autonomy reforms may have negative effects depending on the degree of economic development and educational development (Hanushek et al., 2013). These authors reported that in developed countries, increased autonomy over pedagogical content, personnel, and budget have a beneficial influence on student achievement. By contrast, in developing countries, increased autonomy undermines students' achievement, where a lack of strong institutional structure. The negative effect in developing countries appears evident for autonomy related to academic content but also

emerges for personnel and budgets (Hunushek et al., 2013). For example, all analyses in this study show that the shortage of an educational staff index was higher for public schools than for private schools. However, the proportion of certified teachers was higher for public schools. This suggests that unqualified teachers can influence teaching and learning practices and that this can lead to the negative effects of private schools. Similarly, Stern and Smith (2016) pointed out in interviews with private school principals that the content and pedagogical knowledge of teachers were insufficient to provide students with quality educational opportunities. Thus, many private schools were more likely to hire a large number of part-time teachers, some of whom hold second teaching positions in private schools, while most of teacher is civil servant and hold full-time positions in public schools. In addition, given that the education law enacted in 2005 to improve teacher quality applies to public schools, the difference between teacher employment patterns and teaching practices based on qualified teachers is expected to widen. In this regard, Lubienski and Lubienski (2013) argue that private school features have been praiseworthy, as high autonomy and less regulation do not apply any longer; it may be that the public sector can be further regulated to adopt more innovative and effective practices, although private independent schools are less likely to reform, giving rise to curricular stagnation.

5.2 Policy implications

Shedding light on the HL effect

It was noticeable that in all analyses, the robust effect of school resources was compared to the marginal impact of family background. As mentioned earlier, in the school effect study on the impact of school and family

background on students' academic performance, this was expressed in developing countries as weak family backgrounds and strong school effects (Heyneman & Loxley, 1982; 1983). A similar phenomenon has since been found in developing countries called the HL effect. However, in recent studies, even in developing countries, strong family backgrounds and weak school effects have been reported just as in industrialized countries (Baker et al., 2002; Buchmann & Hannum, 2001; Heyneman, 2015). They explain this phenomenon because, along with economic development, schools in developing countries have met the minimum requirements. Thus, recently, the importance of schooling, which has been noted since the study of Heyneman and Loxley (1982, 1983), is fading in developing countries. However, considering recent research in developing countries (Bouhlila, 2015; Huang, 2010; Ishiguro, 2018) that reported school effects, it is cautious that conclude the HL effect has disappeared. In particular, this phenomenon appears to be constant in Indonesia. Park and Sandefur's study (2006) that compares family and school effect on reading literacy with PISA 2000 data, the lack of the educational resources seems to hinder student learning. This is also supported by the robust impact of the shortage of educational resources shown in all analyses results of this study.

In school effect research, many researchers have tended to focus on the family background rather than school in relation to educational outcomes. However, the family background is less likely to change compared to that of the school, as schools have more room for improvement, which can lead to students' educational improvement (Byun & Kim, 2011). Therefore, this finding is positive in terms of educational development and inequality in developing countries.

Privatization or public provision

Indonesia, which has achieved quantitative growth at the level of basic education, is moving to lead the transition along with improving quality. Along with educational reform, discussions are underway to increase Indonesia's nine-years compulsory education period to 12 years. Considering that private schools account for a higher proportion of private schools as school levels rise, the implementation of such policies is expected to further increase the number of private schools.

However, presenting different results depending on the type of private school, as shown in this study, implies that policymakers should approach carefully to private schools. That is, the reckless expansion of private schools could hinder the Indonesian government's aim to achieve educational quality. It is undeniable in Indonesia that the private school's decisive role in taking over the burden of the public sector by providing educational opportunities and enabling educational access to the marginalized and those in remote areas. In addition, private school advocates argue that private schools are more involved in national education discourse because they are more responsive to students and their parents than the public sector that they are serving (Tooley, 2009). As such, they suggested the positive aspects of private provision and argued that the proportion of private schools should be increased in the education sector at the national level.

In contrast, Lewin (2007) and Watkins (2004), who maintain a negative stance on private schooling in developing countries, claim that nonprofit organizations cannot provide educational services on a national level without relying on public services. Their main argument is that basic education is a human right that only states can deliver. In particular, the low-cost private school, which must rely on community income, can deteriorate the local

economy. Furthermore, trying to supplement the institutional public education system with non-governance schools is to undermine public education over the long term.

Despite conflicting opinions on the role and impact of private schools, the demand for private schools is still high in Indonesia. Despite the issues raised in the existing literature with regard to funding and infrastructure, the primary reasons for choosing a private school in Indonesia are 1) differentiated demand (mainly religious), 2) low national exit exam score to enter public school, and 3) lack of access to public education (Stern & Smith, 2016; Rahman, 2016). Regarding the perspective of school choice, the first reason is made by the preferences of students and their parents; however, the second and third reasons suggest that the government should have the capacity to ensure that every citizen has the right to be educated (as enshrined in educational law). This does not necessarily mean that education should be delivered through the public sector. As Heyneman et al. (2011) point out, while the state is not a sole provider of education, it will remain a major supplier and a final decision maker of what is needed to learn to become a citizen as well as the main financial source for educational funding. However, as many studies proved, it is difficult to achieve this role without the assistance of the private sector, given the challenging situation at the secondary education level in Indonesia. (Hendajany, 2016; Heyneman et al., 2011; OECD, 2015). Therefore, unless the Indonesian government is going to privatize the education sector according to the market theory, this study suggests that policy attempts should be made based on better understanding of the effect of school characteristics on academic performance to align with the quality of private schools to public levels are necessary.

CHAPTER VI. CONCLUSION

6.1 Summary

This study intends to provide empirical evidence on the school type effect in Indonesia, focusing on the role of the private sector in achieving quantitative expansion in educational development. To this end, the school type effect on the students' reading literacy score was examined, employing the propensity score matching method and multilevel model.

This analysis divided into two parts, first examine the difference in reading literacy scores between private and public schools. The result presented that reading literacy scores of students attending private schools are significantly lower, even after controlling for student background variables, indicating that private schools have a negative impact on students' reading literacy scores.

Second, in further analysis to examine whether the negative impact of private schools is also found in comparison with different types of private schools, private schools are subdivided into private government-dependent private schools and private independent schools according to the degree of public funding.

The difference in reading literacy scores between private government-dependent and public schools was found to be greater than in other analyses. In addition, the family SES background of students attending private government-dependent school was poorer than that of the public and had a more inferior teaching and learning environment than the public. However, the impact of private government-dependent schools on reading literacy

scores was not statistically significant.

On the other hand, the difference between public schools and private independent schools was statistically significant. Specifically, the private independent school has a better social composition and similar characteristics with public schools. Therefore, it is expected that the school type effect does not exist, or the difference is small. However, the results showed different results than expected. The negative effect of a private independent school (-19.18) showed a significantly stronger than compared to overall private school analysis (-11.30).

As a result, this study partly proved the low quality of private schools in Indonesia. This differential effect of private school type suggests that the multifaceted feature of Indonesian private schools. In all analyses, the difference in reading literacy scores between different types of schools also influenced by students' background however, substantial part was explained by school characteristics. Therefore, in terms of educational policy in Indonesia, the implication was drawn to ensure quality education, the government has to provide adequate support and manage private schools in order to ensure quality education as well as efforts to secure government capacity to provide sufficient secondary education opportunities at mass levels. Besides, from the results that the school effect still exists compared to the developed country, it showed the possibility that schooling can have a positive effect on improving students' achievement. This study also suggests that school effect related studies in Indonesia as well as other developing countries where private schools play the role of providing educational opportunities include more various school types, not a dichotomous distinction between public and private schools.

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well as other developing countries where private schools play the role of providing educational opportunities include more various school types, not a dichotomous distinction between public and private schools.

6.2 Limitations and Suggestion for Further Studies

This study contributes to supplement the methodological shortcoming on school effect researches and more rigorously estimate school type effect. Further, this study suggests policy implications regarding private school and educational development in Indonesia.

However, this research has limitations. First, PISA does not provide a pretest measure, prior achievement could not be controlled. Second, PISA does not collect information about religion which is a distinctive feature in Indonesian education. Thus, this research could not provide sufficient explanation related to religion.

Therefore, this research suggests further research based on the data that can better reflect the context of Indonesia, and qualitative research regarding the private school effect or school choice enables to contribute to the development of education in Indonesia.

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국문초록

인도네시아의 학교유형이 학업성취도에 미치는 영향에 관한 연구

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본 연구는 인도네시아의 교육발전 측면에서 사립학교가 교육기회를 제공하는데 중요한 역할을 했다는 점에 주목하여 학교유형이 학생의 학업성취도에 미치는 영향을 실증적으로 분석하기 위해 실시되었다. 분석에는 국제학업성취도평가(PISA)의 2018년도 자료가 사용되었으며 경향점수매칭을 통해 선택편의를 제거한 뒤 학교효과를 보다 엄밀하게 검증하고자 하였다. 기존 문헌에서는 서구의 사립학교와는 인도네시아의 사립학교에서 제공되는 교육의 질이 공립에 비해 떨어지고, 이는 사립학교에 재학하는 학생들의 낮은 성취도로 이어진다는 인식이 일반적이었다. 연구결과는 사립학교 학생들의 읽기 점수는 공립학교의 학생들보다 낮은 것으로 나타나 사립학교유형이 학생의 학업성취에 부정적인 영향을 미치는 것으로 드러났다. 이러한 학교유형에 따른 차이가 사립학교 유형을 세분화하였을 때도 여전히 입증되는지 살펴보기 위해 사립학교를 정부로부터 재정적인 지원을 받는 정도에 따라 정부에 재정적으로 의존하는 사립학교와 정부로부터 재정적으로 독립된 사립학교로 구분하여 학교 유형 효과를 검증하기 위한 추가 분석을 실시

하였다. 그 결과 정부에 재정적으로 의존하는 사립학교유형은 학생의 읽기 점수에 미치는 영향은 통계적으로 유의하지 않았다. 이는 특정 유형의 학교에 다니는 것이 학생의 학업성취에 영향을 미치는 것이 아니라, 학교 자체의 특성이 더 큰 영향을 미친다는 것으로 학교 교육의 중요성을 시사하는 부분이다. 반면, 정부로부터 재정적으로 독립된 사립학교의 학생은 선택편의를 제거한 이후에도 공립학교에 재학하는 학생에 비해 읽기 점수가 통계적으로 유의하게 낮은 것으로 나타났다.

연구 결과는 사립학교의 유형에 따라 학생의 읽기 점수에 미치는 영향이 다른 것으로 나타났다. 이러한 학교유형간 읽기 점수의 차이는 학생의 배경요인에 영향을 받기도 하지만 학교와 관련된 요소들로 설명되는 부분이 많은 것으로 보여져 사립학교의 역할과 양적 확대에 관해 면밀한 검토가 요구된다.

본 연구는 인도네시아의 사립학교효과를 추정함으로써 교육 발전 측면에서 학교자원의 중요성 및 양질의 교육을 제공이라는 교육 목표 달성을 위해 사립학교 역할에 대한 국가의 입장 재정립의 필요성과 같은 정책적 시사점을 도출하였다. 이러한 시사점은 개발도상국의 학교효과 연구에서 단순히 공사립 간 교육결과를 비교를 하는 것에서 나아가 국가의 맥락을 반영할 수 있는 다양한 학교유형이 포함되어야 할 필요성을 보여준다.

주제어: 학교효과성, 사립학교효과, 다층모형, 경향점수매칭 (PSM), 인도네시아 사립학교, 국제학업성취도평가(PISA)

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