

ZONING ADMISSION POLICY AND EDUCATION INEQUALITY: A CASE STUDY IN INDONESIA

Najwa Khairina

Syarif Hidayatulla State Islamic University, Indonesia

<https://orcid.org/0000-0001-9097-7795>

ABSTRACT

Zoning admission policy is a new regulation implemented in Indonesia's public school with the aim of promoting education's equity. Since its application in 2017, zoning policy has raised pros and cons regarding its effectiveness to achieve its goal as opposed to its drawback in hampering school's competitiveness. To assess the effectiveness of zoning policy to promote equity, I followed the model developed by Pöder, Lauri, and Veski (2017) in evaluating zoning policy moderation effect on students' achievement. In this model, I evaluate whether zoning admission policy lowers the effect of family background on students' achievement. Using PISA (2018) survey data, I found that zoning admission policy has a positive moderation effect on students' achievement. The analysis reveals that zoning policy has lowered the family background effect on student achievement both in math and science tests. This result indicates that zoning policy may help government to promote education equality.

Keywords: Family background effect, Moderation effect, PISA, Zoning policy

INTRODUCTION

The provision of equal access to education has been a key issue for Indonesia's government. As an archipelagic country, with more than 17,000 islands scattered across 1,905 million km², providing an equal standard of public education is a very large challenge. Moreover, public education facilities are very hard to access in many regions across the country, and the poverty incidence worsens the situation owing to lack of money to access transportation that is needed to reach the education facilities. In addition, poverty has left people with limited options to choose a school; they often have to endure putting their children in schools that have broken facilities and inadequate numbers of teachers. Thus, many studies have shown that educational attainment is related to individual earnings (Hoxby & Weingarth, 2005; Konstantopoulos & Borman; 2011; Woessmann, 2004), which subsequently impacts the distribution of income in the economy (Benaabdelaali et al., 2012; Castelló-Climent & Doménech, 2021). Education, therefore, has been perceived to have an important role to develop the skills needed to compete in the labour force. Technological innovation in the modern era is well recognised as contributing to the labour force needing to acquire higher level skills. Hence, the role of education is becoming more important in determining students' future income. Subsequently, it has created a competition for students to get enrolled in the most reputable schools that achieve the best performance in education.

Recent research has found that inequality in education is present in many ways. Esteves (2018) found inequality in outcomes according to gender; whereas Zhang et al.'s (2015) research found inequality between regions - rural and urban (Zhang et al., 2015). Similarly, Broer et al. (2019) identified unequal outcomes according to social, economic, and cultural

conditions, and Shifrer's (2013) research highlighted the impact of differences in individuals' physical, mental, and emotional health on educational achievement. Overall, the socio-economic situation plays a significant role in deciding students' quality of education. For instance, Chen, Kong, Gao, and Mo (2018) investigated the relationship between a range of socio-economic factors, including parents' education level, their occupational prestige, family income, and property ownership. In confirming that socio-economic factors affect children's education, it was found that parents with a better socio-economic situation enrolled their children in more reputable schools which were likely to have better academic performance. They concluded that children from low socio-economic families were less likely to perform well in academic pursuits and without the ability to choose schools that might better suit their needs would suffer even more. The perpetuation of this situation clearly worsens education inequality in Indonesia.

In response to such inequality in education, governments typically formulate a policy to reduce the impact of socio-economic factors, which in Indonesia considers school admission policy. The Ministry of Education and Culture has recently enacted a new admission rule through a zoning system (Batita, 2020). Many countries, such as, Japan, Finland, Republic of Korea, USA, and Australia have implemented a form of zoning in their student enrolment system to ensure equality of education long before Indonesia. The main objective of a zoning system is to provide equal access to education, such that every student has the same opportunity to gain an education and in Indonesia enter any school of their choice within their residential zoning area. This policy also supports more equal distribution of resources among schools, thus helping to reduce the so called 'top-notch', highly privileged, schools being the main schools that attract students from more affluent backgrounds, because they have the better economic and educational resources.

Pöder, Lauri, and Veski (2017) consider equality in education from the two perspectives of achieving equal outcomes across different groups and providing equal opportunities. However, in relation to this paper and the Indonesian education context, the issue of equal opportunities to access education facilities despite the family's background is the focus. Furthermore, I investigate how school admission policies can help to create equal opportunities. Considering the fact that family background, such as double-income parents, high socio-economic status, and parents' education, has long been known to privilege students with better access to better education related facilities (Hanushek & Woessmann, 2013; Konstantopoulos & Borman, 2011); Woessmann, 2004)). Thus, this research sought to examine whether educational policy, such as a zoning admission policy is able to moderate the degree of family-background effect on student performance in the Indonesian context and thus may promote education equality.

The implementation of the zoning system has had a mixed response among parents and schools. Since the zoning system has only recently been implemented, as it started in 2017, this study's focus on its effectiveness considers a relatively short time frame. However, it is important to investigate change that hopes to make a difference. This research aims to illuminate the situation by examining the impact of family background effect on student performance and how school zoning policy may moderate the impact of family background on student performance. The research finding, therefore, will be strategic in helping to understand how the school zoning policy may help government create equality in education.

LITERATURE REVIEW

Education has a main role in supporting a nation's development and is vital at the individual level as it is considered a main factor in determining people's income. Thus, education is

perceived as a long-term investment in the economy since it increases the quality of human capital to develop the nation and increase Gross National Product (GDP) (Appiah, 2017; Shaturaev, 2021). Thus, providing better education and ensuring that a larger fraction of the population gets a better quality of education were seen as ways of enhancing opportunity and reducing inequality (Nurhasanah, Wahidin, & Hanafiah, 2021).

Educational equity has two meanings: equal outcomes or equal opportunities. Educational equity is the system's ability to create educational outcomes independently of the background characteristics of parents. Equality of educational opportunity implies that educational services are made accessible to everyone respectful of their abilities and interests (Aksu & Canturk, 2015). This means that everyone should have the right to obtain a quality education, that guarantees the presence, participation, and progress of all students, and above all equal opportunities (Medina-García et al., 2020). However, in practice, limitations have been found, which have resulted in the creation of significant gaps in educational opportunities. Moreover, recent studies have found that long-term inequality in education has not only lead to inequality on the basis of gender (Esteves, 2018), but inequality between provinces and regions, and between rural and urban areas (Zhang et al., 2015), and subsequently across the social, economic, and cultural strata (Broer et al., 2019). Inequality is also shown to impact individuals' physical, mental, and emotional health (Shifrer, 2013). Therefore, inequality in education has a formidable and oppressive impact on society, families and individuals, such that the conduct of research into the potential and success of zoning policies is vital for governments to be able to plan and address the situation and ensure people's human rights are at the forefront (United Nations, 1976).

Inequality of education across social, economic, and cultural strata similarly applies to other developing countries and is known to be a growing problem as governments seek to improve their economic outcomes. While Beblo and Lauer (2005) pointed out that parents' education strongly affects children's educational attainment, they note that where poverty is transmitted from generation to generation, students are likely to inherit their parents' human capital capacity. Thus, without input of resources to change this situation improved educational outcomes are unlikely. Similarly, Muhammad's (2015) research in Malaysia and India also found that students whose parents had achieved high educational qualifications performed better at school than those whose parents were less educated. Undoubtedly, parents with higher educational qualifications are better equipped to educationally and financially support their children's education (Bakar, Mamat, & Ibrahim, 2017; Glick, Randrianarisoa, & Sahn, 2011). This has been enlarged upon by Chen, Kong, Gao, and Mo's (2018) research that a range of socio-economic factors, including parents' education, occupational prestige, family income, and property ownership, impacted their children's educational attainment in terms of their motivation to learn and their reading ability. They noted that the higher the parent's education level, occupational prestige, and income, the greater the children's reading ability and motivation to learn. Of relevance also is the fact that reading ability has been shown to be the most significant predictor of academic success (Bastug, 2014).

Thus, it is well established that children's socio-economic background needs to be taken into account when considering how education systems can ensure equality in the provision of and access to education. In general, high-socioeconomic status (SES) families are in a better position to contribute time, knowledge, and financial resources, besides human capital capacity, to the education of their children compared with their low-SES counterparts. Children of high-income families are typically supported in a range of ways, firstly by attending similarly high achieving schools, and secondly through higher expectations and learning resources available in the home, additional extra-curricular learning opportunities, including private tuition. In contrast, children coming from disadvantaged families are both limited in choice of school, and opportunities for learning outside of school. In the context of Indonesia, their families are

unable to afford the expense to get into ‘a good school’, or access extra support, such that expectations of academic success remain low. Dilas, Mackie, and Trines (2019) state:

[Indonesia] has much lower literacy levels than those of other Southeast Asian nations. An analysis by the World Bank showed that 55 percent of Indonesians who complete school are functionally illiterate . . . [defined as] not equipped with the skills necessary to enter successfully into the labor market.

Concerning income, families with low income may not be able to provide their children with all the necessary resources for living, such as a house, a study area, or a computer besides other supplements like extracurricular books, newspapers, and magazines (Chen et al., 2018). A study by Pöder, Lauri, & Veski, (2017) confirmed the impact of family background as a continuing powerful cause of inequality in educational results. In their case study of Sweden, Finland, and Estonia, they found the effect of family background was greatest in Sweden and least in Estonia. However, they reported that students in Finland performed better in PISA results regardless of their family background characteristics. The study also found that the different sizes of family background effect by country indicated not only variability of inequality of opportunity but also skill dispersion between countries and unevenness of intergenerational mobility. They also noted that increasing inequality in family income translated into inequalities in children’s educational outcomes and subsequently their future life opportunities.

While schools play an essential role in providing students’ opportunity to learn and establish their attitude towards learning, the fact that they differ in terms of teaching quality, resources and facilities (OECD, 2004), paves the way for inequality in learning outcomes. Moreover, schools that consistently achieve better outcomes gain a reputation for academic success which in turn attracts parents who are aware of the advantages of school choice and are able to pay higher tuition fees. In contrast, families from low-socioeconomic backgrounds have difficulty affording even a low-tuition fee for a low-quality school. Researchers have called for government intervention to address such imbalances in the provision of education (Seidman, 2009; Stiglitz & Rosengard, 2015). From a financial perspective intervening indirectly by creating regulation and providing financial aids for students coming from low-income families has been suggested. Alternatively, Seidman (2009) called for more direct operation of public schools where tuition fees would be lowered until they reached zero to accommodate families with the most significant need for support.

Thus, choice of school involves the issue of choice of public versus private schooling, which is by no means new regardless of country, state or city, and in the Indonesian context it is no less so (Asadulla & Maliki, 2018; Stern, & Smith, 2016). Clearly, the existence of public schools is for the purpose of helping children from low socio-economic background families to obtain an education with lower tuition and possibly zero tuition fees. However, as noted earlier, public schools have generally been found to have poorer education quality and academic achievement compared with private schools in developing countries like Indonesia (OECD, 2014; Samuel, 2017) The superior performance of private schools is also typically independent of huge support and investment by governments in public schools, although Stern and Smith (2016) contest this and point out that parents in fact send their children to some private schools that do not perform as well as their public counterparts. They note this may relate to a school providing both religious training and education. They state: “the idea of what makes a school ‘good’ in the eyes of some Indonesian parents may be very different than our traditional view of academic performance above all else” (p. 10).

Education inequality has been an issue for quite a long time in Indonesia and the unequal opportunity to access a good education as well as disparity in education’s quality between

schools and across regions has led to a socio-economic problem. In response, the government has recently developed and implemented a school admission policy. Pöder et al. (2017) have showed that education policies can increase or decrease the magnitude of family-background effect on students' achievement. PISA (2009) stated that there are three things that may prioritise school-level choice policy regarding the school admission of prospective students. These are: (1) students walking distance to school, including zoning or catchment area policies; (2) student's previous performance, including academic record or aptitude test; and (3) students having siblings in the same school. According to Pöder, et al. (2017), school-level admission policies play a significant role in moderating individual-level of family background in educational achievement and outcome regarding the equity of education. Thus, the Indonesian Ministry of Education and Culture's new policy on school admissions was based on students' proximity to schools, hence referred to as the School Zoning System policy. Many countries, such as Japan, The Republic of Korea, New Zealand, Australia, USA, UK, and Finland, already implement such a system (Batita, 2020). For instance, New Zealand's policy has been implemented since 1989, and is based on geographical location, although it only applies to public or government-funded schools to ensure all the students, including those from rural areas, have access to quality education. Zoning of public schools is also implemented in Australia to ensure access whether students reside in urban locations, rural or remote, where distance education is also provided to those students too far away to physically attend. Socio-economic background is also an influence that the Australian education system considers, including student diversity, and regulation of other key factors, such as quality of teachers, and monitoring of students' performance over time (Sulistiyosari et al., 2020). Pöder et al. (2017) showed that allocation of admissions' criteria regarding the procedure, also plays a role in attaining educational equity across an education system and therefore is an important outcome of the policy.

The main goal of the zoning system in Indonesia is to help ensure students receive an equitable education. To do this it is anticipated that the zoning policy will prevent the traditional dichotomy between public and private school choice by changing affluent parents' perceptions of 'favourite schools' being the only 'good' schools. However, most parents desire to send their children to these socially valued favourite schools, regardless of whether they achieve the best academic outcomes or not. This new policy, Regulation of Ministry of Education and Culture No. 17/2017, clause 2, was later revised under Regulation No.14/2018 (Bakar, Supriyati, & Hanafi, 2019, p. 19). The zoning system is divided into two based on (a) the administration area, for example, village, city and district, and (b) the theme/substance, such as service zone, forest zone, and residential zone. The impact of the regulation is long-term with the aim for all schools to be ultimately in an equivalent position to provide an appropriate education for students. The zoning system regulates that public schools owned by local governments must accept prospective students who live within the radius of the closest zone from the school. These students must comprise 90% of the school's enrolment leaving the remaining 10% of places for special cases. The radius of the closest zone is determined by the local government in accordance with the availability of school-age children in the area and the capacity of the study groups at each school.

Before the implementation of this zoning system, Indonesian schools' admission system was based on students' academic report and national examination result. This former school admission system has received substantial criticism since it has been found to exacerbate the problem of inequality, because of socio-economic background being known to affect children's academic performance (Chevalier et al., 2013). Nevertheless, the implementation of the new zoning system has also promoted discussion. Both parents and schools have similar concerns regarding the quality of schools. On the parents' side, the zoning policy affects parents and students whose residential areas are far from public schools thus limiting their options. On the

schools' side, the zoning policy acts to eliminate a school's ability to select students other than those from the relevant zone (except for the 10% the policy allows). Hence, as a consequence, a school's performance may change for the worse, such that the community's view of its competitiveness would be lowered. Thus, Batita (2020) found that this implementation of zoning student admissions was problematic in practice for a range of reasons. These included lack of dissemination of information to the public, lack of local government's preparedness in terms of determining the zone, and general community misunderstanding. While such issues may worsen educational inequality in the short term, Safarah and Wibowo's (2018) early research found that the system was considered effective in seeking to support education equality. However, since the zoning system at the time of this research has been implemented for three years, a study of its effectiveness is timely though limitations are acknowledged in the light of it being a long-term initiative.

BETWEEN THEORY AND EMPIRICAL DATA

A. Education Production Function

Family background and culture has been seen as a key factor in determining student academic achievement and as Zhang et al. (2015) points out, education is the largest investment in human capital where the 'cost benefit' framework is considered the primary underpinning principle for families in their decision to invest in education. Thus, the wealth and economic background of families plays a vital role in student performance and achievement, such that their socioeconomic status is interpreted as a proxy for the quality of the home learning environment. This theory is supported by many studies in which evidence has been found that a family's higher socioeconomic status has a positive effect on student's achievements (Broer et al., 2019; Chen et al., 2018; Chevalier et al., 2013; S. Li, Xu, & Xia, 2020; Thomson, 2018).

In addition, cultural capital theory is also relevant to explaining the connection between family background and students' achievement (Bourdieu & Richardson, 1986). This theory conceptualises how a family's lifestyle and cultural resources are critical in establishing children's intellectual, educational aspirations and motivation to achieve in schools (Nonoyama-Tarumi, 2008). This helps explain how children from socially privileged backgrounds can be expected to succeed in contrast to those from areas of poverty. Put another way, families with high cultural resources are more aware of the importance and availability of education and set expectations and aspirations for their children's success. Similarly, they are able to enrich them with the appropriate resources to support their academic success. This success, as noted earlier, has been shown to be reflected in children's reading achievement (Bastug, 2014), such that a typical measure of cultural capital as discussed by Kingston (2001) and used by Pöder et al. (2017) is the number of books in the home. He notes: "having books around may stimulate children to read, to develop their own literacy, which they can apply to the pursuit of virtually any taste. Books are not an exclusive resource, nor do they develop distinctive class-based dispositions" (p. 95). Therefore, to categorise family background, this paper uses the number of books in the home following Pöder et al.'s (2017) model. Moreover, this proxy for family background is commonly used by researchers as it is considered to be both relevant and reliable as single-dimensional measure (Brooks-Gunn & Markham, 2005; Pöder et al., 2017). Furthermore, Schütz, Ursprung, and Wößmann (2008) advised that the number of books at home may be used as a proxy not only for family education and social background, but also for their economic background, since books are goods that have to be purchased but are not essential like food. It also a recommended statistic because it has a superior data coverage and cross country comparability besides being used as an important single predictor of student performance internationally (Woessmann, 2004).

B. School Admission Policy and Education Equality

Within the view of human capital theory, education is considered as investment for a person's future. The return on such investment in education is in the form of future income, future social status, and networks (Ammermueller & Pischke, 2009). A study by Cunha and Heckman (2007) shows that a person's future return in education can be predicted by looking at their choice of schooling. In addition, Harmon et al. (2003) provide empirical proof of return on education in the United Kingdom; although long term, this was considered higher compared with other types of investment.

When the theory of education production function is considered, Hanushek (1979) shows that schools' input is a main factor in influencing students' achievement. School resources, such as teacher quality, class size, and school facilities are proven to have a positive relation with student achievements. A study by Greenwald et al. (1996) analysed the relation between school resources and student achievement based on the concept of education function production. This study confirmed that a range of school inputs had a strong positive effect on student achievements. Furthermore, Hanushek (2008) highlighted teacher quality as standing out among other school inputs in relation to student achievement. It was shown that schools that had good quality teachers were more likely to produce successful graduates who were likely to excel in winning labour force competitions. This argument was supported by Lee and Wie's (2015) research that outlined a positive relationship between schooling and occupational choice, and future earnings, thus contributing to productivity and economic growth. The quality of a school has also been shown to ultimately influence students' cognitive ability and future productivity besides future income (Hanushek, 2002).

Since parents are aware of the fact that schools play a significant role to determine students' future income, they pay extra attention to investing in their children's future by choosing the best school. In this case, parents, in general, have a willingness to pay an extra amount of tuition for their children's education if they can afford it (Stiglitz & Rosengard, 2015). However, not all parents can afford school fees for a 'top-notch' school that is equipped with high quality teachers and learning facilities. Mainly, only parents from higher socio-economic backgrounds have the option to choose 'a better school' for their children (Chevalier et al., 2013; Hsieh, 2000; Pöder et al., 2016; Shumow et al., 1996). Families from low socioeconomic backgrounds are usually faced with limited choice of schools or no choice.

Thus, the importance of families having choice for their children's schooling is vital to ensuring their educational needs can be met but this needs to be driven at the government and education system level. As noted earlier, among other supportive legislation, national systems that have some form of school admissions policy have been found to improve the equality in students' learning outcomes (Nurhasanah, Wahidin, & Hanafiah, 2021; Raynor, 2017). Wilson and Bridge (2019) point out that policy incorporating school choice mechanisms as a means of allocating students to schools has been incorporated in a variety of ways into a broad range of school admissions policies across the world. As Rayner (2017) also argues, their role in addressing inequality is also vital in guarding against the manipulation of admissions. As an important component of the managerial system this also helps to guard against the shaping of schools as businesses, which can facilitate injustice and inequality. Nevertheless, as Pöder et al. (2017) note a successful education policy in traditional Europe determined children's schools according to their residential neighborhood, Wilson and Bridge's (2019) study found that this system exacerbated school segregation by both socioeconomic status and ethnicity, so worsening inequality. Thus, the debate continues with mixed results (Bakar, et al., 2019; Pöder et al., 2017), but importantly for Indonesia's relatively new initiative it is important to continue research into the policy's intent to show that neighborhood schooling can actually help diminish family background effect on educational outcomes.

RESEARCH DESIGN AND METHODOLOGY

In this paper, I use PISA 2018 survey data for Indonesia to estimate the effect of zonation policy (OECD, 2019). PISA is a large-scale international comparative test of student achievement, conducted by the Organisation for Economic Cooperation and Development (OECD), with 65 countries participating in the testing of 15-year-old students. For this research the data was derived from a total of 10,943 students. PISA data consists of three different surveys to schools, students, and teachers. In this paper I combine school data into student level data. The PISA student database provides individual performance data in mathematics, science, and language and includes wide-ranging background information. While school questionnaires provide information about family input and school policy, this paper combines both data to estimate the effect of school admission policy on student performance, while at the same time observing family background effect as the moderation variable.

RESULTS

Descriptive Statistics

This section reports the descriptive statistics of the main variables in the model. Table 1 describes the descriptive statistics of the proportion of school ownership status. These data consist mainly of public schools (70.81%). This proportion is relevant to the present analysis, since these public schools adhere to the zoning admission policy as noted earlier being enacted in early 2018.

Table 1. School ownership status

	<i>f</i>	%
Private	3,011	29.19
Public	7,304	70.81
Total	10,315	100.00

Further, to measure the Family Background Effect (FBE), I used the number of books at home as a reliable predictor, since it combines multiple family background impact from socio-economic and education aspects (Fuchs & Wößmann, 2008) and is representative of families' resource allocation priority over education related materials (Pöder et al., 2017). Table 2 shows the percentage of students who selected each range of 'number of books at home'. Almost a quarter of students selected 0-10 showing a minimum of books at home. When the range 11-25 is combined with this it suggests that almost 60% of students reported they had 25 books at home or less, including zero.

Table 2: Number of books at home

Number of Books	<i>f</i>	%
0-10	2,636	24.09
11-25	3,772	34.47
26-100	3,091	28.25
101-200	787	7.19
201-500	353	3.23
>500	304	2.78
Total	10,943	100.00

Scrutiny of the remaining distribution shows a further 28.25% of students reported having between 26 and a 100 books at home, thus, on the overall data, book ownership was mostly spread around 0-100 total books at home, which on the cumulative percentage accounted for around 87% of students.

Table 3 below depict the proportion of schools applying zoning policy. The percentage of schools reporting that they always implement zoning policy is almost 60%, while the proportion of schools that never use zoning admission policy is reported at only approximately 15%. Thus, this confirmed that I had enough observations to investigate the relationship between FBE and student achievement with the zoning policy as a moderating variable.

Table 3: Proportion of schools applying zoning policy

Zoning Policy	<i>f</i>	%
Never	1,477	14.32
Sometimes	3,015	29.23
Always	5,823	56.45
Total	10,315	100.00

Empirical Analysis

A regression analysis was conducted to estimate the relationship between FBE and student performance. In addition to this analysis, I used zoning admission policy as a moderating variable with the main purpose being to estimate the moderating (decreasing) effect of the zoning policy on family background (as zoning policy is expected to eventually affect students’ test performance). The following regression model was used in the analysis:

$$A_i = f(F_i, S_i)$$

Where *i* indicates an individual at school *s*, *A_i* represents student’s achievement, which was measured by test score in math and science¹. *F_i* represents family background and number of books at home is used as a proxy for family background and *S_i* represents school zoning admission policy. To further analyse this model, the following regression equation was applied:

$$A_{is} = \alpha + \beta_1 * F_{is} + \varepsilon \dots\dots\dots (i)$$

$$A_{is} = \alpha + \beta_1 * F_{is} + \beta_2 * S_{is} \dots\dots\dots (ii)$$

$$A_{is} = \alpha + \beta_1 * F_{is} + \beta_2 * S_{is} + \beta_3 F_{is} * S_{is} + \varepsilon \dots\dots\dots (iii)$$

The data were divided into two sets: (1) the full sample and (2) the public-school subsample. This division allowed a deeper analysis of the public-school data set, since the obligation to implement zoning policy was strictly imposed in these schools. The result of these regression estimates for both Math and Science, for each set, are reported in the next two sections, respectively.

Full Sample Analyses – All Schools

Table 4 presents the regression result for the Math test scores for the above three regression models (i, ii, iii). The first model (Model 1) provides the estimation result of the effect of FB on students’ Math test score. The coefficient for the first model shows a positive and statistically significant association between books as a proxy of FBE and student performance on the Math test (*p*<.01), with a magnitude of 11.29. This shows that students with the higher group of book ownership are associated with a higher math test score, of as much as 11.29 points. In model two, the result was similar for FBE even after the zoning policy variable was added, however, zoning policy was not proven to be statistically significantly associated with students’ test score. Similarly, in Model 3, where I measured the moderation effect of zoning policy on FBE in relation to the test score, the regression result shows that even though the zoning policy variable and interaction between zoning policy and books was not statistically significantly associated with student’s test score, they are shown to have a moderation (decreasing) effect on books, such that the

¹ The reading test score was not included in the analysis based on Pöder et al.'s (2017) point that reading test scores may be influenced by students having English as an added or foreign language.

coefficient is slightly lower compared to the estimation result in Model 1 and Model 2. These results provide empirical proof that the zoning admission policy may help to lower the effect of family background on students' performance, and hence should assist government to better promote education equality.

Table 4: Full sample regression estimates on FBE and Zoning Policy for the Math test score

Y=Pv1Math	Model 1	Model 2	Model 3 Policy Moderation
Book	11.29137***	11.58875***	10.67486***
Zoning Policy		1.278306	-0.27261
Book*zoning policy			0.64738
Constant	374.666***	371.5036***	373.706***
Adj-Rsquare	0.0243	0.0254	0.0254
Prob (F)	0.0000	0.000	0.000
Number of Obs.	10,943	10,261	10,261

Note: ***, **, * indicate the level of significance at 1, 5, and 10 percent, respectively.

The second analysis provides the estimation of the results of the effect of family background on students' Science test scores. Similar to the Model 1 results for Math, the coefficient for this model shows a positive and statistically significant association between books as a proxy of FBE and student performance on the Science test, with the magnitude of 11.88, which is slightly higher compared to the result for Math. This shows that students with the higher group of book ownership are associated with a higher Science test score, as much as 11.88 points. Both Model 2 and Model 3 for Science show a similar result as for the Math equivalent results. Here we also see that zoning policy gives a moderation effect on book ownership such that the book coefficient as the proxy for FBE is decreasing. These results suggest empirical proof that zoning policy helps to lower the FBE on student performances.

Table 5: Full sample regression estimates on FBE and Zoning Policy for the Science test score

Y=Pv1Science	Model 1	Model 2	Model 3 Policy Moderation
Book	11.88189***	12.0768***	10.77654***
Zoning Policy		-0.67206	-2.87864
Book*zoning policy			0.9210721
Constant	386.8143***	386.6079***	389.7414***
Adj-Rsquare	0.0351	0.0359	0.0358
Prob (F)	0.0000	0.000	0.000
Number of Obs.	10,943	10,261	10,261

Note: ***, **, * indicate the level of significance at 1, 5, and 10 percent, respectively.

Sub-Sample Analyses – All Public Schools

Table 6 and 7 present the regression estimation results for the Math and Science test scores for the public schools, respectively. They show that the coefficient for the effect of number of books at home is higher compared with the result from the full sample, but with the same level of statistical significance ($p < .01$). The results were statistically significant at this level, for all the three models on a par with the full sample results. Similarly, these results provide evidence of a moderating effect from the zoning policy. Both models using the full sample and the public-school sample gave a consistent estimation result, providing empirical evidence of a moderation effect of zoning policy. This gives hope that the zoning policy in the long term may help government to improve education equality. As the implementation of zoning policy in this research context aims to support education equality by giving equal opportunities for students from different family backgrounds to enter a school of their choice, this should also help promote more equal distribution of resources to schools, thus encouraging similar quality of education provisions. The proof of moderation effect of zoning policy in these regression analyses provides an early indication that family background has lesser effect on student academic performance when a zoning policy is implemented as in the Indonesian education context. Thus, the continuation of zoning admission policy in the long run should help to further decrease the family background effect on student's academic performance.

Table 6: Public school sub-sample regression estimates on FBE and Zoning Policy for the Math test score

Y=PV1Math	Model 1	Model 2	Model 3 Policy Moderation
Book	12.76225***	12.77509***	10.91478***
Zoning Policy		2.025793	-0.9724
Book*zoning policy			1.267831
Constant	377.0759***	374.1031***	378.5137***
Adj-Rsquare	0.0295	0.0296	0.0296
Prob (F)	0.0000	0.000	0.000
Number of Obs.	7,729	7,279	7,279

Note: ***, **, * indicate the level of significance at 1, 5, and 10 percent, respectively.

Table 7: Public school sub-sample regression estimates on FBE and Zoning Policy for the Science test score

Y=PV1Science	Model 1	Model 2	Model 3 Policy Moderation
Book	12.7684***	12.77314***	10.7782***
Zoning Policy		0.74787	-2.467305
Book*zoning policy			1.3595
Constant	389.7394***	388.6419***	393.3718***
Adj-Rsquare	0.0384	0.0386	0.0384
Prob (F)	0.0000	0.000	0.000
Number of Obs.	7,729	7,279	7,279

Note: ***, **, * indicate the level of significance at 1, 5, and 10 percent, respectively.

CONCLUSION

In this study I analysed the empirical evidence to investigate whether there was a moderation effect from the implementation of a school zoning policy on Indonesian public school students' academic achievement by increasing or diminishing the effect of family background. This policy has been seen as a solution for promoting equal opportunity for students to be admitted to good and affordable schools. Since its implementation in 2017, it has been expected to help achieve greater education equality across regions within Indonesia's territory. While it is acknowledged that the desired results from this change in policy will take time and this present research indicates some promising results it is important that such research continues but also includes investigation of how the various stakeholders are experiencing the change in practice.

Moreover, the impact of family background is profound, such that it remains a deep-seated, prevailing cause of poor education outcomes for students from low-socioeconomic backgrounds, so much so that it is intergenerational. As noted earlier, to achieve a more equitable educational outcome is not easy, particularly where there is significant poverty since students need to move beyond the human capital capacity they have typically inherited from their parents. Thus, the ability to escape the vicious cycle of poverty also needs to be considered from the perspective of curriculum and development of literacy, numeracy and technology

skills (Cheung & Slavin, 2013; Gulati, 2008; Hubber, Outhwaite, Chigeda, McGrath, Hodgen, & Pitchford, 2016).

Using the Ordinary Least Square (OLS) regression estimates, we found empirical evidence that school zoning policy reduces the effect of family background on student's academic performance. Even though the zoning policy variable itself was not statistically significant, by including the zoning policy variable into the model a diminishing effect of family background on student performance was observed. This result was already expected because the zoning policy had only begun to be implemented in 2017, only a year before the PISA survey administration. While this indicates the implementation of the zoning policy has lessened the impact of family background on student performance, the empirical analysis excludes the estimation of reading test scores although reading ability is an indicator of academic success. However, as explained earlier, since the research was conducted in Indonesia, a non-English speaking country, performance in reading was omitted (Pöder, et al., 2017). Nevertheless, because of the relevance of reading ability to gauging students' future academic performance it is recommended that this be considered in future research (Cheung & Slavin, 2013; Gulati, 2008; Hubber, Outhwaite, Chigeda, McGrath, Hodgen, & Pitchford, 2016).

On the other hand, in this paper I only discuss the moderation impact of zoning admission policy and did not compare the effectiveness of any other type of admission policy to raise education equality. It needs to be noted that zoning admission policy may have several drawbacks, such as elimination of school classification based on academic achievement, which may cause a decline in school quality within the nationwide 'top-notch' public schools. Thus, future research that compares the effectiveness of different admission policies applied in Indonesia's schools would provide more extensive strategic information on the influence of admission policy related to students' academic achievement and how it subsequently affects education equality.

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Address for correspondence: Najwa Khairina, Faculty of Economics and Business, Syarif Hidayatullah State Islamic University.

Gedung Baru Fakultas Ekonomi dan Bisnis UIN Syarif Hidayatullah Jakarta
Jl. Ibnu Taimiyah IV, Ciputat Timur, Tangerang Selatan, Indonesia 15419

Email: <najwa.khairina@uinjkt.ac.id>

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