University of Groningen

The education divide in Indonesia

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Publication date:
2017

Link to publication in University of Groningen/UMCG research database

Citation for published version (APA):
Muttaqin, T. (2017). *The education divide in Indonesia: Four essays on determinants of unequal access to and quality of education*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.

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The impact of decentralization on educational attainment in Indonesia

Abstract

This study contributes to our knowledge on the impact of decentralization of the education sector in Indonesia. We extend existing research by examining the influence of both municipal factors and other explanatory variables on educational attainment in Indonesia. We focus on mean years of schooling as an indicator of educational attainment. We hypothesize that after decentralization, 1) educational attainment is higher compared to the pre-decentralization era, 2) regional variations in educational attainment will have increased, and 3) the fiscal capacity, degree of urbanization, and development will be higher; the higher the municipality's mean year of schooling. The latter is also expected for the newly created municipalities of the past years. We test the hypotheses with panel data on 5,541,983 respondents aggregated to 3,880 observations nested in 491 districts/cities nested in 32 provinces for the pre and post-decentralization era. The results reveal the following. First, after decentralization, the length of schooling slightly increased but progress in the length of schooling has slowed down a bit. Second, educational attainment variation between provinces slightly decreased but the variation among municipalities increased. Third, the degree of municipalities' development and urbanization have a significantly positive impact on improving educational attainment while the fiscal capacity and the status of being a new municipality do not have a significant effect on extending the length of schooling. Our findings suggest that especially rural areas and less developed municipalities have lagged behind in the attempt to improve Indonesia's educational attainment.

4.1   Introduction

Decentralization has become a global phenomenon that has taken place in more than 80 percent of the world's countries, in both developed and developing countries (Manor, 1999). Many donor agencies and development institutions promote decentralization as a major element in good governance efforts (Berg-Schlosser, 2004). From a good governance perspective, decentralization entails bottom-up planning as a strategy to capture and address local needs and aspirations (Johnson, 2001; Devas, 2002), and to achieve responsiveness and accountability of policy makers to local citizens (Crook & Manor, 1998). Reasons to implement decentralization are diverse, ranging from international economic pressures to internal demands for increased citizen participation (Duncan, 2007).

For a long time, Indonesia was one of the most centralized nations in Asia (e.g. Budiman, 1988; Mackie & MacIntyre, 1994; Nordholt, 2003). This situation changed dramatically when the Indonesian government initiated a decentralization wave in 2001. The country was decentralized in the hope to realize a modern, decentralized administrative system that would accelerate the improvement of public services, particularly in the education field (BEC-TF, 2010).

Since the 1990s, education has been an increasingly important policy domain in Indonesia. Education is perceived as crucial to the country's economic transition from an agricultural to an industrial economy that increasingly depends on the skills of employees (Jeon, 2011). In addition, Indonesia is a socially and ethnically diverse country, with over 300 distinctive ethnic groups and 742 different languages and dialects (Unesco, 2011). Universal education is assumed critical to strengthen social cohesion among citizens, which in turn is important to maintain political stability as well as sustainable economic growth (Unesco, 2011).

The decentralization of education was expected to become a stepping-stone to improved educational outcomes in Indonesia. In the decentralization literature, there are two perspectives on the link between decentralization of education and educational outcomes. Proponents of the first perspective argue and present evidence for a positive effect of education decentralization, such as Heredia-Ortiz (2007). In Indonesia, for example, Simatupang (2009) showed that on average most education outcomes significantly changed for the better after decentralization. Moreover, local governments were found to respond better to local needs for education services, as indicated by improvements in the national average years of schooling, adult literacy rates, female literacy rates, and lower high school dropout rates. In addition, several evaluation findings showed that decentralization leads to service provision practices that are closer to the local people's needs (Usman, 2001; UNDP, 2002; Sumarto, Suryahadi, & Arifianto, 2004).

However, proponents of the second perspective present studies showing that decentralization has a negative impact on educational outcomes (see, for instance

Treisman, 2000). In the Indonesian case, Kristiansen and Pratikno (2006) for example presented evidence that decentralization of education almost tripled the school costs. Consequently, parents may be asked to pay more for their children's education, which may lead to school dropout. Others added that after one decade of decentralization in education, Indonesia's education service is still not satisfactory because of a lack of competence of the education district offices, which will also hamper educational outcomes (Haryanto, 2010).

In sum, previous studies produced inconsistent and contradicting evidence on the impact of decentralization on improving one particular educational outcome in Indonesia, namely years of educational attainment. This study aims to explain these inconsistent findings by focusing on the variation in educational services and outcomes in the various administrative levels that came into existence with Indonesia's decentralized system of governance.

We assume that decentralization enables the local government to properly respond to local demands to improve government accountability and to innovate and advance their effectiveness in the educational field, which may lead to improved adults' educational attainment and thus to a sustainable society. However, next to the positive effects, decentralization may have negative effects on educational outcomes, depending on the functioning of the lower administrative levels as a new actor in educational service provision. Therefore, decentralization does not necessarily have a positive impact on educational attainment; this depends on regional characteristics and a local government's implementation capacity and quality. For example, the reduced power and information position of the central education ministry could lead to system collapse (Madeira, 2012). Decentralization can also lead to confusion over education management and policy implementation, which can negatively affect educational effectiveness and efficiency (Treisman, 2000).

Nevertheless, if planned and implemented properly, decentralization has the potential to improve education services, and thus educational attainment, connecting local level aspirations and preferences. Likewise, decentralization can also strengthen accountability because it provides robust incentives for local administrative levels to work towards better education services. Decentralization is thus likely to generate differential effects on educational attainment in the various regional and local levels.

4.2 Research questions

Given that the decentralization process in Indonesia led to more autonomy in educational policymaking and implementation, we assume that regional differences and variation in local authorities' capacities to manage the education system have increased. The main research question of this chapter is, therefore: *To what extent did the decentralization of*

Indonesia's educational sector affect (variability in) educational attainment at the provincial and municipal levels?

In this study, educational attainment is operationalized by length of schooling received. The two sub questions that guide this paper are (1) to what extent did length of schooling change before and after decentralization and (2) to what extent does length of schooling vary within and between local administrative levels?

In the remainder of this chapter, we first discuss both the social and scientific contribution of this paper, followed by the research design and methodology. Before presenting the theoretical framework and hypotheses, we briefly describe the setting of educational decentralization in Indonesia. We then discuss the empirical findings in relation to the research question and hypotheses, and close with the conclusion and recommendations.

4.3   Social and scientific significance

Indonesia is an interesting decentralization case to study since it implemented the decentralized system as a "big bang" (World Bank, 2003). It changed from one of the most centralized countries to one of the most decentralized in the world, after it bestowed power and authority from the central government to the local level (Nordholt, 2003). This big bang of decentralization allows the study of its impact on service provision in the educational sector.

This chapter contributes to the existing literature on decentralization in education by presenting a before and after analysis of the impact of decentralization on changes in educational attainment in Indonesia. We use panel data of the pre-decentralization era (1996-1999) and the post-decentralization (with direct elections) era (2008-2011). The scientific relevance of this study is thus in analysing the effect of decentralization on regional inequality. Despite a considerable number of studies on the impact of decentralization on educational attainment, to our knowledge no explicit exploration of the conditions under which decentralization may have positive and/or negative effects on educational attainment has been carried out in Indonesia.

The societal relevance of the study is to provide insights that may be helpful in developing context-specific policy interventions aimed at improving educational attainment in specific regional situations in Indonesia. These insights are important for creating effective and targeted government interventions as part of Indonesia's good governance ambitions in terms of voice and accountability as well as government effectiveness, which are both important World Bank good governance indicators (Kaufmann, Kraay, & Mastruzzi, 2009). Voice and accountability capture perceptions of the extent to which the citizens are able to participate in selecting their government. Government effectiveness captures perceptions of the quality of public services, the quality of policy formulation, and implementation (Kaufmann *et al.*, 2009).

4.4   Research design and methodology

In the following sections, we first present a review of the international literature on decentralization in the Indonesian context and then develop three hypotheses that will guide subsequent statistical analyses. We employ both descriptive statistics and multilevel regression analyses (see, *e.g.* Snijders & Bosker, 2011). Looking at the nature of decentralization, which involves a multilevel government structure, we need to consider these various levels in our analysis to comprehend the effects of decentralization at these levels.

Even though decentralization in Indonesia mainly pertains to the district and city level, the impact at the province level is also critical because, since 2008, the central government has mandated governors as central representatives to coordinate among districts and cities. We take into account the impact and interdependence of these various levels (municipalities and provinces), where each province consists of several municipalities. We included different time points related to the two decentralization phases: four years before decentralization from 1996 to 1999 and four years after decentralization with democratization (2008 to 2011).

In this manner, we can study the change in educational attainment measured by length of schooling from the pre-decentralization period to the post-decentralization period, and the development in length of schooling over the years as expressed by the mean length of schooling and the correlation matrix. We tested the impact of four important factors affecting educational attainment: the municipalities' fiscal capacity, the proportion of urban area, the municipalities' type and level of development, and the municipalities' establishment (i.e., whether new or not). Moreover, we tested the stability of the effect of the control variables over time, by including so-called cross-level interactions (Snijders & Bosker, 2011).

4.5   Decentralization and education in Indonesia

The concept of decentralization is broad and varied. Rondinelli and Nellis (1986, p.5) define decentralization as "the transfer of responsibility for planning, management, and the raising allocation of resources from the central government and its agencies to field units of government agencies, subordinate units of levels of government, semi-autonomous public authorities or corporations, area-wide, regional or functional authorities, or non-governmental private or voluntary organizations". Likewise, Mawhood (1983) simply defines decentralization as the devolution of power from central to local governments, whereas others define it more precisely as a transfer of authority and responsibility for public functions from the central government to subordinate or quasi-independent government organizations (Cohen & Uphoff, 1997; Litvack, Junaid, & Richard, 1998; UNDP, 1999).

Conceptually, there are different types of decentralization, depending on the degree of autonomy granted to the local level (for a discussion of these types sees Uphoff 1997; Litvack *et al.*, 1998; UNDP, 1999). The World Bank (2004) categorized the decentralization process in Indonesia as *devolution*, which is defined as a transfer of authority through which the central government moves responsibility and certain functions to quasi-autonomous units of local governments that are beyond its direct control. Devolution is considered the most rigorous type of decentralization (Cohen & Peterson, 1999)

The way in which the Indonesian education system is based on the decentralization policy is described in both Regional Government Law and Regional Fiscal Balance Law.[6] These laws rearrange the roles, functions, and responsibilities among government levels and they were a starting point to implement direct elections. While steps towards decentralization were already taken in 2001, it was not until 2004 that the governors, mayors, and heads of district were given even more autonomy due to the introduction of direct elections at the local level (Sjahrir & Kis-Katos, 2011). Direct elections demand that local leaders not only take into account the orders of the central government but also consider the aspiration of the voters. Consequently, decentralization gives more opportunities for local governments to exercise their decision-making authority to pursue their objectives.

The introduction of direct elections stimulated all local leader candidates to offer attractive promises in their campaigns, including, for example, a commitment to abolish education fees, so that voters elect them. Free education, therefore, has appeared as a prominent topic in almost all local political contests since. Several studies conclude that in direct elections, education has usually become a strategy for candidates to gain popular votes (Sifuna, 2005; Oketch & Rolleston, 2007).

In the decentralized system, the central government annually allocates more than 32 percent of the government expenditure to the provinces, districts, and cities (*Budget Statistics,* 2006-2012). Such allocation provides more options for local governments to improve public services, particularly in the education sector, because it is stated in the constitution that governments (central, provincial, district, and municipal level) are obliged to allocate a minimum of 20 percent to the education sector. Moreover, the local governments also received enormous human resources transfers: more than 2.6 million public servants are currently working at the lower level (World Bank, 2003), of which the majority work in the education sector, such as teachers, principals, and staff of local education offices.

The Constitution of Indonesia states that every citizen shall have the fundamental right to obtain education (Indonesia constitution, preamble). Operationally, the Indonesian education system is based on Law no. 20/2003 of the National Education System that integrates various types of education, including general, technical and

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[6] The Regional Government and Regional Fiscal Balance Law No. 33/2004.

vocational, and madrasah (religious) schools, both formal and non-formal. Under this law, formal education is defined by the following: (1) pre-primary education for the age 4-6, (2) six years primary education for ages 7-12, (3) three years lower secondary education for ages 13-15, (4) three years upper secondary education for ages 16-18, and (5) higher (tertiary) education (Law no. 20/2003).

The government initially launched a six-year compulsory education requirement in 1984, which was followed by introducing a nine-year compulsory education system in 1994 (Arina, 2011). Currently, the decentralized education system deals with more than 50 million students ranging from primary to senior secondary education in 247,383 schools with more than 42 million pupils enrolled in compulsory education (Central Bureau of Statistics or CBS, 2014). Tertiary education is centrally administered and it consists of 5 million students in 3,815 public and private higher education institutions (CBS, 2014).

After more than one decade of education decentralization, the inputs of the education sector have consistently increased, especially after the fully decentralized system was implemented with almost all local government leaders being directly elected. This is indicated by an increasing number of schools from 227,481 in 2005/2006 (as a point of departure for the initiation of direct elections) to 231,823 in 2008 when all the local governments' leaders were directly elected. This growth in the number of schools continued to 234,771 in 2009/2010 and 247,383 in 2011/2012 (CBS, 2014).

The fact that the government provided the funds to establish more schools as a way to improve access to education, also resulted in rising enrolment rates both in compulsory education (pupil age 7-15 years) and in years beyond compulsory education. For example, school enrolment rates of pupils in the age of 7 to 12 years consistently increased from 95 percent before the decentralized system in 1999 to 98 percent in 2012. Likewise, school enrolment rates of pupils in the age of 13 to 15 years rose tremendously from 79 percent in 1999 to almost 90 percent in 2012. Also school enrolment rates of pupils between the ages of 16 and 18 years increased considerably from 51 percent to almost 61 percent (CBS, 2014). To conclude, at the national level, overall access to education improved after one decade of decentralization.

4.6   Theory and hypotheses

Theoretical work about the impact of government decentralization dates back to the early 1970s. Oates (1972) introduced the preference-matching argument, reasoning that decentralization will improve allocative efficiency by bringing greater diversity into the supply of public services, because decentralization allows serving a diverse set of preferences for public goods. Oates (1972) and Tiebout (1956) also argued that decentralization leads to an efficient provision of public goods because local preferences are better served than in the case of centralization.

The basic assumption behind such claims is that decentralization stimulates political accountability, which will have a positive effect on government efficiency. Elections provide accountability through two different, although related, effects. First, it creates a selection effect, since voters can decide not to re-elect incompetent incumbents. Second, it promotes an incentive and discipline effect, since unsuccessful incumbents have an incentive to improve the quality of government in order to increase the probability of re-election (Besley & Smart, 2007).

Due to these two effects, it is assumed that decentralization and direct elections enable local people to choose local government leaders who are responsive and accountable. In turn, these local leaders will have an incentive to absorb local preferences and to develop context-specific policies and programs. Decentralization is thus assumed to lead to informational advantages on the side of local governments (Hayek, 1948), as well as to more attention to preference heterogeneity and to more opportunities to control agency problems (Tommasi & Weinschelbaum, 1999; Bardhan, 2002).

Increased local government resources will positively reinforce this process, because it gives local governments even more autonomy to design and plan context-specific educational programs and to promote local government ownership, which is important to strengthen local government control (Simatupang, 2009). The resulting context-specific educational programs, based on appropriate control, are expected to lead to improved educational outcomes (Sjahrir & Kis-Katos, 2011), because these programs can incorporate the social, cultural and geographical diversity in municipalities, which was neglected in the centralization era due to a one-size-fits-all development policy.

The above arguments align with Faguet and Sanchez' findings (2006) that showed decentralization improved public school enrolment in Colombia. Their study also showed that in highly autonomous districts characterized by less central government control, enrolment rates increased while in districts with greater control from the central government enrolment rates declined. Similarly, for the Argentinian case, Habibi *et al.* (2001) found that decentralization had a positive and significant impact on enrolment rates. This led them to conclude that decentralization is positive for education because it allows local governments to raise more of their own resources, which is conducive to improving educational output. Therefore, the first hypothesis reads: *Compared to the pre-decentralization era, the progress in the mean length of schooling is higher overall after decentralizing Indonesia's educational sector (H1).*

Whereas we expect that overall more progress will be made in educational attainment, in terms of an increasing length of schooling after decentralization, decentralization can also have a negative effect by creating more regional variation. We expect that some regions will benefit more than others from the decentralization process for the following reasons. First, transferring the decision-making authority closer to local people might only generally yield positive results if the local government's capacity is adequate. The other way around, the benefit of decentralization may be weakened when local governments lack technical capabilities. For example, Galiani and Schargrodsky's

findings (2002) showed that the effect of decentralization on educational outcomes in Argentina is generally positive, but that its impact is stronger in provinces that are fiscally better managed. Conversely, the impact is negative for schools located in poor provinces with lower fiscal capacity.

Second, although local people's aspirations regarding public services might be similar, the local voters' preferences in policy domains may vary depending on local characteristics. For instance, in some districts, most people might favour a better transportation infrastructure over a better education system, whilst in other districts one may prioritize the education sector. These assorted decisions may influence the success of public services, such as education. It implies that if local governments based on voters' preferences place education services as the highest priority, education service delivery is more likely to improve. On the other hand, if local governments do not emphasize education services, the results may be the opposite.

Third, local governments differ in terms of resources and constraints that may affect education services (Kaiser, Hofman, Kadjatmiko, & Suharnoko, 2006). For example, some municipalities, which have revenue sharing from oil and mining, generate much more revenue that can be spent on education, while other municipalities do not have this source of income. In terms of governance, variations among municipalities may thus influence the effectiveness to provide better educational services.

To summarize, local governments' disparities regarding voters' preferences, decision-making and implementation capacity, and resources and constraints may intensify regional variations in educational outcomes, such as educational attainment. We therefore expect that after implementing decentralization, variability in length of schooling between municipalities and between provinces increases. Thus, the second hypothesis reads: *Compared to the pre-decentralization era, regional variation in education attainment both in municipal and provincial level is higher after decentralizing Indonesia's educational sector (H2).*

As we argued, the effect of decentralization on educational attainment is expected to be influenced by a local government's capacity, such as human, financial and information resources, and infrastructure (Williamson, Rajabifard, & Enemark, 2003). Various aspects matter in this regard, the first one being fiscal capacity[7]. Subroto (2007) found, for example, that the decentralized system increased fiscal capacities of municipalities in Indonesia and thus may increase local government education expenditure. However, Subroto (2007) found that decentralization increased disparities in education expenditures per student, which thus enlarges the gaps in fiscal capacities for education across municipalities.

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[7] According to Ministry of Finance decree No. 54/PMK.07/2014, fiscal capacity refers to an overview of each region's financial capacity which is reflected through the general revenue in Local Government Budget (excluding Special Allocation Fund, Emergency Fund, old loans, and other revenues restricted for financing certain expenses) to fund the government's duty net of personnel expenditures and the number of poor people.

The capacity of municipalities is influenced by other characteristics as well. Whether a municipality is urban or rural, for example, may relate to lower per capita cost of providing education service (Jayasuriya & Wodon, 2003). Kessides (2005) argues that efficiency would be better in urban than rural areas because monitoring may be easier in urban areas. Urban areas also often have better infrastructure and facilities, such as good transportation. This facilitates short travel distances to school, which stimulates education attainment (Johansone, 2010). In addition, living in urban areas provides better reinforcement for students' school completion. Therefore, we predict that the type of municipality administration and level of the socio-economic development effect on the education service.

Furthermore, referring to the Regional Government Law No. 32/2004 and the Ministry of Development for Disadvantage Regions (MDDR) decree on list of underdeveloped districts, we assume that cities have more resources than district as indicated by Gross regional product (GRP) (Halim, 2002). In addition, Prud'homme (1995) points out that economic activity and average income in a city is larger than those in a district. Moreover, in terms of socio-economic circumstances, the government defines that an underdeveloped district is in general worse than a developed district (MDDP, 2014).

Fourth, local government proliferation policy, including at municipality might influence on variations in capacity of the municipality. We that municipality proliferation is matter whether a municipality is newly established or not.[8] Studies on the impact of local government (municipality) establishment and formation have varied in terms of their conclusions about the possible outcomes of establishing new municipalities (Brancati, 2006). In the Indonesian context, Qibthiyyah (2010) shows that the impact of the creation of new local governments is not uniform across the effected local governments. Her findings show support for the existence of improved education outcomes in new local governments as represented by a reduction in the dropout rate. Qibthiyyah (2010) explains that the presence of spill over may be signaled by a relatively worse outcome in the originating municipalities during the post-event of municipality creation in contrast to outcome improvement in the new municipalities. The findings also imply the creation new municipalities tend to improve service delivery from higher accountability and higher intergovernmental transfers.

Based on the above, we decided to include four proxies into our analysis that provide information about a municipality's capacity: (1) the local government's fiscal capacity; (2) the proportion of urban area (urbanization), which influences the economies of scale; (3) the type of municipality administration and level of the socio-economic development; and (4) the type of new municipality establishment. The third hypothesis expects: *the higher the fiscal capacity, and the degree of urbanization and development*

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[8] In the context of Indonesian, decentralization intertwines with a policy to create new municipalities, i.e., the creation of new local governments one part of the decentralization program in Indonesia. According to Harmantyo (2011), a number of municipalities have increased from 319 in 1999 to 524 in 2010.

and if a municipality is newly created, the longer the municipality's mean year of schooling (H3).

Based on those arguments, the theoretical framework could be systemized in figure 4.1.

Figure 4.1 Theoretical Framework
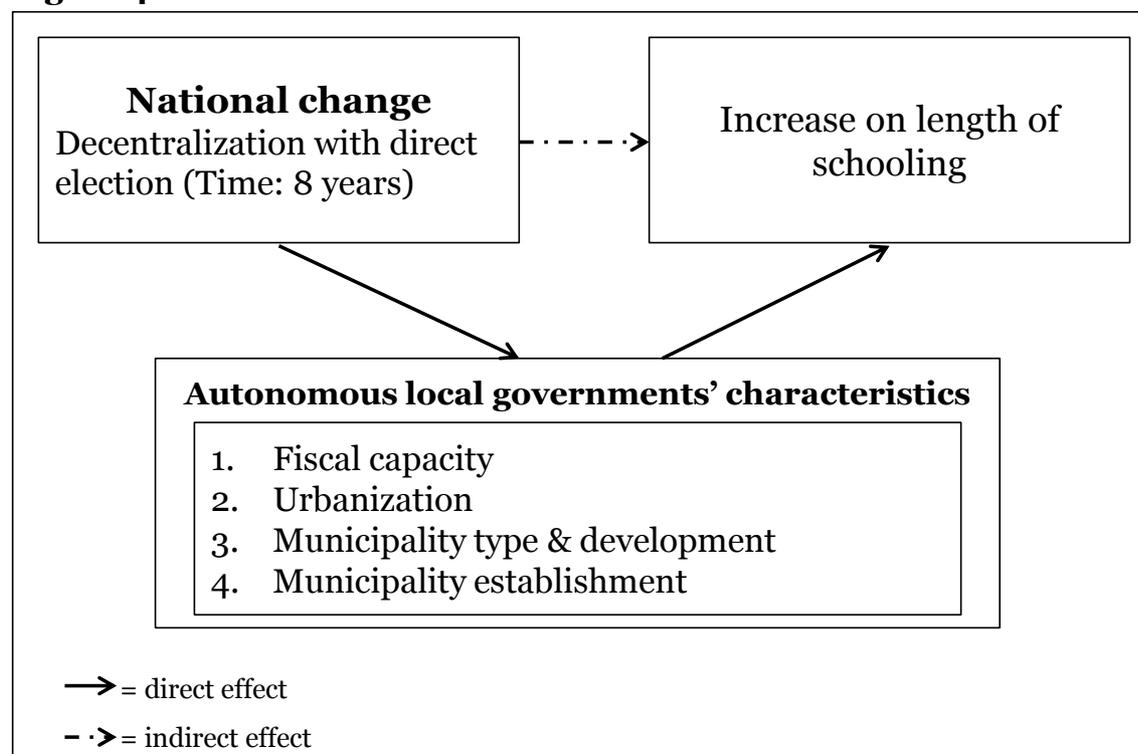
4.7   Data and method

4.7.1 Data and measurements

The most important source of data for our analysis was a rich, annual nationwide survey: the national socio-economic survey (Susenas) from the *Indonesia Central Bureau of Statistics* (CBS). The Susenas is a nationwide survey conducted to gather basic social and economic information as a main source of monitoring indicators of social and economic development in Indonesia. During 1963-1978, it was conducted every two years and then it was done on an annual basis until 1992. Since 1992, in addition to the basic social and economic questionnaire (the Core), an additional questionnaire was introduced which gathers more detailed information on special interest topics (the Module). The Susenas Core is conducted on an annual basis in July while the Susenas Module is conducted

every three years in July. The Susenas Core annually covers eight indices: demography, health, education, labour, fertility and family planning, housing, and consumption (CBS, 2013).

We combined the Susenas data with data on municipality development from the Ministry for the Development of Disadvantaged Regions (MDDR) in 2011 and from a database of newly created municipalities from the Ministry of Home Affairs (MoHA), which was updated and adjusted for 2008-2011. We selected data at four time points before decentralization (1996-1999) and four time points after decentralization (2008-2011). Additionally, we employed a fiscal capacity index from the Ministry of Finance (MoF). We exclude all municipalities in the Jakarta province because these are not autonomous entities, as they are centrally managed by the province as part of its metropolitan character. Thus, we constructed panel data that contain four years before decentralization and four years after decentralization, based on 5,541,983 pupils in 491 municipalities (districts/cities), and nested in 32 provinces.

4.7.2 Variables

Educational attainment is operationalized by length of schooling measured by the average number of years of education received by people aged 15 and older, using official durations of each level (Barro & Lee, 2010), weighted with CBS population weights. We constructed the annual municipalities' length of schooling from the Susenas datasets by combining the questions: (1) highest education completed and (2) highest school grade ever achieved or is currently attending. We then converted them into years of education, ranging from: 0 for no schooling; 0-6 for primary school grades; 6-9 for junior secondary school grades; 9-12 for senior high school grades; 13-15 for higher vocational education (diploma I, II, and III); and 16 for bachelor and more.

Decentralization period indicates the calendar years 2008-2011, to facilitate the comparison of average length year of schooling in municipalities before and after decentralization. In addition, we constructed eight dummy variables pertaining to four years before decentralization (1996-1999) and four years after decentralization (2008-2011).

Fiscal capacity as defined by the Ministry of Finance (MoF, 2011) is classified in four ordinal categories: low fiscal capacity (index <=0.5) as 1; middle fiscal capacity (0.5<index<1) as 2; high fiscal capacity (1<=index<2) as 3; and the highest fiscal capacity (index>=2) as 4. Data on the fiscal capacity is only available after decentralization because before decentralization the local governments were not autonomous entities. Moreover, due to the calculation method, the index criteria changed over time. We therefore only utilized the fiscal capacity in one year (2010) using criteria on the basis of

the local government's own-source revenue (*pendapatan asli daerah*, PAD) + revenue sharing fund (*dana bagi hasil*, DBH) + general allocation fund (*dana alokasi umum*, DAU) + other revenues + personnel expenditure/the number of poor population.

Urbanization is annually measured by the proportion of urban area in the municipalities. This is coded 0 to 1, with zero referring to a municipality with mainly rural area and one for a municipality with mainly urban area (from Susenas 1996-1999 and Susenas 2008-2011).

Municipality's type and level of development represents the socio-economic level of development in 2011, with a code 0 for the least developed district; 1 for a developed district; and 2 for the city administration area (from MDDR).

Municipality's establishment from 2008-2011 is coded 0 for an old municipality and 1 for a newly established municipality (MoHA, 2012).

4.7.3 Statistical analysis plan

The first step in the analysis was to describe the development in the average length of years of schooling over the years before and after decentralization, both at the municipal and provincial levels. After presenting descriptive statistics, we conducted a three-level (year, municipality, and province) regression analysis in MLwiN 2.30 (Rasbash, Steele, Browne, & Goldstein, 2014) with correlated (random) year effects (a 'fully multivariate' model, see chapter 16, Snijders & Bosker, 2012). This modelling approach allowed us to take into account the hierarchical nature of our data and to test the hypotheses of period (at the year level) and municipalities.

   After assessing the overall mean and variances at the three levels in the so-called null model (without any covariates), we included the parameters for eight years (with 1996 as the reference year) to estimate the progress of schooling over time in Model 1. Then, in Model 2, we incorporated the contextual factors at the municipality level, which allowed us to estimate the effects of fiscal capacity, urbanization, and municipality's type and status, and municipality establishment. In a third model, we employed cross level interactions to test the difference in (effects on) progress of educational attainment after the education decentralization. This model turned out not to be an improvement over Model 2 in terms of meaningful effects and by comparing their deviances to assess the relative fit of the models by means of a chi-square test (see for a further explanation Snijders & Bosker, 2012). Therefore, the estimates of the third model are not presented.

   In the next sections, we first show descriptive statistics, then turn to testing the hypotheses by interpreting the results of Models 1 and 2.

4.8　Results

4.8.1　Descriptive results

Table 4.1 presents descriptive statistics for the average length of schooling at the municipal level before decentralization, starting at 6.41 years of schooling (SD 1.36) in 1996 to 7.38 years of schooling (SD 1.58) in 1999. Meanwhile, after decentralization the mean year of schooling at the municipal level was 7.70 (SD 1.48) in 2008 and increased to 8.0 (SD 1.56) in 2010. Then, it decreased to 7.98 years (SD 1.57) in 2011. In addition, the variation of the length of schooling consistently increases before decentralization but it fluctuates after decentralization.

At the provincial level, before decentralization, the mean year of schooling consistently increased from 6.66 (SD 0.77) in 1996 to 7.73 (SD 0.87) in 1999. After decentralization, it similarly rose from 7.93 (SD 0.69) in 2008 to 8.28 (SD 0.81) in 2011. At provincial level, the pattern is slightly different with the municipal level: both variations of the length of schooling before and after decentralization grow constantly. Moreover, variability at the municipal level is higher than at provincial level as is clearly shown by the standard deviations.

The fiscal capacity of municipalities is mainly low with an average of 1.9 on a scale from 1 to 4. Meanwhile, the percentage of urbanized municipalities went up from 28 percent in 1996 to 36 percent in 2011. Urbanized municipality variations slightly increased from 0.07 before decentralization to 0.10 after decentralization. Additionally, the variable type of administration and status of development indicates mainly developed municipalities (mode=1).　The majority (59%) of the 491 municipalities are old established municipalities, which are, already existed before decentralization. The rest (41%) are newly created municipalities, proliferated after decentralization.

Table 4.1 Descriptive Statistics. $N_{level 1=3,928}$; $N_{level2=491}$; $N_{level3=32}$.

Variables	Years	Min	Max	Mean/*mode*	SD
Municipality level (N=491)					
- Mean year of schooling	1996	2.1	10.5	6.41	1.36
	1997	2.3	10.5	6.66	1.37
	1998	2.5	12.1	7.27	1.57
	1999	2.8	12.2	7.38	1.58
	2008	1.7	12.0	7.70	1.48
	2009	1.0	12.1	7.88	1.58
	2010	0.5	12.3	8.00	1.56
	2011	0.9	12.2	7.98	1.57
- Urbanization	1996	0.0	1.0	0.28	0.26
	1997	0.0	1.0	0.28	0.26
	1998	0.0	1.0	0.28	0.26
	1999	0.0	1.0	0.30	0.27
	2008	0.0	1.0	0.36	0.31
	2009	0.0	1.0	0.36	0.32
	2010	0.0	1.0	0.37	0.31
	2011	0.0	1.0	0.36	0.31
- Fiscal capacity	All years	1.0	4.0	1.90	1.06
				1.00	
- Type and development	All years	0.0	2.0	0.81	0.73
				1.00	
- Establishment (new)	All years	0.0	1.0	0.41	0.49
Province level (N=32)					
- Mean year of schooling	1996	4.9	7.8	6.66	0.77
	1997	5.4	8.2	6.92	0.73
	1998	5.9	8.8	7.58	0.77
	1999	6.0	9.1	7.73	0.87
	2008	6.5	9.0	7.93	0.69
	2009	6.6	9.6	8.14	0.74
	2010	6.5	9.7	8.28	0.78
	2011	6.0	9.9	8.28	0.81

4.8.2 Multilevel analysis

The null model presented in Table 4.2 shows that on average Indonesian citizens received approximately 7.5 years of schooling. Based on the presented variances (in the random part in the table), the differences between municipalities is largest (59%, see footnote 1 in Table 2), followed by differences between the years (27%). The differences between provinces are relatively low (14%). Extending the model with separate parameters for all years shows that there is indeed an increase in educational attainment from approximately 6.5 years of schooling in 1996 (the intercept of Model 1 in Table 4.2) to approximately 8 years in 2011 (6.479+1.571).

Moreover, Model 1 reveals smaller differences between municipalities in the earlier two years before decentralization, (the random part of Table 4.2 show variances of approximately 1.4 for 1996 and 1997) compared to the other years with estimated variance equal to approximately two. Model 1 is an improvement over the simple null model, as is confirmed by the decrease in deviance from 10,973.1 (Null Model) to 5,842.3 (Model 1).[9] After including the four explanatory variables (fiscal capacity, urbanization, municipality's type and status, and municipality establishment), the values of the variances significantly decline ranging from approximately 0.6 to 0.9 (not shown in the table). The deviance difference between Model 1 and Model 2 was 884.9. This difference is significant when tested against a chi-squared distribution test with five degrees of freedom (corresponding to the five added fixed parameters). The effects of urbanization and type of the municipality were both significant.

Overall, the trend in the length of schooling at the municipal level shows a constant increase where the aggregate improvement after decentralization (2008-2011) is smaller than before decentralization (1996-1999). Table 4.2 reports the incremental increase of the length of schooling from 0.25 years in 1997 to 0.97 years in 1999 and from 1.29 years in 2008 to 1.57 years in 2011. During the four years before decentralization, the mean length of schooling at municipal level amplified by approximately 1 year with an annually increase of 0.32 years. On the other hand, for the duration of four years after decentralization, it increased by about 0.28 years, which is annually only 0.09 years.

Our first hypothesis proposed that compared to the pre-decentralization era, the progress in length of schooling is higher after decentralizing Indonesia's educational sector. Although the length of schooling slightly increased, the progress in length of schooling declined in the post-decentralization era. Both Models 1 and 2 in Table 4.2 provide clear evidence to refute this hypothesis, indicating a progress of approximately 0.9 in the pre-decentralization era and approximately 0.3 in the post-decentralization era.

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[9] The difference in deviance of 5,130.8 is tested with a chi-squared distribution with 35 degrees of freedom (df, the number of added parameters, 7 'fixed' year effects and 28 'random' correlations, see Table 4.3).

Table 4.2 Multivariate multilevel regression analysis of mean years of schooling

$N_{level 1=3,928}$; $N_{level2=491}$; $N_{level3=32}$

	Null Model [①]		Model 1 [②]		Model 2 [③]	
	Coeff.	*S.E.*	*Coeff.*	*S.E.*	*Coeff.*	*S.E.*
Fixed Part						
Intercepts	7.479 ***	0.123	6.479 ***	0.121	6.390 ***	0.129
Level 1: Years						
Years: 1996 (ref.)						
1997			0.248 ***	0.016	0.235 ***	0.016
1998			0.854 ***	0.019	0.840 ***	0.019
1999			0.971 ***	0.026	0.918 ***	0.025
2008			1.292 ***	0.037	1.086 ***	0.027
2009			1.470 ***	0.041	1.266 ***	0.032
2010			1.590 ***	0.038	1.358 ***	0.031
2011			1.571 ***	0.040	1.354 ***	0.032
Level 2: Municipalities						
Fiscal Capacity						
(Fiscal-gm)					0.023	0.018
Urbanized municipalities (%)						
(Urban-gm)					2.553 ***	0.082
Municipalities' type: Less developed (ref.)						
Developed district					0.304 ***	0.087
City					0.493 ***	0.101
Municipalities' establishment: Old municipality (ref.)						
New municipality					-0.007	0.069
Random Part						
Level 3: Province	0.357	0.120	0.361	0.107	0.366	0.100
Level 2: Municipality	1.486	0.104				
Level 1: Years	0.665	0.016				
1996/1996			1.431	0.093	0.549	0.036
1997/1997			1.462	0.095	0.599	0.039
1998/1998			2.096	0.136	0.913	0.060
1999/1999			2.092	0.136	0.916	0.060
2008/2008			1.814	0.118	0.690	0.045
2009/2009			2.038	0.133	0.937	0.061
2010/2010			2.036	0.132	0.905	0.059
2011/2011			1.962	0.128	0.855	0.056
-2*loglikelihood:	11034.1		5926.9		5042.0	

Notes:

[①] We calculate variances in mean year of schooling from Model Null: (1) level 1 (years) is 27% (0.665/[0.357+1.486+0.665]); (2) level 2 (municipalities) is 59% (1.486/[0.357+1.486+0.665]); and (3) level 3 (provinces) is 14% (0.357/[0.357+1.486+0.665]).

② We construct dummy variable for years with 1996 as reference, the estimate coefficients (β) increased from 0.248 in 1997 to 1.571 in 2011. Mean year of schooling in 1996 is 6.48 years and the highest change is from 6.728 (6.48 + 0.248) in 1997 to 7.334 (6.48 + 0.854) in 1998.

③ From Model 2, we can see that if in 2011 the length of schooling average is about 8 years, the average length of schooling are: 10.6 years (8+2.553) for people living in urban area, 8.3 years (8+.304) for people in developed district, and 8.5 years (8+.493) for people in city area. Random slopes in Model 2 showed that variations over years are wide-ranging from low to high variations. For example, the low variations are 0.549 and 0.599 in 1996 and 1997, while the high variations before decentralization are 0.913 (1998), 0.916 (1999) and after decentralization are 0.690 (2008), 0.937 (2009), 0.905 (2010), 0.855 (2011).

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

The next hypothesis proposed that compared to the pre-decentralization era, regional variability in education attainment will be higher after decentralizing Indonesian's educational sector. The descriptive statistics in Table 4.1 indicate that before decentralization, the standard deviation of the length of schooling at the municipal level is overall slightly higher after decentralization by about 1.5 than before decentralization, where 1996 and 1997 have a standard deviation of 1.4. On the other hand, the average standard deviation of the length of schooling at the provincial level after decentralization are equal or even slightly lower than before decentralization (approximately 0.75).

The only partial support of the descriptive results for hypothesis 2 are supported by the estimates for the variances in the multilevel analysis, revealing the lowest variances in the pre-decentralization years 1996 and 1997, in both Models 1 and 2 in Table 4.2. In summary, results partially support the hypothesis that compared to the pre-decentralization era, variation in education attainment at municipal level is higher after decentralizing Indonesian's educational sector but the variation at provincial level is slightly lower.

For further interpretation of the pattern in variability, we can inspect the correlation matrix as shown in Table 4.3, which clearly demonstrates that the correlations between the years are high, the more so within the pre-decentralization and post-decentralization periods than between the two periods. The high correlations show that it is unlikely that length of schooling will change drastically from one year to the next; the somewhat lower correlations between the periods show a lower association between mean measurements of mean length of schooling that are at least 12 years apart (and hence more change).

Table 4.3 Estimated correlation matrix of mean years of schooling in pre- and post-decentralization years, based on Model 2 (N=$_{3,928}$).

Years [4]	1996	1997	1998	1999	2008	2009	2010	2011
1996	1							
1997	0.897	1						
1998	0.908	0.927	1					
1999	0.825	0.807	0.864	1				
2008	0.726	0.722	0.723	0.680	1			
2009	0.692	0.687	0.665	0.615	0.813	1		
2010	0.706	0.713	0.688	0.633	0.842	0.832	1	
2011	0.671	0.673	0.657	0.598	0.836	0.818	0.910	1

Note:
[4] Random slopes' correlations are strong both before decentralization (cf. correlations between 1999 to 1996, 1997, 1998 are .825, .807 and .864) and after decentralization (eg. Correlations between 2008 with 2009, 2010 and 2011 are .813, .842 and .836).

The last hypothesis suggests that the higher the fiscal capacity, degree of urbanization, and development, and if a newly created municipality, the higher the municipality's mean year of schooling. The findings partially support this hypothesis as illustrated by Model 2. It shows that the level of urbanization, the type of administration and development status of the municipalities have a significantly positive impact on the average length of schooling. Urbanization enables people at the municipality level to lengthen their schooling by maximally 2.6 years when comparing fully (100%) urban municipalities to completely rural areas (0% urbanization).

In addition, the municipal type and development status have a significantly positive impact on the length of schooling of about 0.3 years in a developed district and 0.5 years in a city administration compared to a less developed municipality. It implies that if in 2011 the length of schooling average is about 8 years, the average length of schooling is 10.6 years for people living in urban areas, 8.3 years for people in developed districts, and 8.5 for people in city areas. This finding shows that urbanization has the largest effect on educational attainment. On the other hand, the municipalities' fiscal capacity and the newly created municipalities do not have a significant effect on the mean length of schooling.

Moreover, whereas the municipalities' fiscal capacity has a positive direction, the direction of the newly created municipalities is negative effect on the mean length of schooling. It means that the higher the municipalities' fiscal capacity may increase the

mean length of schooling but the policy to create a new municipality may deteriorate the mean length of schooling.

4.9   Conclusion and discussion

Decentralization is expected to stimulate accountability and to empower local and subnational governments. Accountability as part of good governance is expected to enable local governments to improve their services in the educational sector. This study expands research on the impact of decentralization of Indonesia's education sector using a multi-level government approach. The handful of earlier studies examining the impact of the decentralized education system in Indonesia has mainly focused on one particular administrative level and neglected the hierarchical structure of Indonesia's administrative and government systems. Taking into account the nature of decentralization and its resulting multilevel government structure, by focusing on these various levels, help us better comprehend the effects of decentralization on educational attainment in Indonesia.

This study analyzed the impact of decentralization on educational attainment comparing two waves of administrative and political changes in the Indonesian government system. This endeavor enabled us to disentangle educational progress in relation to the centralization era and the decentralization era with direct elections (democratization). We thereby extended existing research by examining the influence of municipal factors and other determinants by using panel data from 5,541,983 respondents aggregated to 3,880 observations, nested in 491 districts/cities, nested in 32 provinces for the pre and post-decentralization era.

4.9.1 Summary of findings

In line with our theoretical expectations, our findings suggest that the length of schooling consistently improved both in the centralization and decentralization era. However, the progress in mean years of schooling after decentralization was smaller than before decentralization. Additionally, substantial variability in mean length of schooling is also observed after decentralization, even when taking into account municipality characteristics, such as urbanization.

This implies that decentralization is not a guarantee for improving educational attainment because of trade-offs between intended and unintended consequences. Decentralization may increase accountability and empower local governments to provide better education services but only if local governments have the capacity to do so. Therefore, decentralization increased people's educational attainment in some municipalities but not in others. Moreover, the mean years of schooling even decreased after decentralization in some municipalities.

Two of the four investigated municipality characteristics were shown to improve the length of schooling. The level of urbanization and the development status of a municipality have a significantly positive impact on the mean length of schooling. From this, we conclude that urbanization and municipality development, which is represented by a better infrastructure, more job opportunities and better health care, have a positive impact on improving quality of living in a municipality, as shown by others (cf. Filmer & Pritchett, 2001). This might be due to the fact, as argued by Buchmann and Brakewood (2000), that higher levels of development are more likely in urbanized districts, which often have better road and transport infrastructure and better educational opportunities. These increased educational opportunities likely lead to an increase in the length of schooling.

The municipalities' fiscal capacity or whether they are newly established municipalities do not have a significant impact on improving the people' average length of schooling at the municipal level after taking into account indicators of urbanization. Analyses from the World Bank (2008) suggest that net enrolment rates are positively correlated with education spending per student and with education spending as a share of overall municipality spending. However, the municipalities' fiscal capacity, the measure used in this chapter, does not always represent the education expenditure per student. The World Bank (2008) found that poor municipalities spend a larger proportion of their budgets in the educational sector than those in some of the richest municipalities do. The 40 percent of the poorest districts spend approximately 35.4 percent of their budget on education, while the richer districts spend 31.5 percent. Therefore, poorer municipalities are not necessarily lagging behind in education expenditure per capita. In addition, the amount of educational expenditure is not sufficient to improve educational access. It also depends on how the local government utilizes the education expenditure, which is related to the human capacity available at the local government level to improve the quality of education service. An improvement in education service in its turn will attract more people to lengthen their schooling (Kaiser, 2006).

4.9.2 Unexpected findings, limitations and avenues for future research

Two unexpected findings deserve further discussion. First, we conclude that the progress of change decreased after decentralization. Why this progress is slower after decentralization can be explained by Bardhan's adapted theory of decentralization for developing countries (2002). Firstly, centralization can create economies of scale with regard to overhead and facilities. For example, a centralized system can be more economically efficient in purchasing materials for building a large number of new schools as a method to provide more access to education. Secondly, decentralization implicitly assumes that allocated funds automatically reach the beneficiaries. This assumption needs to be qualified with the spending quality and the capacity of public bureaucrats at

the local level. Third, a World Bank's study (2008) exposed that although the share of municipalities on the total education budget is dominant, the majority of these expenditures is for routine spending, such as personal expenses (75.2%). Therefore, although municipalities spend a substantial share of expenditures in the education sector, they actually have very little fiscal autonomy for expenditures to implement context-specific programs. Finally, progress of length of schooling becomes more difficult to improve when the schooling has already been achieved to a substantial level.

Second, our findings also reveal that decentralization increased the variability in the mean length of schooling between municipalities, but not among the provinces. These findings could be elucidated by Nordholt's argument (2003) that decentralization in Indonesia bestowed power and authority from the central government to the municipal level as an autonomous entity. Consequently, the roles of provinces are limited especially in the education sector because the primary and secondary school are directly managed by the municipalities. Moreover, local government autonomy enabled the municipality to tailor their program to accelerate education attainment. However, the municipalities are diverse in terms of resources and constraints, which enlarged the variations in improving educational service (Kaiser, 2006). For instance, some municipalities received substantial revenue, such as revenue sharing from oil, mining and several local taxes, while other municipalities did not have such additional income. Moreover, in terms of governance, the varied capacities of the local governments had consequences for the effectiveness of the implementation of a context-specific educational program. As a result, some municipalities benefitted more from decentralization while others were not able to benefit optimally from decentralization (Galiani & Schargrodsky, 2002).

Finally, a number of limitations to this study and avenues for future research deserve further discussion. Firstly, due to the nature of our data at the municipal and provincial level which were constructed from individual survey data from different years, these findings do not reveal the micro level pattern. An avenue for research would be to conduct analyses at the micro level, such as household and individual levels to disentangle a comprehensive portrait of the impact of education decentralization. Secondly, the new municipalities and new provinces data before decentralization are proxies because those municipalities and provinces were still part of other municipalities and provinces during the centralization era. Future studies could employ more fine-grained measures of the data for newly created local governments, both municipalities, and provinces. Third, other contextual aspects such as education expenditure could be examined to determine in more detail the configuration of constraints and opportunities regarding educational access. Finally, future work might also take on a two-sided perspective on government supply and people demand of education and their simultaneous interaction.

Despite these limitations, the current study presents new results and draws a comprehensive picture of educational attainment in Indonesia at both the municipal and the provincial level. Our results show similarities as well as differences between the eras

of centralization and decentralization with democratization that might be useful for further improving Indonesia's decentralization policy. One consideration based on our analysis is how to define the role of the central, provincial, and municipal levels within the multilevel system in handling educational service delivery with the aim of reducing regional discrepancies. This critical issue relates to the question how the central government can define better interventions, both in the domains of finance and technical assistance, to reduce these regional disparities. Our study seems to indicate that the central government's interventions need to be prioritized to predominantly rural area and less developed municipalities.