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Influence of Fiscal Decentralisation and Ethnic Diversity on Educational Outcomes – Evidence from Indonesia

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Abstract: *The main objective of this paper is to clarify the influence of fiscal decentralisation and ethnic diversity on Indonesia's educational outcomes using Indonesian provincial-level data from 2001 to 2014 and applying dynamic panel data estimation. This paper takes into account that ethnic diversity mediates the relationship between fiscal decentralisation and educational outcomes. The result confirms that the inclusion of the ethnic diversity variable lessens the positive influence of fiscal decentralisation on educational outcomes. The presence of a diversity debit hypothesis in Indonesia overshadowed the local government's effort in improving regional educational outcomes through decentralisation. This paper proposes a set of policy recommendations based on empirical results to assist the local government in controlling the adverse effect of ethnic diversity on regional educational outcomes.*

Keywords: Fiscal decentralisation; Ethnic diversity; Education outcomes; Indonesia, GMM.
JEL Classification: H75, H77, I25

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1. Introduction

Education is considered one of the powerful instruments to alleviate poverty and income inequality. There is strong evidence that cognitive skill is related to economic growth. The Indonesian government's commitment to improving the education sector is vibrant. Indonesian constitutional law stipulates that the government must allocate 20% of local and national budgets for the education sector. The government manifested its commitment to education through a nine-year basic education programme as stipulated by Law Number 20/2003 regarding the National Education System.

Decentralisation was expected to advance the domestic education outcome. The literature proposed two perspectives regarding the relationship between decentralisation and education outcomes. The first argues that decentralisation positively impacts education (Habibi et al., 2001; Faguet & Sanchez, 2006). The local government's knowledge regarding local preferences is the main reason to authorize the local government to deliver customized public goods that match local needs. However, the second perspective presents the opposite argument: decentralisation dampens education outcomes due to the lower capacity of local authorities compared to the central government in providing education infrastructure (Kaiser et al., 2006).

Studies on the effect of ethnic diversity on social, economic, and political outcomes were started by Easterly and Levine (1997), who conclude that ethnic diversity is one of the significant factors that impede economic development in an economy, triggering the initiative to consider ethnic diversity as one of the critical factors in determining economic growth. The main reason is that an ethnically diverse society is associated with a lower provision of public goods. Over time, the result gains support from a significant scholarly literature. The adverse effect of ethnic diversity on economic development, known as the diversity-debit hypothesis (Gerring et al., 2015), is widely accepted. The diversity-debit hypothesis posits a negative relationship between ethnic diversity and economic development.

Several researchers propose an opposite result by concluding that an ethnically diverse society is a talent-pool society that triggers a more competitive environment (Alesina & La Ferrara, 2000); provides more extensive provision of public goods (Rugh & Trounstine, 2011); and results in a better economic outcome (Gisselquist et al., 2016). The empirical study

of the effect of ethnic diversity on educational attainment in Indonesia is limited. Most of the empirical research regarding ethnicity in Indonesia is regarding the provision of public goods (Alesina et al., 2018; Yuhki et al., 2018) and social conflicts (Indra et al., 2019). This paper adds new empirical evidence on fiscal decentralisation and ethnic diversity on education outcomes in Indonesia.

The objective of this paper is to explain the impact of ethnic diversity on the relationship between fiscal decentralisation and education outcomes in Indonesia. Indonesia is an ideal example to observe this topic. First, for the last two decades, Indonesia has experienced a significant change from a centralized to a decentralized system. Decentralisation significantly changed the regional decision-making in Indonesia by limiting the function of the central government (only retaining six absolute functions) and increasing the authority of the local government. Secondly, despite the 'big-bang decentralisation' in Indonesia and the government's commitment to the education sector, the education outcome in Indonesia is still persistent (Asian Development Bank, 2015). Finally, Indonesia is considered one of the most ethnically diverse societies (Alesina et al., 2003; Mavridis, 2015). Indonesia comprises more than 1,000 ethnicities, and more than 650 languages co-exist in Indonesia (Statistics Indonesia, 2015).

This paper employs Indonesian provincial-level data from 2000 to 2014 to clarify the effect of fiscal decentralisation and ethnic diversity on education outcomes in Indonesia. This paper offers several novelties to the existing literature on this topic. First, the empirical analysis in this paper accommodates several essential issues, such as persistence in the variables and endogeneity between the key variables, which has not been appropriately addressed in the previous literature. The presence of persistence and endogeneity in the variables may bias the estimated impact of the critical variables. Dynamic panel estimation is applied to circumvent these issues. Second, this paper considers the influence of ethnic diversity on the connection between fiscal decentralisation and educational outcomes by including the interaction variable of fiscal decentralisation and ethnic diversity. Third, this paper applies an expenditure-based decentralisation measure, which is more suitable for Indonesia. Indonesian decentralisation authorizes the local governments with significant discretion in expenditure, while the primary taxing right remains in the central government. Fourth, this paper employs ethnic fractionalisation and ethnic polarisation indices to

achieve comprehensive knowledge in this subject. Finally, this paper offers a set of policy recommendations to assist the Indonesian government in handling the impact of ethnic heterogeneity and fiscal decentralisation policy on education outcomes.

This paper proceeds in four sections. Section two presents a related literature review on this topic, followed by section three, explaining the data and empirical analysis. Section four discusses the results before concluding in section five.

2. Literature Review

Several mechanisms may link decentralisation and educational outcomes. First, decentralisation can shorten decision-making by removing bureaucratic layers and decreasing transaction costs by reducing information costs and designing tailor-made development programmes (Oates, 1972; Ahmad & Brosio, 2009). A tailor-made education programme leads to improvement of education outcomes because it integrates the social, cultural, and geographical diversity in society (Faguet & Sanchez. 2006; Kiz-Katoz & Sjahrir, 2011), and the school can operate in a way that is more flexible, innovative, and responsive to local needs (Barrera-Osorio et al., 2009). Some studies find that decentralisation in education is more responsive to local needs, as indicated by improving education outcomes (Suryadarma et al., 2004).

Second, the Asian Development Bank (ADB) (2015) concludes that decentralisation may strengthen the accountability between schools and society. Society has access to supervise the availability of the school's infrastructures (e.g., teachers, books, and curriculum). Lastly, decentralisation stimulates a sense of responsibility in the education sector between shareholders (teachers, society, and government). Each stakeholder with their interest will provide a check and balance mechanism that will ensure the upgrading of education attainment (De Grauwe, 2005). Several studies show that decentralisation significantly improved school participation, education attainment (Duflo et al., 2014; Gertler et al., 2014), and education infrastructures (King & Ozler, 2005; Carnoy et al., 2008).

On the contrary, several factors may explain the opposite effect of decentralisation on educational outcomes. First, decentralisation emphasizes the assumption that local government has more knowledge regarding local

preferences. This is a strong assumption, which is not always accurate. To gather comprehensive information requires massive resources, such as technology, human resources, and infrastructures, which are rarely available at the local government level. Local governments may not have the necessary information regarding the needs of local people; therefore, it will affect the supply and the quality of public goods. (Prud'homme 1995; Rodriguez-Pose & Gill 2004).

Second, decentralisation may trigger overlapping education management between local and central governments, which hamper educational efficiency and effectiveness (Treisman, 2000; Madeira, 2002). A well-planned decentralisation programme should mention a clear division of public service delivery function between central and local government. An additional factor that may dampen the effect of decentralisation on education is the opportunity for elite capture of public funds (Bardhan, 2002).

Suryadarma (2012) yields that in a less corrupt region in Indonesia, public spending is associated with better enrollment, while the effect is insignificant in a more corrupt region. Several studies in Indonesia confirm that decentralisation increased school costs. Consequently, parents must pay more for children's education, which leads to a decrease in net enrollment (McEwan & Carnoy, 2000; Kristiansen & Pratikno, 2006). Lack of competence of local authorities hampers education outcomes, and decentralisation reduces the length of schooling and increases regional education inequality (Muttaqinet al., 2016); decentralisation does not affect educational achievement and dampens teachers' effort (Leer, 2016).

In their study in Africa, Easterly and Levine (1997) posit that ethnic diversity has an adverse impact on social, economic, and political outcomes. The main reason for this is that a more heterogeneous society is associated with a lower provision of public goods (Alesina et al., 1997). The literature presents several ways to explain the adverse effect of ethnic diversity in the provision of public goods. Gerring et al. (2015) introduce a diversity-debit concept that explains the negative effect of ethnic diversity on human development, including education, health, and wealth. Several reasons may explain the negative relationship between ethnic diversity and development outcomes. First, a heterogeneous society may have different preferences over what, where, and how the local government should provide public goods. Therefore, lower utility leads to smaller contributions to the provision of public goods (Chandra, 2001).

In their study in Germany, Akay et al. (2017) find that well-being is relatively lower when people live in ethnically segregated enclaves. Reynal-Querol and Montalvo (2017) in Sub-Saharan Africa argue that ethnolinguistic fractionalisation has a direct negative relationship with economic growth, while religious fractionalisation has no direct effect on economic growth. The research confirms that polarisation has an adverse effect on growth because it reduces the rate of investment and increases public consumption and the incidence of civil wars. Gershman and Rivera (2018), in their study in Sub-Saharan African countries, find that when the underlying ethnolinguistic groups are sufficiently aggregated into more basic language, and family's diversity is taken into account, educational and health outcomes, electricity access, and night-time luminosity are all negatively related to diversity.

Trust within a society may affect the behaviour of the society. Social capital, trust, and social action are more potent in a homogenous society than in a more diverse community. Hence, a heterogeneous society is less able to resolve collective action issues required in providing a socially optimal public good (Miguel & Gugerty, 2005; Putnam, 2007). Mavridis (2015), in his study on the effect of ethnic diversity on social trust in Indonesia, confirms the adverse impact of ethnic diversity on social trust. Another important factor is related to the response of the authorities in dealing with ethnic diversity.

The political judgment of a politician may intervene in the interest of his/her ethnic/supporting groups, which may cloud his/her discretion in allocating resources efficiently. The politician owes their power to the supporting groups and must guarantee that his/her supporters get their paybacks in term of policies that benefit the group (Franck & Rainer, 2012; Gibson & Hoffman, 2013). In terms of social cohesion within an ethnically heterogeneous society, Staveren and Pervaiz (2017), in their cross-countries study, which includes the Minorities index, conclude that social exclusion, which reduces social cohesion rather than diversity, may benefit from using measures of social exclusion next to ethnic diversity.

However, some studies suggest that a more heterogeneous society is a talent pool where each group has an expertise that complements each other and may work together and thrive more compared to a less diverse community (Alesina & La Ferara, 2000; Page, 2007). For instance, ethnically diverse cities such as New York, Singapore or Los Angeles may have

gained a positive economic outcome from the varied talent-pool within their society. Gisselquist et al. (2016), in their study, argue that there is a positive relationship between ethnic heterogeneity and some measures of public goods provision, especially welfare outcomes related to publicly provided goods and services (diversity-dividend hypothesis).

People who wish to live together in a more heterogeneous society are likely to be more ambitious, more skilled, and more highly educated than people who stay put or relocate to an ethnic enclaved area (Gerring et al., 2015). Ayob (2018), in his study of 22 countries, finds that an increase in ethnic diversity within countries is associated with a higher engagement in social entrepreneurship and that inter-religious trust reduces the negative relationship between religious diversity and social entrepreneurship. He argues that ethnic diversity encourages more social entrepreneurship activity engagements because diversity causes instability, and instability creates more social problems to be solved. Tonini and Zhang (2018) find that in South Africa, people in an ethnically diverse region are motivated to equip themselves with social skills to connect with those outside their group. These social skills make them better equipped for the labour market than those in a less ethnically diverse society.

Another feature of a diverse community is the more extensive provision of public goods (Boustan et al., 2000; Rugh & Trounstine, 2011). Ethnic diversity triggers incentives for each ethnic group to form a political coalition to support certain politicians to achieve the group's interest. This form of alliance is called consociationalism (Lijphart, 1999). Consociationalism is a familiar concept in the Indonesian government's political field. Winning candidates at national and local election levels are supported by inter-ethnic voters instead of a single cultural group. The elected politician must be able to put up with the different preferences of his/her voters by providing larger public goods in exchange for their political support. Several studies in developing economies support this result, such as Liberia (Fearon et al., 2009), Zambia (Gibson & Hoffman, 2013), and Indonesia (Siburian, 2019).

In their study in Ghana, Churchill and Danquah (2020) find that ethnic diversity has a positive and significant relationship with the probability of engaging in the informal sector. Trust plays an essential role in reducing the probability of engaging in informal work, and it is lower in an ethnically diverse society. However, Berdiev et al. (2020) find different results in their

cross-country studies (130 countries). They use five dimensions of ethnic/cultural diversity, including ethnic income inequality, ethnic–linguistic fragmentation, cultural fragmentation, ethnolinguistic polarisation, and ethnic–linguistic segregation, to measure the impact on the international shadow economy. The study finds that income inequality across ethnic groups increases underground activity across different modelling variations, while the effects of the other dimensions are statistically insignificant.

Panizza (1999) suggests that education is a classic example of public goods, significantly influenced by local preferences. Ethnic diversity affects educational outcomes in several aspects. First, ethnic diversity affects educational outcomes through extra resources spent to deal with ethnic differences. Teaching and learning efficiency may reduce because teachers and students have to deal with cultural differences (Lee, 2007; Dronkers & van der Velden, 2013). Teachers in a less diverse society may devote their resources exclusively to teaching, increasing school effectiveness, and ultimately advancing school outcomes. Ratna et al. (2017) conclude that the linguistic barrier may lessen the effect of diversity on economic outcomes in United States' (US) cities.

Second, ethnic diversity affects the teacher's attendance. Studies present evidence that the differences in ethnicities affecting not only students but also teachers. Communication barriers may generate lower trust between teachers, students, and parents that trigger a fragile environment prone to conflicts. The presence of colleagues who shared the same ethnicity offers a more comfortable working environment for the teacher and may affect the teacher's attendance (Guerero, 2012; McGuirk, 2016).

Ethnic diversity may improve education outcomes if several conditions, such as equal status, collaboration, a shared interest between ethnic groups, similar political support from the government to each group, and a conducive environment for partnership, are met (Pettigrew, 2008). Ethnically different students with different potential skills may work together in a team, and eventually, it affects the educational outcomes of each member of the team. Ultimately, the partnerships will improve the overall school attainment (Dronkers & van der Velden, 2013).

Based on the literature above, the effect of ethnic diversity is ambiguous. A recent study by the Office of National Statistics in the United Kingdom (UK) (2020) argues that childhood poverty and educational outcome vary for different ethnic groups, and it cannot be ruled out that it may be related

to other variables and the educational resilience of different ethnic groups when living in poverty.

3. Data and Model

3.1 Data and key variables

This paper employs 33 province-level data from 2001 to 2014 from Indonesian Statistics, Ministry of Finance, and the World Bank (detailed in Table 1). The summary statistics of the data are presented in Table 2. The critical variables in this paper are literacy as the measure of educational outcome, ethnic diversity is measured with an ethnic fractionalisation index (EFI), and fiscal decentralisation is proxied by expenditure-based decentralisation.

Table 1. Data Sources

Variable	Unit of measurement	Source
Literacy, log	Index	Statistics Indonesia
Fiscal decentralisation, log	Ratio	Ministry of Finance
Ethnic fractionalisation index	Index	Statistics Indonesia
Gini index	Index	Statistics Indonesia
Regional income per capita, log	IDR	Statistics Indonesia
Transfer per capita, log	IDR	Ministry of Finance
Primary school enrolment rate	Index	Statistics Indonesia
Geographical area	km square	Statistics Indonesia
Population, log	regional population	Statistics Indonesia
Conflicts, log	number of conflicts	World Bank

Table 2. Summary Statistics

Variable	Observation	Mean	Std. Deviation
Literacy, log	462	4.525	0.068
Fiscal decentralisation, log	462	28.035	1.154
Ethnic fractionalisation index	462	0.627	0.251
Gini index	462	0.151	0.118
Regional income per capita, log	462	16.105	0.899
Transfer per capita, log	462	13.9	1.028
Primary school enrolment rate	462	94.771	13.071
Geographical area	462	112.211	0.819
Population, log	462	15.151	1.018
Conflicts, log	462	4.658	1.489

EFI is the probability that two individuals randomly selected in a region come from a different ethnic group. Several researchers applied EFI to measure ethnic diversity (Easterly & Levine, 1997; Alesina et al., 1999; Gisselquist et al., 2016; Gerring et al., 2015; Mavridis, 2015). The EFI value ranges from 0 to 1. EFI equals zero if all the population belongs to the same ethnic, and one, if all of the population belongs to different ethnicities. EFI is defined as:

$$EFI_j = 1 - \sum_{k=1}^{N} E_{kj}^2, \quad (1)$$

where k = 1,2,3,… N is an ethnic group; N is the number of groups; E_{kj} is the share of ethnic k in province j.

This paper measures Indonesian fiscal decen(tralisation based on the expenditure approach. This approach is suitable for Indonesia because the decentralisation law grants the Indonesian local government significant authorisation on spending. The local government is authorised to decide local expenditure priorities based on local needs. The primary taxing right remains with the central government. The central government limits the taxing power of the local government based on Law Number 28/2009 regarding Local Tax. This paper defines decentralisation as the share of local government spending (total central and local government spending).

3.2 Model specification

To analyze the effect of ethnic diversity and fiscal decentralisation on education outcomes, this paper applies the following model:

$$Lit_{jt} = \beta_0 + \beta_1 Lit_{jt-1} + \beta_2 EFI_{jt} + \beta_3 FD_{jt} + \beta_4 (EFI_{jt} * FD_{jt}) + \beta_5 X_{jt} + \mu_{jt} \quad (2)$$

where j and t are province and year, respectively; β_0, β_1, β_2, β_3, β_4 and β_5, are the parameters to be estimated; and μ_{jt} is the error term. Lit_{jt} is the measure of literacy as the proxy of education outcome. $Lit_{jt\text{-}1}$, EFI_{jt}, and FD_{jt} are the previous value of dependent variable, measure of ethnic diversity, and measure of fiscal decentralisation, respectively; X_{jt} are the vector of province level covariates that are expected to influence the dependent variable (control variables).

The control variables in this paper include income inequality to measure regional income distribution; the regional income per capita to measure regional capacity; intragovernmental transfer to control for the total resource available for the local government from the central government; primary school enrolment rate to measure the primary school enrolment rate; the geographical area size of the region to control for geographic coverage of the region; population to capture the scale effect for government allocation; and number of conflicts to capture the political stability of the region

This paper deals with two critical econometric issues, persistence, and endogeneity. Several variables in this estimation, namely ethnic diversity and income inequality tend to change slowly with minimal within-province variation over time (persistence). Persistence in the variables indicates that there may exist some potential unobserved slow-changing factors, which may result in biased estimators. The ordinary least squares (OLS) and fixed effect estimation cannot fix this problem properly (Houle, 2017).

The relationship between fiscal decentralisation and education outcome may reflect reverse causation. The central government allocates the amount of intragovernmental transfer using a specific formula, including the human development index that includes the education outcome variable. In contrast, education outcomes may depend on how much intragovernmental spending is allocated to the education sector. Endogeneity may also exists, between income inequality and education outcome. Any unobserved factors that

influence income inequality and education outcome may bias the estimated relationship between the two variables (Coady & Dizioly, 2017).

Both persistence and endogeneity may bias the estimation. To circumvent persistence issues, the analysis includes the lagged value of the dependent variable. However, the consequence of the procedure is the violation of the exogeneity assumption. Arellano and Bond (1991) offer first-difference generalized method of moments (GMM) to solve the problem and deal with endogeneity. Nevertheless, Blundell and Bond (1998) suggest that difference GMM suffers from weak instrument problems, especially with the presence of persistence, and they offer the system GMM estimator as a solution. System GMM resolves weak instrument problems by applying level restrictions that remain useful in the small-time periods and the presence of persistence. This paper uses a two-step System GMM, which results in more asymptotically efficient estimates than the one-step System GMM (Baltagi, 2013). Several diagnostic checks are performed to check the stability of the model. The Hansen J statistics confirm the validity of over-identifying restrictions. To check for serial correlation of the error term, we perform the Arellano-Bond test. The Arellano-Bond test also checks for the lag of second-order correlation in the equation, which is also equal to test the validity of the weak exogeneity assumption (Coady & Dizioly, 2017).

4. Estimation Results and Robustness Check

4.1 Results

The main estimation result is described in Table 3, which presents the estimated coefficients, the *z*-test statistics based on robust standard errors, and the statistical significance of the estimated coefficient. The result highlights several significant findings. First, on the statistical aspect of the model, for all estimations, the *p*-value Arellano-Bond test for serial correlation of the disturbances suggests that the first lag of the literacy rate is an essential determinant of the present level of literacy rate and confirms that further lags of the literacy rate have no significant impact on the current literacy rate. The test result also provides evidence to support the use of dynamic panel analysis in the estimation. The *p*-value of Hansen J statistics shows that the model's over-identifying restrictions are valid (Roodman, 2009; Cameron & Trivedi, 2010).

Table 3. Estimation Result

Variable	(1)	(2)	(3)
Lag of literacy	0.88***	0.884***	0.896***
	(0.039)	(0.031)	(0.028)
Gini index	-0.021	-0.033*	-0.036*
	(0.009)	(0.021)	(0.019)
Regional income per capita	0.002**	0.002***	0.002***
	(0.019)	(0.034)	(0.063)
Transfer per capita	0.004**	0.004***	0.004*
	(0.001)	(0.002)	(0.002)
Primary school enrollment rate	0.0002***	0.0002***	0.0002***
	(0.0002)	(0.0004)	(0.0004)
Geographical area	-0.005***	-0.005***	-0.004***
	(0.002)	(0.001)	(0.003)
Population	0.002	-0.002	-0.002
	(0.005)	(0.001)	(0.003)
Conflicts	0.001	0.001	0.001
	(0.0003)	(0.0004)	(0.0003)
Fiscal decentralisation (FD)	0.027**	0.036*	0.090*
	(0.001)	(0.006)	(0.005)
Ethnic fractionalisation		-0.015***	-0.006**
		(0.024)	(0.015)
FD x Ethnic			-0.078**
			(0.063)
N	462	462	462
Number of instruments	19	19	23
AR (1) test p-value	0.007	0.008	0.005
AR (2) test p-value	0.106	0.76	0.103
Wald statistic p-value	0.000	0.000	0.000
Hansen J Test p-value	0.405	0.125	0.403
Maximum decentralisation effect			0.09

Notes: 1. Numbers in parentheses represent the Windmeijer standard error. 2. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

We now examine the estimated result of the interest variables, namely fiscal decentralisation, ethnic diversity, and the combined effect of both variables. When we only account for fiscal decentralisation, the estimation result indicates that fiscal decentralisation is associated with an increase in educational outcomes at a 5% significance level (Table 3; column 1). When we include an ethnic diversity variable in the estimation, the estimation finds that ethnic diversity is negatively related to educational outcomes at the 1% significance level, and fiscal decentralisation is related to an increase in educational outcome at a 1% significance level (Table 3; column 2). This result suggests that a more ethnically diverse society significantly dampens educational outcomes. The inclusion of ethnic diversity lowers the significance level of fiscal decentralisation on educational outcomes. This result indicates that the previous estimation of the impact of decentralisation on educational outcomes, without the inclusion of ethnic diversity (Table 3; column 1), may suffer a certain degree of the omitted variables problem.

When we include the interaction variable of decentralisation and ethnic diversity (Table 3; column 3), the results present the evidence that, by itself, fiscal decentralisation has a positive and significant impact on education outcomes. However, the negative and significant coefficient for the interaction term between decentralisation and ethnic diversity indicates that a one unit increase of the interaction term between decentralisation and ethnic diversity is associated with 0.078 unit decreases of education outcomes. The negative and significant coefficient of the interaction term provides evidence that the positive effect of fiscal decentralisation on education outcome decreases with ethnic diversity. After the ethnic diversity index reaches a certain point, fiscal decentralisation no longer significantly impacts education outcomes. The results yield that the marginal effect of fiscal decentralisation on education outcomes changes with the ethnic diversity index. Once the ethnic fractionalisation index reaches more than 0.09, fiscal decentralisation no longer significantly affects education outcomes. A diversity-debit hypothesis in Indonesia lessens the positive impact of fiscal decentralisation on educational outcomes. In other words, when we are controlling for ethnic diversity, the estimation result shows that ethnic diversity reduces the positive effect of fiscal decentralisation on educational outcomes. The cut-off value of the ethnic diversity index that influences the impact of decentralisation on educational outcomes is 0.09, which is obtained from differentiating the estimation in Table 3, column (3),

with respect to the fiscal decentralisation variable.

Since the coefficients for fiscal decentralisation are statistically significant in all the models (Table 3; columns 1, 2, and 3), the main effect of fiscal decentralisation and its interaction with ethnic diversity parameters are statistically significantly related to education performance. In Table 3, column (1), the coefficient of fiscal decentralisation is significant, which infers that the average association between fiscal decentralisation and education performance across all values of ethnic diversity is different from zero. The coefficient of fiscal decentralisation on the model in Table 3, column (3), is statistically significant, implying that the relationship between fiscal decentralisation and education performance is significant when ethnic diversity takes a zero value. There are substantial significant differences between marginal effects of fiscal decentralisation at different values of ethnic diversity index, which reinforces the evidence that there is a moderating effect since the coefficient of the interaction variable of decentralisation and ethnic diversity is statistically significant.

Fiscal decentralisation may increase educational outcomes through the implementation of a local-customised development programme. Before implementing decentralisation, the central government applied a uniform education programme throughout the region despite the different characteristics between regions. The local government only became a branch of the central government, as a policy executor with no authority to modify or adjust the programme. Since the implementation of fiscal decentralisation in 2001, the local government acquired power and resources to alter its spending on education infrastructures with respect to local needs, whichwould not have been possible otherwise. Since then, several local governments in Indonesia complement the national education programme with their tailor-made education programmes that match local needs (e.g., geographical area, development stage, demographic structure). This result coincides with Latelier and Ormeno (2018) and Salinas and Solle-Olle (2018).

However, ethnic diversity may reduce educational outcomes in several ways. First, ethnic diversity may affect students' performances at school socio-cultural differences (i.e., language barrier). In some ethnically heterogeneous regions, such as those outside Java, few people can speak the national language, Bahasa Indonesia. More time is required for teachers to deal with culture and language differences in such a region while delivering

the school material compared to a more homogenous society. Therefore, it reduces school effectiveness and finally affects the educational outcomes of the students from that region. Paauw (2009) concludes that the variety of local languages in Indonesia is a challenge for communication and unity in Indonesia. Second, socio-cultural differences may affect the teacher's performance in performing their function to deliver school materials, more precisely affecting teacher attendance. Teachers in an ethnically diverse society must deal with two socio-cultural differences simultaneously, such as between teachers-students and between peers. Dee (2005) concludes that races, ethnicities, and gender dynamics between teachers and students significantly affect educational opportunity. Lastly, related to trust between parents, teachers, and students. One of the prevalent issues in a diverse society is trust. A homogenous society has higher trust among the community compared to their colleagues in a more diverse population. Mutual trust between parents, teachers, and students manifested in the higher participation of parents to support school programmes. Parents and teachers that shared the same cultural value tend to communicate easily compared to those who do not. This result is in line with previous research, such as Dee (2004) and Egalite and Kisida (2017).

As for the control variables, the result shows that income distribution and geographical area are associated with lower educational outcomes. More affluent parents have sufficient resources to provide their children with better nutrition from an early age and send their kids to a better school than low-income families (Ramey & Ramey, 2009). Therefore, children from wealthy families perform better in primary or elementary school and in the completion of the seats in the best colleges, which provide better access to high-skilled (and high paying) jobs. The regional income per capita, transfers per capita, and primary enrollment increase regional educational outcomes. Regional per capita and transfer per capita represent the ability of local governments to provide local public goods in their region. With sufficient resources, the provincial government is now able to offer more physical infrastructures (school, library, laboratories, and other facilities) and incentives (for teachers and students) to improve regional education attainment.

4.2 Robustness checks

To check the robustness of the empirical results, this paper applies years of schooling, revenue-based fiscal decentralisation, and ethnic polarisation index as the alternative measures of educational outcomes, fiscal decentralisation, and ethnic diversity index, respectively. Table 4 describes the empirical results using alternative variables. The maximum decentralisation effect is lower compared to the primary estimation. This may be due to the different set of interest variables used in the sensitivity check estimation. The robustness check result confirms the main findings.

Table 4. Robustness Check

Variable	(1)	(2)	(3)
Lag of school years	0.891***	0.89***	0.895***
	(0.042)	(0.022)	(0.035)
Gini index	-0.005	-0.021	-0.019
	(0.007)	(0.001)	(0.001)
Regional income per capita	0.003**	0.004***	0.004***
	(0.065)	(0.058)	(0.018)
Transfer per capita	0.003*	0.003*	0.003*
	(0.01)	(0.016)	(0.023)
Primary school enrolment rate	0.0003***	0.0003***	0.0003***
	(0.0007)	(0.009)	(0.0007)
Geographical area	-0.008***	-0.005***	-0.007***
	(0.007)	(0.005)	(0.007)
Population	-0.0002	-0.001	-0.001
	(0.006)	(0.001)	(0.009)
Conflicts	0.001	0.001	0.001
	(0.0004)	(0.0004)	(0.0007)
Fiscal decentralisation (FD) – revenue	0.102***	0.102**	0.139**
	(0.004)	(0.007)	(0.004)
Ethnic polarization		-0.011*	-0.006*
		(0.057)	(0.043)
FD x Ethnic			-0.753*
			(0.072)
N	462	462	462

Variable	(1)	(2)	(3)
Number of instruments	19	19	23
AR (1) test p-value	0.012	0.008	0.009
AR (2) test p-value	0.470	0.260	0.340
Wald statistic p-value	0.000	0.000	0.000
Hansen J Test p-value	0.114	0.125	0.164
Maximum decentralisation effect			0.05

Notes: 1. Numbers in parentheses represent the Windmeijer standard error. 2. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

5. Conclusion

The paper investigates the impact of fiscal decentralisation and ethnic diversity on educational outcomes in Indonesia using Indonesian provincial-level data from 2001 to 2014. When the estimates only account for fiscal decentralisation, the estimation result finds that fiscal decentralisation is associated with increased educational outcomes. However, the negative and significant coefficient of the interaction terms between fiscal decentralisation and ethnic diversity index delivers evidence that the positive effect of fiscal decentralisation on education outcome declines with ethnic diversity. The results yield that the marginal effect of fiscal decentralisation on education outcomes changes with the ethnic diversity index. After the ethnic diversity index reaches a certain point (0.09), fiscal decentralisation no longer significantly impacts education outcomes.

The significant impact of ethnic diversity on regional educational outcomes provides a set of policy recommendations for the Indonesian government. The government may minimize the harmful effect of ethnic diversity on educational outcomes in several ways: first, the local government should equally support each ethnicity to provide the public good, especially in the education sector. Equal treatment for all co-existing ethnicities within the region will avoid the exclusion problem; therefore, it may avoid inter-ethnic conflict due to discrimination that may deteriorate educational outcomes. Second, the local government should endorse a conducive atmosphere for inter-ethnic partnerships in schools. For instance, the local governments should provide the necessary resource to initiate a school programme, which includes the participation of inter-ethnic students,

teachers, and parents. A mentoring programme in school by teachers or students for students from different ethnicities to promote socio-cultural diversity may work as an instrument to increase student performance. Furthermore, the central government should regularly monitor and supervise the education programme implemented by the local government in each region to ensure that all co-existing ethnicities within the countries have equal access and receive the same treatment in terms of education services provided by the government.

A possible extension from this study is to include other variables, such as different measures of educational outcomes, social diversity indices, and other possible variables and extend the study period. This is a topic for future research that will provide a new understanding of educational outcomes.

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