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Determinants of local public expenditures on education: Empirical evidence for Indonesian districts between 2005 and 2012

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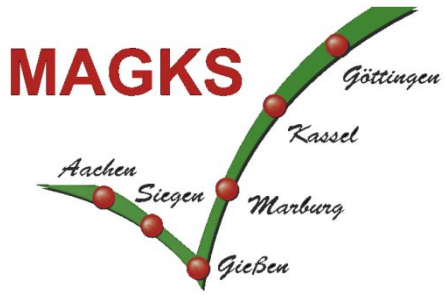

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Determinants of local public expenditures on education: empirical evidence for Indonesian districts between 2005 and 2012

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Abstract

We provide an empirical analysis of the factors that drive expenditures on primary and secondary education in Indonesian districts. We use a panel-data set covering 398 districts between 2005 and 2012. We account for the impact of socio-economic, political and geographical factors on expenditures per pupil and on the share of the overall budget spent on education. Our results are in line studies from other countries showing that educational expenditures are rising in the municipalities' fiscal capacity. Landlocked districts are found to spend less on education than non-landlocked ones. We find some support for the notion that the share of educational expenditures in total expenditures increases in the demand for education, though our indicators for demand are not associated with higher expenditures per pupil. Somewhat surprisingly, the characteristics of the local municipal council do not influence educational expenditures.

JEL: H75, I25, N35

Keywords: Indonesia, local government, educational expenditures, determinants

1. Introduction

Indonesia is one of the largest young democracies in the developing world. In 2001, it has implemented a massive decentralization. Since then, local authorities are in charge of essential tasks such as education and health care. The reform essentially followed the wisdom from fiscal federalism and aimed at improving efficiency in public service provision by handing over responsibility for local public services to the districts. To ensure accountability, the decentralization on the local level was followed by a democratization: District parliaments were installed and from 2004, district heads (mayors) were elected directly by the people. The decentralization is generally considered to have been effective in improving the match between local demand for and local supply of public services. At the same time, deficiencies are reported when it comes to establishing accountability through local elections (e.g., Kis-Katos and Sjahrir, 2014; Sjahrir et al., 2014).

As a developing country, one of the major challenges in Indonesia is to develop the stock of human capital to foster economic growth and reduce poverty especially in the less developed rural areas (e.g., McCulloch and Sjahrir, 2008). Through decentralization, however, the central government has lost direct control over large parts of the educational sector budget. While Kis-Katos and Sjahrir (2014) found that decentralization has increased investments in education especially in those districts with low public infrastructure, the disparities between regions remain substantial. This raises the question which factors drive inter-district disparities in expenditures on education. There is a substantial body of literature on this question for states and school districts in the United States and for some European countries. It shows that expenditures per capita are driven by the jurisdictional fiscal capacity, size and socio-economic characteristics of its population and the characteristics of its government. More recent studies find expenditures to be spatially correlated: jurisdictions expecting to produce large spillovers spend less on education than those expecting small spillovers. So far, however, little is known

about the factors that drive inter-local differences in education expenditures in developing countries. This paper aims at filling this gap.

We provide first evidence on the factors driving inter-district differences in public education expenditures in Indonesia. We account for socio-economic and geographical characteristics of municipalities. In addition, the characteristics of the local municipal council are taken into account. Our main findings can be summarized as follows: Educational expenditures are rising in the municipalities' fiscal capacity. We find that landlocked municipalities spend less on education than non-landlocked ones. This supports the notion that educational expenditures produce regional spillovers. We find some support for the notion that the share of educational expenditures in total expenditures increases in the demand for education. However, our indicators for demand are not associated with higher expenditures per pupil. The characteristics of the local municipal council do not influence educational expenditures.

The remainder of the paper is organized as follows: Section 2 contains a brief review of literature. Section 3 introduces the institutional background in Indonesia. In section 4, we present the data and derive the main hypotheses. The results are presented in section 5. Section 6 discusses the results and concludes.

2. Review of literature

In the last two decades, many developing countries have undergone institutional reforms with a massive decentralization of tasks – including primary and secondary education (World Bank, 2003, see Kis-Katos and Sjahrir, 2014, Intro). Given the large regional disparities in income and fiscal capacity, one of the essential challenges is to provide good quality education in the poor rural areas. Pose and Ezcurra (2010) find that fiscal decentralization increases regional inequalities in low and medium income countries. Sylwester (2002) analyses the impact of educational expenditures on income inequality using a cross-sectional panel of 50 countries. He shows that educational expenditures can reduce income inequality though the effect is small in developing countries. Faguet and Sanchez (2008) provide an analysis for Bolivia and Columbia. Using panel data from official government statistics for each country, they find that decentralization of education finance improved enrolment rates in public schools in Colombia. In Bolivia, decentralization made government more responsive by redirecting public investments to areas of greater need. In both countries, investment shifted from infrastructure to primary school services. Also in both countries, these changes were driven by the behaviour of smaller, poorer, more rural municipalities. Yamauchi et al. (2011) employ data from a survey among 676 Indonesian households to analyse the impact of education on income growth and the transition to non-agricultural sectors. He finds that the impact of education is larger in regions that are well-connected to other regions and to nearby cities.

Starting in the 1960s, some authors have analysed the differences in per capita spending across US states and school districts. They identified a number of important factors that explain why some states and districts spend more on education than others (e.g., Denzau, 1975[1];

[1] Denzau (1975) reviews the early studies and criticizes the disjointed fashion of studies. He re-estimates the different models found in the early studies using a unified data set on 127 school districts in Virginia for the 1969-70 school year. As models explicitly developed to study educational data did quite poorly, he

Denzau and Grier, 1984; Poterba 1996). The literature generally finds empirical support for the notion that the interest group model of public spending holds for education expenditures: Public spending is lower when the share of the population older than 65 years is higher (e.g., Miller, 1996; Fernandez and Rogerson, 1997). Miller (1996) finds that expenditures are higher when the share of parents in the electorate increases. In addition, expenditures per capita are found to depend on the per capita income (e.g., Fernandez and Rogerson, 1997). Colburn and Horowitz (2003) analyses the impact of political fragmentation on educational spending in Virginia. They analyse fragmentation in different dimensions (age, income, race, political parties) and find racial fragmentation to reduce public expenditures on education. In addition, expenditures are found to increase with political fragmentation, local crime rates and the share of people who voted for the Democratic Party. Romer (1990) places a special emphasis on the role of district size. He argues that larger school districts may be different from small ones in three respects. First, large districts are likely to behave more like a bureaucrat trying to maximize the budget while the median voter model is more appropriate for small districts. Second, larger districts are more heterogeneous internally. Finally, larger districts may experience economies or diseconomies of scale. Analysing New York school districts, he finds expenditures increase in district size and interprets this to support the bureaucratic nature of large districts. Nelson and Balu (2014) analysed the reaction of school districts to the "Great Recession" in 2007 and found fiscal stress to reduce expenditures per capita in school districts in

concludes that specifically modeling a theoretical explanation of school spending has been of little value. As significant positive determinants he finds some socioeconomic variables- namely median family income, equalized assessed value per pupil, population density, private school percentage, secondary school percentage, percentage of population in public schools and pupil density as well as some on aid (federal aid, total aid). As significant negative determinants, he finds some fiscal variables (tax price per pupil, percentage of revenue from state sources) and some socioeconomic variables (population change, percentage of public schools and percentage of urban population). As some of the empirical approaches raise serious concerns regarding potential endogeneity problems, they will not be reported in detail here.

Indiana and California. In California, cuts were less harsh in districts with the very poor population.

Epple and Romano (1996) point out that citizens' preferences regarding public education may not be single-peaked because there exists a private substitute. Especially well-off households can opt out and send their children to private schools. In this case, they will prefer low expenditures per students. Thus, an increase in the share of well-off households may reduce the aggregate demand for public education (see also Borck, 2008). Mavisakalyan (2011) analyzes the impact of immigration on private school enrolment. His empirical study supports the notion that well-off households respond to immigration from culturally different and less developed countries by sending their children to private schools. This reaction is accompanied by a reduction in public education expenditures.

Recently, a number of authors have addressed the question whether there is spatial interdependence in the expenditures on education. The theoretical literature suggests that these expenditures should be spatially correlated because public education creates spillovers. Spillovers are especially strong if parents are free in the choice of school for their children, and they can choose to send them to another school district (see Rincke, 2006; Gosh, 2010). Using spatial econometrics on a dataset for Massachusetts school districts, Gosh (2010) finds school districts increase the expenditures per pupil if their neighbouring districts do (see also Ajilore 2013).

There are a number of studies on subnational education expenditures in European countries. While the US school districts are single-purpose governments, the local jurisdictions in charge of primary and secondary education in the European countries covered below are multi-purpose governments. In this respect, they are much closer to the Indonesian districts. Falch and Ratso (1997) use a bargaining model to analyse the impact of labour unions' power on educational expenditures. Based on data from Norway between 1880 and 1990, they show

that teacher employment is kept down when wage bargaining is in the hand of stable governments backed by a parliament with low fragmentation. Political ideology is found to matter as well: Both teachers' wages and employment are more likely to increase under governments with "socialist orientation".

Freitag and Bühlmann (2003) try to explain the high variance in education expenditures among cantons in Switzerland in the 80s and 90s. They analyze the impact of socio-economic characteristics of the cantonal population (including urbanization and economic strength) and political variables (including a share of left-wing parties, the strength of organized interest groups, the strength of Catholic- conservative circles). They perform a bivariate cross-sectional analysis and a panel regression. Their dependent variable is education expenditures per capita, and they use factor analysis to deal with multi-collinearity in the panel regression. They find that factors capturing the population's demand for high-quality education have a strong positive impact. Inner-cantonal decentralization has a negative effect while vertical grants are found to increase educational expenditures per capita. The degree of "consensus democracy" – captured by the number of parties involved in government and their relative strength – has a positive influence.

Herbst and Wojciuk (2014) analyse disparities in local public education expenditures in Poland. They are interested in the effectiveness of equalization tools to neutralize the territorial inequalities in the tax base. Using data on 2478 municipalities over the period 2002-2010, they assess the relationship between local wealth and the inputs for locally administered lower secondary schools. They find that, despite equalization tools, the local tax base has a significant impact. They go on to compare quantity and content of the teaching time in the most affluent and the poorest municipalities and find significantly more hours of assistance by school pedagogues, librarians and shadow teachers in the most affluent municipalities. These are part of the so-called "external education expenditures". For Germany, Schwarz and Weishaupt

(2013) provide an analysis on the factors that drive how much resource German county governments spend on these external education expenditures per student in primary schools. Expenditures are found to decline in the unemployment rate and increase in county's fiscal capacity. They conjecture that political factors contribute to explaining inter-local differences in educational expenditures but do not include indicators to control for their possible influence.

Little research has been done to analyse the spread in expenditures on public education in developing countries. One exception is the study by Gu (2012). He analyses disparities in local public education expenditure in 1520 Chinese counties. Using a multivariate spatial autoregressive model, he finds significant spillover effects. Coastal areas and inland areas are shown to respond asymmetrically to their neighbours' education expenditures. Expenditures are found to depend on the counties' economic and socioeconomic characteristics. Due to a lack of democracy on Chinese counties, Gu (2012) does not address political factors. For Indonesia, these have to be accounted for.

3. Institutional background: Decentralization, democratization and the role of districts in funding public education in Indonesia

The fall of the Suharto "New Order" regime in 1998, after 32 years in power, marked the start of a reform era. The reforms included political, economic, legal, and social reforms. Many reforms, especially those on education and health were supported by international donor institutions like the World Bank (e.g., Better Education through Reformed Management and Universal Teacher Upgrading (BERMUTU), National Program for Community Empowerment in Urban Areas (PNPM UPP), Health Professional Education Quality Project). In the context of this paper, we will focus on the political reforms and the reforms of the public sector with a special emphasis on fiscal decentralization and education.

3.1 Political Reforms

Before political reforms were implemented, the Soeharto regime had tolerated only three political parties. Golkar was Soeharto' ruling party, and two other parties were the Indonesian Democratic Party (PDI) and the United Development Party (PPP) [2]. These three parties were heavily controlled by the government. In the six general elections held by "New Order" regime since 1971, Golkar always won the election with more than 60 percent of the votes.

Political reforms started with laws no 2/1999 and no 3/1999. These permitted the establishment of new political parties and gave them the right to participate in elections. The first democratic election for the national parliament and for municipal parliaments was held during the transition period by the interim President Habibie in 1999. 48 political parties competed for seats in the parliaments. On the national level, PDIP prevailed as the strongest party with 33.7 percent of the votes. The total number of parties that acquired parliamentary seat was 21

[2] Megawati's faction in October 1998 divided the PDI party to set up the PDIP (Democratic Party of Struggle)

at the national level. On district level, 45 parties were able to acquire seats in the 292 municipal parliaments. Political reforms are accompanied by the rebirth of “ideological stream” (*politik aliran*) and showed that parts of the Indonesian population supported parties rooted in ethnic or religious groups (Ufen, 2006). Six of the ten largest parties in national parliament are Islamic-rooted parties, and the other four are secular nationalist.

The political reforms also introduced direct election of the president, vice president, and heads of provincial and local governments. The first direct election of the president and vice president was held in 2004. On municipal level, direct elections started in June 2005 covering 226 local government (11 provinces and 215 districts and cities). By the end of 2009, almost 80 percent of the local jurisdictions held direct elections. Prior to this reform, the head of provincial level (governor) and municipal level such as regents (bupati), and mayors (walikota) are elected by the respective local parliament. In the past, the local parliament had the full authority to appoint and dismiss the head of local executive. The new autonomy law 32/2004 provided a clear definition of the head‘s political functioning. The head of local government should (i) propose and implement local laws, including the budget with approval by the municipal parliament, (ii) administer the jurisdiction as per the guidelines laid down by the municipal parliament, (iii) present accountability reports to the municipal parliament and central government through provincial government, and (iv) deliver information to citizens on the government‘s performance (Skoufias et all, 2011).

The political reforms aimed at increasing accountability at all levels of government. Together with the fiscal decentralization taking place in parallel (for details see section 3.3), introducing elections of parliaments and government representatives on the municipal level was part of a strategy of massive decentralization. It aimed at making the municipal governments more directly accountable to the people and increasing democratic participation at the local level

(Kaiser, et al., 2006). This in turn is expected to have a positive impact on municipal governance.

3.2 Regional structure

After the fall of the Suharto-regime, Indonesia has implemented regional reforms. In 2005, the beginning or our period of analysis, Indonesia consisted of 33 provinces. The average province has 7.1 Mill. inhabitants. On a local level, Indonesia is subdivided into 440 municipalities (349 districts (Kabupaten) and 91 cities (Kota)). The largest jurisdiction is Bandung (4.1 Mill. inhabitants), and the smallest one is Supiori (12.709 inhabitants). Cities are urban municipalities while districts are at least in parts dominated by rural settlements. Districts are often subdivided in a number of villages. The power of these villages is very limited; the main political decisions are made in the districts and cities. The latter units are responsible for the provision of local public goods and services – including primary and secondary schooling. In this paper, we will refer to districts and cities as municipalities.

3.3 Fiscal Decentralisation

Under the Suharto-regime, Indonesia was characterized by a high degree of fiscal centralization. There was little autonomy on the local level, and municipal revenues largely consisted of earmarked vertical grants (e.g. World Bank, 2003). Law no 22/1999 and the subsequent law no 32/2004 marked a turning point in this respect. They assigned the responsibility for a substantial part of public sector activities to the municipal level. District and city government were given the obligatory task to provide the local population with primary and secondary education, health services and social services (including support for people with disabilities, beggars, drug abusers, social disaster victims, homeless, neglected elderly and less prosperous families). Furthermore, they became responsible for spatial planning, housing issues, local infrastructure and promoting local economic development. When fulfilling these tasks, mu-

nicipalities have to follow general regulations put forth by the central government. Within these regulations, however, municipalities have significant leeway in deciding about the quantity and quality of the services they provide. In addition, they can choose the technology of public service provision in accordance with national regulations (e.g., public transport).

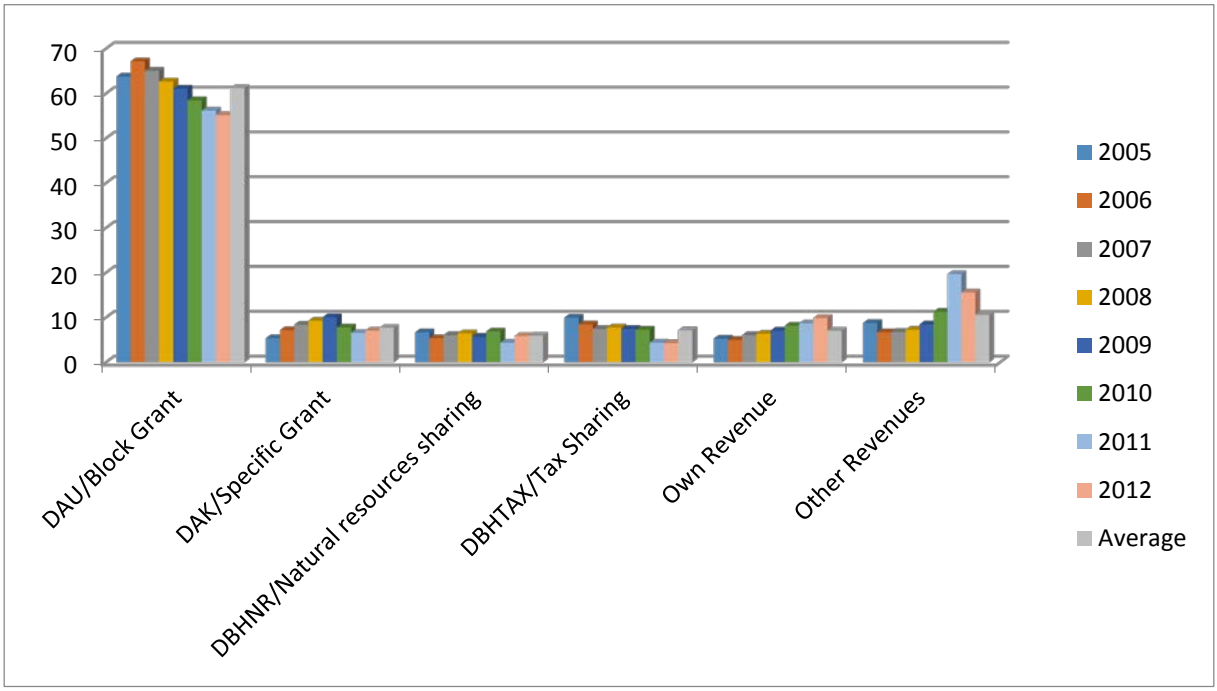
The Central Government remains responsible for defence, security, justice, foreign policy, monetary and fiscal policy, and religion. The provincial government took over the role of a representative of the central government and was given little autonomy. Its primary task is to provide the local population with basic public services that cannot be provided by the municipal government. In addition, they are responsible for ensuring that the coordination among districts/cities works well. Furthermore, provinces have the obligation to supervise municipal governments to ensure that these comply with the central governments' regulations.

Regarding revenues, the municipal level is still very much relying on vertical transfers from the central government. Compared to the pre-reform era, however, the share of earmarked transfers has been reduced. As of 2005, cities and districts receive general transfers that account for 85.9 percent of total municipal revenues on average (see Figures 1). They are not earmarked and designed to reduce regional disparities in fiscal capacity. The largest component is the block grant / Dana Alokasi Umum (DAU). It is consist of basic allocation plus a transfer to reduce the gap between fiscal needs and fiscal capacity in local government budgets[3]. A portion of DAU is earmarked for civil servant salaries and allowances. Only the Special Allocation Grant/ Dana Alokasi Khusus (DAK) is earmarked for the purpose of financing certain specific activities in accordance with national priorities. These are mainly used for

[3] A fiscal need is the sum of weighted indices (population, area, cost differences, human development index and income per capita) multiplied by an average expenditure of districts (provinces) for the DAU allocation for districts (provinces). Fiscal capacity is the sum of own source revenue plus the revenue sharing/DBH entitlement (natural-resource revenue sharing, and tax revenue sharing).

specific investment expenditures (most importantly school construction and renovation , hospital contruction and sanitation).

Figure 1. Composition of Local Government Revenues 2005 – 2012 (in percent)



In addition, municipalities gain revenues from a tax-sharing system. In particular, they receive 8.4 percent of the tax revenues sharing from personal income taxes[4]. On average, tax sharing accounts for 7.3 percent of municipal revenues. Some regions are rich in natural resources. In these regions, municipalities also receive some of the revenues from natural resource exploitation. Beyond that, cities and districts have the right to collect own taxes. In particular, they have the right to levy the following seven taxes: hotel tax, restaurant tax, entertainment tax,

4 Prior the new law no 28/2009, revised law 34/2004, about local tax and charges, the central government had right to collect Territory and Building Tax (PBB), and Land and Building Title Transfer Fees (BPHTB). With this law, the collection of those taxes has been transferred to local government. In addition, the new taxing rights were installed for provinces (cigarette tax) and local governments (swallow nest tax). The enactment of new tax collection is implemented in some stages. BPHTB has been fully implemented by the regions from January 1, 2011, while the Cigarettes tax, and Rural and Urban PBB tax are fully implemented by January 1, 2014. The new law also emphasizes that local governments have authority in setting the tax rate and tax base in accordance with national law.

advertisement tax, street light tax, quarrying tax, and parking tax – including the right to set the tax rate in accordance with national regulation. On average, own revenues account for approximately 6 percent of municipal revenues including charges and fees.

3.4 Responsibilities and expenditures for primary and secondary education

Education plays a key role in developing countries like Indonesia. There are an obligatory nine years of schooling for Indonesian children. The government provides primary and secondary schools without tuition fees – though parents may have to pay for transportation. There are two types of schools in Indonesia – Islamic and public schools.[5] Islamic schools are centrally managed and governed by the Ministry of Religious Affairs (MORA). Funding for teachers' salaries and for operational expenditures comes from MORA and thus from the central government.

In the course of the post-Suharto reforms, the municipal level was granted substantial autonomy in the field of public schools. The fiscal transfer DAU contains earmarked funds to pay for teachers' salaries, and the DAK-grant contains funds earmarked to cover investments in school building. In addition, municipalities receive MOEC's deconcentration fund and co-administration (tugas pembantuan) fund earmarked to cover the costs coordination meetings, supervision, and capacity building.[6] All other costs have to be covered from municipal funds stemming from other sources. The remaining expenditures contain costs of building mainte-

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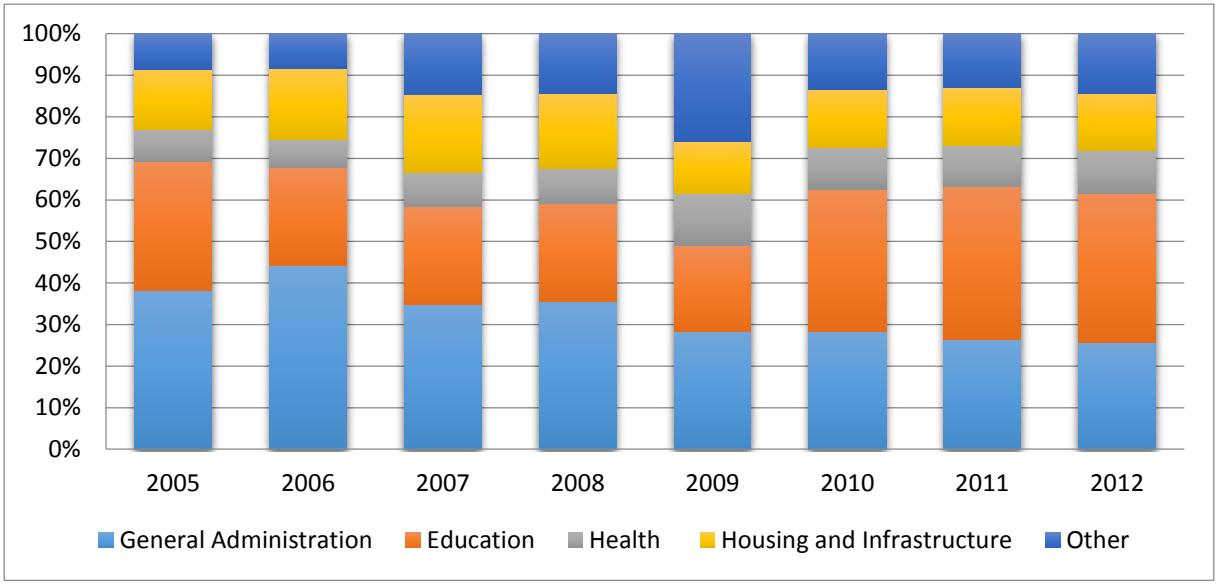
5 In both cases, there are also a number of private schools administered by the MORA or by the MOEC. However, they receive funding from one of these two institutions and have to comply with their regulation. Due to data restrictions, it is impossible to differentiate between those Islamic resp. public schools that are run by the state and those run privately but under state regulation (and funding). Thus, hereafter, we refer to all schools under the control of MORA as Islamic schools while all schools receiving funds from the MOEC are called public schools. Entirely private schools that receive money from tuition fees only are rare exceptions. They are not covered by our data set.

6 Deconcentration fund is administered by Provincial Education Offices on behalf of the central government, while co administrator fund administered by District Education Offices on behalf of the central government

nance, non-teaching staff, and teaching materials.[7] Districts are responsible for administering the primary and secondary public schools. Provinces are in charge of supervising the municipal level in order to ensure compliance with general regulation.

On average, between 2005 and 2012, the share of education expenditure in the municipal budget amount to 28.7 percent of total expenditures which is the second biggest expenditure after general administrative (see figure 2).

Figure 2. Share of Local Government Expenditure by Sector between 2005 and 2012



7 The other important fund is school operational assistance (BOS) directly transferred from central government to the school on a per student basis. BOS funding is implemented since 2005 which up to 2010 was directly transferred by central government to school. In 2012, the central government introduced a new system with involving a unit of the Provincial Education Office (PEO). Than PEO will deliver the fund directly to schools.

4. Data and Hypotheses

4.1 Data and regional disparities in Indonesia

We used data from 398 districts (Kabupaten) from 32 provinces in Indonesia for the period from 2005 to 2012. From the total 399 districts in 2011, we exclude one district of the province of DKI Jakarta, the capital of Indonesia, because the district is not autonomous. We also exclude new districts and one new province (Kalimantan Utara) established in 2012. The districts' fiscal data is retrieved from the Regional Finance Information System (*Sistem Informasi Keuangan Daerah*, SIKD) and Database for Policy and Economic Research (DAPOER) of World Bank Indonesia. The rest of data such as demographic, socio-economic and political are obtained from Indonesian Central Berau of Statistics (BPS RI), Province in Figures, and General Election Committee (KPU). Summary statistics for the variables are given in Table 1.

Indonesian municipalities differ substantially in their demographic, political, and socio-economic characteristics. Indonesia is an archipelago country that entails of more than 17.000 islands. According to population census, 2010, population in Indonesia has been rising at an annual rate of 1.3 percent. The population is still profoundly concentrated in Java, the world's most populous island hosting about 68 percent of Indonesia's total population. The degree of urbanization increased significantly from 41.9 percent to 49.7 percent over the last decade. In average, population density is 124 people per square kilometre. Central Jakarta is the most populous city with 18.569 people per square kilometre, and Tidore Kepulauan is the less populous city with 8 people per square kilometre. Indonesia is the largest Islamic population in the world. The share of Islamic population in 2010 is 87.2 percent. The largest percentage of Muslim population is in Nangroe Aceh Darusalam province reaches 98.2 percent, while Papua is a province with the lowest share of Islamic population of about 21 percent.

Table 1. Descriptive Statistics

Variable	Definition	Mean	Std. Dev.	Min	Max
LN_EDUE_PP	Natural logarithm of per pupil education expenditure	14.818	0.679	10.922	17.611
EDUE_TE	Share of education expenditure per total expenditure	0.314	0.122	0.022	0.664
RATIO_OWN_REV	Share of own revenue to total revenue	0.053	0.049	0.001	0.760
LN_TOTAL_REV_PC	Natural logarithm of per capita total revenue	14.445	0.855	11.154	18.030
RATIO_DAK_REV	Share of specific purposes fund / DAK to total revenue	0.079	0.043	0	0.475
SHARE_ISLAMIC_PARTIES	Votes received by all Islamic parties to total votes	0.311	0.157	0.000	0.780
HHI	a Political competition index based on share of local parliament seat at district level using Herfindahl Heirschman Index (HHI)	0.223	0.080	0.110	0.710
DEM_PARTY	Votes received by Demokrat party to total votes	0.083	0.060	0.000	0.500
GOLKAR_PARTY	Votes received by Golkar party to total votes	0.214	0.101	0.000	0.600
LN_POP	Natural logarithm of total population	12.574	1.038	9.121	15.439
LN_DENSITY	Natural logarithm of density (population/area)	295.404	447.821	0.771	3,181.347
URBAN	Share of population in urban area	23.268	17.642	0.000	94.660
LANDLOCK	A dummy equals one for districts with no access to the sea	0.729	0.445	0.000	1.000
LN_DISTANCE	Natural log of the distance to the province capital	4.993	1.010	1.099	7.515
SHARE_ISLAMIC_POP	Share of Islamic population relative to total population	0.739	0.347	0.000	1.000
SHARE_POPSCHAGE	Share of population in age 7 - 18 years of age relative to total population	0.204	0.031	0.007	0.434
LN_GRDP_PC	Natural logarithm of Gross Regional Domestic Product per capita	16.151	0.758	13.696	19.694
NER	The enrolment number of pupils of the school-age group for primary and secondary per total population in that age group	66.359	9.666	4.260	90.550
LITERATE	Number of people above 15 years old who can read relative to total population	90.222	11.536	10.930	99.950
MEAN_SHARE_ISLAMIC_PUPIL	An average share of Islamic pupil between period 2005 and 2012	0.109	0.087	0	0.455

On average between 2005 and 2012, income per capita was US$ 1.614 ranging from US$ 94 up to US$ 37.910.[8] The wide range between the minimum and maximum value of income per capita suggests a large heterogeneity across districts. With respect to fiscal capacity, the substance of district governments' expenditure is mostly financed by the balancing fund, especially the dominating DAU. On average, the DAU across district has declined slightly from 63 percent in 2005 to 61 percent in 2012 which show that the districts are still highly dependent on central transfer. Furthermore, their own source revenues only account less than 10 percent, which on average, has increased from 5 percent in 2005 to about 6 percent in 2012.

One of the interesting political factors in Indonesia is the existence of Islamic parties due to largely Moslem population. However, on average, the share of Islamic parties in local parliament is only 31 percent. Before 2009, 34 percent of districts had a majority of seats occupied by Islamic parties. After the 2009 election, this share reduces to 28 percent. The rest are mostly held by nationalist parties.

Urbanisation, as measured by the share of population living in urban areas divided by total population, shows deviations, ranging from entirely rural districts (0 percent) to highly urbanised ones (95 percent). The population in the school age 7 – 18 years old is around 20 percent on average. Yet there are significant cross-sectional differences ranging from 1 percent to 43 percent.

During our period of study, education performance indicators such as literacy rate and net enrolment rate show significant improvements. the literacy rate is defined as the proportion of the adult population aged 15 years and over who is literate. On average, it was 90 percent ranging from 10.9 percent to 99.5 percent. In addition, the average of net enrolment rate in primary and secondary school was more than 60 percent. It ranges from 4.3 percent in Nduga

8 Based on World Development Indicator, On average between 2005 and 2010, Official exchange rate (LCU per US$, period average) 1 US$ = 9417 IDR

in Papua Province to more than 90 percent in Samosir in Sumatera Utara Province. On average, educational expenditure per pupil amounts to US$ 360. The range between districts is wide from US$ 5,88 to US$ 4.726 per pupil. The average share of education expenditures as a percentage of total expenditures and year was 31 percent, ranging from 2 percent to 66 percent. The share of the Islamic schools student, on average, was 10,9 percent. The largest parts (about 52 percent) of the districts have less than 10 percent of pupils in Islamic schools. However, some districts witness a substantial share of pupils in Islamic schools with the Sumenep district reaching more than 50 percent.

4.1 Endogenous variables

We are interested in identifying the driving factors of the local expenditures on education. A meaningful comparison requires us to use relative measures as an endogenous variable. In the analysis to follow, we are going to use two different measures. As the first endogenous variable, we use the share of education expenditure in total expenditure (EDUE_TE). The second measure (LN_EDUE_PP) is the natural log of expenditure per pupil visiting the local public schools. In both cases, educational expenditures include all vertical grants (especially parts of DAU and DAK) earmarked for teachers' salaries and investments. In addition, it comprises all the additional funds used in primary and secondary education. Unfortunately, the existing data does not permit us to isolate the expenditures stemming from non-earmarked sources. Instead, our measure for educational expenditures comprises earmarked and non-earmarked funds.

4.2. Exogenous variables and hypotheses

There are different categories of explanatory variables to account for. First, we account for the demand for public primary and secondary education. Given that school attendance is obligatory, demand refers to the extent to which the population in a certain municipality really complies with the requirement to send their children to school. In addition, it may refer to the quality of schooling provided. If demand is high, we expect a larger share of expenditures in total expenditures (EDUE_TE). The impact of demand on the expenditures per pupil is not clear ex-ante. If quantitative demand is high because many parents send their children to school, expenditures per pupil will be lower. If qualitative demand is high, expenditures per pupil is expected to be high.

We use six proxy variables to capture this demand. First, we expect qualitative and quantitative demand to depend on the literacy rate among the adult population (LITRATE). The higher the literacy rate, the more educated the average parents are. We expect that educated parents better understand the benefits from school education and are thus more likely to send their children to school. Consequently, we expect a positive sign for LITRATE in the regressions for EDUE_TE and LN_EDUE_PP. Second, we expect the demand for education to be higher in municipalities with better job opportunities outside the agricultural sector. Provincial capitals provide job opportunities for educated people. The more proximate the provincial capital is, the more attractive these job opportunities are and thus the larger the demand for public education. The proxy variable we use is the natural log of the distance to the province capital (LN_DISTANCE). We expect a negative sign for this variable in the regressions for EDUE_TE and LN_EDUE_PP.

Given the special role of Islamic schools and their funding directly through MORA, we have to account for the share of pupils that visit Islamic schools. The larger this share, the lower the quantitative demand for educational expenditures by the district government. Unfortunately,

the available data on the number of pupils in Islamic schools is incomplete and extremely volatile. Therefore, we do not use annual data but the mean share of Islamic pupils in total pupils visiting Islamic or public schools (MEAN_SHARE_ISLAMIC_PUPIL) between 2005 and 2012 as an exogenous variable. We expect it to have a negative impact on EDUE_TE and LN_EDUE_PP.

In addition, we account for the share of the Islamic population. Even though children from Islamic families do not automatically visit Islamic schools, we expect that the demand for education in Islamic schools is larger in districts with a large share of the Islamic population. Therefore, we expect the demand – both quantitative and qualitative – for education in public schools to decreases in the share of Islamic population (SHARE_ISLAMIC_POP). Thus, we expect a negative sign for SHARE_ISLAMIC_POP in both the EDUE_TE and the LN_EDUE_PP-regression.

Finally, we account for the share of the population that potentially requires schooling and for the net enrolment rate. The larger the share of population that needs schooling and the larger the net enrolment rate, the lower the expenditures per capita. Variable NER captures the enrolment number of pupils of the school-age group for primary and secondary per total population in that age group. The variable POPSCHAGE depict population in school age between 7 – 18 years. As these variables refer to quantitative demand, we expect positive signs in the EDUE_TE-regressions and a negative one in the LN_EDUE_PP-regressions.

For a given level of demand, the expenditures per pupil depend on the costs of providing schooling. The costs of schooling are high when the average distance between two pupils is large. We use the population density (DENSITY) as the first proxy for the costs of school provision. The lower DENSITY, the more costly it is to organize schooling. As the average population density may be low even when the largest part of population concentrated in one spot of the district, we use the share of urban population (URBAN) as an additional proxy.

The larger URBAN, the lower the per capita costs. Thus, we expect a positive sign for DENSITY and a negative one for URBAN in both regressions. We also include the natural log of population size (LN_POP) as an exogenous variable. Following the argument by Romer (1990), larger districts are likely to suffer more heavily from bureaucratic power and slack. Romer (1990) argues that bureaucrats lead to larger budgets. This points at a positive relationship between municipal size and LN_EDUE_PP. For EDUE_TE, the prediction is less straight-forward.

The ability to spend resources on education depends on the economic and fiscal situation of the municipalities. We use the natural log of the local GDP per capita (LN_GRDP_PC) as a proxy for the economic situation. To capture the fiscal situation, we use the ratio of municipalities' own revenues to total revenues (RATIO_OWN_REV) and the municipalities' total revenues per capita (TOTAL_REV_PC). The larger these variables, the higher the fiscal capacity of the municipality and thus the higher the expenditures per pupil are expected to be. With respect to EDUE_TE, we do not have a clear prediction regarding the impact of these variables. Furthermore, we account for the amount of earmarked grants municipalities' receive through DAK-grants. These contain funds earmarked for school building construction and renovation. We expect a positive sign in the regressions for both endogenous variables.

A special focus rests on the influence of political factors. Here, the variable SHARE_ISLAMIC_PARTIES captures the share of municipal council seats occupied by delegates from Islamic parties. The share of seats occupied by the Democratic Party and the Golkar Party are depicted by the variable DEM_PARTY and GOLKAR_PARTY respectively. We expect Islamic parties to be less interested than other parties in spending large amounts of resources on public schools. Instead, they are expected to use their influence to reduce these expenditures in order to increase the relative attractiveness of Islamic schools. Other parties, especially democratic party members, are likely to be more interested in providing good

quality public education. Thus, we expect a negative sign for SHARE_ISLAMIC_PARTIES and a positive one for DEM_PARTY in both the EDUE_TE and LN_EDUE_PP-regressions.

The fragmentation of political power within the council is captured by the Herfindahl index (HHI) calculated over all parties. The higher the Herfindahl Index, the less fragmented the local council is. The expected relationship between HHI and educational expenditures is not clear ex-ante. On the one hand, a high concentration of power may result in low expenditures on education because the government does not have to fight hard for re-election and can waste resources – e.g. for an excessively large public administration or luxurious public buildings (e.g., Sjahrir et all, 2014.). On the other hand, Mierau, Jong-Apin and de Haan (2007) argue that fragmentation may prevent public sector reforms. If reforms include increasing public spending for public schools, this may imply a positive relation between political power and expenditures per capita. Finally, fragmentation implies that coalitions are needed to reach decisions. The Public Choice literature generally supports the notion that coalition governments have higher expenditures because they need to serve a larger number of interest groups (e.g., Mueller ,2003). As it is not clear whether teachers or parents form a strong interest group, it is unclear whether schools benefit from fragmentation in the local council.

We accommodate the findings in the most recent studies that used spatial econometric methods and find expenditures to be locally correlated (see section 2). Given the specific topography of Indonesia, we do not use the classical spatial econometrics tools. Instead, we argue that landlocked municipalities surrounded by competing municipalities can expect to have more spillovers than municipalities that are surrounded by water (in parts or entirely). We introduce the variable LANDLOCKED – a dummy variable that takes the value of 1 for a district with no access to the sea and 0 otherwise. A negative sign is expected in EDUE_TE and LN_EDUE_PP- regressions.

5. Empirical Analysis

We use a linear panel model to estimate the impact of the covariates presented in the previous section on educational expenditures of 398 Indonesian municipalities from 2005 to 2012. We start with the regression models using EDUE_TE as endogenous variable:

$$EDUE\_TE_{it} = \alpha^{TE} + \beta^{TE} X_{it-1} + \gamma_t^{TE} + \varepsilon_{it}^{TE} \quad (5.1)$$

The matrix X_{it-1} contains the exogenous variables described in section 4.2. All exogenous variables enter the regression equation lagged by one period. This lag accounts for the fact that the education expenditures in year *t* are determined in a formal decision of the local council in t-1. The models include year fixed effects (γ_t^{TE}). Hausman-tests suggest that the fixed effects models are adequate. Nevertheless, we report random effects models to learn about the impact of time-invariant variables on educational expenditures.

Table 2 reports the results of our regression. The baseline specification in column 1 consists of a random effects model using all exogenous variables described in section 4 except for LN_DENSITY because this variable is highly correlated with LN_POP.[9] Column 2 contains the corresponding fixed effects models. In the next two specifications, we replace LN_POP with population density LN_DENSITY – random effects and fixed effects models are reported in column 3 and 4 respectively. In the models contained in the last two columns, we drop DAK from baseline specification – again both of random effects and fixed effects.

9 The full correlation table is presented in the appendix.

Table 2. Determinant of the share of local public education expenditure in total expenditure 2005 – 2012

VARIABLES	Random (1)	Fixed (2)	Random (3)	Fixed (4)	Random (5)	Fixed (6)
RATIO_OWN_REV (t-1)	-0.205***	-0.174***	-0.271***	-0.179***	-0.212***	-0.175***
	(0.0512)	(0.0620)	(0.0502)	(0.0621)	(0.0512)	(0.0620)
LN_TOTAL_REV_PC (t-1)	-0.0193***	0.00156	-0.0241***	-0.00486	-0.0197***	0.00256
	(0.00597)	(0.00722)	(0.00527)	(0.00702)	(0.00598)	(0.00719)
RATIO_DAK_REV (t-1)	0.128***	0.0568	0.0198	0.0428		
	(0.0389)	(0.0409)	(0.0384)	(0.0406)		
SHARE_ISLAMIC_PARTIES (t-1)	0.0228	0.0443	0.00289	0.0440	0.0256	0.0463*
	(0.0229)	(0.0279)	(0.0223)	(0.0280)	(0.0230)	(0.0278)
HHI (t-1)	0.00909	0.00197	-0.0288	-0.000145	0.00904	0.00257
	(0.0290)	(0.0326)	(0.0283)	(0.0327)	(0.0291)	(0.0326)
DEM_PARTY (t-1)	0.0293	0.0585	0.0389	0.0590	0.0356	0.0584
	(0.0476)	(0.0590)	(0.0462)	(0.0590)	(0.0476)	(0.0590)
GOLKAR_PARTY (t-1)	0.0269	0.106***	0.0232	0.0993***	0.0293	0.108***
	(0.0270)	(0.0353)	(0.0261)	(0.0353)	(0.0270)	(0.0353)
LN_POP (t-1)	0.0574***	0.0253**			0.0545***	0.0229*
	(0.00554)	(0.0122)			(0.00548)	(0.0121)
		-		-		-
URBAN (t-1)	3.34e-05	0.000908**	-6.24e-05	0.000923**	1.82e-05	0.000894**
	(0.000198)	(0.000359)	(0.000188)	(0.000359)	(0.000198)	(0.000359)
LANDLOCK	-0.0264***		-0.0318***		-0.0259***	
	(0.00661)		(0.00610)		(0.00661)	
LN_DISTANCE	-0.0113***		-0.00754**		-0.0116***	
	(0.00337)		(0.00314)		(0.00337)	
SHARE_ISLAMIC_POP (t-1)	0.0206	0.0274	0.0292**	0.0298	0.0181	0.0262
	(0.0127)	(0.0383)	(0.0119)	(0.0384)	(0.0127)	(0.0383)
SHARE_POPSCHAGE (t-1)	0.300***	0.225**	0.289***	0.190*	0.304***	0.227**
	(0.0748)	(0.0985)	(0.0726)	(0.0986)	(0.0749)	(0.0985)
LN_GRDP_PC (t-1)	-0.00869**	-0.000566	-0.00293	-0.00663	-0.0112***	-0.00141
	(0.00411)	(0.00683)	(0.00397)	(0.00634)	(0.00405)	(0.00680)
NER (t-1)	0.000393	-0.000510*	7.46e-05	-0.000462	0.000358	-0.000516*
	(0.000252)	(0.000304)	(0.000249)	(0.000303)	(0.000252)	(0.000304)
LITERATE (t-1)	0.000406*	0.000644*	0.000584**	0.000596	0.000427*	0.000696*
	(0.000244)	(0.000386)	(0.000235)	(0.000385)	(0.000244)	(0.000384)
MEAN_SHARE_ISLAMIC_PUPIL	0.00699		-0.00578		0.00978	
	(0.0482)		(0.0443)		(0.0483)	
LN_DENSITY (t-1)			0.0389***	-0.00834		
			(0.00305)	(0.00807)		
Constant	-0.118	-0.168	0.417***	0.382***	-0.0278	-0.140
	(0.147)	(0.267)	(0.0941)	(0.148)	(0.145)	(0.266)
Observations	2,597	2,597	2,597	2,597	2,597	2,597
F statistics		62.94		62.68		66.12
Probability > F stat		(0.000)		(0.000)		(0.000)
Wald Chi-squared	2006.49		2197.90		1989.12	
Probability > chi2	(0.000)		(0.000)		(0.000)	
R-squared	0.348	0.366	0.344	0.365	0.345	0.366
Number of regency	398	398	398	398	398	398
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes

*** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent.

The main results of these six models can be summarized as follows. The variable RATIO_OWN_REV is significant and negative in all models. POPSCHAGE and LN_POP are significant and positive in all models. In the random-effects model, significantly positive estimators are reported for LITERATE and DENSITY while TOTAL_REV_PC, LANDLOCK, and LN_DISTANCE are negative and significant. In the fixed effects models, GOLKAR yields a positively significant coefficient estimator whereas URBAN is negative and significant. DAK is positively significant only in the baseline specification with random effects, and SHARE_ISLAMIC_POP is significantly positive in the third model. LN_GRDP_PC are negative and significant in the random effects models 1 and 5 while LNER are negative and significant in the fixed effect models 2 and 6. Finally, SHARE_ISLAMIC_PARTIES yields a significant coefficient estimator in model 6. All other variables are insignificant.

In a next step, we run the same regression models with LN_EDUE_PP as an exogenous variable. The corresponding model reads:

$$LN\_EDUE\_PP_{it} = \alpha^{PP} + \beta^{PP} X_{it-1} + \gamma_t^{PP} + \varepsilon_{it}^{PP} \tag{5.2}$$

Here, γ_t^{PP} depicts the year fixed effects. Again, Hausman-tests suggest that the fixed effects models are adequate. However, we report random effects models to identify the impact of time-invariant variables on educational expenditures.

The results are reported in Table 3. We find significantly positive coefficient estimators for LN_TOTAL_REV_PC in all models. In the random effects model, we find significantly positive signs for LN_GRDP_PC, HHI, SHARE_ISLAMIC_PARTIES and significantly negative signs for LANDLOCKED, and SHARE_POPSCHAGE. MEAN_SHARE_ISLAMIC_PUPIL is positive and significant in all random effects except for the third model.

Table 3. Determinant of local public education expenditure per pupil 2005 – 2012

VARIABLES	Random (1)	Fixed (2)	Random (3)	Fixed (4)	Random (5)	Fixed (6)
RATIO_OWN_REV (t-1)	-0.0699	0.0565	-0.159	0.137	-0.0705	0.0542
	(0.278)	(0.344)	(0.276)	(0.343)	(0.278)	(0.343)
LN_TOTAL_REV_PC (t-1)	0.271***	0.136***	0.377***	0.124***	0.271***	0.139***
	(0.0325)	(0.0400)	(0.0290)	(0.0388)	(0.0325)	(0.0398)
RATIO_DAK_REV (t-1)	0.0132	0.193	0.0900	0.187		
	(0.213)	(0.227)	(0.212)	(0.225)		
SHARE_ISLAMIC_PARTIES (t-1)	0.218*	0.234	0.243**	0.267*	0.219*	0.241
	(0.125)	(0.154)	(0.123)	(0.155)	(0.124)	(0.154)
HHI (t-1)	0.441***	0.219	0.512***	0.241	0.441***	0.221
	(0.158)	(0.181)	(0.156)	(0.181)	(0.158)	(0.181)
DEM_PARTY (t-1)	0.284	0.306	0.205	0.335	0.285	0.306
	(0.258)	(0.327)	(0.255)	(0.327)	(0.258)	(0.327)
GOLKAR_PARTY (t-1)	0.152	0.371*	0.140	0.356*	0.153	0.376*
	(0.146)	(0.196)	(0.144)	(0.195)	(0.146)	(0.196)
LN_POP (t-1)	-0.0922***	-0.0344			-0.0925***	-0.0425
	(0.0299)	(0.0675)			(0.0295)	(0.0668)
URBAN (t-1)	0.00214**	-0.000231	0.000719	-0.000284	0.00214**	-0.000181
	(0.00106)	(0.00199)	(0.00104)	(0.00199)	(0.00106)	(0.00199)
LANDLOCK	-0.153***		-0.148***		-0.153***	
	(0.0351)		(0.0335)		(0.0351)	
LN_DISTANCE	-0.0185		-0.00311		-0.0185	
	(0.0179)		(0.0172)		(0.0179)	
SHARE_ISLAMIC_POP (t-1)	0.0128	-0.0598	0.00293	-0.0284	0.0126	-0.0639
	(0.0681)	(0.212)	(0.0657)	(0.212)	(0.0679)	(0.212)
SHARE_POPSCHAGE (t-1)	-2.021***	-0.0204	-2.027***	-0.133	-2.020***	-0.0140
	(0.406)	(0.546)	(0.400)	(0.546)	(0.405)	(0.546)
LN_GRDP_PC (t-1)	0.0467**	-0.0178	0.0515**	-0.0178	0.0464**	-0.0207
	(0.0222)	(0.0379)	(0.0218)	(0.0351)	(0.0218)	(0.0377)
NER (t-1)	-0.00144	-0.00274	-0.00147	-0.00275	-0.00145	-0.00276
	(0.00137)	(0.00168)	(0.00137)	(0.00168)	(0.00137)	(0.00168)
LITERATE (t-1)	0.000682	0.00469**	0.000852	0.00488**	0.000684	0.00487**
	(0.00132)	(0.00214)	(0.00129)	(0.00213)	(0.00131)	(0.00213)
MEAN_SHARE_ISLAMIC_PUPIL	0.591**		0.344		0.591**	
	(0.257)		(0.244)		(0.257)	
LN_DENSITY (t-1)			0.0296*	-0.0982**		
			(0.0168)	(0.0447)		
Constant	11.31***	12.73***	8.429***	12.88***	11.32***	12.83***
	(0.795)	(1.479)	(0.518)	(0.819)	(0.780)	(1.475)
Observations	2,597	2,597	2,597	2,597	2,597	2,597
F statistics		162.93		163.50		171.49
Probability > F stat		(0.000)		(0.000)		(0.000)
Wald Chi-squared	3629.29		3604.22		3630.75	
Probability > chi2	(0.000)		(0.000)		(0.000)	
R-squared	0.591	0.599	0.587	0.600	0.591	0.599
Number of regency	398	398	398	398	398	398
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes

*** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent.

The fixed effects models yield positive and significant estimators for LN_POP. LITRATE yields positive coefficient estimators. These are (weakly) significant in some of the models. SHARE_ISLAMIC_PARTIES is positively significant only in the random-effects model excluding size (model 3). Weakly significant estimators are reported for GOLKAR (positive) in the random effects models. Coefficient estimators for LN_DENSITY are weakly significant and positive in the random effects model yet significantly negative in the fixed effects model.

6. Concluding remarks

We provide a panel data analysis of the factors driving the educational expenditures in Indonesian municipalities (districts and cities) between 2005 and 2012. Some of our findings are well in line with the literature and/or the hypotheses derived in section 4.2. The most remarkable result in this respect is the persistently negative coefficient estimators for LANDLOCK. Landlocked municipalities spend fewer public resources on education – both in absolute terms per pupil and in relative terms. This result is in line with the hypothesis that educational expenditures generate positive spillovers.

We find the share of educational expenditures in overall expenditures to be higher for municipalities with a larger share of children. This supports the notion that the municipal governments respond to the quantitative demand for education. The negative relationship between the share of educational expenditures and the distance to the district capital points in the same direction. The fact that the share of educational expenditures is lower in districts with a large share population living in of urban areas supports our notion that providing schooling in these areas generates economies of scale. Finally, the negative impact the ratio of own revenues to total expenditures indicates that local population is more reluctant to support high shares of public funds being used for education if funds stem from locally collected taxes.

The regressions using expenditures per pupil as endogenous variable provide only little support for the notion that municipal governments respond to residents' demand for high-quality education. Only the positive relationship between expenditures per pupil and the literacy rate among adults in the fixed effects models points in this direction. On the other hand, these regressions support the notion that per pupil expenditures strongly depends on the level of local economic development and the availability of fiscal means. The negative impact of SHARE_POPSCHAGE and MEAN_SHARE_ISLAMIC_PUPIL on expenditures per pupil clearly show that per pupil expenditures are higher the lower the share of children that actually visit public schools.

Looking at the impact of political factors, the regressions in Table 2 and 3 provide little support for our hypothesis. The performance of HHI in Table 3 provides no conclusive answer regarding the impact of political concentration. The fact that HHI is significant in the random effects models but seizes to be significant in the fixed effects model contradicts the notion that there is a strong causal link between political concentration and educational expenditures. The positive impact of GOLKAR on the educational expenditures in the fixed effects models in table 2 and in table 3 (weakly significant) gives some indication that ideological arguments drive political decisions on educational expenditures. On the other hand, we find no evidence that Islamic parties use their political power to reduce expenditures on education to promote MORA-concentrated Islamic schools. Finally, our results do not support the notion put forth by Romer (1990) according to the influence of bureaucrats increases in municipal size and lead to higher educational expenditures per capita.

The study suffers from a number of limitations. The most important limitation is that we cannot differentiate clearly between expenditures funded by earmarked vertical grants and expenditures funded by non-earmarked sources. It seems reasonable to assume that expenditures for teachers' salaries per pupil are unlikely to vary massively across municipalities. Thus, not

being able to isolate this element of DAU-transfers does not jeopardize our main results. Regarding the vertical grants for investments in school buildings, the assumption of equal amounts per pupil on average is less realistic. In particular, it is possible that the central government systematically discriminates between different municipalities. We try to cope with this data restriction by including the share DAK-grants. Even though investments for school buildings make up a substantial part of this grant, not being able to isolate the part of DAK earmarked for educational purposes remains a shortcoming of our dataset.

The poor data quality on the share of pupils in Islamic schools poses a second shortcoming of our analysis. If better quality data becomes available, it is a promising endeavour to analyse the competition between public and Islamic schools and its impact on local goverments' expenditures on education. The underlying theoretical model is more demanding because two different sets of decision makers, and decisions have to be accounted for. Like in this paper, the local government's decision needs to be analysed. In addition, it is necessary to model the parents' school choice. This more encompassing analysis will provide insights that we cannot gain given the data currently available. In particular, it may shed more light on the influence of political factors – in particular, the role of Islamic parties in local politics.

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Appendix

Table A.1 Matrix correlation

	LN_EDUE_PI	EDUE_TE	TIO_OWN_	TOTAL_REV	ATIO_DAK-R	_ISLAMIC_I	LHHI	DEM_PART	OLKAR_PAR	LLN_POP	LURBAN	LLANDLOCK	N_DISTANCE	RE_ISLAMIC	RE_POPSCH	LN_GRDP_P	LNER	LLITERATE	ARE_ISLAM	LN_DENSITY
LN_EDUE_PP	1																			
EDUE_TE	0.0761	1																		
LRATIO_OWN_REV	-0.1015	0.1642	1																	
LLN_TOTAL_REV_PC	0.6154	-0.5817	-0.2651	1																
LRATIO_DAK-REV	0.1051	-0.1463	-0.3171	0.2417	1															
LSHARE_ISLAMIC_PARTIES	-0.1585	0.2214	0.1236	-0.3614	-0.2515	1														
LHHI	0.0589	-0.2825	-0.1671	0.2553	0.2089	-0.535	1													
LDEM_PARTY	0.1995	0.3278	0.1543	-0.045	-0.0259	-0.1639	-0.2514	1												
LGOLKAR_PARTY	-0.1353	-0.3421	-0.0679	0.125	0.063	-0.1408	0.1807	-0.4299	1											
LLN_POP	-0.4004	0.6572	0.3952	-0.8459	-0.4139	0.3655	-0.3734	0.2326	-0.2252	1										
LURBAN	-0.0157	0.3024	0.5851	-0.2672	-0.385	0.1936	-0.2797	0.235	-0.181	0.485	1									
LLANDLOCK	-0.0774	-0.1061	0.0204	0.0466	0.0587	0.0055	0.0489	-0.0429	0.0492	-0.0488	0.0345	1								
LLN_DISTANCE	0.1441	-0.3224	-0.3604	0.3778	0.1994	-0.2114	0.2393	-0.1155	0.0552	-0.4481	-0.3647	-0.0438	1							
LSHARE_ISLAMIC_POP	-0.1349	0.3461	0.1247	-0.4063	-0.3034	0.7568	-0.4519	0.0194	-0.1297	0.4533	0.2342	0.008	-0.2356	1						
LSHARE_POPSCHAGE	-0.1763	-0.0042	-0.1502	0.0336	0.1449	-0.0218	0.0972	-0.1235	0.0467	-0.1299	-0.172	0.1098	0.1662	-0.0365	1					
LLN_GRDP_PC	0.405	-0.1356	0.1588	0.4099	-0.2995	0.0495	-0.1367	0.2074	-0.1018	-0.1126	0.2775	0.036	-0.0142	0.1186	-0.1172	1				
LNER	0.015	0.327	0.1788	-0.1523	-0.1802	0.1616	-0.1197	0.1556	-0.2314	0.2201	0.296	-0.0443	-0.1677	0.3113	0.2976	0.1862	1			
LLITERATE	-0.0512	0.1602	0.0783	-0.0992	-0.1579	0.213	-0.235	0.0501	-0.0292	0.12	0.1685	0.0109	-0.1056	0.3435	0.362	0.2104	0.5847	1		
MEAN_SHARE_ISLAMIC_PUPI	-0.1619	0.3754	0.1854	-0.5062	-0.2686	0.5814	-0.274	0.063	-0.2679	0.5547	0.2379	-0.0022	-0.2067	0.6144	-0.1119	-0.0441	0.2281	0.1267	1	
LLN_DENSITY	-0.3003	0.7053	0.43	-0.7969	-0.2068	0.3084	-0.2665	0.2216	-0.2452	0.8126	0.5029	-0.0073	-0.4689	0.3838	-0.1056	-0.2151	0.2936	0.0858	0.5162	1