Australian National University

Working Papers in Trade and Development

Legislature Size, Local Government Spending, and Public Service Access in Indonesia

Blane D. Lewis

Working Paper No. 2016/16

Arndt-Corden Department of Economics
Crawford School of Public Policy
ANU College of Asia and the Pacific

Legislature Size, Local Government Spending, and Public Service Access in Indonesia

Blane D. Lewis
Australian National University

Abstract This study examines the impact of legislature size on local public finance outcomes in Indonesia. The investigation employs both continuity- and randomization-based regression discontinuity methods to accommodate the endogeneity of council size and to identify its causal effects on local government spending and service delivery. Several studies have examined the influence of increasing legislature size on expenditures, but no consensus has emerged on the direction of impacts. Moreover, interpretation of the efficiency of derived spending effects has remained elusive and reliant on ad-hoc theorizing. This is the first study to examine the causal impact of council size on service outcomes, thereby facilitating an empirically-based understanding of expenditure efficiency effects. The study finds that increasing legislature size negatively affects local government total and capital spending. The investigation also shows that rising legislature size has a negative influence on citizen access to public services, explicitly indicating a decline in local efficiency. The findings contradict recent explanations of similar empirical results.

Key words Legislature size; local government; spending, service delivery; efficiency, Indonesia

JEL classification: H72; H75; H76

Introduction

The starting point for much of the recent theory on the impact of local legislature size is the well-known article by Weingast, Shepsle, and Johnsen (1981). These authors conjecture that larger councils, formed across single member electoral districts, lead to the implementation of capital projects that are "too large" and increased local spending. In this context, a growing number of legislators exacerbates the fiscal commons problem, whereby individual councilors seek to target project benefits to their home districts but where those projects are funded from a common pool of cross-district resources. As the number of legislators rises, any given councilor absorbs a smaller share of an additional project's costs, leading to higher demand for inefficiently large projects and increased spending. It is fair to say that this theory has become the conventional wisdom on the topic (Hohmann, 2017).[1]

[1] Other researchers have extended the Weingast et al (1981) framework beyond geographic-based, single member electoral districts. Velasco (2000) considers the expenditure impact of a rising number of executive

On the other hand, Primo and Snyder (2008) have shown that an increase in the number of councilors may lead to declining local government spending. If central government partially subsidizes local public goods provision, for example, then project costs are "re-internalized" to a certain extent, and the common pool problem is somewhat mitigated. Negative spending effects may obtain, especially given a sufficiently large (initial) number of legislators, as project demand decreases with abridged local cost sharing.[2] In this case, local project spending may become inefficiently low. Both the above two theories are typically called pork barrel models, meaning they assume that the main objective of legislators is to return project benefits to their home districts and other constituents.

Still other researchers have argued that increasing legislature size can be beneficial for local efficiency and spending outcomes. Pettersson-Lidbom (2012) posits the existence of an agency problem between time-constrained councilors and local government bureaucrats, whereby the former seek to restrain the budget maximizing tendencies of the latter. In this case, a growing number of legislators leads to a decline in inefficient local spending.

The empirical research to date that has tested theoretical predictions related to the impact of legislature size offers decidedly mixed results. Gilligan and Matsusaka (1995, 2001), Bradbury and Crain (2001), Baqir (2002), Perotti and Kontopoulos (2002), and Egger and Köthenbürger (2010) all find that council size has a positive impact on local spending. Contrarily, De Figueiredo (2003), Pettersson-Lidbom (2012), Garmann (2015), and Hohmann (2017) determine that legislature size negatively affects expenditure at the local level.

Empirical researchers face two significant challenges in investigating the causal effects of council size on local spending and efficiency. The first difficulty concerns the

branch spending authorities and state-owned enterprises, for example; and Lizzeri and Persico (2005) focus on the spending effects of an increasing number of political parties in the legislature. Both studies find that a growing number of decision-makers leads to less spending.

[2] Reduced congestion associated with local public goods provision also supports declining expenditure effects (Primo and Snyder, 2008).

endogeneity of legislature size. The most recent work in this area recognizes that the size of the local council is endogenous and that a failure to accommodate that endogeneity in model specification leads to biased estimation results. Of the studies mentioned above, only Egger and Köthenbürger (2010), Pettersson-Lidbom (2012), Garmann (2015), and Hohmann (2017) adopt methods that allow for the endogeneity of legislature size.

The second hurdle relates to determining whether the estimated spending effects are efficient or not. None of the studies mentioned above provides direct empirical evidence on that count; researchers instead have relied on simple assumptions or ad-hoc theorizing to make the case one way or the other. Of the studies enumerated above, those that find expenditure increases argue that the result is inefficient while those that find spending decreases claim that the outcome is efficient.[3] In all instances, however, the inferences are derived from theory and not explicit evidence. These judgements may be correct, of course, but it would be useful to have some empirical confirmation of the theory-based assertions.

This study examines the impact of legislature size on local government spending and service access in Indonesia between 2005 and 2012. Indonesia offers an interesting laboratory in which to examine the effects of legislature size on public finance outcomes. The country launched a very ambitious program of fiscal decentralization in 2001. Local governments have become responsible for the delivery of most key public services, including those in the education, health, and infrastructure sectors. In 1999, the popular election of local councils was introduced, and Indonesia initiated direct elections of district heads in 2005.

The investigation in this paper employs both continuity- and randomization-based regression discontinuity methods to overcome problems related to the endogeneity of council size and identify causal district spending and citizen service access effects. The examination

[3] The exception to the rule is Hohmann (2017). He finds negative spending impacts of increasing council size in Germany but reasonably suggests that further research would be required before a judgment can be made about the interpretation of effects.

of service impacts allows for an empirically-based assessment of the extent to which spending effects are efficient or not. This appears to be the first study to assess the impact of endogenous legislature size on services and the first to employ two different approaches to regression discontinuity design in the investigation of legislature size effects of any kind.

The study finds that rising council size negatively affects local government total and capital (project) spending. In addition, the investigation shows that rising legislature size has negative impacts on citizen access to key public services as well. The latter result implies a decline in local government efficiency.[4] The derived outcomes for spending and services together are consistent with some (but not all) theoretical predictions (Primo and Snyder, 2008) but contradict the interpretations of other recent and similar empirical findings (De Figueiredo, 2003; Pettersson-Lidbom 2012; Garmann, 2015).

The rest of the paper proceeds as follows. First, some background information on local fiscal and political affairs and service delivery in Indonesia is provided. Second, the variables and data used in the examination are reviewed. Third, the methods and identification strategy are explained. Fourth, the main empirical results of the study are presented and discussed. Fifth, the robustness of the results is interrogated. A closing section summarizes and concludes.

Local Fiscal and Political Affairs and Service Provision

Local Fiscal Affairs

Indonesia is a unitary country and throughout most of its history its public sector was one of the most centralized in the world. In 2001, however, the country began a determined effort to decentralize authority over service delivery to subnational governments—provinces and local governments (districts). District service assignments focus on education, health, and

[4] Efficient service access is that for which supply of services matches demand. If it is assumed that, in general, citizens demand greater access to services then reduced service access is inefficient (all else being equal).

infrastructure functions but also include tasks related to agriculture, social protection, environment, low-income housing, and security, among others. Local expenditure budget shares for education, health, and infrastructure are approximately 35 percent, 10 percent, and 15 percent, respectively. Subnational government responsibility for service delivery is significant. Provincial and district expenditure makes up about one-half of total public-sector spending net of subsidies and interest payments. Local government expenditure encompasses about 75 percent of the subnational total (Lewis, 2017b).

District revenues include those from: own-sources, shared tax and non-tax revenue, a general-purpose grant, a specific-purpose grant, and others. Own-sources are rather constrained; allowable taxes are enumerated, and maximum tax rates are prescribed in national legislation. The most important local taxes are those on electricity consumption and hotel and restaurant sales. Districts may create their own user charges based on rules set in law. But central government reserves the right to cancel charges and fees that it believes breach legislative principles and it often does so (Lewis, 2003).

Shared taxes consist of the property tax (through 2013, now decentralized to districts) and the personal income tax. Shared non-taxes derive from national forestry, fisheries, mining, and gas and oil revenues. The general-purpose grant is an equalization mechanism, which allocates funds based on a fiscal gap formula. The specific-purpose transfer is a matching capital grant; it spans numerous sectors but is concentrated in education, health, and infrastructure.[5] Other revenues include special autonomy funds for districts in Aceh, Papua, and West Papua; grants from the central government for teacher certification and other education operations; and transfers from provinces. Taken together intergovernmental fiscal transfers comprise more than 90 percent of local revenue budgets (Lewis, 2017b).

[5] In 2016, the specific-purpose grant was reconstructed as a proposal-based transfer to provinces and districts. The matching component was expunged.

During the period of study here local governments had substantial discretion over the expenditure of revenues to which they had access. Districts were required to spend 20 percent of their budgets on education but had full spending autonomy over the remainder of their funds. The education spending mandate is not particularly onerous since it includes teacher salaries, and this makes the target rather easily achieved for most local governments. (Lewis and Nguyen, 2018). In recent years district spending authority has been curtailed to a certain extent. In addition to compulsory education expenditure, since 2015 districts have become obliged to spend at least five percent of their funds on health and transfer another 10 percent of their resources to the villages within their jurisdictions (Lewis, 2015; Antlov, Wetterberg, and Dharmawan, 2016).

Local Political Affairs

Indonesian fiscal decentralization has been complemented by significant political developments at the local level. Prior to 1999, both subnational government executives and councils (*Dewan Perwakilan Rakyat Daerah*, DPRD) were appointed by central government. The popular election of DPRD representatives was introduced in 1999. Starting in that year, DPRDs also began to appoint subnational government heads, as central government appointed executives' terms expired. Indonesia initiated direct elections of provincial and district government heads in 2005. Direct elections have since been implemented in a gradual manner, as DPRD-appointed executives' terms finished (Lewis, 2017b).

DPRD elections are held across multiple voting sub-districts (*dapils*) within subnational government jurisdictions, where each *dapil* is allocated seats in the DPRD based on its relative population size (given the DPRD's total number of seats). Over the period of study, the number of *dapils* per local government jurisdiction ranged from two to seven and the number of seats per *dapil* varied from three to 12. Voting is based on proportional

representation and open-list electoral rules. There was no electoral threshold for political parties participating in DPRDs polls during the period of study (Tomsa, 2014).

DPRD members are elected for five-year terms. Since the first polls in 1999, legislative elections have been held in 2004, 2009, and 2014.[6] The exact number of seats allocated to a DPRD is a deterministic and discontinuous function of jurisdiction population size. Table 1 shows how the number of local DPRD seats was fixed in the 2004 and 2009 elections, which span the period of investigation of this study.

[Table 1]

Note that the number of seats in the legislature for districts with population sizes greater than one million was increased from 45 to 50 just prior to the 2009 elections. The change was based on a proposal to the national legislature (*Dewan Perwakilan Rakyat*, DPR) from one of the largest and most powerful political parties in Indonesia, GOLKAR.[7] The suggestion was agreed to by most of the other parties in the DPR and the appropriate change was made in revised electoral legislation, Law No. 10/2008.

In any case, there are no exceptions to the rule relating pre-election population size to total number of DPRD seats in the data used in this study. Figure A1 illustrates the deterministic relationship between population size and the total number of council seats for the 2004 and 2009 elections. [8]

[Figure 1]

DPRDs are tasked with significant responsibility over budget-related matters. They assist the subnational executive in planning fiscal year revenues and expenditures, have authority for approving annual budgets and mid-year budget revisions, and oversee budget

[6] Comprehensive data on the 2014 elections are not yet available.
[7] GOLKAR is the party of ex-president Suharto.
[8] The figure shows districts with populations up to two million persons to best illustrate the relationship. There are 13 local jurisdictions with population greater than two million; the largest place (Surabaya) has a population of just over four million. Jakarta, population (approximately eight million) is not included in the study due to lack of data.

execution. At the end of the budget year the executive presents a financial accountability report to the DPRD, which the latter evaluates. The DPRDs are also meaningfully involved in day-to-day policy- and regulation-making over the entire range of district responsibilities and play a key role in formulating local medium-term development strategies, as well.

Only a very limited amount of empirical research has been undertaken on the impact of local councils in Indonesia. Sjahrir et al (2014) find that political fragmentation (as measured by the effective number of political parties) in DPRDs is associated with (but does not necessarily cause) less administrative expenditure. Lewis and Hendrawan (2018) find that majority political coalitions can mitigate the negative effects of political fragmentation on public finance outcomes— but only during the first year or two of a coalition's existence, after which the moderating effects disappear. The authors conclude that majority coalition support for the executive's local spending and service agenda dissipates quickly after elections, as attention turns to corrupting the budget.

Local Service Provision

Local government education, health, and infrastructure service delivery has gradually improved since decentralization began. Table 2 shows the extent to which access to major services in those three sectors changed from 2001 to 2012. Education, health, and infrastructure measures include net enrolment rates of students in junior and senior secondary school; percent of births attended by a health professional; and percent of households with access to improved water and sanitation facilities and the proportion of villages with access to a paved road; respectively. Service access has risen across all indicators. While progress has not been particularly rapid, it has, in general, been steady.[9]

[Table 2]

[9] Service access variables are selected based on the availability of data. Data also exist on child immunization rates, but the variable has not been consistently measured across the years and so it cannot be used in the analysis here. There are no comprehensive data on service quality for Indonesia.

Variables and Data

Dependent variables of interest to this study include local government fiscal and service outcomes. Fiscal variables comprise district total and capital expenditure. Local government spending data come from the Ministry of Finance (MoF), which compiles the information from district executed budgets in the first instance.

Service outcomes incorporate those for education, health, and infrastructure sectors and were detailed above: net enrolment rates in junior and senior secondary school; percent of births attended by a health professional; and household access to water and sanitation facilities and village access to paved roads. In the analysis below, I employ the mean of these six variables as an indicator of average citizen access to public services provided by local government.[10] Data on all variables except road access have been supplied by the Central Statistics Agency (BPS) annual socioeconomic survey (SUSENAS). Data on village access to paved roads have been accessed through BPS's Village Survey (PODES). BPS/PODES survey results are available for 2003, 2005, 2008, 2011, and 2014. Variable values for missing years have been linearly interpolated.

The key independent variable in the analysis is pre-election population size (the forcing variable in the regression discontinuity analysis). Data on pre-election population have been supplied by the General Elections Commission (KPU).

The study also employs several other covariates. These include: a dummy variable indicating if the district is newly created or not, ethnic fractionalization, intergovernmental transfers, Gini coefficient for personal (household) consumption, personal (household)

[10] Alternatively, the service access index could be constructed by employing principal components analysis. This procedure was also carried out. The empirical results do not change appreciably; the qualitative conclusions reached here based on the analysis are robust with respect to the serviced access measure. I prefer to use average service access because it is more easily interpreted.

consumption, and a dummy for those districts from Eastern Indonesia.[11] More detail on the use of these variables will be provided below.

New districts are created when a single jurisdiction splits into two or more administrative units. In Indonesia the process is known as *pemekeran* and it is a ubiquitous phenomenon.[12] Data on *pemekeran* have been provided by the Ministry of Home Affairs.

The ethnic fractionalization (EF) variable is are constructed using the following expression.

$$EF = 1 - \sum_{m} s_{mi}^{2} \quad (1)$$

In equation (2) s_{mi} is the population share of ethnic group m in the total number of ethnic groups in local jurisdiction i. The index varies between zero (perfect homogeneity) and one (perfect fractionalization). The data used to calculate the index come from the national census, which was conducted by BPS in 2000 and 2010.

Data on intergovernmental transfers come from MoF, while data on the personal (household) consumption (Gini and level) have been accessed through BPS/SUSENAS.

The analysis in this paper focuses on districts with directly elected heads, which make up the vast bulk of districts during the study period.[13] Between 2005 and 2012, 390 local governments with directly elected executives are represented in the data set. This comprises about 80 percent of the total number of such districts that existed during the study period. The total number of these local governments, by population size category, at the start of each

[11] Districts in Eastern Indonesia comprise those in the provinces of Maluku, Maluku Utara, Nusa Tenggara Barat, Nusa Tenggara Timur, Papua and Papua Barat. Eastern Indonesia is the least developed region of the country and spending and service access in districts in there are significantly different from those in the rest of Indonesia.

[12] For an up-to-date analysis of the determinants of district splitting see Pierskalla (2016) and for recent investigations of the (largely deleterious) effects of *pemekaran* see Burgess et al (2012), Bazzi and Gudgeon (2016), and Lewis, (2017a).

[13] Garmann (2015) distinguishes between local governments with elected and appointed heads in his examination of council size effects in Germany. He finds a negative council size effect on spending for the former but no statistically significant results either way for the latter. It is not analytically feasible to draw that distinction in this study, owing to the small sample of districts with appointed heads (52).

electoral period, is shown in Online Appendix Table A1. Summary statistics are provided for all variables used in the analysis are provided in Table 3.

[Table 3]

Methods and Identification

The objective of this examination is to assess the impact of legislature size on district spending and public service access. In this context, the size of the legislature is likely to be endogenous, because of reverse causality or bias due to omitted variables—citizen or political party preferences, for example (Egger and Köthenbürger, 2010; Pettersson-Lidbom, 2012; Garmann, 2015; Hohmann, 2017). To accommodate that endogeneity and identify the causal spending and service effects I use regression discontinuity (RD) methods.

I employ a sharp RD design with multiple cut-offs, where the latter are defined as a function of the various population thresholds. In this framework, pre-election population is the forcing variable. Pre-election population determines exactly the number of seats in the DPRD. To operationalize the multiple cut-off RD approach, I normalize and pool pre-election populations to form a single cut-off. I normalize population around thresholds as follows.

$$
\begin{aligned}
X_{ni} = {} & X_i - 100{,}000 && \text{if } 50{,}000 < X_i \leq 150{,}000 \text{ (for both electoral periods)} \\
& X_i - 200{,}000 && \text{if } 150{,}000 < X_i \leq 250{,}000 \text{ (for both electoral periods)} \\
& X_i - 300{,}000 && \text{if } 250{,}000 < X_i \leq 350{,}000 \text{ (for both electoral periods)} \\
& X_i - 400{,}000 && \text{if } 350{,}000 < X_i \leq 450{,}000 \text{ (for both electoral periods)} \\
& X_i - 500{,}000 && \text{if } 450{,}000 < X_i \leq 550{,}000 \text{ (for first electoral period)} \\
& X_i - 500{,}000 && \text{if } 450{,}000 < X_i \leq 550{,}000 \text{ (for second electoral period)} \\
& X_i - 1{,}000{,}000 && \text{if } 950{,}000 < X_i \leq 1{,}050{,}000 \text{ (for second electoral period)}
\end{aligned}
$$

In the above formulation, i represents individual local governments, X_i is pre-election population, and X_{ni} is normalized pre-election population. The lower and upper bounds used to establish the normalized pre-election populations are, in general, fixed at the midpoints of the relevant pre-election population categories as defined in Table 1. The exceptions to this rule concern the last population size class in the each of the two electoral periods, where the bound endpoints were chosen to make the interval length consistent with that of the other

bounds (i.e. a population size of plus or minus 50,000). Pooling the normalized pre-election populations in the manner here creates a single cut-off at zero.[14]

Following Imbens and Lemieux (2007), define $Y_i(0)$ and $Y_i(1)$ to be a potential spending or service outcome for district i where $Y_i(0)$ is the outcome to the left of the threshold (control) and $Y_i(1)$ is the outcome to the right of the cut-off (treatment). In this case, the impact of increased legislature size is given by $Y_i(1) - Y_i(0)$. Unfortunately, $Y_i(0)$ and $Y_i(1)$ cannot be observed simultaneously and so attention turns to the average effects of council size, $Y_i(1) - Y_i(0)$, across subgroups of the relevant population. Let $D_i = 0$ if a district is in the control group and $D_i = 1$ if a district is subject to treatment. Observed outcomes, Y_i, are therefore $= Y_i(0)$ if $D_i = 0$ and $= Y_i(1)$ if $D_i = 1$; and the average causal effect of the size of the legislature, τ, at the cut-off, c=0, is given by:

$$\tau = \mathrm{E}\left[Y_i(1) - Y_i(0) \mid X_{ni} = c\right] = \mathrm{E}\left[(Y_i(1) \mid X_{ni} = c\right] - \mathrm{E}\left[Y_i(0) \mid X_{ni} = c\right] \quad (2)$$

The key identifying assumption in this framework is that $\mathrm{E}[Y_i(1) \mid X_{ni}]$ and $\mathrm{E}[Y_i(0) \mid X_{ni}]$ are continuous in X_{ni}, normalized pre-election population. This implies that all other unobserved determinants of spending and service outcomes, Y_i, are also continuously related to X_{ni} (Imbens and Lemieux, 2007). The implication allows one to use outcomes just below the cut-off as valid counterfactuals for those just above the cut-off (Skovron and Titiunik, 2015; de la Cuesta and Imai, 2016). Note that in the set-up here, crossing the threshold from the left to the right implies an additional five seats on the council. (See Table 1.) Thus, treatment is defined as a marginal increase of five legislators.

The general form of the estimating equation is:

$$Y_i = \tau D_i + g(X_{ni}) + \mu_i \quad (3)$$

[14] See Brollo, Nannicini, Perotti, and Tabellini (2013) for the use of similar pooling and normalization procedures in the context of multiple cut-off RD designs.

In equation (2) subscript i refers to the district; Y is the outcome; D is the treatment dummy variable, as defined above; g(X) is a polynomial function of the running variable X_{ni}; μ is the error term; and τ is the treatment effect, which is to be estimated.

I estimate the treatment effect using non-parametric regression techniques within narrow windows (bandwidths) on each side of the cut-off point.[15] In this context three choices must be made: the degree of polynomial of the regression equation, the kernel type, and the bandwidth. Recent research argues for the use of lower order polynomials (Gelman and Imbens, 2017; Skovron and Titiunik, 2015) and I employ a polynomial of degree one in the estimation procedures below. I use a triangular kernel (that weights observations closer to the cut-off point more heavily) and choose bandwidths in a data-driven fashion to minimize the mean squared error (MSE) of the RD point estimator,[16] as the latest work in this area advocates (Imbens and Kalyanaraman, 2012; Skovron and Titiunik, 2015).

The RD methods described here identify a local average treatment effect (LATE) (Lee and Lemieux, 2010). It is perhaps useful to emphasize the local character of estimated treatment effects. While the internal validity of effects estimated in the described manner is typically argued to be strong, external validity is usually thought to be relatively weak. This suggests that it may be unreasonable to generalize about council size effects at values of the forcing variable outside a narrow range around the cut-off.

Empirical Results

The treatment effects analysis begins by examining the standard RD plots. Figure 2 shows the RD plots for log spending per capita, in total and for capital, and annual change in average service access, all relative to pooled pre-election population. Each dot in the figure represents the average value of the outcome in question for a data-driven selected range (bin) of pooled

[15] I use the Stata command 'rdrobust' to estimate treatment effects in this article. See Calonico, Cattaneo, Farrell, and Titiunik (2017).
[16] The MSE of the estimator is the sum of the bias squared plus the variance. As such, the bandwidth selection procedure optimizes the bias-variance trade-off. (Skovron and Titiunik, 2015).

population. Local polynomial regressions of order four are superimposed on the data on both sides of the cut-off to best illustrate the relationships (Skovron and Titiunik, 2015).

[Figure 2]

Attention is drawn to variable relationships at the threshold. The plots appear to show a pronounced downward break in all outcome variables around the cut-off. This implies that increasing legislature size may negatively affect district total and capital spending and service access. The plots are merely suggestive of impacts, however; a firm conclusion can only be reached after a formal estimation of treatment effects (i.e. using data-driven bandwidths and properly estimated standard errors).

I now provide formal empirical estimates of council size treatment effects as illustrated in the above RD plots, by estimating equation (2). As previously noted, I employ non-parametric estimation procedures, using a triangular kernel and MSE optimal bandwidths. I estimate effects using a polynomial of degree one. Estimated standard errors are clustered at the district level.

Table 4 provides the results. Each regression in the table shows the: total number of observations, MSE-optimal bandwidths (in thousands of persons), number of observations to the left and right of the cut-off used in estimation procedures, robust bias-corrected estimated treatment effect (τ), and estimated (cluster robust) standard errors.

[Table 4]

The estimation output confirms the suspected negative impact of rising legislature size on district total and capital spending and on service access, as illustrated in the RD plots. The results imply that a marginal increase of five councilors leads to an 18 percent decline in total spending and a 21 percent decrease in capital expenditure. In addition, the output

indicates that the specified increase in council size causes a 1.1 percentage point decline in average service access, all else being equal.[17]

Overall these results are consistent with the pork barrel theory developed by Primo and Snyder (2008): increasing legislature size leads to a decrease in (total and capital) spending and an increase in inefficiency. The conclusion that the impact of rising council size is harmful (i.e. inefficient) contradicts recent interpretations of similar spending effects (Pettersson-Lidbom, 2012; Garmann, 2015).

As explained in the introduction, Primo and Snyder (2008) posit that a condition for the negative impact of fragmentation on spending is that central government at least partially subsidizes local service delivery. In Indonesia, central government heavily subsidizes district service provision: central-local transfers account for more than 90 percent of local government revenues. Primo and Snyder (2008) also argue that negative spending effects are more likely with larger (initial) council sizes. Council sizes in Indonesia are, in fact, relatively large, comprising about 30 legislators on average. This is at the high end of the range of council sizes reviewed by Primo and Snyder (2008).

Other interpretations of spending and efficiency effects are possible, of course. Coate and Knight (2011), for example, theorize and provide supporting empirical evidence from US that the divergence of preferences between elected heads of local government and councilors leads to difficulties in reaching budget decisions and that such delays force a decrease in project spending. In the current context, it is at least plausible to conjecture that a rising number of legislators on the council would make joint executive-legislative decision-making increasingly difficult, which, in turn, might cause capital spending to decline. More research would be required to sort out the precise mechanisms involved.

[17] I find no impact of increasing council size on own-source revenues or other types of spending—personnel and goods and services—and so I do not include those results here.

Robustness Tests

I test the robustness of the above empirical results along three dimensions: running variable manipulation, covariate balance, and an alternative approach to RD designs.

Running Variable Manipulation

For the RD approach to be valid there must be no precise manipulation of the forcing variable, pre-election population, near the cut-off points. This would be the case, for example, if BPS and/or KPU were to systematically falsify population estimates to allocate fewer or more DPRD seats to local jurisdictions than they would otherwise merit according to the rules. While there has been no suggestion that BPS and/or KPU act in such a manner, it might still be considered a possibility. Alternatively, manipulation of the forcing variable might occur if people were to migrate strategically to locate themselves in jurisdictions that match their desired number of DPRD seats. This also seems unlikely, although perhaps plausible.

Figure 3 shows the density of pre-election population around the pooled cut-off. The figure is not suggestive of any apparent discontinuities at the threshold, indicated by the vertical line at zero. A formal test of the null hypothesis that no discontinuity exists at the cut-off, using a procedure developed Cattaneo, Jansson, and Ma (2016), indicates that the null cannot be rejected. Specifically, the robust bias-corrected test statistic, using a polynomial of degree one, a triangular kernel, with jack-knifed standard errors (the default procedure) is 0.344 and the p value is 0.730. The use of a polynomial of degree two instead does not change the conclusion: the robust bias-corrected test statistic is 0.088 and the p value is 0.930. In sum, the evidence implies no manipulation of the forcing variable at the threshold.

[Figure 3]

Covariate Balance

The treatment effects analysis carried out here assumes that other predetermined covariates or placebo outcomes are balanced around the pooled pre-election population

threshold. If they were not balanced, then such variables might confound the estimated council size treatment effects on outcomes of interest. I test the covariate balance assumption using several important potential confounders on which data are available: a dummy indicating whether the district is newly created, ethnic fractionalization in the jurisdiction, intergovernmental transfers per capita, Gini for personal consumption, personal consumption per capita, and a dummy variable for districts in Eastern Indonesia. All of these variables might be expected to influence district spending and/or service delivery outcomes.

Table 5 shows the formal treatment effects estimation results, taking each of the potential confounders as the dependent variable in turn as is usual practice. The regression output demonstrates that none of the variables considered varies significantly around the pooled threshold. I conclude that these variables do not substantively confound the derived statistically significant treatment effect results related to district spending and service access. The conclusion supports the argument that the initially derived results are robust.

[Table 5]

Randomization-Based RD

A potential problem with the above analysis is that the number of observations used in the estimation procedures are rather small, perhaps casting doubt on the statistical power of the estimations. One way around this issue is to apply a different formulation of the RD methods, one that is better suited to smaller samples. This alternate framework is called randomization-based RD, as contrasted with the more standard continuity-based RD design that was used above. Randomization-based RD techniques are thought to be especially useful as a robustness test when the number of effective observations is relatively limited (Cattaneo, Titiunik, and Vazquez-Bare, 2017).

A brief comparison of the two RD methods may be helpful. The continuity-based approach, which was applied to generate the main results above, selects bandwidths by

minimizing the mean square error of the treatment effects point estimate. Treatment effects are then derived as the difference between average outcomes at the cut-off. Covariate balance is subsequently tested by determining if selected covariates exhibit jumps around the cut-off, as was done here. If the regressions are smooth across the cut-off, then it is assumed that covariates do not confound the estimated treatment effects. In these circumstances, estimation and inference are based on large-sample approximations (Cattaneo, Frandsen, and Titiunik, 2015; Cattaneo, Titiunik, and Vazquez-Bare, 2017).

On the other hand, the randomization-based method selects bandwidths to assure that covariate balance is achieved in the first instance. In this case, a covariate is defined as balanced if its mean values on either side of the cut-off are not statistically significantly different from one another. Once the appropriate bandwidth has been determined—i.e. the maximum bandwidth for which all covariates are balanced—the treatment effect is estimated as the difference in means of the outcome variable on either side of the cut-off (within the bandwidth). In this situation, the estimated treatment effect is unconfounded by construction. Here, estimation and inference more closely approximate that of randomized experiments (Cattaneo, Titiunik, and Vazquez-Bare, 2017).

I now apply the randomization-based RD technique to examine the effects of increasing council size on district spending and service delivery. I use the same covariates used in the continuity-based RD balance test above to determine the appropriate bandwidth here: a dummy for new districts, ethnic fractionalization, log intergovernmental transfers per capita, Gini for personal consumption per capita, log personal consumption per capita and a dummy variable representing districts in Eastern Indonesia. Note that the significance level used to test whether the randomization assumption is satisfied within bandwidths is 0.15, as suggested by Cattaneo, Frandsen, and Titiunik (2015). The last window (in a series of ordered trials, starting with a minimum bandwidth) for which the randomization assumption

holds is the bandwidth within which the treatment effects are estimated. Implementation of the procedure results in a bandwidth of 6.88 (in thousands of persons) on either side of the cut-off. Note that this bandwidth is narrower than those used in the continuity-based RD estimation of treatment effects above and therefore the effective number of observations employed to estimate effects is smaller.

[Table 6]

Table 6 provides the estimation results of employing the randomization-based RD technique, as described just above. The table presents the same output as before, except that p values are shown instead of standard errors. The results indicate that an increase of five councilors in the DPRD leads to a 21 percent decrease in total district spending, a 41 percent decline in local government capital spending, and a 1.7 percent annual decrease in average service access. These treatment effects estimates are somewhat larger (in absolute value) compared to those earlier derived but still broadly consistent. I conclude that the qualitative conclusions reached above concerning the negative impact of legislature size on district spending and public service access are robust.

Summary and Conclusions

Previous empirical research on the effects of increasing local legislature size has resulted in a diverse and inconsistent set of results. Some researchers have found that increasing council size has a positive impact on local spending while others have determined that marginal increases to the size of the local legislature lead to a decline in expenditure. Analysts have typically just assumed rising spending is inefficient while reduced expenditure is efficient.

This study examines the impact of rising legislature size on local government spending and public service access in Indonesia. The study finds that rising council size negatively affects district total and capital spending. In addition, the investigation shows that increasing council size has a concurrent negative impact on citizen access to key public

services, implying a decline in local government efficiency. This is a unique result in the empirical literature.

More specifically, the investigation determines that an increase of five legislators on the DPRD leads to a decrease in local government total spending of between 18-21 percent, a decline in capital expenditure of between 21-41 percent, and a reduction in annual average public service access of between 1.1 to 1.7 percent. The range in size of effects for any given outcome is a function of the different RD methods used in their estimation. While magnitudes vary across techniques, derived qualitative conclusions based on the estimates do not.

What explains the diverse research outcomes present in the literature? Part of the answer must surely lie in the wide variation in methodological approaches used, only some of which have accommodated the endogeneity of council size and most of which have not. Another likely explanation relates to the varied institutional environments in which studies have been undertaken. Theory suggests that intergovernmental fiscal arrangements and local council size are especially important in this regard. Indonesian local governments are very dependent on intergovernmental grants to finance service delivery and council sizes are especially large. It may be that these institutional characteristics have driven the contrarian results found in this study. Overall, this suggests that future research in this area should take careful note of institutional context and the extent to which it affects outcomes.

What of policy consequences? One implication of the research in this study, specifically for Indonesia, is that government may wish to consider decreasing the size of local councils (or at least not increasing them as was done prior to the 2009 elections). Smaller council sizes would, in theory, encourage local governments to spend more, especially on capital, which in turn, would be expected to lead to improved service access for citizens. The adoption of such a policy stance seems unlikely, however, since it would confront significant political interests associated with holding positions of power at the local

level. But if such a strategy is not embraced, average legislature size will persist in rising, along with population growth, and fiscal and service outcomes will continue to suffer.

References

Antlöv, H., Wetterberg, A. & Dharmawan, L. (2016). Village governance, community life, and the 2014 village law in Indonesia. *Bulletin of Indonesian Economic Studies*, *52*(2), 161-183.

Baqir, R. (2002). Districting and government overspending. *Journal of political Economy*, *110*(6), 1318-1354.

Bazzi, S. and Gudgeon, M. 2016. Local Government Proliferation, Diversity, and Conflict. No. dp-271. Boston University-Department of Economics.

Bradbury, J.C. & Crain, W.M. (2001). Legislative organization and government spending: cross-country evidence. *Journal of Public Economics*, *82*(3), 309-325.

Brollo, F., Nannicini, T., Perotti, R. and Tabellini, G. 2013. The political resource curse. *American Economic Review*, *103*(5), 1759-96.

Burgess, R., Hansen, M., Olken, B., Potapov, P., and Sieber, S. 2012.The political economy of deforestation in the tropics. The Quarterly Journal of Economics 127 (4), 1707-1754.

Calonico, S., Cattaneo, M.D., Farrell, M.H., & Titiunik, R. (2017). rdrobust: Software for regression discontinuity designs. *Stata Journal, Forthcoming*.

Cattaneo, M.D., Jansson, M. & Ma, X. (2016). rddensity: Manipulation testing based on density discontinuity. *The Stata Journal (ii)*, 1-18.

Coate, S. & Knight, B. (2011). Government form and public spending: Theory and evidence from US municipalities. *American Economic Journal: Economic Policy*, *3*(3), 82-112.

De Figueiredo, R.J. (2003). Budget institutions and political insulation: why states adopt the item veto. Journal of Public Economics, 87(12), 2677-2701.

de la Cuesta, B. & Imai, K. (2016). Misunderstandings about the regression discontinuity design in the study of close elections. *Annual Review of Political Science*, *19*, 375-396.

Egger, P. & Köthenbürger, M. (2010). Government spending and legislative organization: Quasi-experimental evidence from Germany. *American Economic Journal: Applied Economics*, *2*(4), 200-212.

Garmann, S. (2015.) Elected or appointed? How the nomination scheme of the city manager influences the effects of government fragmentation. *Journal of Urban Economics*, *86*, 26-42.

Gelman, A. & Imbens, G. (2017). Why high-order polynomials should not be used in regression discontinuity designs. *Journal of Business & Economic Statistics, Forthcoming*.

Gilligan, T.W. & Matsusaka, J.G. (1995). Deviations from constituent interests: The role of legislative structure and political parties in the states. *Economic Inquiry*, *33*(3), 383-401.

Gilligan, T.W. & Matsusaka, J.G. (2001). Fiscal policy, legislature size, and political parties: evidence from state and local governments in the first half of the 20th century. *National Tax Journal*, 57-82.

Hohmann, D. (2017). The effect of legislature size on public spending: evidence from a regression discontinuity design. *Public Choice*, 173, 345-367.

Imbens, G. & Kalyanaraman, K. (2012). Optimal bandwidth choice for the regression discontinuity estimator. *The Review of Economic Studies*, *79*(3), 933-959.

Imbens, G.W. & Lemieux, T. (2008). Regression discontinuity designs: A guide to practice. *Journal of Econometrics*, *142*(2), 615-635.

Lee, D.S. and Lemieux, T. (2010). Regression discontinuity designs in economics. *Journal of economic literature*, *48*(2), 281-355.

Lewis, B.D. (2003). Tax and charge creation by regional governments under fiscal decentralisation: estimates and explanations. *Bulletin of Indonesian Economic Studies*, *39*(2), 177-192.

Lewis, B.D. (2015). Decentralising to villages in Indonesia: Money (and other) mistakes. *Public Administration and Development*, *35*(5), 347-359.

Lewis, B.D. (2017a). Does local government proliferation improve public service delivery? Evidence from Indonesia. *Journal of Urban Affairs*, *39*(8), 1047-1065.

Lewis, B. D. (2017b). Local government form in Indonesia: tax, expenditure, and efficiency effects. *Studies in Comparative International Development*, DOI 10.1007/s12116-017-9236-z.

Lewis, B. D. and Hendrawan, A. (2018). The impact of majority political coalitions on local government spending, service delivery, and budget corruption in Indonesia. Working Papers in Trade and Development, Number 2018/09, Arndt-Corden Department of Economics, Australian National University.

Lewis, B. D. and Nguyen, H. T. M. (2018). Policy failure and educational attainment in Indonesia. Working Papers in Trade and Development, Number 2018/15, Arndt-Corden Department of Economics, Australian National University.

Lizzeri, A. and Persico, N. 2005. A drawback of electoral competition. *Journal of the European Economic Association* 3(6), 1318-1348.

Perotti, R. & Kontopoulos, Y. (2002). Fragmented fiscal policy. *Journal of Public Economics*, *86*(2), 191-222.

Pettersson-Lidbom, P. (2012). Does the size of the legislature affect the size of government? Evidence from two natural experiments. *Journal of Public Economics*, *96*(3), 269-278.

Primo, D.M. & Snyder Jr, J.M. (2008). Distributive Politics and the Law of 1/n. *The Journal of Politics*, *70*(2), 477-486.

Skovron, C. & Titiunik, R. (2015). A practical guide to regression discontinuity designs in political science. *American Journal of Political Science*.

Tomsa, D. (2014). Party system fragmentation in Indonesia: the subnational dimension. *Journal of East Asian Studies*, *14*(2), 249-278.

Velasco, A. Debts and deficits with fragmented fiscal policymaking. 2000. *Journal of Public Economics* 76 (1), 105-125.

Weingast, B.R., Shepsle, K.A. & Johnsen, C. (1981). The political economy of benefits and costs: A neoclassical approach to distributive politics. *Journal of Political Economy*, *89*(4), 642-664.

Australian National University

Tables

Table 1 Population size and number of DPRD seats.

	Population thresholds for 2004 elections	Number of seats
1	<= 100,000	20
2	> 100,000 and <= 200,000	25
3	> 200,000 and <= 300,000	30
4	> 300,000 and <= 400,000	35
5	> 400,000 and <= 500,000	40
6	> 500,000	45

	Population thresholds for 2009 elections	Number of seats
1	<= 100,000	20
2	> 100,000 and <= 200,000	25
3	> 200,000 and <= 300,000	30
4	> 300,000 and <= 400,000	35
5	> 400,000 and <= 500,000	40
6	> 500,000 and <= 1,000,000	45
7	> 1,000,000	50

Source: General Elections Commission (KPU)

Table 2 Service access, 2001-2012.

Year	Junior secondary enrolment	Senior secondary enrolment	Professionally attended births	Household water access	Household sanitation access	Village road access
2001	59.6	36.8	48.9	44.0	54.6	63.6
2002	60.7	37.8	67.9	44.8	57.6	60.1
2003	62.8	40.9	68.6	44.3	58.7	57.6
2004	65.3	44.0	71.5	45.4	61.2	60.5
2005	61.9	41.2	68.3	43.9	57.3	62.5
2006	66.0	44.6	69.2	44.7	56.7	64.1
2007	65.0	45.7	69.1	46.9	56.6	65.6
2008	64.2	45.2	71.0	48.5	58.7	67.2
2009	65.1	46.2	72.1	50.6	59.2	68.9
2010	65.7	46.4	74.2	52.5	60.5	69.7
2011	65.4	48.7	75.5	54.3	61.0	70.5
2012	67.5	50.4	78.1	56.6	63.1	71.2

Source: Central Bureau of Statistics (BPS) SUSENAS and PODES.

Table 3 Summary statistics.

Variable	Number of observations	Mean	Standard deviation	Minimum	Maximum
Pre-election population ('000)	2,254	233.1	118.4	50.6	549.8
Number of DPRD seats	2,254	29.3	6.1	20.0	45.0
Local government total spending per capita	2,251	3,029,295	1,743,604	291,448	16,900,000
Local government capital spending per capita	2,106	901,403	881,152	62,065	11,300,000
Annual change in average service access index	1,207	1.8	2.8	-3.9	7.3
New district dummy	2,254	0.47	0.50	0.00	1.00
Ethnic fractionalization	1,882	0.52	0.30	0.01	0.99
Intergovernmental transfers per capita	2,254	2,818,071	1,531,889	406,533	11,300,000
Gini coefficient for household personal consumption per capita (x 100)	2,254	17.3	14.0	0.2	60.2
Household personal consumption per capita	2,254	626,703	199,488	246,986	1,988,474
Eastern Indonesia dummy	2,254	0	0	0	1

All economic and fiscal variables are measured in rupiah in constant 2010 terms.

Table 4 Legislature size impact on district spending and service access

Dependent Variable	Tot. Obs.	Bandwidth	Obs. Left	Obs. Right	τ	SE	
Log district total spending per capita	2,251	14.0	235	335	-0.183	0.038	***
Log district capital spending per capita	2,106	15.7	239	339	-0.208	0.057	***
Annual change in service access	1,207	13.0	120	212	-1.105	0.301	***

Legislative size is the treatment variable. Tot Obs is the total number of observations. Bandwidths are in thousands of persons. Obs Left and Obs Right are the effective numbers of observations used in estimation. τ is the estimated treatment effect, which is cluster-robust and bias-corrected. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. All fiscal variables are measured in constant 2010 terms.

Table 5 Test of covariate balance

Dependent Variable	Tot. Obs.	Bandwidth	Obs. Left	Obs. Right	τ	SE
Newly created local government	2,254	8.1	117	210	0.045	0.062
Ethnic fractionalization	1,882	16.0	201	334	0.037	0.056
Log of intergovernmental transfers per capita	2,254	12.5	201	302	0.010	0.035
Gini coefficient for personal consumption per capita	2,254	13.6	218	320	-1.854	1.291
Log of personal consumption per capita	2,254	4.9	58	117	0.105	0.067
Eastern Indonesia	2,254	9.9	144	268	-0.058	0.065

Legislative size is the treatment variable. Tot Obs is the total number of observations. Bandwidths are in thousands of persons. Obs Left and Obs Right are the effective numbers of observations used in estimation. τ is the estimated treatment effect, which is cluster-robust and bias-corrected. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. All fiscal variables are measured in constant 2010 terms.

Table 6 Legislature size impact on district spending and service access (randomization-based RD approach)

Dependent Variable	Tot. Obs.	Bandwidth	Obs. Left	Obs. Right	τ	p-value
Log district total spending per capita	2,251	6.9	91	142	-0.208	0.001
Log district capital spending per capita	2,106	6.9	95	136	-0.414	0.000
Annual change in service access	1,207	6.9	85	134	-1.662	0.000

Legislative size is the treatment variable. Tot Obs is the total number of observations. Bandwidths are in thousands of persons. Obs Left and Obs Right are the effective numbers of observations used in estimation. τ is the estimated treatment effect, which is cluster-robust and bias-corrected. All fiscal variables are measured in constant 2010 terms.

Table A1. Population size, number of council seats, and districts in sample.

	Population Thresholds 2004 Elections	Number of seats	Number of districts in sample
1	<= 100,000	20	22
2	> 100,000 and <= 200,000	25	74
3	> 200,000 and <= 300,000	30	50
4	> 300,000 and <= 400,000	35	31
5	> 400,000 and <= 500,000	40	25
6	> 500,000	45	110

	Population Thresholds 2009 Elections	Number of seats	Number of districts in sample
1	<= 100,000	20	36
2	> 100,000 and <= 200,000	25	95
3	> 200,000 and <= 300,000	30	68
4	> 300,000 and <= 400,000	35	35
5	> 400,000 and <= 500,000	40	23
6	> 500,000 and <= 1,000,000	45	67
7	> 1,000,000	50	66

Source: General Elections Commission (KPU)

Figures

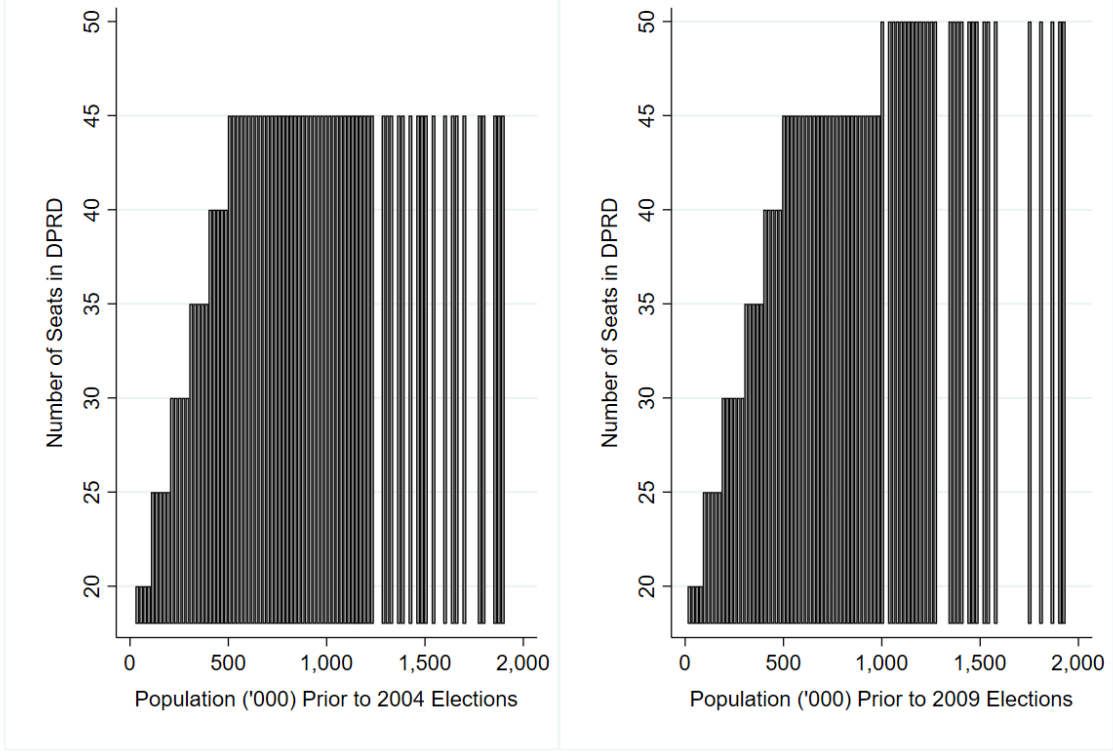

Fig. 1 Pre-election population and number of DPRD seats

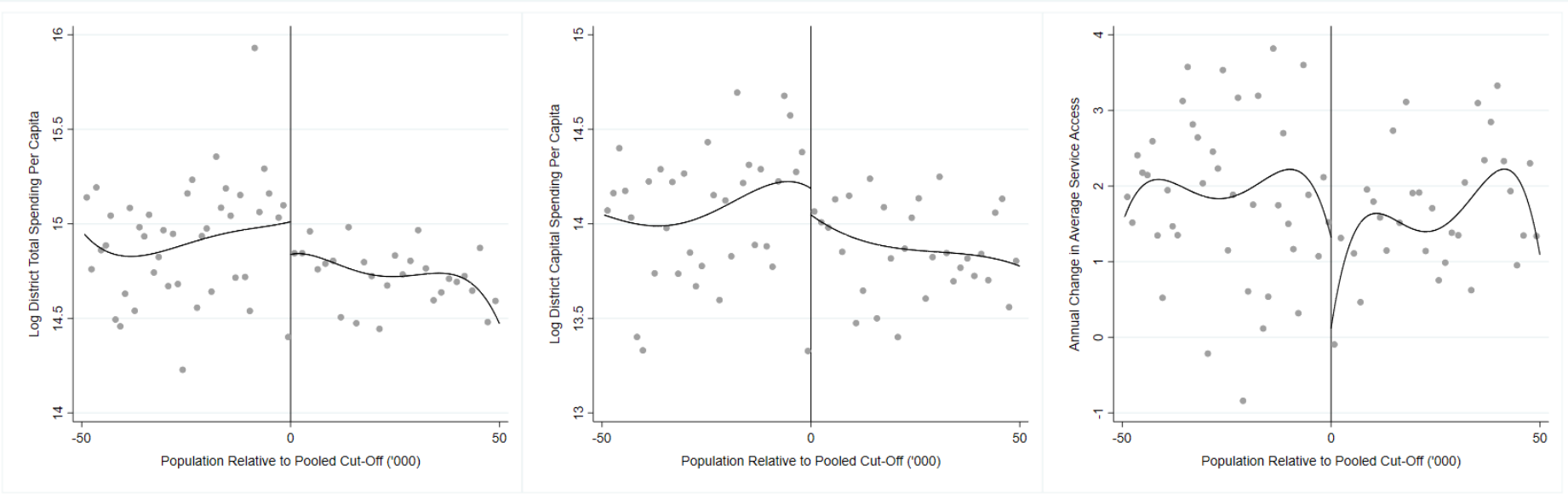

Fig. 2 RD plots for district spending and service access

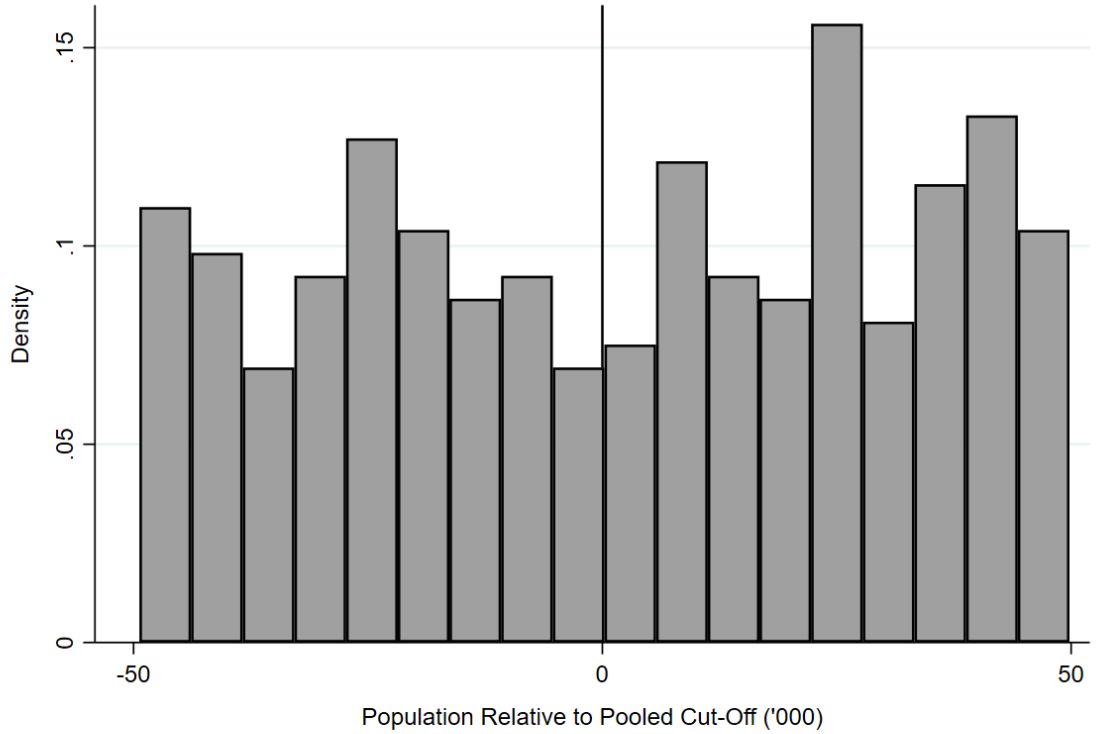

Fig. 3 Density of running variable