Government Fragmentation and Public Goods Provision

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We investigate the effects of territorial government fragmentation on the quality of public services. We argue that an increase in the number of regional governments has two effects: (1) it redistributes fiscal and administrative resources to underserved regions and (2) encourages yardstick competition. Extreme government fragmentation, however, limits efficiency gains by reducing administrative capacity, economies of scale, and enabling capture. We test this argument using original data on the number of regional governments in sub-Saharan Africa (1960–2012). Consistent with our theoretical expectations, we find robust evidence for an initial increase in the quality of services provision following regional government splits, which levels off at high levels of regional fragmentation. Three distinct difference-in-difference analyses of microlevel, georeferenced data on health outcomes in Malawi, Nigeria, and Uganda further support our theoretical argument.

How does the fragmentation of regional governments affect the provision of social services such as health and education? Though the optimal size of political units has been debated since at least Plato's time, we still have a limited understanding of how the number and size of political units within a polity impacts development outcomes (Charron, Fernández-Albertos, and Lapuente 2013). We explore this question by building on recent work on administrative unit proliferation (Grossman and Lewis 2014; Pierskalla 2016a), the large body of work on the effects of decentralization, especially its implications for better governance (Faguet 2014; Myerson 2006), and work by Maskin, Qian, and Xu (2000), which investigates the informational benefits of multiple self-contained units for organizations more generally. The first goal of this article is to test, in the context of developing countries with relatively weak capacity, whether an increase in the number of regional governments results in improvements in the delivery of public services.

We define government fragmentation as a political process through which administrative units are split into a larger number of smaller units. Emerging work on the splitting of existing regional governments suggests that changes in territorial structures are often implemented as a result of political bargains between national elites and local marginalized groups (Grossman and Lewis 2014; Kimura 2013). In this process, politically and economically marginalized groups lobby national elites to create new units in exchange for their political support. While recent work has examined the electoral implications of granting marginalized areas their own administrative units via splits (Gottlieb et al. 2016; Hassan 2016), this political rationale for reorganizing the administrative structure of states, however, likely also has important redistributive consequences. The second goal of this study is to explicitly explore the redistributive implications of politically motivated government fragmentation.

Creating new regional governments often implies a reallocation of fiscal resources, bureaucratic personnel, and administrative attention to hitherto underserved areas. This reorientation, we argue, is likely to improve the quality of public services delivery in new regional governments, which have higher marginal returns for many service outcomes and which benefit from greater control over local spending. Moreover, while marginalized groups are often unable to gain access to public offices under the control of incumbent elites in pre-

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split regions, they are increasingly able to do so in newly created governments, widening the pool from which political leaders are drawn.

More indirectly, government fragmentation also generates improvements in public services delivery nationally in the medium to long term by encouraging yardstick competition. Work by Myerson (2014) on the benefits of autonomous regions provides justification for this mechanism. If governorship positions provide the opportunity to signal competency to voters (Myerson 2006), and serve as a typical step on the political career ladder, their multiplication intensifies yardstick competition between subnational leaders (Faguet 2014). This is particularly important for territorial-based governments because the comparison of performance across self-contained units is easier than for units with different functional responsibilities (Maskin et al. 2000).

The decentralization literature offers important insights to why the positive impact of government fragmentation on public goods provision has an upper limit. Decreasing the size of regional governments through splits reduces the economies of scale in public goods production (Oates 1985), while also (arguably) increasing administrative costs (Zax 1989). Building on Prud'homme (1995), extreme fragmentation may result in the short supply of the human capital, financial, and infrastructural resources needed to effectively maintain high-quality decision making. Reducing the size of political units may also increase the likelihood of elite capture (Bardhan and Mookherjee 2006), especially if government fragmentation is used to develop and strengthen patronage networks (Green 2010).

The above discussion leads to a clear, testable primary implication: a country's number of regional governments has a positive yet diminishing effect on the quality of its public services. Moreover, our first theoretical mechanism carries an additional observable implication. The redistributive effect of government fragmentation suggests that initial gains in services delivery will be concentrated in newly created regional units. To the best of our knowledge, no study to date has tested any of these propositions.

We focus our empirical analysis on the African continent, since studying this region offers several advantages. First, by limiting ourselves to Africa, we are able to hold constant features that are common across the continent, such as a history of colonial rule, decolonization, and continued influence by the West. Second, given the arbitrary nature in which colonial powers drew administrative and political borders in Africa, there is a substantial potential for efficiency gains through reforming territorial structures. Third, our theoretical framework assumes the fragmentation of regional governments that have the authority to influence service provision. In sub-

Saharan Africa, regional governments hold significant (at least de jure) responsibility for service provision, while in other regions (e.g., Latin America), key social services are largely the purview of lower-level local governments and municipalities. Limiting our analysis to Africa thus ensures that we concentrate on appropriate empirical settings to test our theoretical arguments.

We implement several complementary tests of our theoretical predictions: one drawing on country-years as units of analysis, others on detailed microlevel data in three country cases. To measure the quality of service provision for the country-level analysis, we use outcome data for health and education from the World Development Indicators (WDI) to construct a composite index. To measure our key explanatory variable, government fragmentation, we assemble an original data set on the number of top-tier regional governments—states (as in Nigeria), provinces (Kenya), and districts (Uganda)—for all sub-Saharan countries since independence. We focus on top-tier regional government since this tier is most relevant for subnational politicians with national aspirations.[1]

We first estimate standard fixed-effects panel models, which only use within-country variation, to estimate the relationship between regional government fragmentation and services provision. We augment the fixed-effects models by using an instrumental variable (IV) strategy that exploits temporal variation in the number of regional governments in neighboring countries as a source of exogenous variation, as well as two additional instruments (the length of small and medium rivers and the country's land mass concentration) that account for cross-sectional variation in the number of regional governments. Consistent with our theoretical prediction, we find robust support for a positive and significant effect of the number of regional governments on the quality of service provision when moving from few to a moderate number of political units. As the number of regional governments increases, the effect becomes smaller, as hypothesized. These findings are robust to alternative measures of the dependent variable, imputation of missing values, quinquennial analyses, and changes to model specifications.

Our second analysis tests explicitly our argument regarding the redistributive implications of unit splits: that initial gains will be especially concentrated in newly created political units. We use retrospective fertility information culled from the Demographic Household Surveys (DHS) for three African countries for which the DHS provides geocoded data

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1. The term "top-tier" refers to political jurisdictions that have a government body and are proper subsets of the country's entire territory.

(Uganda, Nigeria, and Malawi).[2] By merging the DHS data with our data on the location of government splits, we are able to compare the survival of infants born before and after regional splits against the survival of infants in comparable nonsplitting regions. This is a powerful design, since it entails running the same microlevel difference-in-difference regression analysis in three subnational settings. Reassuringly, we find a robust reduction in infant mortality in newly created "splinter" regions in all three countries that exceeds the long-term annual trends in comparable regions. Interestingly, outcomes temporarily worsen in rump ("mother") units, suggesting that distributional effects play a role in the way improvements in service delivery unfold over time, above and beyond alternative channels such as greater ethnic homogeneity and improved administrative attention.

This article makes several noteworthy contributions. First, we introduce novel theoretical arguments to the small, but growing, literature on government fragmentation (Green 2010; Grossman and Lewis 2014; Malesky 2009; Pierskalla 2016a), identifying the redistribution effects and yardstick competition as key mechanisms through which territorial reorganization of states can affect development outcomes. Policy experts and academics have thus far concentrated on the negative consequences of increasing the number of subnational governments, including elite capture, weak administrative capacity, greater fiscal dependence, and a high fiscal burden (Lewis 2014). By contrast, our research indicates that the positive effects of such reforms may outweigh the direct costs.

Second, our empirical analysis is the first to explicitly test the effects of top-tier regional government fragmentation on the quality of services delivery. Using original data, complementary cross-national and microlevel research designs, and careful attention to causal identification, we add an important layer of evidence to the debate around government fragmentation and political institutions more generally. We believe the territorial structure of government—distinct from the allocation of political and fiscal authority across levels of government—is an important lens through which a plethora of political phenomena can be analyzed, because it cuts across traditional concepts of regime type and decentralization.

Finally, this article also contributes to the empirical literature on the effects of decentralization on public goods provision. A large literature has evaluated the effects of decentralization on public goods provision, with mixed results. We believe that the scholarly disagreement about the effects of decentralization reforms is, in part, caused by an insuffi-

cient degree of conceptual distinction between vertical decentralization reforms and changes in countries' territorial structure, which Grossman and Lewis (2014) demonstrate have often followed decentralization reforms. Our argument and results help clarify the differences and commonalities between territorial government fragmentation and vertical decentralization reforms.

GOVERNMENT FRAGMENTATION AND DECENTRALIZATION: PAST FINDINGS

While government fragmentation is often conflated with decentralization, the two are analytically distinct phenomena. Decentralization is the delegation of authority—political, financial, or administrative—to subnational governments (Falleti 2005) regardless of the spatial configuration of those units. In other words, unlike decentralization, government fragmentation entails only the redrawing of political boundaries and does not entail any devolution by central government of specific functions to subnational units.[3]

A large literature has investigated the effects of decentralization reforms on public goods and services delivery. On the positive side, decentralization reforms arguably led to substantial increases in investments in education and health in Bolivia (Faguet 2012), Argentina (Habibi et al. 2003), and Indonesia (Kis-Katos and Sjahrir 2014). Consistent with these findings, Galiani, Gertler, and Schargrodsky (2008) report that school decentralization reform in Argentina had an overall positive impact on student test scores; Salinas and Sole-Olle (2009) document similar effects on educational outcomes in Spain; and Faguet and Sanchez (2008) find that in Colombia, decentralization of education finance improved enrollment rates in public schools. Similarly, using a large-n research design, Robalino, Picazo, and Voetberg (2001) and Jiménez-Rubio (2011) find that a higher degree of fiscal decentralization is associated with lower mortality rates. By contrast, several authors have found that decentralization reforms have negatively affected policy outcomes. For example, a rapid decentralization reform has been associated with a reduction in health expenditure (Akin, Hutchinson, and Strumpf 2005) and heightened rent-seeking behavior (Reinikka and Svensson 2004) in Uganda. Decentralization was also found to contribute to fiscal problems and poor macroeconomic performance (Remmer and Wibbels 2000; Samuels 2003; Treisman 2000) and to the politicization of intergovernmental bargaining for fiscal allocations from the central

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2. See Kudamatsu (2012) for a similar strategy for testing the effect of democratic transitions on health outcomes.

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3. Government fragmentation, however, often occurs following the initiation of decentralization reforms. Grossman and Lewis (2014) argue that this is because the devolution of authority increases the value of controlling subnational units.

government (Treisman 1996). The record of decentralization with respect to ethnic conflict and separatism is equally mixed (Bakke and Wibbels 2006; Brancati 2006).

These mixed findings are, in part, a function of evaluating the effects of large-scale, multidimensional reforms, which often combine elements of vertical decentralization and boundary changes of territorial government units. For example, in Faguet's (2004) landmark study of decentralization in Bolivia, reforms combined elements of increased fiscal resource allocation to municipalities, assignment of official responsibilities for local public goods provision to municipalities, the creation of new local oversight committees, and the creation of new municipalities. Our study attempts to isolate the effects of government fragmentation, holding the degree of vertical decentralization constant. By doing so, we hope to clarify the specific commonalities and differences in theoretical mechanisms that link decentralization reforms and government fragmentation.

The more narrow and nascent literature on government fragmentation in the developing world has focused almost exclusively on the determinants of dramatic increases in the number of regional or local governments in specific country contexts, such as Vietnam (Malesky 2009), Senegal (Gottlieb et al. 2016), Uganda (Green 2010), Kenya (Hassan 2016), Ghana (Ayee 2012), and Indonesia (Kimura 2013; Pierskalla 2016a). In contrast, studies of government fragmentation in rich industrialized nations have disproportionally concentrated on assessing the effects of government mergers (i.e., consolidation) on the quality of representation and on administrative costs (Blom-Hansen, Houlberg, and Serritzlew 2014; Dahl and Tufte 1973; Denters et al. 2014; Lassen and Serritzlew 2011).[4] One of the difficulties in comparing results across studies—in order to synthesize findings into "the state of the literature"—is that past work has not only adopted different definitions (and thus measures) of government fragmentation; it has also used different samples, outcomes, and estimation strategies.

To measure government fragmentation, some use the absolute number of local governments (Oates 1985) or the population-normalized number of local governments (Nelson 1992),[5] while others use the total number of subnational jurisdictions in all government tiers (province, district, county, municipality, etc.), normalized by population or area (Arikan

2004). Treisman (2002) instead uses the number of subnational tiers. Tied explicitly to our theoretical framework, ours is the first study to measure fragmentation as the (normalized) number of top-tier regional governments. As such, our article also makes a measurement contribution to the government fragmentation literature.

Past studies have also diverged on their outcome of interest, focusing to the most part on perceived corruption. Nelson (2013) uses a cross-sectional comparison of the size of lower-tier (local) governments in 94 countries and finds that greater fragmentation is associated with greater perceived corruption but only when excluding municipalities. Similarly, based on a cross-sectional comparison of 166 countries, Treisman (2002) finds that having more tiers of government is associated with higher perceived corruption. By contrast, Arikan (2004) finds that larger municipalities promote dishonest behavior, using a sample of 70 countries. Similarly, Fiorino, Galli, and Padovano (2013) find that fragmentation accompanied by fiscal decentralization is associated with a reduction in perceived corruption. Given the measure of fragmentation (lower-tier governments), the outcome (perceived corruption), sample (mix of developing and developed countries), and estimation strategy (cross-sectional comparisons), these studies have a limited ability to answer the research questions that drive this study.

To date, only a handful of studies have examined the relationship between fragmentation and public goods provision. Consistent with our findings, a recent study of the impact of state splits in India finds that the formation of new states is associated with significant gains in economic activity about a decade after a split (Asher and Novosad 2015). Lewis (2014) provides a qualitative assessment of the detrimental effects of Uganda's extreme fragmentation policy on the capacity of district governments, which is consistent with our theoretical expectation of diminishing returns. Treisman (2002) finds that more tiers of government is associated with less effective provision of public healthcare services and infrastructure. Again, the number of tiers measures a different concept of fragmentation than is implied by our theoretical framework, which focuses on the concentration of a country's top-tier regional governments. Other studies have used expenditure data as outcome measures (Feld, Kirchgässner, and Schaltegger 2010; Zax 1989), but it is unclear whether greater expenditure captures improved provision or greater inefficiencies. We conclude that the important question of whether changes in the number of regional governments is welfare enhancing in the context of developing countries is still wanting.

THE EFFECTS OF GOVERNMENT FRAGMENTATION
The decentralization literature has long sought to define the conditions under which decentralized governments are rel-

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4. For a review of the current state of the literature on government fragmentation in both the developed and developing world, see Lago-Penas and Martinez-Vazquez (2013)'s excellent edited volume. See also the review by Pierskalla (2016b) that focuses exclusively on the developing world.

5. Markedly different definitions of "local government" complicate the interpretation of cross-national regressions of the effects of the number of local governments.

atively more effective than centralized governments at delivering public goods (Riker 1964).[6] Parts of this literature have focused on identifying the ideal size of local governments, stressing two trade-offs.[7] The first is the trade-off between economies of scale, which favor larger political units, and the welfare gains of efficiently matching expenditure allocations to local preferences, which favors small, homogeneous political units (Faguet 2004; Oates 1977). The second trade-off is between the management and administrative costs associated with creating more subnational governments and the alleged enhanced accountability of smaller units (Faguet 2014; Tommasi and Weinschelbaum 2007).

Our theoretical framework diverges from the decentralization literature in two important respects: in its goal and in the mechanisms linking the creation of subnational units to public goods outcomes. First, our goal is not to identify an optimal size or number of regional governments. In fact, we agree with the critique of Treisman (2007, chap. 3) that there is no simple way to calculate the optimal size of subnational units, since this crucially depends on a myriad of conditions that pull in different directions. Instead, we engage in a more modest endeavor: to examine the impact of within-country changes in the density of regional governments. Importantly, this divergence implies a very different empirical strategy. While past decentralization (and government fragmentation) large-n studies, to date, focus almost exclusively on cross-sectional comparisons, our empirical strategy focuses instead on over-time variation within cases. Second, rather than focusing on the technology of service production and citizens' preferences, our framework examines how territorial restructuring affects both the redistribution of administrative resources and, in the medium to long term, the nature of competition among them.

Existing empirical work on the splitting of subnational government units has stressed the importance of locally marginalized groups in the process of territorial reform. In Senegal, local government splits increase the administrative attention to far-flung peripheral villages, in exchange for electoral support for the incumbent's party (Gottlieb et al. 2016). In Uganda, ethnic minorities that lack political influence and access to basic public services at the district level represent an important reservoir of political support. National elites thus offered territorial restructuring in ex-

change for marginalized groups' political allegiance in national elections (Grossman and Lewis 2014). Similarly, in Indonesia, "territorial coalitions" between local elites and national-level actors drove the dramatic proliferation of district governments and the creation of provinces (Kimura 2013; Pierskalla 2016a). Apart from reshaping local politics, we argue that the nature of this politically driven fragmentation of local governments has important distributional consequences.

The reallocation of government resources (fiscal, personnel, administrative) associated with creating a new regional government likely affects public goods provision. While prior to a split public resources are disproportionally concentrated in areas that support local incumbent elites, postsplit resources are funneled to localities in which small improvements in public services are likely to have higher marginal returns. Building the first school or implementing a rudimentary public health campaign in marginalized areas will produce more substantial improvements in health and education outcomes than adding services in the existing government capital. Hence, increasing government fragmentation—especially when targeting regions marked by high inequality—typically implies a more efficient allocation of resources and will thus be associated with higher-quality service delivery. This is especially true in low-capacity settings that are lacking the ability to appropriately serve far-flung communities (e.g., monitor service providers such as nurses and teachers).[8]

Creating government units also implies a secondary, subtler effect. In the medium to long run, increasing the number of regional governments intensifies yardstick competition between subnational leaders. Maskin et al. (2000) provide a powerful framework to understand this mechanism. They explore the relationship between the choice of organizational form (be it the structure of a firm or a government) and the type of information this choice reveals about agents. Specifically, they compare "U-forms," unitary structures that divide organizations along functional lines (e.g., line ministries) and "M-forms," multidivisional forms that divide organizations into self-contained units (e.g., regional governments). While U-forms offer economies of scale, M-forms provide superior incentive schemes in that they allow for yardstick competition. Interpreting signals about the competence of regional leaders is easier because their outputs can be meaningfully compared, while evaluat-

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6. See Faguet (2012, chap. 5), Treisman (2007), and Wibbels (2006) for useful reconstruction and critiques of this literature.

7. Alesina and Spolaore (1997) model the equilibrium determination of the number of countries, while Gómez-Reino and Martinez-Vazquez (2013) model the equilibrium size of local governments and test them cross-nationally.

8. Note that this mechanism requires the presence of marginalized, peripheral regions in territorial government units. While this is a very reasonable assumption in the context of most developing countries, it suggests an important boundary condition for our argument.

ing different functional ministries, for example, is more diffi-cult due to differences in subject domains. By creating more comparable units, it becomes easier to assess the performance of each individual unit because each unit or leader can be com-pared to a larger sample.

For yardstick competition to induce greater effort by re-gional leaders, an incentive system must be in place. In de-mocracies, voters' demand for better services can provide bottom-up pressure for regional leaders to improve their performance (Tommasi and Weinschelbaum 2007). Pro-gressive ambition of regional leaders, in turn, increases pres-sure on national leaders. This insight builds on Myerson (2006), who stresses the importance of creating a large enough number of (relatively) autonomous regions in which aspiring leaders can develop reputations for good governance and thereby offer voters a viable alternative to the national in-cumbent. Many developing countries have too few politicians with a credible reputation for responsible governance that benefits the public. Voters are thus reluctant to pay the tran-sition costs necessary to oust the incumbent in favor of an unproven challenger. If provincial leaders competently serve their region, they can leverage this local success to make a credible bid to voters nationally, provided that they have suf-ficient autonomy to be credited with good governance and that their region is big enough for them to convincingly demon-strate the equivalent of national-level leadership (Myerson 2006).

Assuming that voters are sufficiently informed, govern-ment fragmentation will improve public goods provision by inducing yardstick competition. This positive effect of re-gional fragmentation on public goods provision holds even when voters have no significant differences in policy pref-erences, local governments are not better informed about local tastes or conditions (as argued by Treisman [2007]), and interjurisdictional mobility is severely constrained, as is the case in most developing countries (Bardhan 2002).

Importantly, intensified yardstick competition induced by government fragmentation is not limited to democracies with well-informed voters. Consider, for example, the trade-offs that autocrats commonly face. On the one hand, auto-crats need capable agents, who are not easily identified, to implement policy; on the other hand, capable agents might be disloyal and turn into future challengers (Egorov and Sonin 2011). Increasing the number of regional governments can serve as an effective tool for addressing these agency problems. Not only does regional fragmentation allow auto-crats to rotate officials and thereby limit their ability to develop powerful home bases, but it also allows them to increase yardstick competition. Specifically, autocrats can induce greater effort by offering career opportunities for high-performing

regional leaders. Indeed, research on Chinese politics has highlighted the importance of the competition between (and rotation of) provincial leaders as an important driving force behind regional economic growth at the county and pro-vincial levels (Guo 2007; Li and Zhou 2005).[9]

Regional leadership positions thus allow autocrats, as well as national parties regardless of regime type, to groom, recruit, and screen capable leaders for national-level tasks. Indeed, even if citizens are not well informed, yardstick com-petition could be induced, so long as the national power brokers—be they national parties in autocracies or in young democracies, which are common across Africa—believe that survival in office depends at least to some degree on being able to deliver tangible goods and services. When the local media markets are weak, the central government and na-tional parties likely have better information than voters with respect to the mapping between a regional government's actions and outcomes. Yardstick competition does not de-pend on bottom-up accountability, as it can be effectively induced through a system of rewards from national power brokers. We therefore hold that the welfare-enhancing benefits of regional fragmentation extend to all regime types.

Another indirect and long-term benefit of government fragmentation is the possible improvement in the supply of political talent for higher office. While government frag-mentation increases opportunities for yardstick competi-tion—which should increase effort by leaders irrespective of their inherent quality and ability to deliver public goods and services—multiplying entry points for new political talent might also elevate the quality level of political leaders. Given that locally marginalized groups are often excluded from public office, splitting existing regional governments into several new units generates more opportunities for local leaders to emerge. This potentially deepens the political talent pool and might make it more likely that high-quality leaders will eventually take office. At the same time, if government fragmentation is predominantly driven by patronage, this could encourage the entry of rent-seeking individuals, who, in the absence of yardstick competition, might worsen the provision of public goods and services.

Notwithstanding our divergent assumptions, the existing decentralization literature provides additional reasons to ex-pect public goods provision to increase with government fragmentation. First, a larger number of regional governments allows for greater experimentation and thus the diffusion of best practices across jurisdictions (Oates 1977). Second, carv-

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9. See Xu (2011) for a summary of the emerging literature on how the communist party in China holds regional leadership accountable through a system of rewards and punishments.

ing out smaller provincial governments may increase the accountability of regional incumbents, either due to positive spillover associated with yardstick competition (Besley and Case 1995) or by bringing government "closer to the people." Greater proximity may increase government decision-makers' information about local conditions and citizen preferences on the one hand (Gottlieb et al. 2016), and local residents' information about local government performance on the other (Tommasi and Weinschelbaum 2007). Better information in the hands of citizens can improve candidate selection (Ferraz and Finan 2008) and may reduce corruption (Chowdhury 2004).

The decentralization literature points to another avenue through which public goods outcomes may increase with the number of regional governments. Since ethnic groups tend to cluster geographically, regional splits create, on average, more homogeneous political units. Past work has demonstrated a negative association between ethnic diversity and public goods provision. First, ethnic homogeneity may reduce heterogeneity in preferences, thereby allowing—under certain conditions[10]—a better alignment between the supply of, and demand for, public goods (Alesina, Baqir, and Easterly 1999). Second, if regions become more homogeneous, electoral competition is more likely to focus on competence than identity. Third, collective action is more easily achieved in homogeneous units through a greater ability to sanction free-riders (Miguel and Gugerty 2005). Fourth, government fragmentation that improves group control over its affairs may mitigate ethnic tensions (Kaufmann 1996) and can contain regional separatism by creating regions that are too small to contest the rest of the nation (Hale 2004).

The positive effect of government fragmentation, though, has an upper limit. The creation of too many regional governments eventually creates substantial inefficiencies due to the lack of economies of scale. Small government units can also lack the necessary local human resource base to staff essential administrative positions. As the size of governing units shrinks, local elites are also more likely to capture government and subvert resources for rent-seeking (Bardhan 2002). The latter point is of particular concern where patronage politics is driving the process of government fragmentation and offers a powerful countervailing effect to potential gains in public goods provision. The goal of our empirical analysis will be to provide an empirical estimate for this trade-off between potential gains in service delivery and the dangers of extreme government fragmentation.

Our argument produces two main observable implications. First, the redistribution of administrative resources, paired with the possible medium- to long-term improvement in yardstick competition, will generate a positive, yet diminishing, effect of regional government fragmentation on public goods provision. Second, while we cannot directly test the indirect and long-run effects of government fragmentation on yardstick competition, the redistributive mechanism suggests that gains in services provision are likely to first materialize in regions directly affected by the territorial boundary changes.

EMPIRICAL ANALYSIS: CROSS-NATIONAL DATA
We begin our empirical analysis with country-level panel data in sub-Saharan Africa. Our first goal is to establish the positive (yet diminishing) effect of government fragmentation on the quality of service provision. Several challenges must be overcome in order to test this key proposition. First, our study has to disentangle the measurement of decentralization from the territorial administrative structure across time and space. Second, measuring the quality of service provision is difficult, given the number of potential variables that could be included in the analysis. Third, the interpretation of the effects of political institutions derived from typical cross-country studies is limited by endogeneity concerns (Rodden 2004). Specifically, omitted variables might be driving any association we find in the data between government fragmentation and the quality of services provision.

Measuring government fragmentation
In order to investigate both common trends and variation in regional government fragmentation in Sub-Saharan Africa, we compiled an original data set, manually coding the number of existing *top-tier* regional government units from 1960 (or year of independence) to 2012.[11] This information allows us to construct our key independent variable, *N. Regional Gov pc*, which is the time-varying count of the absolute number of top-tier regional governments in year t in country i per 1 million citizens.

We divide the number of top-tier regional governments by the size of the population to ensure that the density of regional governments in countries of vastly different sizes is comparable—in line with common practice (Lago-Penas and Martinez-Vazquez 2013). As demonstrated below, this measure allows us to disentangle the effects of government fragmentation from other institutional and economic factors

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10. These benefits are expected to increase with regional heterogeneity of preferences and decrease with spillovers in public goods provision across regions (Besley and Coate 2003).

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11. We largely draw on information provided by the Statoids project (http://www.statoids.com/). Section A in the appendix lists the countries in our main sample and provides details on the exact coding procedure.

that may affect the quality of services delivery. The number of regional governments varies in our sample from a minimum of two (São Tomé) to a maximum of 112 (Uganda), with a mean of 12.6. The number of regional governments per 1 million citizens in sub-Saharan Africa varies from 0.06 (Nigeria) to 361.7 (Seychelles), with a mean of 9.5. The distribution has a clear right skew, with 90% of all country years scoring below 10. The appendix, available online, provides a series of figures that explore the empirical distribution of our measure.

Measuring the quality of public service delivery

To test the study's key hypothesis, we extract several measures of service provision using the World Development Indicators (WDI).[12] We operationalize the quality of service provision by grouping these measures into a summary index. Following Anderson (2008), our summary index is a weighted mean of the standardized outcome variables, in which the weights—the inverse of the covariance matrix—are used to maximize the amount of information captured by the index. This approach improves statistical power while being robust to overtesting, because the index represents a single test. To construct the main summary index, we use four service delivery outcomes[13] that have been widely used in cross-national studies of the determinants of public service delivery: life expectancy at birth (Besley and Kudamatsu 2006), under-5 mortality rate per 1,000 live births (Kudamatsu 2012), primary school completion rate (Franck and Rainer 2012), and primary school (gross) enrollment (Lake and Baum 2001).[14] We also construct an alternative summary index that adds DPT (diphtheria, pertussis, and tetanus) immunization rates and pupil-teacher ratios in primary schools as index components. This reduces geographic and temporal data coverage—the WDI only reports immunization rates starting in 1980—but broadens the measure to some extent, moving it closer from outcomes to actual service provision.

While not directly measuring service provision, the advantage of using variables like life expectancy, immunization rates, and child mortality is that they are single measures that capture a myriad of "processes" (hiring and training personnel, stocking clinics, and combating medicine herding), "services" (e.g., immunization campaigns, disease prevention and treatment), and "infrastructures" (e.g., clean water

supply and improved sanitation facilities) that are a function of government efforts. Moreover, this approach follows the established literature and allows comparison of our findings to classic studies of decentralization's effects on public goods provision.

Endogeneity and government fragmentation

Estimating the causal effect of government fragmentation is complicated by the fact that unobserved factors may simultaneously lead to the creation of new regional governments and affect the quality of service provision. Our strategy for overcoming this identification challenge relies on two complementary approaches. First, we rely purely on within-country variation. We use a series of two-way fixed-effects models that differentiate out all time-invariant country-specific unobservables and common time shocks. Country fixed effects account for the government's general territorial organization, that is, the number of existing tiers, general state capacity, colonial history, and legal origins. Year fixed effects are essential due to secular improvements in public health and education and also to capture global policy effects (e.g., the introduction of the Millennium Development Goals).

While the fixed-effects models draw on within-country variation to identify the effect of the number of regional governments per capita, we still have to account for time-varying confounding variables. This is particularly important because changes in government fragmentation are not randomly assigned but are explicitly political (Pierskalla 2016b). Population size, decentralization, the desire to create patronage opportunities, and threats of secession have all been identified as possible sources of fragmentation. We try to account for these factors, admittedly imperfectly, using several control variables.

Drawn from the WDI, we control for the log of the population and urbanization rates, since those can affect both the absolute number of regional government units and the quality of service provision. For similar reasons, we control for the level of development (measured as the log of real gross domestic product [GDP] per capita; Heston, Summers, and Aten 2012), ongoing internal conflict (based on data from the Armed Conflict Data Set),[15] the Polity 2 score from the POLITY IV project (Marshall, Gurr, and Jaggers 2013), the logged value of oil income per capita, expressed in 2009 dollars (Ross 2012), a measure of decentralization (the existence of state-level elections from the Database on Political Institutions [DPI]), and the amount of foreign aid per capita (using WDI

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12. See http://data.worldbank.org/data-catalog/world-development-indicators.

13. We focus on outcomes because the effects of increasing the number of regional governments are ambiguous in terms of expenditures.

14. Where two indicators were highly correlated, such as infant mortality and under-5 mortality or gross and net primary school enrollment, we used the indicator that had better coverage and/or larger variance.

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15. Specifically, we use a dummy variable indicating the incidence of internal armed conflict. See http://ucdp.uu.se/downloads/.

data).[16] Each of these variables is a plausible confounder. For example, by controlling for foreign aid per capita we can, albeit indirectly, account for reform pressure from powerful donors that might affect territorial reforms and changes in public goods provision.

Our second approach relies on instrumental variables. We identify three exogenous sources of variation for the number of regional governments per capita. Our first instrument leverages over-time variation in the number of regional governments. Following the literature on policy diffusion that highlights the importance of regional role models for institutional reforms (Simmons and Elkins 2004), we argue that changes in the territorial structure of neighboring countries will affect the local discourse on institutional reforms and increase the likelihood that a country will adopt similar reforms. We thus calculate for each country-year the mean number of regional governments per capita in all country-years in sub-Saharan Africa, excluding country *i*. We further lag this instrumental variable by one year, relative to our measure of government fragmentation. While regional policy diffusion is plausible, it is much less likely that changes in the territorial structure of neighboring countries also affect the quality of local service provision, other than through the reorganization of regional government units.

The other two instruments build on the fact that administrative and political boundaries are drawn around geographic landmarks. We use geographic information system (GIS) data on rivers around the world to calculate the length of medium and small streams for each country (large rivers might have important economic implications that affect our outcome of interest). Medium and small streams are far less likely to violate the exclusion restriction.[17] Using GIS files that contain the shape of landmasses, we also determine the topographic concentration of each country. Specifically, our third instrument counts the number of distinct landmasses (mainland plus islands) and their geographic size, which we use to calculate a Herfindahl index of landmass concentration. Both small and medium streams, and a high degree of landmass fractionalization, are associated with more regional government units. Since they are time invariant, these two instruments only induce cross-sectional variation in the number of regional governments per capita and cannot be used in conjunction with country-level fixed effects. Hence, we estimate standard pooled

two-stage least squares (2SLS) models while additionally controlling for the full set of confounding variables identified above and year-fixed effects.[18] Summary statistics for all variables can be found in table C1 in section C of the appendix.

Model specification

To test our hypothesis of a positive (but nonlinear) relationship between government fragmentation and the quality of service delivery, we estimate the following model

$$y_{it} = \alpha_i + \gamma_t + \mathbf{x}_{it-1}\beta + \delta govpc_{it-5} + \omega govpc^2_{it-5} + \epsilon_{it}, \quad (1)$$

where the service provision index outcome variable y_{it} is a function of country and year fixed effects α_i and γ_t, and a set of controls $\mathbf{x}_{it-1}$, as defined above. To test for the hypothesized diminishing returns, we include our measure of regional government units per capita and its quadratic term. We also report models that include a log-transformed version of the regional government measure, which provides an alternative way to capture the nonlinear effect of our main input variable. Since it is unrealistic to assume that changes in the number of regional governments have immediate effects, we lag our key independent variable by five years. For the instrumental variable models, we exclude country fixed effects. Throughout, we cluster standard errors at the country level to allow for arbitrary serial correlation and heteroskedasticity.

RESULTS

We report our findings in table 1. Columns 1–4 show results for our main summary index, while columns 5–8 show equivalent results for the extended index. Column 1 shows the estimated coefficients for the standard fixed-effects model. As hypothesized, the effect of the key independent variable is positive for the linear term and negative for the quadratic term. Model 2 replaces the quadratic specification with a log transformation of our main explanatory variable. The coefficient is positive and statistically significant at the 5% level. Models 3 and 4 repeat the estimation using our set of instruments, for which we again find coefficient signs consistent with a diminishing effect. The effect is statistically significant below the 10% level for the quadratic and below the 5% level for the log specification. Our findings are robust to using the extended services outcome index. For the quadratic and logarithmic fixed effects model in columns 5 and 6, terms are statistically significant below the 1% and 5% level. The IV models show again the correct signs and are statistically significant below the 5% level for the linear term in the quadratic specification and logged model.

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16. Sadly, there is a paucity of longitudinal data on decentralization that covers a sufficient set of developing countries. The DPI data, assembled by Thorsten et al. (2001), provide the best geographic and temporal coverage for sub-Saharan Africa.

17. A similar strategy has been exploited by Hatfield and Kosec (2013) to estimate the effect of interjurisdictional competition on US growth.

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18. Given the lack of country fixed effects, we add a measure of ethnic fractionalization as an additional control.

Table 1. Fixed Effects and IV Models, Annual, Main, and Extended Services Index

	Main, FE b/se (1)	Main, FE b/se (2)	Main, IV b/se (3)	Main, IV b/se (4)	Ext, FE b/se (5)	Ext, FE b/se (6)	Ext, IV b/se (7)	Ext, IV b/se (8)
log(Population)	1.845***	2.290***	.139	.260	1.038**	1.290**	.163+	.330*
	(.487)	(.539)	(.125)	(.171)	(.369)	(.428)	(.096)	(.135)
Urbanization	−.019+	−.024**	−.002	−.003	−.010	−.015*	.002	.002
	(.009)	(.008)	(.009)	(.010)	(.007)	(.007)	(.008)	(.010)
log(GDP pc)	.260+	.271+	.232*	.297*	.122	.141	.279**	.329**
	(.149)	(.151)	(.117)	(.129)	(.127)	(.130)	(.105)	(.114)
Intrastate conflict	.032	.011	−.369***	−.386**	−.038	−.049	−.398***	−.451***
	(.052)	(.054)	(.109)	(.121)	(.050)	(.051)	(.096)	(.114)
State elections	.185	.224	.179	.242+	.159	.204	.239**	.317*
	(.166)	(.144)	(.120)	(.145)	(.131)	(.139)	(.090)	(.124)
Polity 2	.013	.016	.007	.008	.004	.007	−.002	−.002
	(.014)	(.014)	(.013)	(.013)	(.006)	(.006)	(.008)	(.008)
log(oil value pc)	−.070**	−.066*	.066+	.065+	−.024	−.026	.011	.004
	(.025)	(.031)	(.035)	(.035)	(.024)	(.030)	(.025)	(.027)
Foreign aid pc	−.000	.000	.000	.000	−.001*	−.000	−.001	−.000
	(.000)	(.000)	(.001)	(.001)	(.000)	(.000)	(.001)	(.001)
ELF			−.696	−.759			−1.054**	−1.115*
			(.464)	(.544)			(.360)	(.440)
N local gov pc 5-year lag	.113+		.117+		.089**		.094*	
	(.057)		(.061)		(.029)		(.046)	
N local gov pc squared 5-year lag	−.001		−.002+		−.001*		−.001	
	(.001)		(.001)		(.000)		(.001)	
log(N local gov pc) 5-year lag		.388*		.392*		.238**		.416**
		(.149)		(.186)		(.082)		(.153)
Constant	−30.931***	−37.739***	−4.320*	−6.673*	−17.609**	−21.440**	−5.017***	−8.082***
	(7.299)	(8.137)	(2.024)	(2.680)	(5.996)	(6.912)	(1.473)	(2.160)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	602	602	589	589	522	522	518	518

Note. Standard errors are clustered at the country level. FE = fixed effects; GDP = gross domestic product.

We further perform specifications tests for all IV models, which clearly reject the null hypotheses of underidentification, weak identification, and endogeneity.[19] We note that limited information maximum likelihood IV estimations produce fairly similar results as 2SLS.

In total, across all models, we find evidence of a nonlinear effect of government fragmentation on the quality of service delivery. Figure 1, which plots the predicted out-come as a function of our independent variable, shows that when the number of regional government units per capita is small, the quality of service provision is fairly low. Increasing government fragmentation from low levels leads to a clear improvement in the quality of service provision. For example, increasing our key independent variable from the minimal value of 0.02 to 10 governments per 1 million citizens increases the expected value of the expanded summary index by almost a full standard deviation. As the density of regional governments increases, though, marginal gains decrease and an inflection point is reached around 45 governments per 1 million citizens. Observations are much sparser in the right half of figure 1, which explains why the linear-log model

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19. Note, though, that we can only implement the overidentification test after foregoing the clustering of our standard errors, due to a co-variance matrix of insufficient rank.
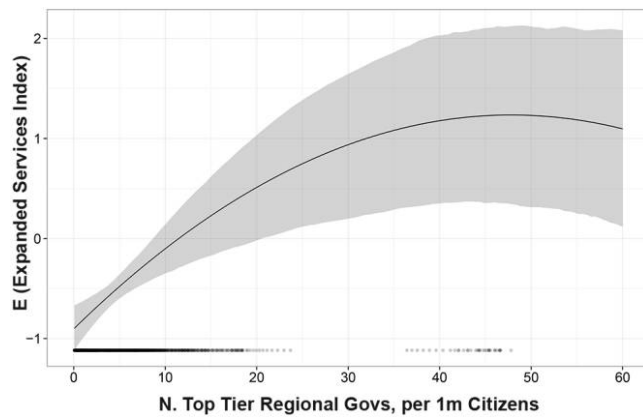
Figure 1. Simulated effect of the number of regional governments per 1 million citizens on the expanded summary index. Gray shading indicates 95% confidence interval. The figure is based on model 5 in table 1, excluding the Seychelles (an extreme outlier).

performs best in most specifications.[20] We believe our results show the strongest support for the initial gains in public service delivery as a function of the density of regional governments. Admittedly, it is harder to determine when these gains dissipate. For one, many of the observations with a high density of regional governments are islands, which might cause inferential problems (although we exclude small nations in our robustness checks—see below). More so, the fact that only a handful of countries pursue a very aggressive policy of territorial fragmentation might reflect an awareness among policy makers of the problems associated with creating too many regional governments.[21]

Robustness checks

We investigate the robustness of our findings in a number of ways. This section simply summarizes our tests, while details are relegated to the appendix.

We start by modifying the lag length for the government fragmentation variable from five to three years, without altering our substantive conclusions (sec. D1 of the appendix). To deal with missing data we rely on multiple imputation (sec. D2 of the appendix) and quinquennial analyses (sec. D3), confirming our main findings. Section D4 of the appendix discusses the possible confounding role of government expenditures and fiscal decentralization, while section D5 shows that our findings are robust to the inclusion of a lagged dependent variable.

As noted, our measure of regional governments per capita displays a right skew, partially due to the density of countries with small populations. We thus reestimate our models, excluding countries with a population below 500,000. This too has no bearing on our findings (appendix, sec. D6). We further explore the issue of influential observations in section D12 in the appendix, finding no evidence that any one country is driving the results. We also add an interaction term between the Polity measure and government fragmentation. Since our theory explicitly applies to both democracies and autocracies, we expect the interaction to be insignificant. Section D8 in the appendix shows the interaction models—indicating no statistical difference across regime types. Similarly, an interaction with ethnic fractionalization (Alesina et al. 2003), is also insignificant, indicating that gains in service delivery are not simply due to reduction in ethnic diversity (sec. D10).[22] Moreover, we also present results for all index components separately (appendix, sec. D9).

While the fixed-effects models control for any unobserved, time-invariant confounding variables and observed time-varying confounders, it is still possible that there remain other unobserved time-varying variables that correlate with both the number of regional governments and the quality of service provision. For example, our foreign aid per capita measure might only capture some of the reform pressure induced by outside actors. We use additional data on IMF and World Bank adjustment programs to explore this issue further in section D11 in the appendix. Without being able to measure additional time-varying confounders, we can still try to explore the general sensitivity of our findings to omitted variable bias. To estimate the size of the bias needed to invalidate our findings, we compare our estimates of the effect of the number of regional governments per capita across different sets of "sparse" regression models (Bellows and Miguel 2009). This allows us to derive an estimate for the bias. We find that the bias through selection on unobservables for the linear term would have to be between 134% and 202% of the selection on observables. This lies above the suggested threshold of 100% of the variation, which indicates that our finding is unlikely to be spurious (sec. D7).

In summary, across a large number of model specifications and outcome measures, using two-way fixed-effects, quinquennial, and IV models, we find robust evidence for

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20. Based, e.g., on the log-likelihood as an indicator of model fit.

21. See, e.g., a popular critique of Uganda's aggressive administrative unit proliferation policy: Richard M. Kavuma, "Local Councils in Uganda Struggle to Make Ends Meet." *The Guardian*, December 15, 2009.

22. While a direct test of this alternative mechanism would require detailed data on ethnic fractionalization at the subnational unit level, it is plausible to expect that countries with overall higher levels of ethnic fractionalization will experience larger gains through government fragmentation if the main channel operates via increasing ethnic homogeneity.

the effect of the number of regional governments per capita on the quality of service provision. The evidence is strongest for the initial, positive effect. Whether pointing to negative or simply diminishing returns at higher levels of regional government fragmentation, our analysis suggests a clear upper limit on countries' ability to improve service delivery by increasing the number of regional governments.

TESTING THE MECHANISM: REDISTRIBUTIVE CONSEQUENCES OF FRAGMENTATION

To test our argument that fragmentation leads to redistribution of resources toward newly created regional governments, we complement the country-level findings with an analysis of georeferenced individual-level data from the Demographic Health Surveys (DHS). The DHS are large, nationally representative surveys. Being standardized, DHS data allow for comparability across countries and are ideal for our analysis as they include a rich set of information on maternal health inputs and outcomes.

Specifically, we seek to compare individual-level data on health outcomes for new ("splinter") and rump ("mother") districts to plausible counterfactuals before and after the creation of a new regional government in a longitudinal difference-in-difference setting. However, implementing such an analysis is challenging, largely because we need georeferenced, longitudinal individual-level data on outcomes of interest, collected around the same time as changes in the territorial structure of government. Given these constraints, there are only three African countries for which this analysis is feasible—Nigeria, Uganda, and Malawi. At the onset of a fragmentation reform, all three cases were on the lower end of the cross-national regional government per capita measure and any increases in the number of government units ought to improve local service delivery (fig. E1 in the appendix situates each case in the context of our cross-national findings). Malawi has had two recent sets of district splits, in 1998 and 2003 (fig. E2 in the appendix), in which the number of districts increased from 24 to 28. In Nigeria, 16 new states were created in three waves of state splits, in 1987, 1991, and 1996 (fig. E3 in the appendix), increasing the number of states from 21 to 37. Uganda experienced four waves of district splits in 1997–98, 2000–2001, 2005–6, and 2010–11, leading to a dramatic increase in the number of districts from 39 in 1996 to 112 in 2011 (fig. E4 in the appendix).[23]

We use data from multiple waves of the DHS surveys to increase our sample size and to minimize reliance on long recalls.[24] To conduct our analysis, we match geographic coordinates to district- and state-level shape files in their respective countries, allowing us to assign surveyed households to nonsplitting, mother, or splinter regions. Figure 2 shows the raw data trend in infant and child mortality for nonsplitting and splinter regions in Malawi, Uganda, and Nigeria (fig. E5 in the appendix also includes mother districts). The raw data suggest that (1) presplit trends are similar, (2) splinter regions reduce child and infant mortality after splits, and that (3) improvements in health outcomes in splinter districts compared to the national trends strengthen overtime. We now turn to a more formal test of these trends.

Model specification

We use standard panel methods to examine the effects of district (Malawi and Uganda) and state (Nigeria) splits on infant and child mortality rates. Our analysis is run, separately for each country, at the individual birth level, allowing us to include a rich set of birth-level controls. Specifically, we estimate the following model:

$$y_{it} = \alpha + \delta_i + \gamma_t + \mathbf{x}_{it}\beta + \mathbf{s}_{it}\omega + \epsilon_{it}, \qquad (2)$$

where our outcome variables y_{it} are infant and child mortality, defined as death within the first year of life and death within the first five years of life, respectively, while δ_i and γ_t represent district and year fixed effects. Our set of birth-level controls, $\mathbf{x}_{it}$, follows from the public health literature and includes infant gender, infant's birth order and its square, a dummy for whether the infant was born within 24 months of its previous sibling, an indicator of whether an infant was a multiple birth, and mother's age and its square. In our first model, the treatment variable, $\mathbf{s}_{it}$, is a binary indicator of whether a district/state has split at each point in time. In our second model, $\mathbf{s}_{it}$ is a continuous variable of the years elapsed since a district has split and is set at 0 for nonsplitting and presplit districts. Identification stems from comparing trends in the health outcomes of births in splinter regions versus nonsplitting regions. The district and time effects remove common level and time trends, allowing us to tie any differential trends in health outcomes to the timing of the district split. We cluster standard errors at the district level to allow for arbitrary serial correlation and heteroskedasticity.

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23. Section E of the appendix provides information on the determinants of the regional splits for each country, our rule for coding regional governments as splinter and mother, as well as a description of the responsibilities of the top-tier regional government with respect to service delivery.

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24. We combine georeferenced DHS survey data from 2000, 2004, and 2010 in Malawi, from 1990, 2003, 2008, and 2013 in Nigeria, and from 2001, 2006, and 2011 in Uganda.

Malawi
Infant Mortality

Nigeria
Infant Mortality

Uganda
Infant Mortality

Malawi
Child Mortality

Nigeria
Child Mortality

Uganda
Child Mortality
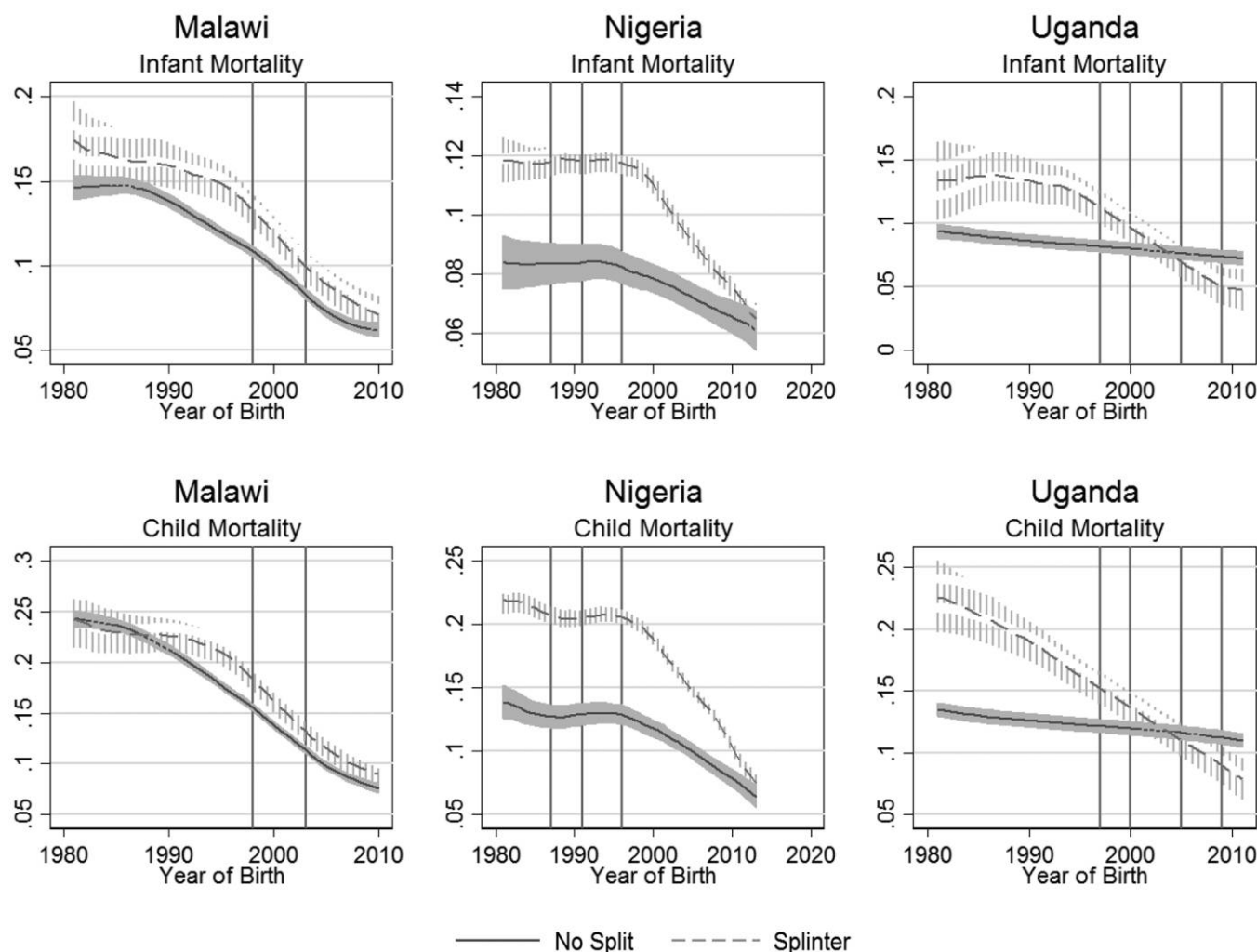
——— No Split   - - - - - Splinter

Figure 2. Infant and child mortality rates in Malawi, Nigeria, and Uganda for nonsplitting and splinter districts. Only districts and states that split in initial waves of splits are shown here. Dark vertical lines represent waves of district and state splits.

Individual-level analysis results

Table 2, which presents the results for splinter districts, contains three specifications per country. Specification 1 includes all available years of data and waves of regional splits, using the dichotomous s_{it} treatment variable defined above. Specification 2 again includes all available years of data and split waves but uses years since district split as the s_{it} treatment variable. Specification 3 uses the dichotomous s_{it} treatment variable but considers only initial waves of splits to examine short-term splits effects; this specification is unaffected by later waves of splits that make it somewhat harder to construct valid counterfactuals. These short-term results look at the period prior to the second wave of district splits in 2003 for Malawi, the period prior to the third wave of state splits in 1996 for Nigeria, and the period prior to the third wave of district splits in 2005 for Uganda.

Consistent with our theoretical prediction, both infant and child mortality rates improved in splinter districts rel-

ative to nonsplinter districts (table 2). The main results in columns 1, 4, and 7 show improved infant and child mortality rates in all three countries, though these are only significant in Malawi. Columns 2, 6, and 8 show results with the outcome that represents years since district split. These results show significant decreases in infant mortality rates as the number of years since the split increases in both Malawi and Uganda. This indicates that the improvements in infant mortality in splinter districts is larger as more time passes after the split. Further evidence for this can be seen in the short-term results in columns 3, 6, and 9 in table 2, which only examine initial district and state splits. These results are not significant, indicating that improvements in splinter districts may take more than five years to be fully realized. In fact, child mortality rates in Malawi actually increase significantly in the short term. This finding is not only consistent with findings from our country-level regressions but is also what one would expect if the effects of splits were not

Table 2. Fixed-Effects Subnational Models—Splinter Districts

Category	Malawi			Nigeria			Uganda		
	1	2	3	1	2	3	1	2	3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Infant mortality	−.0131***	−.0024***	−.0032	−.0090	−.0019	−.0104	−.0071	−.0023*	−.0082
	(.0033)	(.0004)	(.0039)	(.0092)	(.0012)	(.0088)	(.0093)	(.0013)	(.0115)
Child mortality	−.0004	−.0009*	.0121**	−.0153	−.0033*	−.0162	−.0077	−.0029	−.0011
	(.0043)	(.0005)	(.0045)	(.0152)	(.0018)	(.0144)	(.0129)	(.0019)	(.0165)
District FE	✔	✔	✔				✔	✔	✔
State FE				✔	✔	✔			
Year FE	✔	✔	✔	✔	✔	✔	✔	✔	✔
All splits included	✔	✔		✔	✔		✔	✔	
1st split waves only			✔			✔			✔
Years since split tx		✔		✔				✔	
No. of observations	123,715	123,715	93,805	144,866	144,866	54,592	33,795	33,795	27,814

Note. Column 1 for each country includes a binary indicator for whether a district or state was a splinter district/state. These regressions measure the overall effect of being a splinter district on outcome variables. Column 2 for each country includes an indicator for how long a district or state was a splinter. These regressions measure the effect of length of time as a splinter district on outcome variables. Column 3 for each country also includes a binary indicator for whether a district or state was a splinter district/state. It considers only initial waves of splits to examine short-term splits effects. Standard errors are clustered at the district level in Malawi and Uganda and at the state level in Nigeria. FE = fixed effects.

spurious (as there is no theoretical reason to expect that fragmentation has an immediate effect).

Though the point estimates reported in table 2 may seem small, they translate into large savings in infant lives. In 2011, there were about 686,000 births in Malawi, 6,458,000 births in Nigeria, and 1,545,000 births in Uganda (UNICEF 2013). Given our estimates, had all regions improved infant mortality rates at the rate of the splinter districts, this would translate into a further decrease of 8,987 infant deaths in Malawi, 58,135 infant deaths in Nigeria, and 10,992 infant deaths in Uganda in 2011 alone.

To rule out the possibility that our results are driven by long-term trends rather than the creation of new districts and states, we run the following placebo test. For each of the three countries, we created a false "split" for each of the 5–10 years prior to the actual split and looked for treatment effects in the splintering districts using the same difference-in-difference specification as in model 2. Reassuringly, we do not find treatment effects for those placebo splits (appendix, sec. E6). Further, we run regressions that include time trends and regressions and that compare districts that split in early waves to those that split later (appendix, sec. E9). The latter makes the counterfactual comparison more plausible, since we compare outcomes in splitting regions to the subset of nonsplitting regions that changed their boundaries

at a later date. This excludes regions that never made any changes to their administrative boundaries, since they presumably differ more strongly in unobservable characteristics. These results are very similar to our main specification.

To further explore the robustness of our results, we examine health usage measures that might be driving the decrease in infant mortality in splinter regions. Importantly, we find that the quality of health care has improved (health inputs) in splintering regions compared to the national trend (appendix, sec. E5). For example, in Malawi, compared to mothers in nonsplitting districts, mothers in splinter districts showed improved rates in overall usage of antenatal care, number of antenatal appointments, the presence of a doctor or nurse at the time of birth, and use of antimalarial medication during pregnancy after their district split. In Uganda, mothers in splinter districts showed improved rates of antenatal tests including blood pressure and blood samples, increased rates of antimalarial medication usage during pregnancy, and increased usage of receiving and taking postnatal vitamin A supplements. Results of this analysis are not available for Nigeria.

Our main analysis of health outcomes in splintering regions, together with our placebo tests and analysis of health inputs, present a powerful complement to our initial country-level results and support our theoretical expectations that

gains will be concentrated in splinter regions. As expected, when we focus our analysis on mother regions, the results, reported in table E8 in the appendix, are different. Infant and child mortality rates increase slightly in Malawi and Uganda, though this is not significant. The results for years since split show nonsignificant effects in Malawi, but infant mortality significantly increases in Uganda the longer a district has been a "mother district." Short-term results for initial waves of district splits show partially significant increases in infant mortality in Uganda, indicating negative effects for mother districts in the years following district splits.

In mother districts in Nigeria, infant and child mortality rates decrease nonsignificantly overall. The results for years since state split show that in Nigeria, the longer a state has been a mother, the better its infant and child mortality rates are relative to nonsplitting states. However, the short-term outcomes show that in the initial five years after the split, Nigeria saw significant increases in both infant and child mortality in mother states. States in our sample split as early as 1987, versus 1998 in Malawi and 1997 in Uganda, providing 10 additional years of postsplit data for Nigeria. Nigeria's initial increase in infant and child mortality rates, which can also be seen in Malawi and Uganda, seems to be offset by null effects (or even potential improvements) in these areas for mother states in later years.

Our results for mother regions offer additional indirect evidence that our overall finding is not solely due to increasing local ethnic homogeneity but instead relates to resource redistribution and to greater supply of quality leaders. The creation of splinter and mother regions typically increases ethnic homogeneity in both compared to the original unit.[25] If increased ethnic homogeneity is the main channel through which public service quality is improved, we should observe similar gains in both mother districts and splinter districts. As table E8 in the appendix shows, this is not the case.

In total, these findings support the presence of a distributive effect that benefits splinter regions. The importance of distributive effects as a consequence of jurisdictional boundary changes is also consistent with case-specific evidence from Senegal and Indonesia, where the creation of new local government units has direct and substantively meaningful effects on the fiscal allocations toward splinter regions (Gottlieb et al. 2016; Pierskalla 2016a).

We are unable to directly test the more indirect and long-term effects of government fragmentation on yardstick competition or the talent pool of political leadership. For purposes

of this article, these arguments serve as untested theoretical assumptions that provide theoretical intuitions about the overall empirical findings in our tests. Section F in the appendix provides some indirect and suggestive evidence that government fragmentation is also related to the political talent pool, but future work will have to disentangle these effects further.

CONCLUSION

Countries differ, sometimes dramatically, in their degree of government fragmentation. Whereas some countries (such as Benin or Ghana) are divided into a small number of regional governments that serve a large number of residents, other countries (such as Uganda and Kenya) have explicitly adopted a policy of creating new regional governments, such that each government serves a smaller number of residents. A handful of recent studies has pointed to the importance of this phenomenon, albeit limiting their theoretical and empirical analysis to an examination of the determinants of increases in the density of regional governments. This study breaks new ground by deriving a new set of hypotheses and providing robust empirical results that substantiate our theoretical argument.

We argue that in the context of the developing world, increasing government fragmentation supports the provision of social services by redistributing resources to underserved areas and by inducing greater competition between subnational leaders. Creating new government units involves reallocating substantial fiscal and administrative resources to localities that were formerly marginalized, which is likely to improve service delivery outcomes. Moreover, government fragmentation intensifies yardstick competition between regional leaders. In parallel to (but distinct from) these mechanisms, smaller government units are also more likely to be homogenous and enable local leaders (elected or appointed) to be attentive to local needs, possibly adding further efficiency gains. At the same time, government fragmentation may add administrative costs, reduce economies of scale, and aggravate elite capture. We thus expect positive yet diminishing effects of regional fragmentation on public goods provision in both democracies and autocracies that base their legitimacy on performance.

We test this theoretical proposition using new data on the number of regional governments in sub-Saharan Africa from independence to 2012. The construction of this data set represents one of the contributions of this article. Using a variety of statistical models, we find clear and robust evidence for the hypothesized nonlinear positive but diminishing effect: increasing the number of regional governments per capita exerts a large, significant positive effect on the quality

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25. Section E8 in the appendix provides evidence on ethnic diversity in Ugandan districts pre- and postsplit.

of service provision, but at high levels of regional government fragmentation, adding more units has clear diminishing returns.

We then present evidence from three separate difference-in-difference analyses to substantiate the redistributive mechanism underpinning our theory. We merge individual-level DHS data for Uganda, Malawi, and Nigeria with information on changes in territorial government structures. We find that health outcomes improved in splinter regions compared to nonsplitting regions after about a three-year lag—in line with our country-level findings. Outcomes temporarily got worse for individuals in mother regions—an effect that dissipated over time. These findings are consistent with the redistributive mechanism and provide an additional layer of confidence in our cross-national results.

As for scope conditions, our argument is relevant for low- and middle-income countries and does not necessarily apply to high-income countries. In the developed world, innovative technologies allow administrative units to serve a growing number of residents effectively. For example, information communication technologies allow regional and local governments to reduce information asymmetries even as the physical distance between residents and local government officials increases. Similarly, citizens do not need to leave their home to obtain information on the relative performance of their regional government or on the virtues of competing candidates for local positions. Under such conditions, countries may see efficiency gains from having a small number of large regional governments without a real loss in the information advantages of small units. This may explain why several developed countries (e.g., Japan, Denmark, Switzerland, and Poland) have been consolidating subnational governments (Blom-Hansen et al. 2014; Breuillé and Zanaj 2013).

This suggests some important implications for potential policy reforms. Our results indicate that governments in sub-Saharan Africa could reap substantial efficiency gains in public goods provision through modest increases in the number of subnational government units. The effect is most likely to materialize for countries that are affected by enduring colonial legacies of administrative structures, which have generated unusually large government units or units that are strongly mismatched with underlying ethnic communities, or local government capacity. An important caveat is the role of politics: existing research on Uganda (Grossman and Lewis 2014) and Indonesia (Pierskalla 2016a) shows that once provisions for jurisdictional boundary changes are formally established, politicians will seek to take advantage of them for political gains, above and beyond what might be considered "optimal" with respect to public goods provision.

This article makes a conceptual and empirical contribution to the nascent study of government fragmentation but also to the much larger body of work on decentralization. Previous decentralization studies have not considered the implications of changes in territorial structures that often take place amid decentralization reforms (Fiorino et al. 2013). This omission may explain some of the conflicting findings of studies that examine the effects of decentralization on social and economic outcomes. A key avenue of future research is to examine the robustness of the findings of past studies that have tested the effects of decentralization reforms to the inclusion of the number of regional governments (per capita). More generally, the territorial organization of states—unitary or federal, more or less decentralized—is an important institutional feature that has received insufficient attention in the past.

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