The Effects of Administrative Unit Proliferation on Service Delivery

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February 25, 2014

Abstract

A large literature on decentralization and federalism has analyzed the effects of inter-governmental allocation of powers. However, little theoretical and empirical attention has been given to another feature of the territorial organization of states: the number and size of administrative (subnational) units. Whereas a handful of recent studies focused attention on the determinants of administrative unit proliferation, in this paper we examine, instead, the consequences of choosing between a large and a small number of administrative units. Using original data on the number of primary administrative divisions for all low and middle-income countries (1960-2012) we assess the effect of the number of administrative units on public services provision. To identify a causal effect we rely on within-country variation and on an instrumental variable strategy that leverages different sources of exogenous variation. Consistent with our theoretical expectations, we find robust evidence for an inverted-U relationship between the number of administrative units on the quality of services provisions, adding an important new dimension to the debate on decentralization.

1   Introduction

A large literature on decentralization and federalism has examined the determinants and effects of inter-governmental allocation of powers across levels of government. Specifically, following the seminal work by Tiebout (1956) and Oates (1972), the decentralization literature has mostly focused on exploring the conditions under which decentralized governments are relatively more efficient than central governments in the delivery of public goods and social services.[1] Surprisingly, however, little theoretical and empirical attention has been given to another feature of the territorial organization of states: the number and size of administrative units.[2] Both unitary and federal systems rely on administrative structures that break the political system into subnational units. These structures can, on the one hand, be mere administrative extensions of central government bureaucracies, implementing policy decisions from the national level, or near-independent units in federal systems with wide-ranging political and fiscal authorities. In either scenario, though, the number and size of administrative units is expected to play an important role in shaping the provision of social services, such as health and education.

Whereas some countries limit the number of administrative units to a bare minimum, a growing number of countries choose to pursue a policy of administrative unit proliferation. For example, as part of their post-communist decentralization reforms, Czechoslovakia and Hungary increased their number of municipalities by about 50% between 1989 and 1993 (Ilner, 1999). Brazil also increased its number of municipalities by over 50% following its return to civilian rule (Dickovick, 2011). Similarly, after relocating essential government functions to the district level, Uganda increased its number of districts from 33 to 112 between 1995 and 2011 (Green, 2010), and Indonesia increased its number of provinces from 26 to 33 and districts from 290 to 497 in less than a decade after Suharto's fall (Kimura,

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[1]See Treisman (2007) and Faguet (2012, Ch. 5) for useful reconstruction and critiques of this literature; see Bardhan (2002); Wibbels (2006) for helpful reviews.

[2]Alesina & Spolaore (1997) model the equilibrium determination of the number of *countries* in different political regimes, and in different economic environments. We are unaware of studies that analyzes the optimal number of administrative units *within* states, for example, given a certain level of decentralization.

2013). Following liberalization reforms Vietnam increased its number of provinces from 40 to 64 between 1996 and 2003 (Malesky, 2009). In sum, in numerous countries, the subnational structure of the state has undergone a substantial transformation, leading to a large variation in the territorial make-up of countries, even when taking into account a country's area and population size, as well as its level of decentralization.

Following Grossman & Lewis (2014), we use the term administrative unit proliferation to denote a political process resulting in a large number of local governments splitting into two or more units over a relatively short period. Increasing the number of administrative units—even without additional statutory devolution of powers—likely has significant implications to a country's political, social and economic landscape. The creation of new administrative units typically makes each one, on average, smaller and more homogeneous. This in turn may affect important determinants of local public goods provision: citizens' capacity for collective action (Alesina *et al.* , 1999) and their ability to use social sanctioning to increase cooperative behavior (Miguel & Gugerty, 2005). An increase in the number of administrative units also means that citizens are more likely to have leaders and administrators that are more proximate to them; those leaders are thus more likely than leaders of large constituencies to share constituents' familial and social networks. Such proximity likely improves the flow of information between local government officials and constituents (Hayek, 1948), strengthens reciprocity relationships between leaders and constituents (Baldassarri & Grossman, 2013), as well as increases the ability of citizens to align the incentives of local leaders using social rewards (Tsai, 2007).

The increased homogeneity of administrative units can also influence dynamics of (local) ethnic politics, potentially reifying ethnic boundaries and creating a sense of improved group control over their affairs (Brancati, 2008). This, indeed, seems to be the case in Indonesia (Kimura, 2013), Nigeria (Kraxberger, 2004) and Uganda (Green, 2008).

A small and growing literature has recently identified the importance of large changes to countries' administrative unit make-up. This literature, however, has thus far focused

solely on explaining the *determinants* of administrative unit proliferation (Grossman & Lewis, 2014; Kimura, 2013; Pierskalla, 2013; Green, 2010). In this paper we focus, instead, on the political and economic *consequences* of choosing between a large and a small number of subnational administrative units. Specifically we wish to examine the causal effect of the number of administrative units on the quality of key social services.

We expect the number of administrative units to have an inverted-U shaped effect on the quality of service provision. Smaller units bring government 'closer to the people', increasing information by government decision-makers on local conditions and citizen preferences on the one hand, and information of local residents about local government performance on the other (Hayek, 1948). Smaller units are also likely to be more homogenous on various socio-cultural dimensions, reducing heterogeneity in preferences and further strengthening links between citizens and local leaders. This overall allows—under certain conditions[3]—a better alignment between the supply and demand for public goods and services, irrespective of the level of decentralization.

At the same time there exists an important trade-off between the degree of information and homogeneity in ever-smaller units and their administrative capacity. Small administrative units cannot reap the benefits of economies of scale in public goods production and may lack the human capital, or financial and infrastructural resources to effectively meet the demand for public goods and to maintain high-quality of decision-making (Prud'homme, 1995). At the same time small administrative units are exposed to the danger of being captured by local elites to control access to rents (Bardhan & Mookherjee, 2006). We expect there to be an institutional 'sweet spot' between a territorial make-up of very few and very many administrative units that balances the trade-off between improvements in information and homogeneity and capacity and elite capture.

To test this theoretical expectation, we draw on original data on the number of primary administrative units for all low and middle income countries from 1960 to 2012.[4] For each

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[3]The purported benefits of decentralization increase with regional heterogeneity of preferences and decrease with spillovers in public goods provision across regions (Oates, 1972; Besley & Coate, 2003).

[4]By primary units we mean the highest level of government that has administrative authority below the

country we reconstructed the change history of the number of units from information provided through the Statoids project (Law, 2013). To measure the quality of public services provision we use *outcome* data from the World Bank Development Indicators in the areas of health and education to construct a composite index. Using a summary index to measure complex concepts such as "quality of social services" maximizes information contained in our data and mitigates the problems of cherry-picking and multiple testing (Casey *et al.*, 2012; Grossman, forthcoming).

To identify the causal effect of the number of administrative units on services provision we follow a three-pronged strategy. We first estimate fixed effects models, which only use within-country variation. In a second step, we augment the fixed effects models by using an instrumental variable strategy that exploits temporal variation in the number of administrative units in neighboring countries as a source of exogenous variation. Third, we use alternative instruments, the length of small rivers and the land mass concentration of the country, which induce cross-sectional variation in countries' number of administrative units. Throughout, we control for a number of important confounding variables, like the degree of decentralization, GDP per capita or the level of democracy. The core aspects of our empirical analysis follow a pre-specified pre-analysis plan. As such this paper joins calls made by Lupia & Elman (2014) and Miguel *et al.* (2014), and others, to increase transparency of data analysis as a mean to increase the reliability of published results in the social sciences.

Across all models we find support for our theoretical expectation of an inverted-U shape relationship between the number of primary administrative units and the quality of services provision. These findings are robust to various model specifications and sensitivity analyses, providing a fresh insight to the debate on the effects of decentralization on public services provision. Hitherto contradictory findings on the role of political and fiscal decentralization for the quality of government services, which we briefly review below, might in part be due

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central (or federal) government. For example, in India primary administrative units are states, in Indonesia the primary administrative units are provinces and in Uganda those are districts.

to ignoring the territorial administrative structure at the outset of decentralization reforms. Moreover, our argument and evidence highlights that various aspects thought to be closely associated with decentralization (e.g. better information, homogeneous preferences) should be treated separately from the allocation of political and fiscal decision-making authority. Our analysis shows that improvements in public goods provision can be realized even in states with low degrees of decentralization, if the size of administrative units is sufficiently (but not too) small. Optimal results might be obtained when decentralization reforms are paired with moderate levels of administrative unit proliferation. Hence, our paper not only provides a first empirical estimate of the effects of administrative unit proliferation, but also offers a new take on the larger decentralization literature.

The remainder of the paper is structured as follows. Section 2 builds on the existing theoretical and empirical literature on decentralization and the territorial organization of states to develop our main theoretical hypothesis. Section 3 introduces our research design, main measures and data sources. Section 4 outlines our estimation strategy, while Section 5 summarizes our main findings and a series of robustness checks. Section 6 concludes and identifies future research avenues spurred by our analysis.

2   The Territorial Organization of States

The vertical distribution of political power in countries has been the topic of a large body of work spanning political theory, economics, public policy and political science. Early work on the determinants of economic and social development has stressed the importance of strong centralized systems of governance (Hirschman, 1958). By contrast, students of development in the 1980-1990s period generally heralded the benefits of decentralization, urging central governments to re-allocate fiscal, administrative and political authority to lower levels of government. Early proponents of decentralization have argued that such devolution of power will not only curb the power of the central government (Seabright, 1996) and mitigate ethnic tensions and conflict (Kaufmann, 1996), but also lead to a

more efficient provision of public goods, and a more sound economic policy (Oates, 1972). Parallel work on 'market-preserving federalism' (Qian & Weingast, 1997; Weingast, 1995) has equally lauded the benefits of a credible re-allocation of political authority to subnational units in improving overall economic well-being.

The prominence of decentralization reforms in the developing world combined with their disappointing outcomes has spurred a renewed interest in the theoretical underpinnings of the core models of decentralized governance structures. For example, Bardhan & Mookherjee (2006), Treisman (2007), and Eaton *et al.* (2011) provide a comprehensive analysis of the theoretical assumptions underlying the purported benefits of decentralization and delineate their narrow scope conditions. These authors, among others, offer modifications to existing theoretical models of decentralization; ones that pay closer attention to the political incentives of decision-makers. It is shown that, under certain unfavored conditions, the purported benefits of decentralization can turn into the opposite: producing capture of institutions by local elites, a race-to-the bottom for tax revenue and welfare policies, unsound fiscal policy, and political strife.

It comes as no surprise that the empirical literature on the effects of decentralization on public goods provision shows mixed findings. On the positive side, decentralization reforms arguably led to substantial increases in investments in education and health in Argentina (Habibi *et al.* , 2003), Bolivia (Faguet, 2012) and Indonesia (Kis-Katos & Sjahrir, 2014). Consistent with these findings, Galiani *et al.* (2008) report that school decentralization reform in Argentina had an overall positive impact on student test scores, Barankay & Lockwood (2007) find that more decentralization is associated with higher educational attainment in Switzerland, and Rubio (2010) reports that fiscal decentralization of health services in Canada has had a positive and substantial influence on the effectiveness of public policy in improving a population's health. Similarly, using a large-n research design, Robalino *et al.* (2001) and Jiménez-Rubio (2011) find that higher degree of fiscal decentralization is associated with lower mortality rates, and Enikolopov & Zhuravskaya (2007) find positive effects of political decentralization on public goods provision, at least when

fiscal decentralization led to increases in the strength of national political parties.

By contrast, several authors have found that decentralization reforms have been associated with negative policy outcomes. For example, a rapid decentralization reform has been associated with a reduction of health expenditure in Uganda (Akin *et al.* , 2005), and heightened rent-seeking behavior (Reinikka & Svensson, 2004). In addition, decentralization was found to contribute to fiscal problems and poor macroeconomic performance (Remmer & Wibbels, 2000; Treisman, 2000; Samuels, 2003) and to politicization of intergovernmental bargaining for fiscal allocations from the central government (Treisman, 1996). The record of decentralization with respect to ethnic conflict and separatism is equally mixed (Brancati, 2006; Bakke & Wibbels, 2006).

We believe that the scholarly disagreement about the effects of decentralization reforms is, in part, caused by a key oversight. While the vertical allocation of fiscal and political authority is undoubtedly important, past analysis has taken as a given the administrative territorial structure of the units that had been delegated new powers and responsibilities. In practice, however, a dramatic increase of the number of administrative units often occurs following the initiation of decentralization reforms. One reason for that is that devolution of new authority to localities—the centerpiece of decentralization reforms—makes each administrative unit more valuable to citizens and elites, and thus can trigger their demand. This phenomenon is widespread particularly in Sub-Saharan Africa, where almost half of countries have increased their number of administrative units by at least 20% since 1990, amidst a wave of decentralization reforms (Grossman & Lewis, 2014).

More generally, changes in the territorial administrative structure of countries are not only restricted to federal or highly decentralized countries. Even fairly centralized countries such as Libya, the Sudan, Cambodia, Vietnam or Indonesia under President Suharto adjust and sometimes radically change the territorial make-up of administrative units. While a series of studies has investigated the determinants of administrative unit proliferation in specific country contexts (Grossman & Lewis, 2014; Kimura, 2013; Pierskalla, 2013; Green,

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2010), to our knowledge, no empirical study has yet compared processes of administrative unit re-organization in a large-n cross-country sample.

We believe this to be a theoretical and empirical omission. Several of the mechanisms commonly described as the potentially beneficial effects of political and fiscal decentralization, can be equally applied to more centralized forms of decision-making, when implemented through administrative structures that are sufficiently small (Treisman, 2007). Hence, it is important to conceptually distinguish processes of decentralization from territorial structures reforms.

2.1   The Effect of the Number of Administrative Units

There are several reasons—derived from the political economy of decentralization literature— to believe that increasing the number of primary local governments can have a positive effect on the quality of social services, independently of the degree of political or fiscal decentralization.[5] First, increasing the number of units means that the local government is located 'closer to the people'. Closeness increases citizen information on politicians, allowing for better candidate selection (Casey, 2013), and arguably better accountability (Seabright, 1996; Tommasi & Weinschelbaum, 2007; Grossman, forthcoming).[6]

Smaller territorial administrative structures equally increase available information on local bureaucrats, enabling local citizens and businesses to more effectively pressure the government. Closeness also entails better information available for government decision-making and better feedback between services provisions and citizens' needs and preferences. Again, the informational advantage of smaller units applies to local governments lead by locally accountable officials, but also provides crucial information to agents of a relatively

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[5]We share the assumption made by Bardhan (2002, 188-190) that the fiscal federalism framework that emerges out of Tiebout (1956) is inappropriate for analyzing local conditions in developing countries. Specifically the fiscal federalism literature (unrealistically) assumes population mobility, high level of information on the types and quality of local services, effective mechanisms of local accountability, equal capacity across local governments and that local services are funded from a local tax base.

[6]According to Tommasi & Weinschelbaum (2007), smaller constituencies improve the ability of citizens to overcome coordination problems in contracting with agents, assuming a principal-agent model of political accountability.

centralized bureaucracy (Treisman, 2007). The literature on deconcentration of government bureaucracies explicitly emphasizes the informational needs of bureaucrats having to adapt to local conditions (Rondinelli *et al.* , 1989; Turner, 2002).[7]

Apart from informational advantages, smaller units also usually imply, on average, more homogeneous (religious or ethnic) constituencies. Ethnic homogeneity has long been associated with better quality of local public goods (Banerjee *et al.* , 2005, 639) due to shared preferences at the local level (Alesina & La Ferrara, 2005), enhanced ability to sanction defectors (Miguel & Gugerty, 2005; Habyarimana *et al.* , 2007), or more indirectly, by reducing ethnic conflict and secessionism (Brancati, 2006).

Both channels—improved information and increased population homogeneity—suggest efficiency gains in public goods and services provision for smaller territorial units, irrespective of their extent of political and fiscal authority.

On the other hand very small administrative subnational units often suffer from insufficient capacities to implement programs and undertake core government roles (Grossman & Lewis, 2014). Especially if used for patronage, there is the fear that smaller and smaller units will become ineffective when it comes to services provision. A small number of large local units can also reduce inefficiencies stemming out of economies of scale in procurement.[8] In addition, while a large number of small local governments may have better local information, they may be more vulnerable to capture by local elites (Bardhan & Mookherjee, 2006).[9] Ineffectual or captured government structures are a problem both for highly decentralized or relatively centralized systems of governance, putting limitations on a strategy of administrative unit proliferation.

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[7]While deconcentration was initially considered a sub-type of decentralization, it was later largely neglected in favor of research on the re-allocation of political and fiscal authority to lower levels of government (Turner, 2002).

[8]Economies of scale does not factor in if the central government continues to take the lead in procurement on behalf of local governments, as is the case in many developing countries where local governments tend to mostly bear costs of management of services such as health and education as well as maintenance of infrastructure such as water wells.

[9]The extent to which elite capture is a problem depends on levels of income inequality (Easterly, 2006) and on local norms of reciprocity (Bowles & Gintis, 2004; Baldassarri & Grossman, 2013).

The above discussion suggests that the quality of service provision is worst when the number of administrative units is either very high or very low. With a low number of territorial units government services provision lacks necessary information and caters to a heterogeneous population. With a very high number of territorial units governments can draw on better information and target services to more homogeneous groups, but lacks administrative capacity for proper implementation and is prone to elite capture. Hence, we expect an inverted-U shaped relationship between the number of administrative units and the quality of public goods provision:

H_p **Quality of Services:** *The number of administrative units has an inverted U-shaped effect on the quality of services provision.*

3 Research Strategy

Several challenges, pervasive in the larger literature on decentralization, have to overcome in order to test our key hypothesis. First, our study has to disentangle the measurement of decentralization from the general territorial administrative structure. Second, the interpretation of effects of political institutions, derived in typical cross-country studies, is limited by endogeneity concerns. Reversed causality or omitted variables might be driving any association we find in the data between the number of administrative units and the quality of services provision. Third, measuring the quality of services provision is problematic since a number of potential variables could be included in the analysis. This raises concerns of cherry-picking and undisciplined model search that might invalidate our hypothesis testing (Kabaila, 2009; Humphreys *et al.* , 2013). Fourth, missing data (on both outcome measures and independent variables) can create serious bias in the analysis of an association between political institutions and the provision of social services (Ross, 2006). In the following subsections we describe, in turn, our strategy for dealing with each of these challenges.

3.1 Data and Measurement

To measure the territorial administrative structure across countries we compiled an original dataset, manually coding the number of existing *primary* administrative subnational units in all developing countries from 1960 (or year of independence) to 2012.[10] This information allows us to construct our key independent variable, *N. Administrative Units*, which is a time-varying count, capturing the absolute number of primary administrative units in year t in country i. Given the skewness of the variable we also test the robustness of our findings using the natural log of the number of administrative units.

3.2 Exogenous Variation in Administrative Unit Proliferation

Estimating the causal impact of the number of administrative units is complicated by the fact that there might be unobserved factors that make it more likely that primary units will split and that, at the same time, contribute to the quality of service provision. In addition, the relationship between the number of administrative units and service provision may be subject to reverse causality. This is the case, for example, when local governments exercise high capacity, which translates into effective provision of good and services, and this provides stakeholders the confidence needed to increase the number of administrative units in order to bring services closer to people.

We use two strategies to overcome this identification challenge. First, we use a series of fixed effect models that, by construction, differentiate out all time-invariant country specific unobservables. Secondly we employ an instrumental variable estimation strategy that exploits the presence of plausibly exogenous factors contributing to the extent to which a developing country is divided into primary subnational units.

Our fixed effects estimations control for time-invariant, unobserved factors at the country level. In some robustness checks we add year effects to factor out temporal shocks that

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[10]We largely draw on information provided by the Statoids project. The supplementary appendix provides details on the exact coding procedure.

might affect both the number of administrative units and the quality of services provision in our universe of countries. While the fixed effects models only draw on within-country variation for the identification of the effect of the number of administrative units, we still have to include measures of time-varying confounding variables.

Across all our specifications we control for the following variables that have been specified in our pre-analysis plan: log of country size and log of the population, since both factors affect the absolute number of administrative units and the quality of services provision. Both variables are drawn from the World Development Indicators (WDI). For similar reasons we control for the level of development, measured as the log of GDP per capita (WDI), ongoing internal conflict, based on data from UCDP UCDP/PRIO Armed Conflict Dataset[11], the polity 2 score from the POLITY IV project (Marshall *et al.* , 2013), the logged value of oil income per capita (Haber & Menaldo, 2011), and a measure of fiscal decentralization, based on the work of Henisz (2000), each of which is a plausible confounding variable. This set of controls, taken together with the fixed effects, we believe, provides a sensible first estimate of the effect of the number of administrative units on the quality of services provision.

We augment our standard fixed effects estimations with additional instrumental variable (IV) models. For the IV models we require a set of instruments for which the following assumptions must hold: (a) Exogeneity: independence of potential outcomes from the instruments; (b) Exclusion restriction: no other channels from the instrument to the outcome, other than through the number of administrative units; (c) Strength: strong association between the instrument and the endogenous input variable; and (d) Monotonicity (Angrist & Imbens, 1994).

We identify three exogenous sources of variation for the number of administrative units. Our first instrument—the mean number of administrative units in neighboring countries— leverages over-time variation in the number of administrative divisions. Following the liter-

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[11]Specifically, a 0-3 ordinal variable indicating the intensity of internal armed conflict, ranging from no conflict to internal war.

ature on policy diffusion that highlights the importance of regional role models for institutional reforms (Simmons & Elkins, 2004; Weyland, 2005), neighborhood status is defined as belonging to the same wider geographical region (e.g. Latin America, Sub-Saharan Africa, etc.). A policy of administrative unit proliferation implemented in neighboring countries affects the local discourse on institutional reforms and increases the likelihood that a country creates new administrative units.[12] While regional policy diffusion is plausible (and supported by our data), it is much less likely that changes in the territorial structure of neighboring countries also affects the quality of local of services provision, other than through the re-organization of administrative units. Due to the time-varying nature of this instrument, we estimate fixed effects 2SLS models that include a full set of country fixed effects, as well as our standard battery of control variables.

We test the robustness of our findings using two other instruments that build on the fact that in many countries administrative unit boundaries are drawn around geographic landmarks. We use publicly available GIS data on rivers across the globe to calculate, for each country, the length of small streams. We chose small streams, since large rivers might have important economic implications that affect our outcome of interest. Small streams are a good predictor of the number of primary administrative units, but are unlikely to affect the quality of services provision through other channels. We note that a similar strategy has been exploited by Hatfield & Kosec (2013) to estimate the effect of inter-jurisdictional competition on growth in the USA.

In addition, based on GIS files that contain exact shapes for landmasses, we calculated the topographic concentration of each country. Specifically, our third instrument counts the number of distinct landmasses (mainland plus islands) and their geographic size, which

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[12]We also experimented with defining adjacency through a traditional distance matrix. We calculated the mean number of administrative units for countries within 800 km and 1500 km distance. This approach yields a much weaker instrument. Estimates based on these instrument largely point towards an inverted-U shaped finding but are statistically insignificant. This is partially the case because geographic distance covers many neighboring countries that are not in our set of low and middle income countries. More importantly, simple geographic distance also often bridges traditional regional boundaries. We believe the average number of administrative units in the wider geographic region is a conceptually and mechanically better instrument.

we then use to calculate a Herfindahl index of land mass concentration. For example, using this measure Benin is perfectly concentrated, while a country like the Maldives is rather dispersed. Similar to small streams, a higher degree of land mass fractionalization is associated with more administrative units. Note that these two instruments only induce cross-sectional variation in the number of administrative units and cannot be used on conjunction with country-level fixed effects. Hence, whenever we use this set of instruments we estimate between effects and standard pooled 2SLS models, while additionally controlling for the full set of confounding variables identified above.

Note that both sets of instruments identify different local average treatment effects (LATE). As Deaton (2010) points out, it is important to consider whether a particular LATE estimate corresponds to the theoretical mechanism one is interested in. Specifically, our two cross-sectional instruments allow us to estimate the changes in public services provision as a function of the number of administrative units induced by geographic variation. This is likely different from the effects of administrative unit proliferation induced through a political process of institutional reform. In a way, this LATE provides us an estimate of the 'politics-free' effect of the number of administrative units. By contrast, our first instrument explicitly assumes that policy reforms are often inspired by similar process in neighboring countries. The LATE estimate for this instrument is therefore arguably closer to the effect of the number of administrative units induced by a more politicized endogenous reform process. That we obtain similar results from both the fixed effects and the two types of IV models increases our confidence in the reliability of our findings.

3.3 Measuring Dependent Variables

To test H_p we extract several proxy measures of services provision using the World Development Indicators. We operationalize the quality of service provision by grouping a number of related measures into a summary index. Following Anderson (2008), our summary index is a weighted mean of several standardized outcomes, where the weights—the inverse of

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the covariance matrix—are used to maximize the amount of information captured by the index. This approach improves statistical power while being robust to over-testing because the index represents a single test. Moreover, using a summary index ensures that the probability of a false rejection does not increase as additional items are added to the index, and minimizes the risk that researchers over-interpret individual proxy measures that may be statistically significant due simply to random chance. We report the effect of the number of administrative units on both the summary index and its constituent items, but conclude that the number of administrative units has a causal effect if and only if the coefficient on the summary index is statistically significant by conventional standards.

We use four service delivery outputs to construct the summary index.[13] These variables have been widely used in cross-national studies of the determinants of public service delivery: Life expectancy at birth (Besley & Kudamatsu, 2006), under-5 mortality rate per 1,000 live births (Kudamatsu, 2012), primary school completion rate (Franck & Rainer, 2012) and primary school (gross) enrollment (Brown, 1999; Lake & Baum, 2001).[14]

The advantage of using life expectancy 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 campaign, disease prevention and treatment) and *infrastructures* (e.g., clean water supply and improved sanitation facilities.) One important caveat, however, is that for many low income countries, reducing infant mortality (which has large effects on life expectancy) does not necessarily entail large improvements in *health care.* Specifically, in order to reduce the prevalence of tuberculosis, malaria, diarrhea, and lower respiratory infections—the main culprits of child mortality in low-income countries—environmental change are arguably as important as health care services. As Deaton (2013, 119) aptly explains, these environmental changes include, but

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[13]Consistent with intuition developed in the fiscal federalism literature, we focus on localized services that are generally not subjected to large spillovers. With spillovers, decentralization leads to under provision of local public goods, as local decision makers do not internalize the costs and benefits accruing to other districts (Oates, 1977).

[14]In cases where two indicators were highly correlated, such as infant mortality and under-5 Mortality or gross and net primary school enrollment, we opted using the indicator that had better coverage and/or larger variance.

are not limited to better water and better sanitation, which require government action.[15] Summary statistics for all variables can be found in the Online Appendix.

3.4 Missing Data

Since data can be sparse for some developing countries, especially given the long time-series, we follow Ross (2006) and Stasavage (2005) and simulate missing data using multiple imputation.[16] Multiple imputation works well under the MCAR assumption, i.e. missingness is random, conditional on covariates. Given our comprehensive set of controls, we believe this is the best available option for dealing with missingness in the data. Multiple imputation estimates are presented in the main text, while listwise deletion estimates, which return substantively similar results, are reported in the online appendix.

4 Model Specification

Estimation strategies were developed in advance in a detailed pre-analysis plan posted on the Experiments in Governance and Politics (EGAP's) Design Registration webpage prior to analysis. The plan specified the measures of variables and econometric specifications that we would use in our analysis. In the online appendix we describe deviations from the pre-analysis plan and the rationales for these.

To test the effect of administrative unit proliferation on the quality of services we employ a standard time-series-cross-sectional data structure. The main dependent variable is our index of services provision. We estimate models of the following form:

$$y_{it} = \alpha_t + \gamma_t + \mathbf{x_{it-1}}\beta + \delta admin_{it-1} + \omega admin^2_{it-1} + \epsilon_{it}$$

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[15] In Deaton's terminology, fighting tuberculosis, malaria, and diarrhea is mostly the domain of *public health*, rather than of *health care*, even though improvements in health care can certainly help alleviate those problems.

[16] Missing data are imputed using Stata's MI command, with the number of imputation $m = 10$.

Where outcome variable y_{it} is a a function of country (and year) fixed effects and our set of controls $\mathbf{x_{it-1}}$, which we have defined above. To test for the hypothesized inverted-U shaped relationship, we include our measure of administrative units and its quadratic term. Throughout we cluster standard errors at the country level. To estimate the IV models we use standard Two-Stages-Least-Squares (2SLS).

5   Results

We report four sets of results in Tables 1–4. In the first two columns of each table the dependent variable is the service delivery summary index, followed by estimates where the dependent variables are the constituent elements of the index: Life expectancy, Infant mortality, Primary education completion rate and Primary education (gross) enrollment. As mentioned above, for each dependent variable we report two set of results: fixed effects estimates and IV estimates.

We begin by testing directly our main hypothesis of an inverse-U relationship between the number of administrative units and the quality of service delivery. We expect to see a positive and significant coefficient for the number of administrative units, and a significant negative coefficient for its quadratic term. Table 1 column 1 shows the estimated coefficients for the standard fixed effects model. As hypothesized, the effect of the key independent variable, the number of primary administrative unit is positive and significant for the linear term and negative and significant for the quadratic term. Focusing on an initial increase in the number of administrative units from low levels by 10 units (which is equivalent to about 0.66 standard deviations), causes an increase of 0.23 standard deviations in the service delivery summary index. For comparisons sake, a similar increase in GDP per capita (0.66 standard deviations) is associated with a summary index about 0.22 standard deviations higher. This means the magnitude of the effect of the number of administrative units *is equivalent to the effect of GDP per capita*. Strikingly, as the table makes clear, we find large positive and significant effects of the number of Administrative Units on each of

the outcomes that make up the index.

More so, consistent with our theoretical prediction, the negative significant coefficient for the quadratic term suggests suggests a 'sweet spot' that optimally balances between information and homogeneity on one hand, and capacity and capture on the other. Figure 1 plots the predicted level of services provisions as a function of the number of administrative units from the first model in Table 1. When the number of administrative units is very small (i.e., and each unit is very large), local governments do not enjoy informational and homogeneity advantages. By contrast, a very large number of administrative units entail a capacity loss and heightened likelihood of elite capture. The quadratic term though is somewhat noisier than the simple linear component, contributing to the wide confidence intervals in Figure 1 in the tail end of the distribution of the number of administrative units. This is likely due to the smaller number of cases that feature a more extreme form of administrative unit proliferation (see rug of the distribution).

The signs of the coefficients for the control variables increase our confidence in the reliability of our estimates. The quality of social services, as measured by our composite index, is increasing in a country's wealth (GDP per capita), decentralization and democracy levels and the size of its oil revenue; and decreasing in levels of internal conflict and geographic size.

Column 2 reports the estimates for the fixed effects 2SLS estimation, using the number of primary divisions in neighboring countries as the instrument. The 2SLS estimates confirm our initial finding. The coefficient is marginally smaller than in the standard fixed effects model, but remains positive and statistically significant below the 0.1% level. We replicate this finding across the sub-components of the summary index of services provision.

When we add our other two instruments, the length of small rivers and the land mass concentration, and switch to a *between effects* or standard pooled 2SLS estimator, we still find a positive linear and negative quadratic term, but statistical significance weakens. If we just include the linear term, the effect of the number of administrative units is again

statistically significant below the 5% and 1% level for the summary index and most of its subcomponents. The online appendix provides detailed regression results. Across models the Kleibergen-Paap rk LM statistic ranges from 4.19 in the fixed effects and 8.9 in the pooled model. Due to the larger number of instruments in the between effects and pooled model, we can also implement a test of the exogeneity assumption. The Sargen-Hansen statistic is 1.79, with an associated p-value of 0.77, i.e. we fail to reject the null hypothesis of exogeneity for this set of instruments, providing some additional credibility.

Table 1: Non-linear Fixed Effects and Instrumental Variable Models (country-years, imputed)

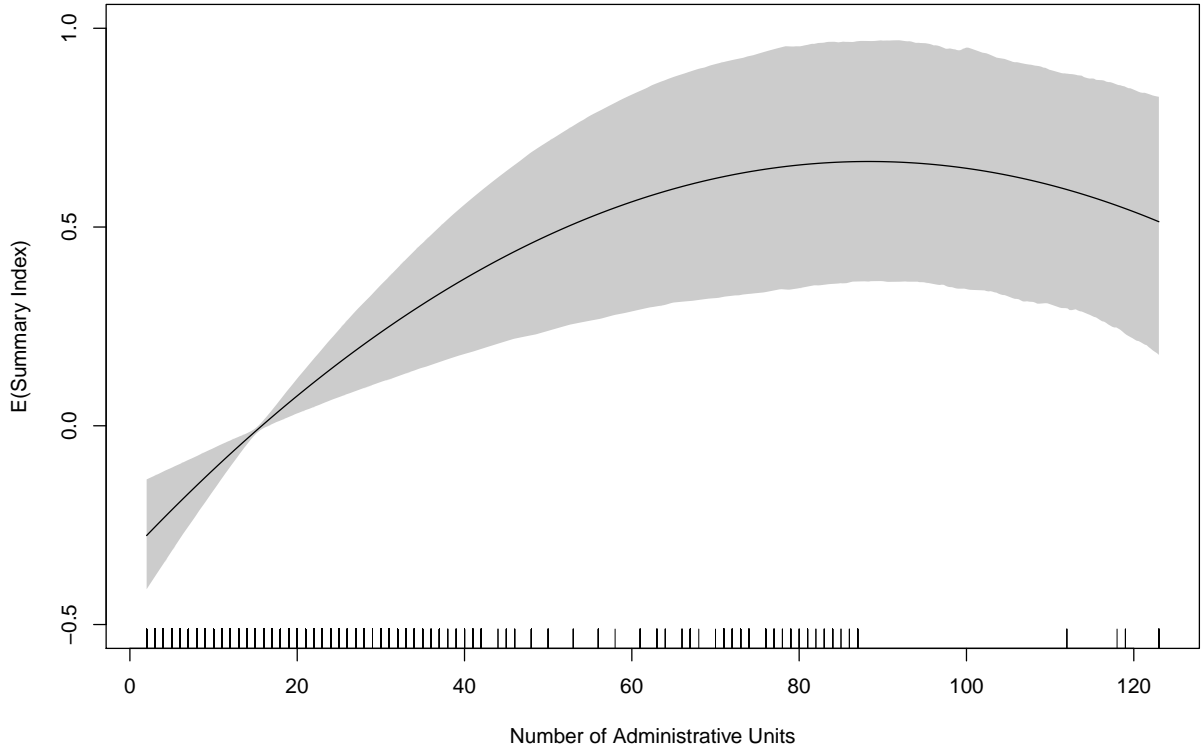|	Summary index		Life Expectancy		Infant Mortality		Primary Completion		Primary Enrollment	
	FEs	IV	FEs	IV	FEs	IV	FEs	IV	FEs	IV
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
N. Administrative Units	0.023**	0.021**	0.223**	0.244**	2.590***	2.794***	0.736**	0.660*	0.591*	0.417
	(0.007)	(0.008)	(0.085)	(0.090)	(0.694)	(0.754)	(0.230)	(0.276)	(0.269)	(0.299)
N. Administrative Units Squared	-0.000*	-0.000+	-0.001*	-0.001+	-0.016**	-0.018**	-0.004*	-0.004	-0.003	-0.003
	(0.000)	(0.000)	(0.001)	(0.001)	(0.005)	(0.007)	(0.002)	(0.002)	(0.002)	(0.003)
log(Area)	-0.179***	-0.181***	-1.802***	-1.792***	-13.800***	-13.775***	-5.113***	-5.131***	-6.039***	-6.125***
	(0.025)	(0.016)	(0.294)	(0.173)	(2.670)	(1.487)	(0.869)	(0.664)	(0.935)	(0.686)
log(Population)	0.343***	0.348***	4.226***	4.191***	35.775***	35.591***	9.917***	10.021***	9.286***	9.606***
	(0.043)	(0.020)	(0.475)	(0.205)	(4.149)	(1.770)	(1.275)	(0.760)	(1.509)	(0.799)
log(GDP pc)	0.316***	0.319***	4.653***	4.626***	33.933***	33.858***	12.826***	12.892***	5.104*	5.354***
	(0.043)	(0.019)	(0.471)	(0.186)	(3.908)	(1.677)	(1.354)	(0.621)	(1.656)	(0.954)
Internal Conflict	-0.019	-0.017	-0.072	-0.083	3.695*	3.674***	-2.498***	-2.464***	-0.272	-0.156
	(0.018)	(0.014)	(0.177)	(0.112)	(1.467)	(0.938)	(0.641)	(0.495)	(0.724)	(0.586)
Decentralization	0.277	0.274*	-0.367	-0.339	-5.419	-5.231	5.282	5.233	17.990*	17.812**
	(0.180)	(0.136)	(1.872)	(1.038)	(13.295)	(9.394)	(5.175)	(4.461)	(7.586)	(5.725)
Polity 2	0.026***	0.026***	0.255***	0.254***	2.578***	2.573***	0.873***	0.874***	0.683***	0.688***
	(0.004)	(0.002)	(0.039)	(0.014)	(0.341)	(0.132)	(0.122)	(0.069)	(0.152)	(0.071)
log(Oil Value pc)	0.061***	0.061***	0.236+	0.233***	2.512*	2.473***	1.850***	1.858***	2.590***	2.607***
	(0.011)	(0.006)	(0.120)	(0.066)	(1.009)	(0.586)	(0.338)	(0.219)	(0.488)	(0.285)
Constant	-6.013***	-6.058***	-24.472**	-24.173***	-806.097***	-805.398***	-136.483***	-137.339***	-32.987	-36.095***
	(0.654)	(0.353)	(7.511)	(3.368)	(62.661)	(31.202)	(19.535)	(12.272)	(23.657)	(13.900)
Observations	5972	5972	5972	5972	5972	5972	5972	5972	5972	5972

Figure 1: Simulated Effect of the Number of Administrative Units on the Summary Index. Includes a Rug of the Real Data Distribution.

5.1 Robustness Checks

To ascertain the strength of our finding we implement a series of robustness checks. We estimate our basic imputed models with (a) alternative measures for decentralization (from the World Bank's Database of Political Institutions)[17], (b) additional control variables such as the amount of foreign aid per capita, and (c) using an extended summary index of services provision. These estimates, which can be found in tabular form in the online appendix, substantiate our main results reported above. We also add year effects to our models in Table 1, which weakens the statistical significance of our findings, but does not change the

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[17]Specifically the indicator that measures the existence of elections at the state-level.

signs of our coefficients. In addition, we replicate our estimation of all the models reported in Table 1 using the non-imputed data with substantively identical findings. Using non-imputed data also strengthens the statistical significance of our findings in the between effects and pooled instrumental variable models and recovers highly statistically significant results for the fixed effects models with additional year effects. The Online Appendix provides detailed regression results.

To further probe the robustness of our findings we implemented a sensitivity analysis, following suggestions by Bellows & Miguel (2009) and Nunn & Wantchekon (2011). While the fixed effects models control for any unobserved, time-invariant confounding variables, it is still possible that there exist other unobserved, time-varying variables that correlate both with the number of administrative units and the quality of services provision. To estimate the size of the theoretical bias we compare our estimates for the effect of the number of administrative units across different sets of 'sparse' regression models. This allows us to derive an estimate of how large the bias through unobservables would have to be to completely explain our findings. We find that the bias through selection on unobservables would have to be on average as large as the selection on observables. This lies right at the suggested threshold of 100% of the variation and indicates that our finding is unlikely to be completely spurious (see online appendix for more details).

5.2 Testable Implications

To further strengthen our confidence in our findings, we next turn to examine some additional observable implications of our argument. First, in our theoretical discussion we explicitly argued that the potential benefits of smaller territorial units should accrue independently of a country's level of decentralization. If our argument is correct, there should be little difference between countries exhibiting low and high levels of decentralization for the effects of the number of administrative units, our main input variable. Table 2 reports the estimates of our standard set of models that also includes an interaction term between

the decentralization measure and the number of administrative units.[18] Across the different outcome measures and the fixed effects and IV models, the number of administrative units remains positive and statistically significant below the 5-0.1% level. The interaction term between the number of administrative units and the decentralization measure is never close to reaching statistical significance. In essence, we are unable to statistically distinguish the effect of our main variable between more centralized and more decentralized countries.

In our theoretical discussion we outlined the importance of two mechanisms—the availability of information and increased homogeneity in smaller administrative units. Both mechanisms suggest additional observable implications. First, if the informational channel were operating, we would expect that countries with higher levels of available information and transparency will benefit less from the proliferation of administrative units. In short, improved information in the hands of both citizens and local governments, due to a reduction in the size of administrative units, is more valuable the fewer alternative information dissemination channels exist. Past research has shown that democracies enjoy higher levels of media freedom and transparency, improving overall accountability and government performance (Besley & Burgess, 2002; Hollyer *et al.*, 2011; Egorov *et al.*, 2009; Snyder & Strömberg, 2010). Hence, in democracies the effect of administrative unit proliferation should be muted in comparison to non-democracies.

Table 3 shows evidence to that effect. To facilitate the interpretation of the interaction effect, we use the threshold of six on the Polity 2 scale to identify democratic regimes. In non-democratic systems the effect of the number of administrative units is large, positive and statistically significant. The effect of the democracy variable itself is positive, although hard to interpret directly, since no countries in the sample feature zero administrative divisions. Importantly, the interaction effect is negative and statistically significant. The magnitude of the interaction term implies that in democracies the effect of the number of administrative units is still positive (and statistically significant), but smaller than in non-democracies. The difference between the two scenarios itself also being statistically

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[18]For simplicity we only include the linear term of the number of administrative units.

significant. This finding is consistent with the informational mechanism.

Table 2: Interaction with decentralization (country-years, imputed)

	Summary index		Life Expectancy		Infant Mortality		Primary Completion		Primary Enrollment	
	FEs	IV	FEs	IV	FEs	IV	FEs	IV	FEs	IV
N. Administrative Units	0.011***	0.008***	0.099*	0.107***	1.056**	0.982***	0.317***	0.256***	0.320*	0.146*
	(0.003)	(0.002)	(0.047)	(0.018)	(0.356)	(0.144)	(0.102)	(0.063)	(0.133)	(0.072)
Decentralization	0.243	0.057	-1.807	-4.846^{+}	-7.599	-24.181	2.508	2.157	18.970^{+}	10.367
	(0.263)	(0.292)	(3.190)	(2.825)	(22.151)	(24.129)	(7.360)	(10.729)	(10.593)	(12.413)
Admin Units× Decentralization	0.002	0.016	0.107	0.345	0.099	1.390	0.198	0.224	-0.089	0.569
	(0.013)	(0.026)	(0.157)	(0.229)	(1.172)	(1.952)	(0.408)	(0.966)	(0.561)	(1.051)
log(Area)	-0.179***	-0.181***	-1.800***	-1.798***	-13.792***	-13.858***	-5.107***	-5.147***	-6.033***	-6.131***
	(0.026)	(0.016)	(0.299)	(0.172)	(2.738)	(1.500)	(0.878)	(0.668)	(0.935)	(0.685)
log(Population)	0.354***	0.359***	4.323***	4.298***	37.027***	37.127***	10.250***	10.368***	9.508***	9.818***
	(0.042)	(0.019)	(0.468)	(0.191)	(4.087)	(1.658)	(1.275)	(0.742)	(1.495)	(0.798)
log(GDP pc)	0.318***	0.322***	4.673***	4.657***	34.191***	34.290***	12.894***	12.987***	5.147***	5.411***
	(0.043)	(0.020)	(0.472)	(0.184)	(3.910)	(1.672)	(1.354)	(0.634)	(1.653)	(0.982)
Internal Conflict	-0.018	-0.016	-0.065	-0.065	3.756*	3.838***	-2.477***	-2.430***	-0.261	-0.121
	(0.018)	(0.015)	(0.173)	(0.113)	(1.449)	(0.953)	(0.648)	(0.516)	(0.727)	(0.597)
Polity 2	0.026***	0.026***	0.257***	0.257***	2.608***	2.608***	0.881***	0.882***	0.688***	0.693***
	(0.004)	(0.002)	(0.039)	(0.014)	(0.344)	(0.130)	(0.123)	(0.070)	(0.153)	(0.071)
log(Oil Value pc)	0.063***	0.063***	0.254*	0.246***	2.776**	2.744***	1.917***	1.921***	2.641***	2.638***
	(0.011)	(0.006)	(0.120)	(0.067)	(0.986)	(0.581)	(0.337)	(0.221)	(0.484)	(0.272)
Constant	-6.044***	-6.091***	-24.747**	-24.423***	-809.998***	-810.437***	-137.464***	-138.533***	-33.729	-36.635*
	(0.654)	(0.365)	(7.596)	(3.376)	(63.488)	(31.696)	(19.584)	(12.721)	(23.558)	(14.370)
Observations	5972	5972	5972	5972	5972	5972	5972	5972	5972	5972

Table 3: FEs and IV Models with democracy interaction (country-years, imputed)

	Summary index		Life Expectancy		Infant Mortality		Primary Completion		Primary Enrollment	
	FEs	IV	FEs	IV	FEs	IV	FEs	IV	FEs	IV
N. Administrative Units	0.013***	0.019***	0.116*	0.163***	1.288**	1.638***	0.385**	0.610***	0.416**	0.565***
	(0.003)	(0.003)	(0.054)	(0.028)	(0.405)	(0.234)	(0.117)	(0.088)	(0.136)	(0.114)
Democracy	0.345***	0.566***	3.236***	4.228***	31.125***	41.429***	11.162***	18.891***	9.967***	18.454***
	(0.068)	(0.065)	(0.770)	(0.585)	(6.487)	(5.007)	(2.187)	(2.644)	(2.488)	(2.667)
Admin Units× democracy	-0.004*	-0.017***	-0.022	-0.080*	-0.368$^+$	-0.967***	-0.099	-0.548***	-0.174*	-0.667***
	(0.002)	(0.003)	(0.025)	(0.034)	(0.201)	(0.281)	(0.068)	(0.135)	(0.075)	(0.143)
log(Area)	-0.200***	-0.203***	-1.993***	-1.989***	-16.010***	-16.060***	-5.789***	-5.845***	-6.608***	-6.723***
	(0.027)	(0.016)	(0.304)	(0.171)	(2.852)	(1.489)	(0.946)	(0.727)	(0.965)	(0.687)
log(Population)	0.384***	0.378***	4.612***	4.540***	40.336***	39.867***	11.256***	10.969***	10.285***	10.170***
	(0.044)	(0.021)	(0.483)	(0.210)	(4.321)	(1.886)	(1.313)	(0.805)	(1.563)	(0.860)
log(GDP pc)	0.341***	0.348***	4.866***	4.857***	36.814***	36.967***	13.610***	13.780***	5.814***	6.159***
	(0.044)	(0.021)	(0.487)	(0.188)	(4.171)	(1.754)	(1.425)	(0.650)	(1.641)	(1.015)
Internal Conflict	-0.012	-0.011	0.002	-0.011	4.392**	4.355***	-2.247***	-2.244***	-0.080	-0.009
	(0.018)	(0.014)	(0.178)	(0.113)	(1.523)	(0.952)	(0.660)	(0.509)	(0.728)	(0.580)
Decentralization	0.247	0.208	-0.692	-0.842	-7.431	-9.120	4.238	2.924	17.117*	15.559**
	(0.188)	(0.140)	(1.982)	(1.046)	(14.132)	(9.776)	(5.393)	(4.606)	(7.756)	(5.844)
log(Oil Value pc)	0.057***	0.058***	0.201	0.204**	2.118*	2.161***	1.726***	1.763***	2.481***	2.531***
	(0.011)	(0.007)	(0.123)	(0.069)	(1.037)	(0.633)	(0.343)	(0.225)	(0.481)	(0.289)
Constant	-6.581***	-6.598***	-29.659***	-29.274***	-867.253***	-866.167***	-154.716***	-154.554***	-47.989*	-49.870***
	(0.670)	(0.382)	(7.885)	(3.723)	(67.327)	(35.422)	(19.830)	(12.777)	(23.469)	(14.688)
Observations	5972	5972	5972	5972	5972	5972	5972	5972	5972	5972

Our last robustness check utilizes a similar observable implication of our second theoretical mechanism. One purported benefit of unit proliferation is the increase in the homogeneity of the local population. Countries with very low levels of ethnic fractionalization have little to gain from smaller administrative units. Conversely, the effects of splitting administrative units should be largest in societies with numerous ethnic divisions. This leads us to expect that an interaction between the number of administrative units and a measure of ethnic fractionalization should be positive. We use the ethno-linguistic fractionalization index by Alesina *et al.* (2003) to test this hypothesis. For simplicity, we transform the ELF index into a dummy variable that takes the value one for countries above the median of the ELF distribution. Since the ELF index is time-invariant, we cannot include country-fixed effects in our models. Hence, Table 4 reports estimates from our between effects and pooled instrumental variables models. Across the different outcome measures we always estimate a positive coefficient for the number of administrative units (except for primary enrollment). Likewise, the ELF indicator is, as expected, always negative. As predicted by our argument the interaction term is positive for all models. Although the sings of the coefficients are as expected, most coefficients do not attain statistical significance. This might be due to the coarse and time-invariant information on ethnic compositions or because the informational channel is far more important than any gains from increased homogeneity.

Table 4: FEs and IV Models with ethnic fractionalization interaction (country-years, imputed)

	Summary index		Life Expectancy		Infant Mortality		Primary Completion		Primary Enrollment	
	BE	BE	BE	BE	BE	Pooled	Pooled	Pooled	Pooled	Pooled
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
N. Administrative Units	0.018	0.312*	2.593*	1.217*	-0.198	0.018$^+$	0.257$^+$	2.043	1.020*	0.036
	(0.011)	(0.149)	(1.258)	(0.486)	(0.352)	(0.010)	(0.153)	(1.236)	(0.438)	(0.230)
ELF-High	-0.412	-3.108	-33.637	-9.126	-15.990$^+$	-0.208	-2.473	-21.005	-1.814	-8.673
	(0.268)	(3.523)	(29.840)	(11.483)	(8.319)	(0.281)	(3.863)	(30.777)	(10.925)	(7.664)
N. Administrative Units × ELF-High	0.009	0.024	0.652	0.159	0.403	0.000	0.002	0.169	-0.117	0.078
	(0.014)	(0.178)	(1.509)	(0.580)	(0.420)	(0.014)	(0.207)	(1.626)	(0.610)	(0.337)
log(Area)	-0.062	-1.144*	-4.481	-2.301	-1.373	-0.121***	-1.557***	-10.197**	-4.008***	-3.285**
	(0.042)	(0.558)	(4.716)	(1.821)	(1.309)	(0.032)	(0.410)	(3.272)	(1.151)	(1.038)
log(Population)	0.018	1.183	-1.023	-0.636	1.202	0.060	1.271*	4.306	0.702	2.370$^+$
	(0.060)	(0.793)	(6.673)	(2.582)	(1.866)	(0.044)	(0.579)	(4.850)	(1.691)	(1.272)
log(GDP pc)	0.363***	6.205***	38.094***	10.656*	8.332**	0.380***	6.198***	39.796***	12.665***	7.915***
	(0.099)	(1.300)	(10.973)	(4.242)	(3.053)	(0.055)	(0.747)	(5.841)	(1.973)	(1.768)
Internal Conflict	-0.395**	-5.902**	-32.326*	-20.469***	-5.113	-0.092**	-1.314**	-2.806	-5.903***	-1.285
	(0.136)	(1.796)	(15.162)	(5.826)	(4.206)	(0.033)	(0.412)	(3.377)	(1.292)	(1.104)
Decentralization	0.632	2.654	38.589	14.989	27.569$^+$	0.555***	2.392	25.308	12.951*	25.810***
	(0.491)	(6.511)	(55.012)	(21.024)	(15.288)	(0.107)	(1.622)	(16.471)	(5.966)	(4.957)
log(Oil Value pc)	0.047	-0.173	-1.189	1.873	2.506*	0.067***	0.166	1.819	2.161***	3.002***
	(0.034)	(0.447)	(3.780)	(1.442)	(1.057)	(0.017)	(0.243)	(1.831)	(0.593)	(0.639)
Polity 2	0.008	-0.054	-0.074	0.074	0.611	0.023***	0.187***	2.112***	0.738***	0.716***
	(0.013)	(0.179)	(1.509)	(0.577)	(0.415)	(0.005)	(0.069)	(0.537)	(0.176)	(0.164)
Constant	-2.059	10.215	-321.728*	26.740	35.595	-2.604***	7.981	-387.575***	-7.317	32.378
	(1.283)	(16.835)	(141.927)	(55.025)	(39.669)	(0.728)	(10.035)	(81.956)	(28.766)	(21.376)
Observations	5552	5552	5552	5552	5552	5552	5552	5552	5552	5552

In total, across a number of model specifications, varying outcome measures, using standard fixed effects or fixed effects instrumental variable models we find uniform evidence for an effect of the number of administrative units on the quality of services provision. The evidence is strongest for the initial, positive effect. Our models also generally support the inverted U-shaped hypothesis, but due to data limitations, the downward sloping part of the inverted U is estimated less precisely. Further investigation of the underlying mechanisms suggests that informational channels are most important in explaining the positive effects of unit proliferation. Despite these findings, some concerns remain. Most importantly, there remain important measurement concerns. We are only able to use the number of primary administrative divisions to capture the territorial-administrative organization of the state. It might the case though that important responsibilities for service delivery are located the secondary or even tertiary level of administrative divisions. For example, while Indonesian provinces fulfill some administrative and coordinative functions, the bulk of service delivery in the health and education sector takes place at the lower, district level. Relatedly, in some countries health or education services might be delivered under the purview of a national bureaucracy, that does use local offices for implementation, but whose organization do not necessarily correspond to the wider territorial structure of the country. Both scenarios induce measurement bias in our analysis. Short of detailed additional analysis and coding on a country-by-country basis, there is little we can do at our level of analysis to address these concerns sufficiently. Importantly though, it is hard to imagine while any remaining measurement bias would induce an inverted-U shaped relationship between the number of primary units and the quality of service delivery. Furthermore, our sensitivity analysis for the fixed effects models suggests that any remaining bias through unobservables would have to be extremely large to explain our findings. More detailed analyses of the effects of administrative unit proliferation for specific countries will hopefully address these concerns in future research.

6   Conclusion

Countries differ dramatically in their administrative-territorial make-up. Whereas some countries such as Senegal or Ghana are divided into a small number of primary administrative units, other countries such as Uganda, Kenya and Indonesia have explicitly adopted a policy of administrative unit proliferation. A handful of recent studies have pointed to the importance of this phenomena, albeit limiting their theoretical and empirical analysis to an examination of the *determinants* of administrative unit proliferation. This study breaks new grounds by offering a first test of the *consequences of such policy*. Specifically this paper examines the effect of the number of primary administrative units on a country's quality of service delivery.

We argue that smaller administrative units support the provision of social services provision via two main channels: improved information and increased homogeneity. In smaller units citizens, local politicians and bureaucrats alike have access to better information. This allows citizens to better monitor and pressure elected officials or administrators, while government representatives in turn can more precisely tailor social services to local conditions and needs. Smaller units are also usually more homogeneous in terms of their ethnic composition. A more homogeneous population is more likely to share preferences over public goods and services, as well as be able to sanction defectors more easily, all improving the efficiency of public goods provision. On the other hand, as units decrease in size, they may lose administrative capacity, human capital resources and ability to exploit economies of scale. Together with an increased danger of capture by local elites, such factors represent a countervailing force to the positive effects of administrative unit proliferation. Taken together, we hypothesized that there exists an institutional 'sweet spot' in the size of administrative units that balances both the advantages and disadvantages, generating an inverted U-shaped relationship between the number of administrative units and the quality of services provision.

We test this proposition with new data on the number of primary administrative di-

visions in all developing countries from 1960 to 2012. Using both fixed effects models and two different sets of instrumental variable models (time-varying and time-invariant instruments), we find clear and robust evidence for our main hypothesis. We find that the number of administrative units exerts a positive effect on the quality of services provision, but only up to a certain (optimal) point. At high levels of administrative fractionalization, the effect of adding administrative units turns negative, lowering the quality of services provision. We further substantiate the underlying mechanisms by showing evidence of a reduced effect of unit proliferation in democratic regimes, indicating that the information channel is likely to be the prime driver of our finding.

This paper makes an important conceptual and empirical contribution to the study of decentralization and political institutions more generally. Existing studies on decentralization have not considered the implications of changes in territorial structures that are often taking place amidst decentralization reforms. This omission may explain some of the conflicting findings of studies examining the effects of decentralization on social and economic outcomes. A key avenue for future research is to examine the robustness of findings of past studies that have tested the effects of decentralization reforms to the inclusion of the number of administrative units.

Our findings also pose new research questions related to issues of patronage politics and regime stability. The emerging literature on administrative unit proliferation sees such institutional reforms, at least partially, caused by patronage politics and the desire by rulers to prolong their time in office (Grossman & Lewis, 2014; Green, 2010). If that is the case, we may observe increased regime stability and incumbent survival in the wake of administrative unit proliferation. Future research will have to unpack these different effects and further engage the dynamics of administrative reforms at the sub-national level.

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