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Government Fragmentation, Administrative Capacity, and Public Goods: The Negative Consequences of Reform in Burkina Faso

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Abstract

Although countries throughout the developing world continue to increase their number of subnational administrative units, the consequences of administrative unit creation remain poorly understood. This paper argues that newly created administrative units face relative difficulty generating resources and staffing a full and competent bureaucracy, and as a result, are less capable of providing public goods to their constituencies. These challenges to administrative capacity are less consequential within mother units that were carved apart to create new splinter units and are entirely absent in nonsplitting units. Proxying the local provision of public goods with a measure of nighttime light intensity in Burkina Faso, the findings indicate that the public goods provision in newly created splinter provinces dropped significantly relative to prefragmentation levels, while other administrative units remained largely unaffected.

Keywords

government fragmentation, decentralization, public goods, Africa

Introduction

The international development community has long viewed decentralized governance as crucial for an effective provision of public goods and services. The World Bank went as far as to designate decentralization as one of only a few development priorities in the twenty-first century (Yusuf et al. 1999). It is therefore unsurprising that donors have recommended this type of reform across several highly centralized countries throughout the developing world (Bardhan and Mookherjee 2006). In recent decades, many developing countries have also experimented with drastic increases in their number of subnational administrative units. This process—known as *government fragmentation* or *administrative unit proliferation*—is often implemented in conjunction with broader decentralization reforms under the guise of bringing government "closer to the people."[1] However, as argued by Resnick (2017, 48), ". . . progress on decentralization is sometimes solely equated with the number of subnational governments rather than how well those new sub-units actually function."

Although donor commitment to decentralization stems from a motivation to improve the provision of public goods within developing countries, I argue that a tendency of reforming governments to respond with administrative unit proliferation has consequences in opposition to the ostensible purpose of decentralization. In short, newly created subnational units lack sufficient *administrative capacity* to deliver public goods to their constituents. Drawing on recent work on state/organizational capacity (Centeno, Kohli, and Yashar 2017) and administrative unit proliferation (Grossman and Lewis 2014; Lewis 2014), I conceptualize administrative capacity as a function of access to resources from local taxation and central government transfers, and the quantity and quality of local bureaucracy. Localities within administrative units that are not affected by fragmentation are better able to both tax their citizens and bargain for transfers from the center, while also holding over their bureaucratic experience and staff from the prefragmentation period. Mother units—those carved to provide territory for the newly created splinter units—have similar bureaucratic experience and ability to tax, though their bargaining position in the competition for centrally distributed resources is diminished

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by their shrunken territory. The newly created splinter units, however, are placed in the most limited position to derive resources and face severe bureaucratic constraints.

The argument in this paper implies a puzzling result: the commitment of the donor community to decentralization may spur developing countries to create administrative units too weak to effectively provide public goods. Thus, though donors may be motivated by developmental goals when pushing decentralization, governments that respond with premature administrative unit creation likely face consequences antithetical to development.

In an era in which fragmentation is commonplace in the developing world, understanding how administrative capacity mediates the effectiveness of the provision of public goods is of clear importance. However, absent experimentally assigning communities to different fragmentation types, it is very difficult to tease out the effects of fragmentation on the public goods provision absent confounding factors. This paper offers a second-best alternative research design to this experimental ideal by presenting evidence from the substantial increase in provinces in Burkina Faso, a case that has received very limited attention in the study of the politics of development in Africa (Briggs 2017). I compile data on the local provision of public goods—proxied by a measure of nighttime light intensity—within departments, the administrative unit that falls just below the province. Because departments remain fixed before and after provincial fragmentation, I am able to compare patterns of the public goods provision over time within departments under different provincial configurations, implying that changes in public goods outcomes can be attributed to falling into an alternative provincial state. Difference-in-differences estimates strongly suggest that departments within the entirely new splinter provinces are significantly worse-off relative to those within nonsplitting provinces than they were prior to splitting. Departments within mother provinces, however, appear only slightly worse-off than nonsplitters. Communities within splinter provinces appear to experience a worse public goods provision from fragmentation across different specifications of the postfragmentation period, an effect that is unrelated to endogenous selection into fragmentation types.

This paper is one of only a few studies to rigorously estimate the effects of fragmentation on the provision of public goods (see Asher and Novosad 2015; Grossman, Pierskalla, and Dean 2017), and, to my knowledge, constitutes the first evidence of robust and negative distributional consequences. This evidence therefore also contributes to the broader literature on the limitations of political and economic reform in sub-Saharan Africa (e.g., van de Walle 2001) and the literature on the limitations of administrative unit creation specifically, which has to date noted that fragmentation may be exploited for political reasons and may lead to recentralization (see Green 2010; Grossman and Lewis 2014; Lewis 2014; Malesky 2009, among others), but has yet to show the negative consequences for the provision of public goods. Although existing perspectives have noted the potential for distributional effects from an altered political landscape (Grossman, Pierskalla, and Dean 2017), I propose an alternative theoretical framework that prioritizes the unique challenges of governance in the developing world that stem from limited administrative capacity. These challenges have been previously described in the context of decentralization in general (e.g., Bardhan 2002) and government fragmentation in particular (e.g., Lewis 2014), but have yet to be explicitly linked to the provision of public goods after reform.

Related Work

Contemporary work has primarily focused on explaining the implementation of government fragmentation, centering broadly on two categories of causes. Arguments within the first category view administrative unit creation as stemming from demands for political autonomy and improved access to state resources from below. In Indonesia, for example, Pierskalla (2016) shows that district splits were largely a function of demand for more ethnically homogeneous districts. Kimura (2010) argues that alliances in Indonesia formed across multiple territorial levels, creating coalitions demanding new districts and provinces. Similarly, the territorial structure of Nigeria was altered to better capture the distribution of ethnic groups (Akinyele 1996).

The second category of causes focuses on top–down mechanisms driving fragmentation, highlighting the political incentives of a survival-driven central government. For example, in Vietnam, new provinces were created to secure sufficient political support for previously untenable economic reforms (Malesky 2009). Resnick (2017) shows that incumbents in Ghana created additional units out of noncompetitive districts to secure a larger share of legislative seats in future elections. Evidence also suggests that central governments in some cases, including Nigeria (Kraxberger 2004) and Senegal (Resnick 2014), have used fragmentation as a "divide and rule" strategy to weaken the political opposition. An additional top–down explanation sees new units as a vehicle for maintaining and expanding patronage networks. According to this logic, the creation of a new administrative unit increases access to centrally distributed resources, spurs local construction projects necessary for a functioning regional government, and substantially increases the number of local government jobs. Green (2010) argues that President Museveni relied on district splitting to fuel patronage in Uganda as other

sources of patronage dried up. Hassan (2016) presents evidence suggesting that Kenyan leaders have exploited district creation as patronage as well, targeting unaligned ethnic minority groups. Hassan and Sheely (2017) argue that in the context of lower level administration unit proliferation, there is unlikely a direct neopatrimonial connection between the president and local actors because they are too administratively distant. Instead, a neopatrimonial chain links local administrators to legislators, and legislators to the executive.

Grossman and Lewis (2014) connect both bottom-up and top–down logics, arguing that fragmentation is best understood as a function of both local demands and political incentives from the vantage point of the central government. According to this reasoning, national elites are more likely to create additional subnational units when they need to secure the support of politically, economically, and/or ethnically marginalized regions. In Uganda, for example, district councils were able to express demand for a new district if a majority of councilors approved the separation of one or more counties. However, these demands were sent up as formal requests to the Ministry of Local Government and national parliament for approval (Grossman and Lewis, 2014, 203).

Although political scientists have been interested in why government fragmentation occurs, economic theorists have long viewed smaller governing units as positively related to economic performance. According to these classic perspectives, fragmentation's benefits may come from the information advantage possessed by local government regarding local preferences relative to the central government (e.g., Hayek 1945), the creation of interjurisdictional competition that allows citizens to "vote with their feet" if unsatisfied with their local government (e.g., Tiebout 1956), or the efficiency gains from appropriately assigning taxation and expenditure roles to different levels of government (e.g., Oates 1972). From this line of work, the most important constraint on the effectiveness of small administrative units is their lack of economies of scale in service provision (Oates 1985). Political theorists dating to classical Greece have also generally looked favorably upon small units because they may empower a more robust democratic polity, with citizens better able to hold locally elected officials accountable for government performance (see Faguet 2012, chap. 5 for a review).

Although the classic arguments regarding administrative unit creation seem mostly positive, the empirical consequences of fragmentation remain understudied. In a recent review, Pierskalla (2018, 24) argues that this lack of clarity is due in part to both "a disparate and small set of empirical studies" and a "dearth of strong research designs." Nevertheless, a limited set of recent work has shown the potential benefits of fragmentation. Using a border regression discontinuity design, Asher and Novosad (2015) find that villages in newly created states in India experienced improved nighttime light intensity and education outcomes. Grossman, Pierskalla, and Dean (2017) show that the provision of public goods depicts an inverted U-shaped relationship with a measure of government fragmentation at the country level. Using geocoded data from Nigeria, Malawi, and Uganda, the authors also find improved health care outcomes within fragmented regions. To Grossman, Pierskalla, and Dean (2017), these results are attributable to the influx of capable leaders within newly created units, increased competition between these leaders, and the incentives to target resources toward new regional governments which were previously underserved. However, these positive effects are tempered by excessive fragmentation, which reduces economies of scale in the public goods provision and increases the likelihood of local capture.

This paper intends to contribute to this line of research by making a theoretical departure motivated by the unique challenges faced by fragmenting governments in certain parts of the developing world, particularly in Africa. I argue that the most important factor influencing public goods outcomes after fragmentation stems from variation in *administrative capacity* across subnational governing units. In the conclusion, I conjecture as to what contexts administrative capacity most likely conditions the effects of fragmentation. The next section develops the mechanisms linking fragmentation to the challenges of administrative capacity and the public goods provision.

Fragmentation, Administrative Capacity, and Public Goods

Although factors like ethnic diversity (e.g., Easterly and Levine 1997; Habyarimana et al. 2007) and income inequality (e.g., Acemoglu and Robinson 2006) may condition social preferences for public goods and other development outcomes, society's preferences are unlikely translated into policy-outputs without a sufficiently able government. To Ziblatt (2008, 276), local governments must be "capable of implementing policy that might reflect social preferences." Thus, a local government's capacity to implement policy is a fundamental determinate of the provision of public goods.

The key contention of this paper is that government fragmentation restructures the distribution of administrative capacity across different types of subnational units, which in turn results in heterogeneous public goods outcomes. To make this claim clear, consider a stylized government fragmentation scenario in Figure 1. Prior to fragmentation, there are two units—*A* and *B*. Although subnational, these units are not the lowest level of government and may thus be thought of as provinces, states,

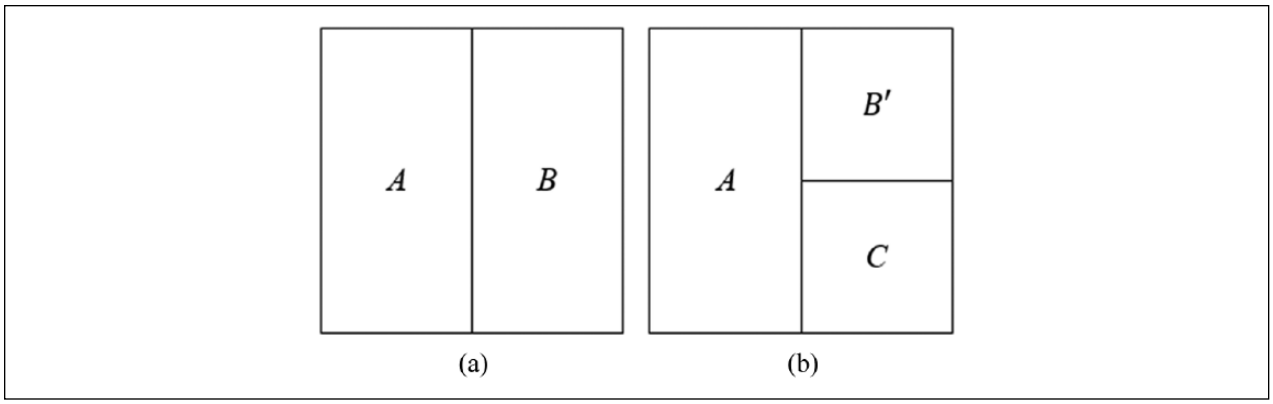

Figure 1. Hypothetical administrative unit fragmentation: (a) prefragmentation and (b) postfragmentation.
A = nonsplitting; B' = mother; C = splinter.

or districts that preside over lower level units like departments or counties. After fragmentation, unit A retains its territorial extent and is therefore denoted *nonsplitting*. Following the language in Grossman and Lewis (2014), unit B is fragmented into two units: the *mother* and the *splinter*. The mother—B'—retains some of its geography from the prefragmentation period, as well as the administrative capital. The excess territory is granted to the entirely new splinter unit C.

Administrative capacity in the context of government fragmentation is largely a function of two factors: (1) access to resources and (2) the quantity and quality of bureaucrats.[2] Centeno, Kohli, and Yashar (2017) describe the importance of these factors similarly, though in the context of "state" and "organizational" capacity more generally, rather than in the context of subnational administrative unit creation.[3] I argue that these factors can be mapped onto the fragmentation types in Figure 1 to show how administrative capacity likely varies across types from fragmentation and how this variation results in heterogeneous public goods outcomes. To provide public goods, administrative units must have access to sufficient *resources*. To build and maintain roads, for example, an administrative unit is minimally required to purchase materials and pay laborers. Access to resources, however, is not equal across fragmentation types. This inequality stems from the two ways in which units derive resources. First, units are often tasked with collecting local revenue. Yet, across much of Africa, taxation is known to be extremely difficult (Kasara 2007). As administrative units become more peripheral, this difficulty becomes even greater. As noted by Grossman and Lewis (2014), splinter units are often less developed and more rural than nonsplitting and mother units, implying that revenue collection will be especially difficult in splinter units. Thus, the relative local capacity to tax postfragmentation is $A = B' > C$.

To Falleti (2005, 329), ". . . the delegation of taxing authority to subnational units that lack the administrative capacity to collect new taxes can set serious constraints on local budgets and increase the dependence of local officials on transfers from the center." Splinters therefore perhaps turn toward a second source of resources—those distributed from the central government—to fund the provision of public goods. Yet, access to centrally distributed resources is often the product of intragovernmental bargaining between subnational units, the structure of which is altered from fragmentation's necessary change in territorial control. Grossman and Lewis (2014, 202) argue that the bargaining leverage of any given administrative unit varies as a function of two factors. First, access to centrally distributed resources increases with territorial size. In other words, larger units are in a privileged position relative to smaller units to derive central funds.[4] Second, as the total number of subnational units increases, the sum bargaining power of all subnational units falls relative to the central government because coordination becomes more difficult. As described by Lewis (2014, 575), "the leverage of the many newly split localities will be diminished relative to their former bargaining power as a larger, single unit."

Prior to fragmentation, the bargaining position and therefore access to centrally distributed resources is $A = B$. Postfragmentation, the mother unit B' loses some of its territorial extent, while A remains fully intact. Furthermore, the splinter unit C would have to coordinate with the mother unit B' to retain the same level of bargaining power as in the prefragmentation period under the unified unit B. Ranking access to centrally distributed resources after fragmentation thus implies that $A > B' = C$.

Administrative capacity also varies as a function of the quantity and quality of the civil service and bureaucrats within each unit. Unlike nonsplitting and mother units, which both retain not only the capital city but also staff

from the prefragmentation period, splinters must organize and staff entirely new regional governments.[5] Bardhan (2002, 189) aptly describes this issue in the context of decentralization in developing countries,

> . . . where the quality of staff in local bureaucracies—including basic tasks like accounting and record keeping—is very low. Even their more professional and technical people suffer from the disadvantages of isolation, poor training and low interaction with other professionals.

Bardhan (2002, 190) notes further that this relative bureaucratic weakness likely manifests most drastically in the provision of public goods and services that require "sophisticated expertise," like ". . . power production and transmission, bulk supply of clean water, and public sanitation."

Existing work on fragmentation in Uganda has shown the validity of these concerns, with new administrative units both severely understaffed and lacking the technical expertise necessary to fill bureaucratic duties (Lewis 2014). According to Nsamba (2009), of the total positions within the newly created Ugandan districts in 2006, only 9 percent of positions were filled. Comparing the quantity and quality of the civil service and bureaucracy across postfragmentation types, splinter units significantly disadvantaged relative to their nonsplitting and mother counterparts, both of which retain their prefragmentation staff and expertise. This implies that $A = B' > C$ when considering relative bureaucratic capacity postfragmentation.

Empirical Expectations

This paper has argued that the provision of public goods will vary after government fragmentation because administrative capacity across nonsplitters, mothers, and splinters will be significantly heterogeneous. Splinter units are in the most limited position to tax relative to nonsplitters and mothers. At the same time, both splinters and mothers are in a weakened bargaining position to access centrally distributed resources. When considering the influence of resources on administrative capacity, the relative ranking across fragmentation types is $A > B' > C$. Factoring in variation in bureaucratic capacity reinforces this ranking, with nonsplitters and mothers both better equipped than splinters, implying that the total ranking across fragmentation in terms of relative administrative capacity is $A > B' > C$. Thus, if government fragmentation results in heterogeneous public goods outcomes across fragmentation types because of variation in administrative capacity, *we should expect splinter units to experience a lower provision of public goods relative to nonsplitting and mother units after fragmentation, while mother units will experience a lower provision of public goods relative only to nonsplitting units after fragmentation*.

Fragmentation in Burkina Faso

This paper tests the validity of this argument by considering the effects of fragmentation in Burkina Faso. The political trajectory of Burkina mirrors that of several other African cases, gaining independence from the French in 1960, followed by years of instability and autocratic rule. Control of the state was seized by Blaise Compaoré in 1987 and he remained in power until being removed following a popular uprising in 2014, an era that spans the temporal scope of this paper. Like most former French colonies in the region, political power was highly centralized until reforms were pushed by the World Bank and the International Monetary Fund (IMF) as part of structural adjustment programs in the 1990s (Englebert and Sangaré 2014). There is little evidence suggesting that local demands for administrative unit creation spurred fragmentation, as in Indonesia (Pierskalla 2016). In fact, the World Bank (2002, 10) found that decisions regarding administrative unit creation were generally ad hoc, while a United States Agency for International Development (USAID) commissioned assessment claimed that Burkina undertook reform "Plainly, because donors wanted it" (Englebert and Sangaré 2010, 17). Fragmentation in Burkina therefore appears to have been undertaken to show tangible evidence of decentralization reform.

The beginnings of the fragmentation period can be traced to the constitution adopted in 1991, which organized the country into local authorities (Article 143) subject to local democratic competition (Article 145). In 1993, a series of laws formally established the roles of subnational jurisdictions, though the territorial units had been in place for several years. *Provinces* are the intermediary unit between regions and departments. Served by a high commissioner appointed by the central government, provinces supervise the administration of governance within their borders (Dafflon and Madies 2013, chap. 2). The government fragmentation laws were passed in 1996, culminating in the addition of fifteen new provinces, an increase from the thirty prior (Englebert and Sangaré 2014).[6] Several *departments* sit within each province. Unlike provinces, departments are served by both an elected official—the mayor—as well as an appointed official—the prefect.[7]

Departments are legally responsible for the provision of public goods and services across nearly every sector, including the management of electricity infrastructure, public lighting, wells, school construction, public hygiene, and land titling, among many others (see Englebert and Sangaré 2010, 7–8, for additional responsibilities).

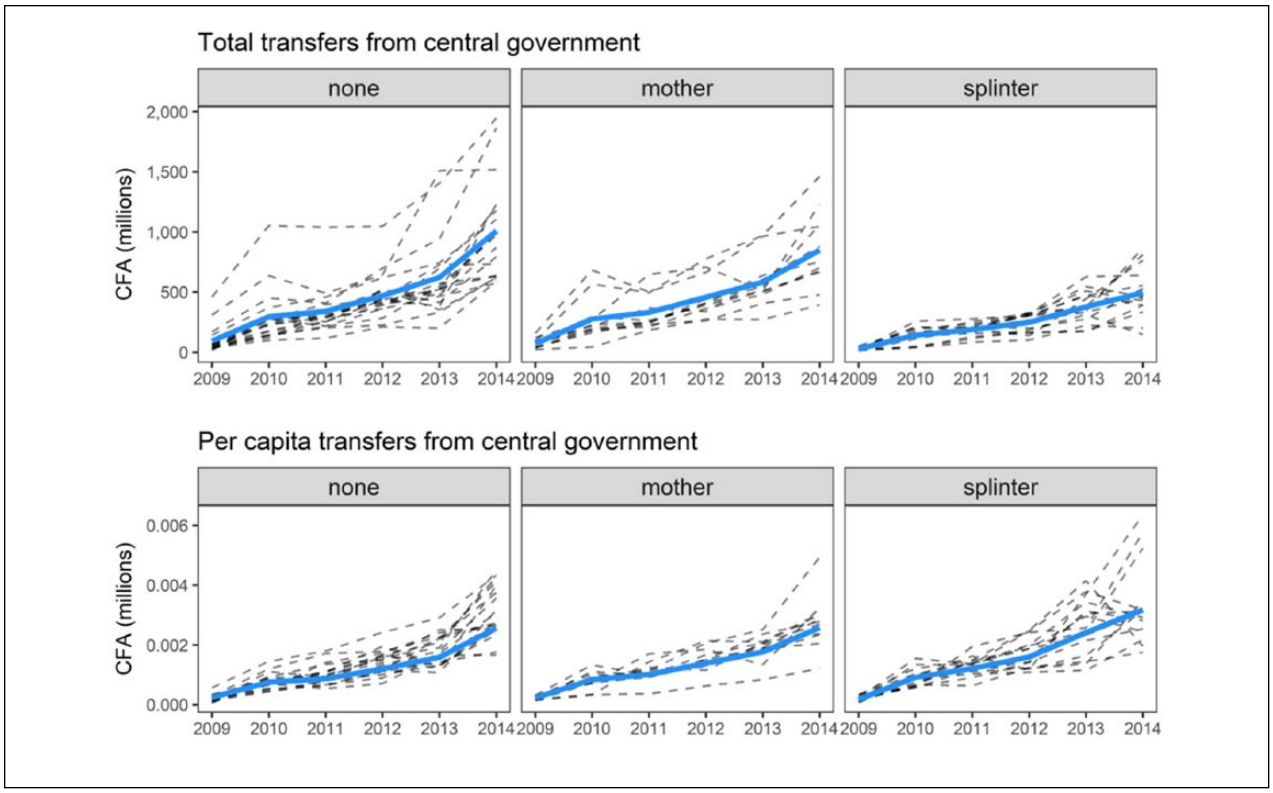

Figure 2. Access to centrally distributed resources, 2009–2014.
Dashed lines are for each individual department and solid lines denote mean within each fragmentation-type-year.

Departments adopt their own budgets to fulfill these responsibilities, though budgets are subject to approval by arms of the central government, including the Ministry of Decentralization and Territorial Control and the Ministry of Economy and Finance. Appointed authorities, including high commissioners at the provincial level, exercise substantial tutelage over departmental decision making, especially when these decisions involve transfers of financial resources from the central government (Englebert and Sangaré 2010).

Localities within splinter units are placed in a weakened bargaining position when attempting to access centrally distributed funds relative to nonsplitting units. Descriptive evidence of transfers in Burkina generally at least partially supports this proposition, with departments within splinter provision receiving the most limited amount of total assistance from the center. Figure 2 depicts each province's access to transfers from the central government between 2009 and 2014, grouped by fragmentation type. These data were obtained directly from Burkina's Ministry of Decentralization and Territorial Administration. Although the causal identification would require data for the years before and after fragmentation, this information is likely unobtainable. Analysts within the Ministry indicated that many documents were lost in the arson of multiple government buildings during the 2014 uprising. The same discussions implied that if not lost from arson, this information may not have been formally collected and maintained for the period of interest. However, a few tentative patterns appear in the available data. First, the total amount of funding transferred from the center has increased on average over time for all three fragmentation types. Second, nonsplitters and mothers have received a lion's share of gross funding, supporting the claim that splinters are in the most limited bargaining position to access centrally distributed resources. Third, on a per capita basis, the resource access becomes more equal across fragmentation types. This implies that population is an important conditioning factoring when considering access to central funds and that the bargaining mechanism may be most important when considering gross assistance.[8]

Englebert and Sangaré (2014) note a similar pattern in 2008 with funds slated specifically for decentralization. The forty-nine urban departments—most of which are in nonsplitting provinces—received 96 percent of external resources allocated specifically for decentralization (loans and grants from international institutions), while the 302 rural departments received only the leftover 4 percent.[9] Figure A2 in the online appendix provides

further evidence from province-level expenditures in 2003—the only year for which expenditures are available. Specifically, fourteen of the fifteen provinces with the lowest expenditures were fragmented, with the bottom nine being splinter provinces. Thus, though local governments were placed in the position of de jure responsibility for the provision of public goods, unequal access to resources suggests that the capacity to deliver these goods has likely been limited for departments within splinter provinces.

Prior to fragmentation, bureaucratic capacity was severely limited country-wide. According to Harsch (2017, chap. 5), as of 1987, for every one thousand Burkinabé citizens, there were only 3.5 civil servants, while in nearby Ghana, there were over twenty-two civil servants per one thousand citizens. After fragmentation, this weak bureaucracy was forced to stretch across a growing number of local governments. The World Bank, concluded in a review of Burkina's reform that local offices were upgraded to the provincial level, ". . . without their having the human resources and skills required to actually manage these new offices" (World Bank, 2002, 10). Limited bureaucratic capacity was stretched the thinnest in the splinter provinces, likely because they were already more rural than their nonsplitting and mother counterparts. To Englebert and Sangaré (2010, 15), a "lack of permanent salaried staff" has been a key cause of limited capacity at the local level in rural areas of the country. This relative bureaucratic weakness seems to have been well-known. The High Commissioner of the splinter province Kompienga in eastern Burkina directly echoed this sentiment, stating that ". . . we obviously didn't have as much to begin with, but they expect us to catch up on our own."[10] The problem is compounded by the fact that, according to Mahieu and Yilmaz (2010, 337), ". . . the small pool of qualified civil servants [in Burkina are] reluctant to accept positions outside the capital or major urban centers." Weak bureaucratic capacity in many rural local communities became such a problem that by 2006, the government adopted a decree to draw and retain quality staff to these units.[11] However, this decree appears to have been ineffective in achieving these goals (Mahieu and Yilmaz, 2010).

Research Design

The proposed theoretical framework implies that province fragmentation should have significantly heterogeneous effects on the provision of public goods across fragmentation types. This expectation poses two methodological challenges. First, the fragmenting units—*provinces*—are not comparable before and after fragmentation since the units do not remain geographically intact. Following Grossman and Lewis (2014), the unit of analysis is therefore scaled down to the *department*—one level below the province. Although each department remains fixed throughout the entire sample period, the fragmentation status of the provinces under which any given department lies may change.

Second, the theoretical expectations imply that by placing a department in a counterfactual fragmentation type—that is, a fragmentation type that differs from the department's observed type—the resulting public goods outcome would have differed. However, because of the fundamental problem of causal inference, it is impossible to simultaneously observe a single unit in multiple treatment states (Holland 1986). To get around this issue, I use a difference-in-differences approach, which compares differences in public goods trends in departments across nonsplitting, mother, and splinter provinces before and after fragmentation (Angrist and Pischke 2008). The parameters of interest are estimated using the following regression model:

$$Y_{dpt} = \gamma_d + \lambda_t + \delta\left(M_{pt} \cdot d_t\right) + \rho\left(S_{pt} \cdot d_t\right) + X'_{dpt-1}\beta + \varepsilon_{dpt},$$

where the variable S_{pt} takes the value of 1 in all department-years for departments in splinter provinces and 0 for nonsplitters and mothers, while M_{pt} is coded 1 only for mother provinces. The pretreatment and posttreatment periods are differentiated by d_t, coded 0 for all observations prior to fragmentation and 1 thereafter. The posttreatment period is modeled to begin in 1997, allowing for the fragmentation law passed in 1996 to plausibly influence the provision of public goods.

Department fixed effects are captured by γ_d, eliminating any time-invariant factors that may confound the effect of fragmentation reform on the public goods provision. This rules out many alternative explanations that do not vary throughout the sample period, several of which are worth briefly noting. First, Hodler and Raschky (2014) argue that regional inequality is partly a function of favoritism to the birth region of a state's leader. In this case, Compaoré remained in office throughout the entire sample period and therefore regional favoritism toward his birth region cannot explain any variation uncovered. Second, the distribution of ethnic groups remained constant, thus eliminating ethnic favoritism as an alternative explanation (Alesina, Michalopoulos, and Papaioannou 2016). Third, potentially important geographic factors like terrain and land-use are eliminated given their lack of variation over time (at least in the relatively short-run). Finally, though the structure of party systems might influence patterns and effects of decentralization (Riedl and Dickovick 2014), this factor also remained fixed with a single dominant party in power. Time fixed effects are denoted by λ_t, removing the effects of year-specific shocks that are common to all departments, like the country-wide

local elections in April of 2006. In additional specifications, a linear time trend is also included and interacted with the control variables described below.

Measuring Public Goods at the Local Level

This research design requires a measure of the public goods provision at the department level that spans the pre- and postfragmentation period. A first option may be to use the Demographic and Health Surveys (DHS), which provide geocoded responses to a battery of questions regarding health and education outcomes as well as access to public services. Grossman, Pierskalla, and Dean (2017) take this approach in their study of fragmentation's effect on child and infant mortality in Malawi, Nigeria, and Uganda. Although this data may be the ideal option, it cannot be appropriately used to study public good outcomes in Burkina at the department level. The DHS surveys are designed to be representative at two levels: (1) the country and (2) the "DHS region." In most countries—including Burkina—the DHS region corresponds roughly to the first administrative unit level. The DHS region in this context is therefore one level above the splitting units (provinces) and two levels above the unit of analysis (departments). Thus, while the geocoded DHS data provide specific coordinates referring to sampling clusters that appear usable at very granular levels of precision, these clusters were not designed to be used as such. The DHS even cautions against this type of use, stating that analyses below the DHS region may be "highly unreliable" and "are not representative of the population living at that exact place."[12]

With this constraint in mind, I propose the average nighttime light intensity as a reasonable proxy for the provision of public goods at the departmental level. *Lights* is processed by the NOAA's (National Oceanic and Atmospheric Administration) National Geophysical Data Center after collection by the U.S. Air Force Weather Agency (Hsu et al., 2015). The raw nighttime light intensity data come as a high-resolution spatial grid and runs from 0 to 63. *Lights* is aggregated by taking the mean grid-cell value in each department-year. Prior to log-transforming, the average in the sample *Lights* is around 0.12, though the highest department-level mean in the sample is just over 33.[13] Following previous empirical studies (Alesina, Michalopoulos, and Papaioannou 2016; Hodler and Raschky 2014), I add a small constant (0.001) to all *Lights* observations to avoid dropping zeros after log-transforming. Shown in Figure A3 in the online appendix, the distribution of *Lights* improves after the log transformation, though the variable remains right-skewed. Transforming *Lights* using the inverse hyperbolic sine, for which zero is defined and adding a constant is unnecessary, results in nearly identical estimates.

For *Lights* to be an appropriate proxy for public goods, the measure should exhibit two properties. First, it should correlate well with the ideal measures from the DHS. To test this relationship, I first aggregate *Lights* to the first administrative unit level, corresponding to the lowest level of appropriate subnational analysis in the DHS data. I then combine DHS survey waves from 1993, 1999, 2003, 2010, and 2014 and create four measures of public goods: (1) household electrification, (2) literacy, (3) child mortality, and (4) infant mortality. Each measure represents the mean response within each DHS region. Figure 3 presents a series of linear regressions in which *Lights* predicts each of these alternative public goods measures. In all models, survey wave fixed effects are included to remove year-specific effects. *Lights* is positively related to household electrification and literacy, while negatively associated with child and infant mortality. These relationships are all statistically significant at the .05 level. Taken together, this exercise suggests that *Lights* is a relatively reasonable proxy for the provision of public goods at the local level in Burkina Faso.

Second, the provision of electricity must also plausibly arise as a function of subnational governance. Widespread electrification is generally dependent on government activity (Min 2015). This is particularly true in Burkina, with the state-owned National Company of Electricity primarily responsible for the supply and distribution of electricity throughout the country (Ouédraogo 2010). However, as described earlier, local governments are responsible for devising their own budget and development plans. Several factors related to nighttime light intensity are under the umbrella of local government responsibility, including the creation and management of energy infrastructure, public lighting, and participation in the design of regional electric networks (Englebert and Sangaré 2010, 8). The ability of departments to improve their provision of electricity remains conditional on input from the central government, with development plans and budgets subject to state approval. The provision of electricity is therefore the result of an interaction between local planning and budgeting and the prerogative of the central government. In this context, bureaucratic capacity and ability to lobby for access to state resources are especially important, implying that nighttime light intensity represents a particularly appropriate measure of public goods as a test for the proposed theory.

Control Variables

Two time-varying department-level controls are captured by X'_{dpt-1}. First, as a landlocked country in the Sahel, economic production in Burkina is sensitive to climatic variation. Thus, I introduce *Drought Index*, which controls for

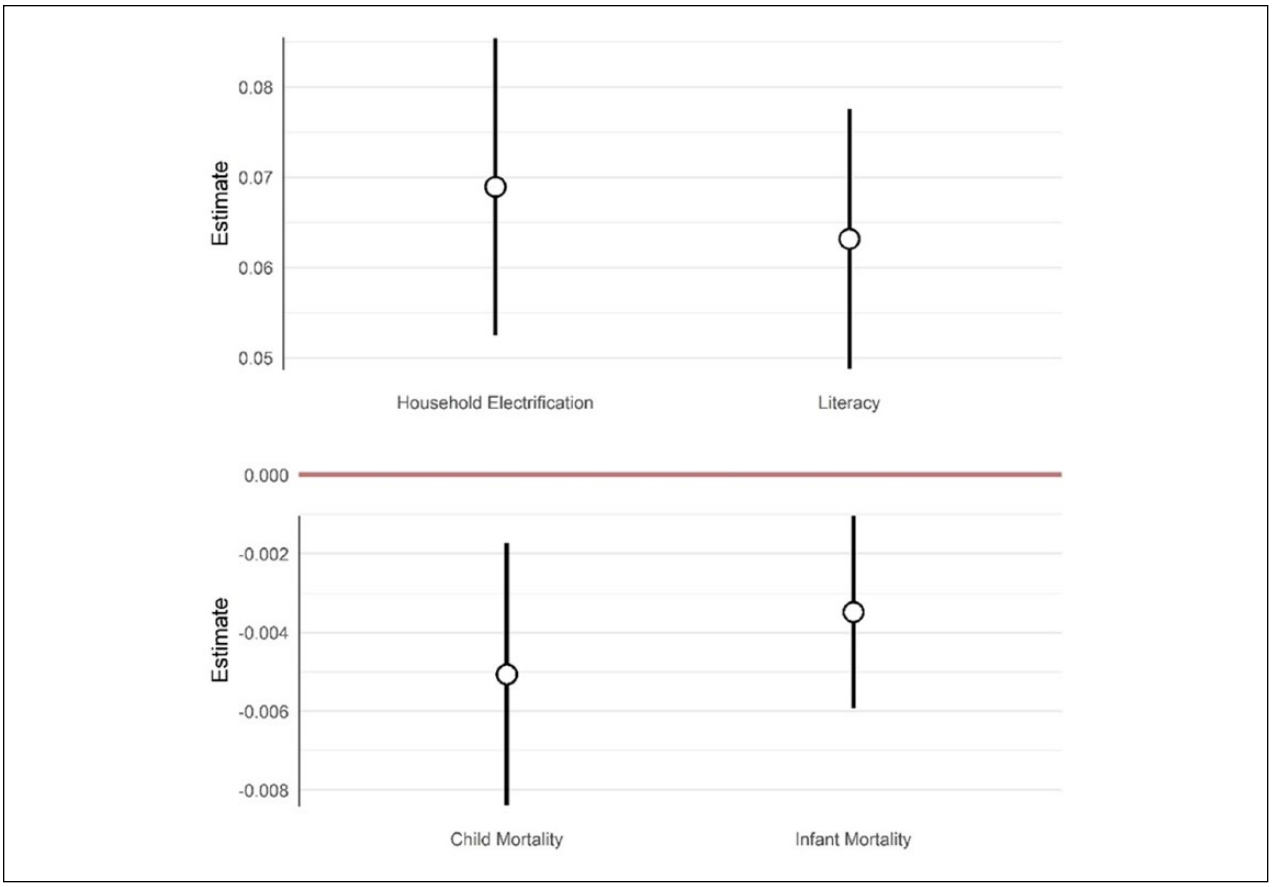

Figure 3. The relationship between *Lights* and alternative measures of public goods at the region-level.
All models include year fixed effects. Lights is logged. Error bars denote 95% confidence intervals.

variation in rainfall across departments. This variable is derived from the Standardized Precipitation and Evapotranspiration Index (SPEI; Beguería et al. 2014) and indicates the proportion of a year for which a department experienced drought. Originally represented by a 0.05 × 0.05 decimal degree spatial grid, the SPEI data are aggregated to the department level by taking the mean value grid-cell value within each department. As domestic energy production in Burkina is dependent on hydro-electrical sources (Ouédraogo 2010), drought is expected to correlate negatively with *Lights*. Second, logged *Population Density* enters the model to ensure that variation in mean nighttime light intensity is not simply due to population changes. Population estimates come from the Center for International Earth Science Information Network, Columbia University, United Nations Food and Agriculture Programme, and Centro Internacional de Agricultura Tropical (2005) project. Estimates are available every five years beginning in 1990. This data limitation requires the filling of population estimates for years in which there was no dedicated estimation. For example, years 1995 through 1999 use the population estimate from 1995, while years 2000 through 2004 use the estimates from 2000. *Population Density* is aggregated to the department level by taking the average grid-cell population density per department. Both controls are lagged one year to avoid posttreatment bias.

Results

Figure 4 depicts the variation in *Lights* across fragmentation types. Prior to fragmentation, the average nighttime light intensity in departments within *nonsplitting* provinces was higher than that for *Mother* and *Splinter* provinces. After fragmentation, *Lights* continued along an upward trajectory for *nonsplitters*, while *Mother* and *Splinter* provinces appear to experience significant stagnation. Moreover, average nighttime light intensity in departments within *Splinter* provinces *worsened* for several years after fragmentation. *Splinters* therefore appear descriptively the most worse-off from fragmentation.

Table A2 presents the primary regression estimates, while Figure 5a plots the difference-in-difference estimates for *Mothers* and *Splinters* using the entire sample period (1992 to 2013).[14] All models include standard errors clustered by province, the highest level of aggregation (Cameron and Miller 2015).[15] The estimates are interpretable relative

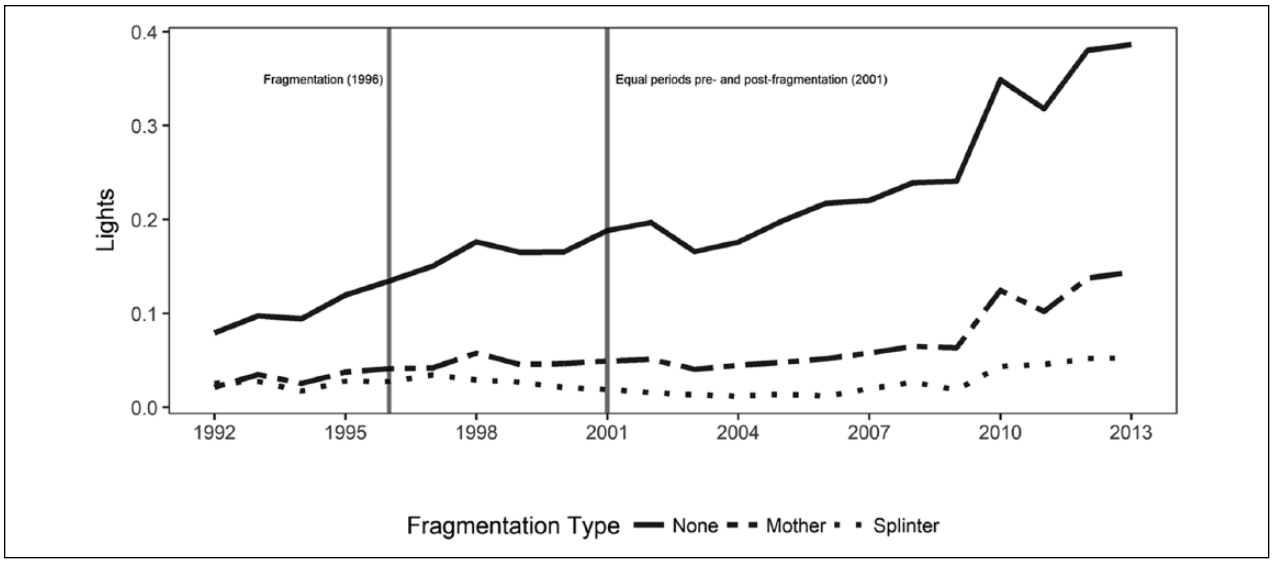

Figure 4. Average nightlights over time and by province fragmentation type.

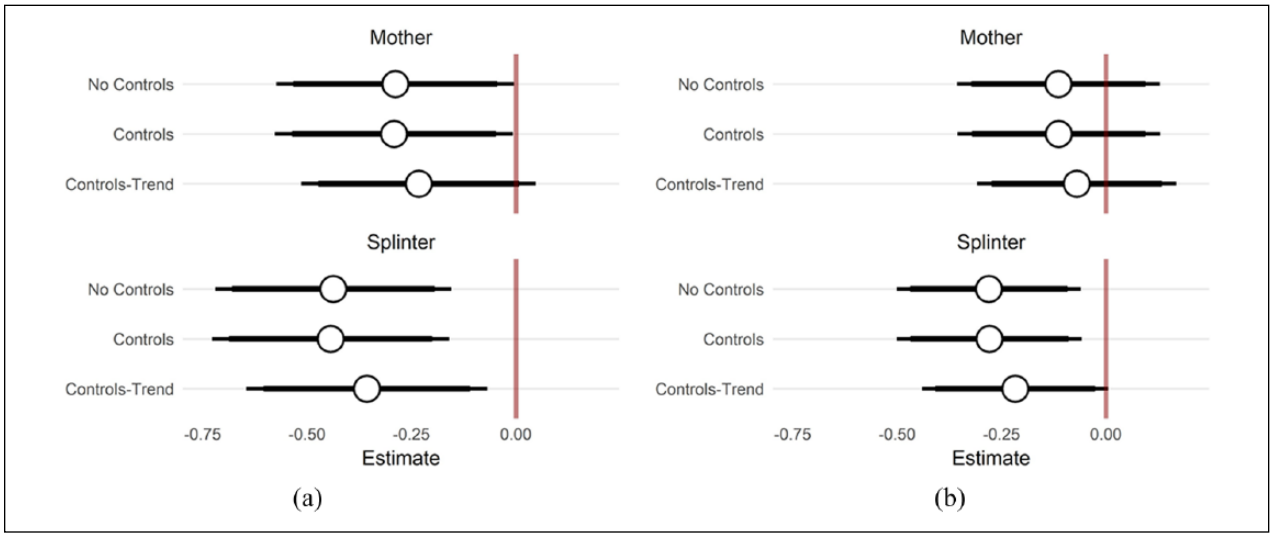

Figure 5. The effect of province fragmentation on *Lights*: (a) 1992–2013 and (b) 1992–2001.
All models include department and year fixed effects. *SE*s clustered by province. Error bars around estimates denote 90% and 95% confidence intervals. Time-varying controls include Population Density and Drought Index. Controls-trend interacts time-varying controls with time trend.

to the omitted category of *nonsplitting* provinces. When omitting time-varying controls, both *Mothers* and *Splinters* present negative and statistically significant estimates. Introducing controls for *Population* and *Drought Index* slightly increases the size of each estimate. In the final model, a linear time trend is interacted with each time-varying control. *Mother* remains negative and similarly sized but is no longer statistically significant at conventional levels. *Splinter*, on the contrary, remains negative and highly statistically significant.

The estimates in Figure 5a suggest departments within mother provinces experienced between 21.82 and 26.15 percent less nighttime light intensity on average because of fragmentation.[16] However, this negative impact should be treated with caution due to variation in standard errors across specifications. On the contrary, departments within splinter provinces are clearly substantively and statistically worse-off, experiencing on average between 31.13 and 36.46 percent less nighttime light intensity because of fragmentation.

Restricting the Sample Period

One empirical challenge to the primary results described thus far may be that the uneven distribution of time periods before and after reform are driving the estimates. The

following estimates subset the sample to include only 1992 to 2001. By moving the end of the sample period closer to the date of fragmentation, we can more plausibly ensure that unmeasured factors not captured in the fixed effects or time trend are not confounding the results.

Shown in Figure 5b, *Mother* is consistently negative, though is never distinguishable from zero across specifications. The estimates for *Splinter*, when either omitting or including time-varying controls, remain negative and statistically significant at the .05 level. When interacting a linear time trend with the control variables, the estimate diminishes in size slightly and becomes significant at the .1 level, though the 95 percent confidence interval just barely crosses zero. Substantively, departments within splinter provinces experienced between 25.09 and 20.19 percent less nighttime light intensity on average from fragmentation until 2001. These results largely confirm that the public goods disparity between splinter provinces and nonsplitters worsened due to fragmentation.

Parallel Trends and Endogenous Selection

Another empirical issue may be that the identification assumptions required for plausible difference-in-differences estimates are not met. Namely, identifying the effects of fragmentation in this framework relies on the *parallel trends assumption*, which states that prior to fragmentation, trends in nighttime light intensity were similar across fragmentation types, but fragmentation in 1996 prompted deviation from this common trend (Angrist and Pischke 2008, chap. 5). Crucially, this assumption does not require similarity in *levels* of nighttime lights across fragmentation types prior to reform, but only similar changes over time. Conditioning on department fixed effects increases the plausibility of this assumption. Furthermore, as shown in Figure 4, though mothers and splinters start below nonsplitters, the yearly changes prior to fragmentation are similar. For example, between 1992 and 1993, all three types saw increased nighttime light intensity, while lights decreased slightly for all types between 1993 and 1994.

Parallel trends can be inspected more directly by interacting each fragmentation type with yearly indicators (Autor 2003). If the effect of fragmentation is statistically significant prior to reform, the parallel trends assumption may be in question and we can surmise that unmeasured differences across fragmentation types unrelated to fragmentation are confounding the results. Said otherwise, departments that were already going to experience a significantly worse trend after 1996 may have endogenously selected into splinters, while those that were going to experience slightly worse trends selected into mothers, and those that were going to experience a significant improvement selected into nonsplitters. However, if there is no effect prior to fragmentation, yet the effect after remains, we can be confident in the plausibility of parallel trends.

Figure 6 presents the results from this exercise, relying on the most conservative modeling strategy, which includes time-varying controls interacted with a linear time trend, as well as department and year fixed effects. As shown in the first panel, the effect of *Mother* is only statistically significant in one of the prefragmentation years. After fragmentation, *Mother* is not consistently statistically significant. Prior to fragmentation, *Splinter* is never distinguishable from zero, indicating that these departments were not significantly different than nonsplitters before reform. However, beginning one year after fragmentation, *Splinter* is negative and statistically significant for several years in a row, with most substantively severe effects appearing between 2001 and 2010. Thus, the negative effect of falling within a splinter province is unlikely related to pre-reform differences.

Influential Departments

As a final empirical check, Figure 7 presents the distribution of estimates when iteratively excluding one department per regression, therefore examining the potential that changes in nighttime light intensity within one department over time are driving the results. This ensures that the departments with relatively significant nighttime light intensity, like those that the house majors cities of Ouagadougou (the capital) or Bobo-Dioulasso are not overly influential in generating average effects. This exercise involves estimating 350 individual regressions (the total number of departments minus 1). All models include controls for both population density and drought as well as their interactions with a linear time trend to ensure the most stringent test is used. The vertical lines within each density plot represent the respective estimate when employing the entire sample (see columns 3 and 6 in Table A2).

Shown in the first panel, the coefficient estimates for *Mother* and *Splinter* remain very similar to those estimated before. In fact, the largest deviations from the original estimates are more negative, indicating that if influential departments are influencing the results at all, they are doing so against the direction hypothesized. This pattern is true for the standard errors in the second panel as well, with the largest changes from the original estimates resulting in smaller standard errors. The primary result of this paper—that departments within *Splinter* provinces experienced a lower provision of public goods after fragmentation—appears unattributable to the influence of any one department.

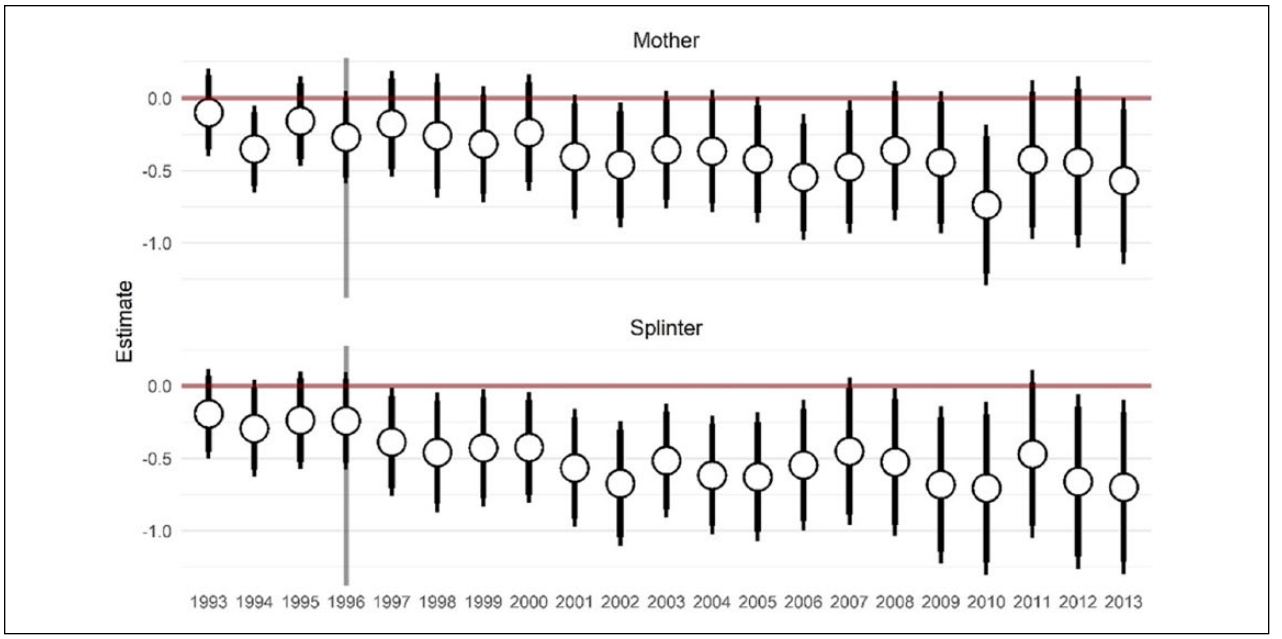

Figure 6. The effect of province fragmentation over time.
This models includes department and year fixed effects as well as time-varying controls for Population and Drought Index interacted with linear time trend. *SE*s clustered by province. Error bars around estimates denote 90% and 95% confidence intervals. The vertical bar indicates province fragmentation in 1996.

Alternative Explanations

The previous tests have ruled out several empirical challenges to the core argument in this paper. Considering the reviewed literature on the motivations of fragmentation, a few alternative explanations must be addressed. First, several perspectives rooted in economic theory imply that the provision of public goods should improve as units become smaller (e.g., Hayek 1945; Oates 1972; Tiebout 1956). If important here, departments within the newly shrunken units—mothers and splinters—should have experience improved public goods outcomes relative to nonsplitters after fragmentation. However, all empirical tests are explicitly contrary to this expectation.

Second, recent work has shown that political elites often leverage the creation of new units as a vehicle for maintaining and expanding patronage networks—see Green (2010) and Hassan (2016), Hassan and Sheely (2017) for examples in Uganda and Kenya, respectively. As described before, fragmentation decisions in Burkina did not appear to follow a distinct political logic of this sort and were instead fairly "ad hoc" (World Bank 2002, 10). Although subnational patterns of political support may allow for a systematic evaluation of whether unit creation followed patrimonial patterns found in other cases, these data are not available. Moreover, a general lack of institutionalized political competition likely prohibits the usefulness of most standard measures of subnational political support.[17] Nonetheless, the implications of the patronage perspective may be evaluated indirectly given the evidence presented in this paper. According to this logic, newly created units pull in centrally distributed funds and spur local construction projects necessary for a functioning regional government, in turn, creating a sizable number of local government jobs which can be distributed to political supporters. If the patronage logic were plausible, splinter units should have experienced the largest influx of resources and jobs. Across all tests, however, splinters were shown to experience the poorest trend in the provision of public goods after fragmentation. Furthermore, splinters appear to pull in the least amount of centrally distributed resources, while nonsplitters and mothers pull in the most (see Figures 2 and A2).

A final argument suggests that, in certain cases, local demands for ethnically homogeneous units spur government fragmentation—see Pierskalla (2016) and Akinyele (1996) for examples in Indonesia and Nigeria, respectively. If this logic is valid, units may have been made more homogeneous, which in turn may improve the provision of public goods (see Habyarimana et al. 2007, for the relationship between ethnic diversity and public goods). Although there is little evidence suggesting that local demands structured fragmentation in Burkina in this way, concerns of this potentially confounding pathway may be assuaged by considering a few factors. Most simply, political competition is generally not mobilized along ethnic lines in Burkina. For example, taking Posner's

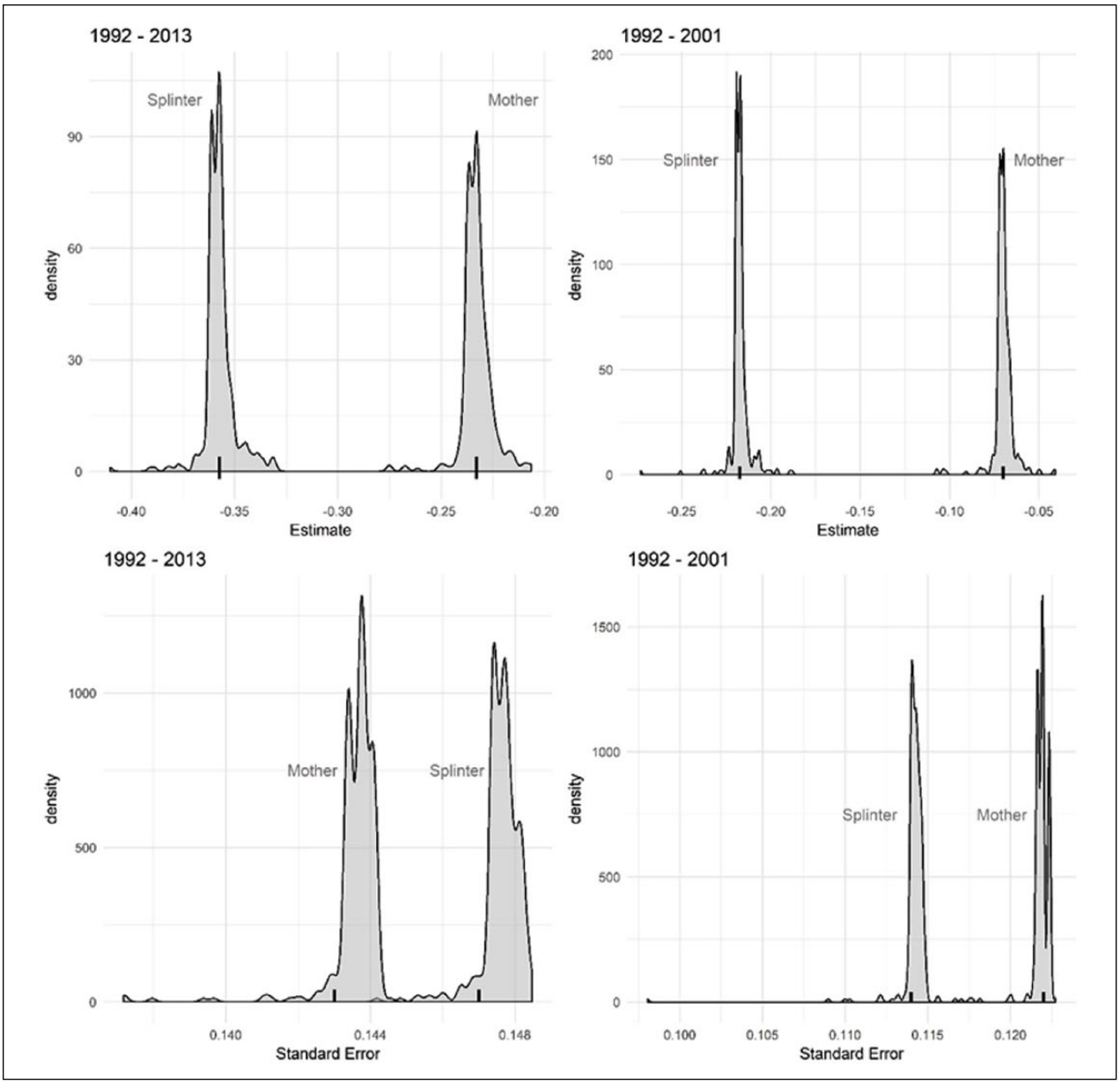

Figure 7. Distribution of estimates when iteratively excluding departments.
Density plots present the results of 350 regression, iteratively excluding one department. All models include department and year fixed effects as well as time-varying controls for Population and Drought Index interacted with a linear time trend. *SE*s clustered by province. Vertical bars denote estimates when including all departments.

(2004) Politically Relevant Ethnic Groups (PREG) measure, Burkina is tied for the least ethnically fractionalized country in Africa (PREG of 0.00). Similarly, the Ethnic Power Relations geocoded release (geoEPR) excludes Burkina because of ethnicity's lack of political relevance within the country (Wucherpfennig et al. 2011).

In addition, geographic variation in ethnicity poorly predicts which departments were subject to which types of splitting. Figure A4 in the online appendix displays density plots for each of Burkina's primary ethnic groups, with the proportion of a given department's population that identifies with each ethnic group depicted on the horizontal axis. These densities are further differentiated along the vertical axis by whether a department was a nonsplitter, mother, or splinter. Each proportion is derived from the Spatially Interpolated Data on Ethnicity (SIDE) data set from Schweinitz and Hunziker (2018).[18] Note that for nearly all ethnic groups, the proportion densities are very similar, regardless of the split type. For one group—the Mossi—there is a larger density of

high proportions for nonsplitters relative to mothers and splinters. However, even a simple multinomial logit, controlling only for population, suggests that this variation is not a statistically meaningful determinant of fragmentation.[19] Finally, by including department fixed effects, the research design bluntly controls for baseline variation in ethnic diversity at the unit level. If there is not significant ethnic migration across departments before and after fragmentation, department-level ethnic diversity cannot be a plausible alternative explanation.

Conclusion

This paper has shown that communities within splinter units in Burkina Faso experienced a worsened provision of public goods from government fragmentation relative to nonsplitting units, while the units used to create the new units were only partially negatively affected. The theoretical framework put forth explains this finding as arising from variation in administrative capacity across splinter, mother, and nonsplitting units. In short, communities splintered into new units are in a weaker position to tax, access centrally distributed resources, and have a more limited bureaucracy than others. These findings resonate with the perspective that fragmentation has distributional consequences (Grossman, Pierskalla, and Dean 2017). However, this paper argues that these consequences can be perverse, limiting the provision of public goods in the communities most affected by fragmentation relative to those least affected.

Although I have provided evidence from only Burkina Faso, the importance of administrative capacity in producing heterogeneous public goods outcomes after fragmentation likely travels in predictable ways. Administrative capacity throughout Burkina, for example, was severely limited both before and after fragmentation (Harsch 2017). As baseline administrative capacity increases within a reforming country, the likelihood that fragmentation will substantially affect administrative capacity likely decreases. Future work should explore how baseline administrative capacity influences the consequences of fragmentation on the provision of public goods.

Burkina Faso also had very little experience with subnational governance prior to fragmentation. In other cases, perhaps especially those with links to indirect rule under the British colonial system, decentralized governance and local political competition may have a stronger precedent. In these contexts, variation in administrative capacity within the fragmenting government may be less important, while mechanisms rooted in altered political competition like those proposed by Grossman, Pierskalla, and Dean (2017) may be more probable. Interestingly, these authors show that individuals within splinter units experience improved public health outcomes after fragmentation in Malawi, Nigeria, and Uganda, all countries which have historical links to indirect rule under the British colonial system. In cases in which demands for administrative unit creation came from below—as in the case of Indonesia (Pierskalla 2016)—fragmentation may less likely result in administratively weak units. Additional work should explore how the historical and political origins of administrative capacity structure the effects of fragmentation.

The primary limitations of this study come from data unavailability. I am only able to evaluate the causal effect of fragmentation on the provision of one public good—electricity. At the same time, I have taken care to show that (1) electricity is a reasonable proxy for the provision of other public goods and that (2) the theoretical mechanisms developed plausibly produce variation in electricity. Similarly, quality data on public employment and government transfers that would be useful as a direct test of mechanisms is generally not available. Instead, I relied on all data made available through meetings with analysts within Burkinabé ministries and qualitative assessments conducted by others to substantiate the theoretical argument. The contributions of focusing on Burkina Faso, even given the data constraints partly unique to the country, outweigh the costs leaving it critically understudied (Briggs 2017).

To conclude, this paper may be read as a cautionary tale for policy makers seeking to improve governance in the developing world through decentralization reform. In particular, "progress on decentralization" should not be "equated with the number of subnational governments" (Resnick 2017, 48). Instead, government fragmentation should be perceived with an eye toward context. Policy makers should ask whether newly created units possess the capacity to fulfill the duties of an effective subnational government. Without such administrative capacity, the goals of bringing the government "closer to the people" may in fact leave many behind.

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Notes

1. Decentralization refers to the delegation of administrative, political, and/or financial authority to subnational governing units (Falleti 2005), while government fragmentation references only the size and number of subnational units, not their authority.
2. Previous work on the local provision of public goods has documented the importance of these two factors as well. For example, Ziblatt (2008) shows that resources and local staff experience were the key variables driving health public goods outcomes in German cities in 1912.
3. Centeno, Kohli, and Yashar (2017, 9–10) also describe "coherence" and "the presence of the state" as important factors influencing capacity. Although important in general, these factors less clearly map onto the present context and/or uniformly affect administrative capacity across all fragmentation types.
4. Lewis (2014, 575) asserts that it is an "uncontroversial assumption" that ". . . a local unit's bargaining power vis-a-vis the centre is increasing in its territorial size."
5. Experienced civil servants may be transferred to the newly created units, attenuating the effect of this mechanism. The tendency of well-experienced bureaucrats to be placed in relatively pleasant regions minimizes this potential given that newly created units tend to be the most rural and underdeveloped in fragmenting countries (Grossman and Lewis 2014).
6. Figure A1 in the online appendix displaying provincial boundaries before and fragmentation, differentiating between nonsplitting, mother, and splinter provinces. Fragmentation types were identified using the documentation provided in the Statoids project (Law 2017). This information was then used to create all shapefiles used throughout.
7. More precisely, mayors serve the *commune*. However, communes and departments are territorially identical. Generally, this governmental level is referred to as the department when referencing to the deconcentration of services and authority and the commune when referring to democratic decentralization. For consistency, I only refer to departments throughout this paper.
8. When explaining access to central funds, separating the effects of bargaining power from population is inherently difficult. The effect of population on access to transfers, for example, may operate through a bargaining mechanism. This discussion has therefore avoided a strong causal interpretation.
9. Reports regarding subnational funding in Burkina often group spending statistics in terms of rural versus urban departments, with some population threshold dictating this distinction. To my knowledge, the specific funding patterns within departments are not publicly reported.
10. Interview conducted in June of 2017.
11. LOI N° 027-2006/An portant règime juridique applicable aux emplois et aux agents des collectivitès territoriales.
12. See dhsprogram.com/faq.cfm for details (accessed May 1, 2018).
13. Summary statistics appear in Table A1 in the online appendix. The relatively low levels of nighttime light intensity, even in the most developed parts of the country, imply that top-coding (i.e., high levels of intensity that indeed vary get lumped into the top value of the scale) is unproblematic. Furthermore, because I use the "stable" version of the nighttime light intensity data, "unstable" sources of light unrelated to the provision of public goods like gas flares or forest fires are removed.
14. Following Kastellec and Leoni (2007), I rely on coefficient plots of the causal variables for interpretation.
15. Models are estimated using the PLM package in R. All standard errors are also heteroscedasticity-consistent (i.e., "robust") and follow an "HC1" degrees of freedom adjustment.
16. The semilogarithmic setup of each regression with dummy independent variables necessitates care in interpreting the impact of *Mother* and *Splinter* on Lights. Following Giles (2011), these estimates are converted to percentage impacts by using $100(\exp(c - 1/2v(c)) - 1)$, where c is the estimated coefficient and v is the estimated variance (i.e., the square of the standard error).
17. In the presidential election in 1991, official numbers stated that Compaoré won 86.42 percent of all votes and 100.00 percent of all "valid" votes. In the National Assembly election of 1997, the year immediately following fragmentation, Compaoré's Congress for Democracy and Progress (CDP) won 91 percent of the 111 total seats.
18. Demographic and Health Surveys (DHS) geocoded data cannot be used appropriately alone at the department level in Burkina. However, Schweinitz and Hunziker (2018) develop a machine learning approach to interpolate the information provided regarding ethnic identification in a country's limited number of geocoded DHS clusters continuously across space. Interpolation of this sort may offer benefits in exploring variation in other DHS indicators of public goods, though adapting their machine learning approach to this context is beyond the scope of this paper.
19. In this multinomial logit, the dependent variable is *Split Type*, which can either be nonsplitting, mother, or splinter. The primary independent variable is the proportion of each department's population that identifies as Mossi. With standard errors clustered by province, the 95 percent confidence interval for the logit coefficient on *Proportion Mossi* for the probability that a department is a mother relative to a nonsplitter is [–6.50, 0.30]; for the probability that a department is a splinter relative to a nonsplitter, the 95 percent confidence interval is *Proportion Mossi* is [–6.74, 0.74].

Supplementary Materials

Replication code and data available at: https://doi.org/10.7910/DVN/AEOMG5. Supplemental materials for this article are available with the manuscript on the *Political Research Quarterly* (*PRQ*) website.

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