Volume Title: African Successes, Volume I: Government and Institutions

Volume Author/Editor: Sebastian Edwards, Simon Johnson, and David N. Weil, editors

Volume Publisher: University of Chicago Press

Volume ISBNs: 978-0-226-31622-X (cloth)

Volume URL: http://www.nber.org/books/afri14-1

Conference Dates: December 11–12, 2009; July 18–20, 2010; August 3–5, 2011

Publication Date: September 2016

Chapter Title: Does Decentralization Facilitate Access to Poverty-Related Services? Evidence from Benin

Chapter Author(s): Emilie Caldeira, Martial Foucault, Grégoire Rota-Graziosi

Chapter URL: http://www.nber.org/chapters/c13388

Chapter pages in book: (p. 57 – 102)

3

Does Decentralization Facilitate Access to Poverty-Related Services? Evidence from Benin

Emilie Caldeira, Martial Foucault, and Grégoire Rota-Graziosi

3.1 Introduction

Over the past two decades, decentralization has been implemented by many developing countries, becoming a key element of public sector reform. By bringing decision makers closer to citizens, decentralization should alleviate information asymmetries, improve accountability, and increase the efficiency of public goods provision. In developing countries, decentraliza-

Emilie Caldeira is associate professor of economics at CERDI-CNRS at the University of Auvergne. Martial Foucault is professor of political science at Sciences Po Paris. Grégoire Rota-Graziosi is professor of economics at CERDI-CNRS at the University of Auvergne.

We thank the National Bureau of Economic Research (NBER), which has funded this project since 2009. We are grateful to the Municipal Development Partnership (MDP) in Cotonou, with special thanks to Hervé Agossou, for their warm welcome and valuable assistance in collecting data, as well as for their fruitful comments and discussions. We also thank the Benin National Institute of Statistics and Economic Analysis, especially Cosmé Vodounou and Damien Mededji, for allowing us access to EMICoV surveys. We thank Elias Potek (University of Montreal, Geography Dept.) for his outstanding work in creating geographical maps in record time. We thank Simon Johnson (MIT), who acted not only as a scientific mentor throughout this research effort, but also as a valuable advisor. We warmly thank Michael Hiscox (Harvard University) for the valuable comments that helped make the chapter's final version stronger and Antoinette Sayeh (IMF) for handling the chapter's policy concerns when it was presented at the NBER conference in Zanzibar. We thank Odd-Helge FjeldStad (International Centre for Tax and Development) and François Vaillancourt (University of Montreal) for all of their constructive suggestions. We are grateful to Leonard Wantchekon (Princeton University) and the participants at the IREEP (Institut de Recherche Empirique en Economic Politique) conference, the CERDI (Centre d'Etudes et de Recherche sur le Developpement International) seminar and the CIRANO workshop, where a preliminary draft of this chapter was presented in November 2011. Finally, we acknowledge financial support from the NBER Program on African Successes, especially Elisa Pepe for her amazing support throughout this project. Any remaining errors are ours. For acknowledgments, sources of research support, and disclosure of the authors' material financial relationships, if any, please see http://www.nber.org/chapters/c13388.ack.

tion is one of the main institutional reforms on international organizations' and donors' agendas to enhance public governance and ultimately reduce poverty. This strategy has been in place for a number of years, but has not undergone a systematic evaluation of its impact on well-being and local governance. Therefore, now that several years have elapsed, it seems an appropriate time to examine the success of decentralization in the struggle against poverty in sub-Saharan Africa.

With this objective in mind, we analyze the effect of decentralization in Benin on access to some poverty-related services, namely water, sanitation, refuse and sewage disposal, and primary education. Poverty is a multidimensional issue and basic health and education services are fundamental human rights.[1] Decentralization is, by definition, a transfer of competencies to local governments, especially in the education and health sectors. These services do not correspond exactly to the Samuelsonian definition of pure public good (nonexcludability and nonrivalry). However, local and central governments share the responsibility for meeting fundamental rights in education and health. Whatever the means of producing such basic services, or nature of relationships with providers, local decision makers ultimately remain politically responsible (World Bank 2004) for achieving improvements in access to drinking water, sanitation, and primary education. In a sense, our argument rests on how decentralization facilitates access to high-quality services rather than on an investigation of how well publicly provided local goods are delivered.

In regard to its democratization and decentralization processes, Benin is representative of African French-speaking countries. An ethnically fragmented country that has been politically stable only since 2001, Benin began a transfer of competencies to seventy-seven local governments, called *communes*, in 1998. The decentralization process definitively took off with local elections in 2002. Our analysis focuses on the 2006–2007 period, which corresponds to a crucial time for democracy in Benin, with the 2006 national elections bringing Yayi Boni to power in place of Mathieu Kerekou, who had ruled the country for twenty-nine years.[2]

By analyzing panel data from seventy-seven Beninese communes for 2006 and 2007, we aim to shed light on the following issues: (a) To what extent does decentralization, measured as the share of local own-revenue in total local revenue for each commune, modify access to basic public services? Is this effect monotone with the degree of decentralization? (b) Does the decentralization effect vary between communes according to their wealth? To answer these questions, we compiled several databases: original public finance panel data, which concerns all Beninese local governments, and the 2006 and 2007 Integrated Modular Survey on Household Living Conditions

1. Articles 25 and 26 of the *Universal Declaration of Human Rights*.
2. In the spring of 2011, President Yayi Boni was reelected for his second and last mandate.

(EMICoV), which covers a sample of 18,000 Beninese households throughout the entire national territory and is representative at the commune level. We have developed a consistent econometric method, taking into account potential endogeneity in the degree of decentralization, the heterogeneity of local governments, and inefficiency in estimating the effects of variables having little within variance.

Our analysis suggests that, on average, decentralization increases access to basic public services. However, this effect is not only nonmonotone, following an inverted U-shaped curve, but its impact is also heterogeneous between poor and nonpoor communes. Decentralization's effect on access to poverty-related services is positive for sufficiently wealthy communes (measured by higher quintiles of an asset-based measure of wealth), and becomes negative for the poorest ones. Therefore, although decentralization succeeds in reducing nonmonetary poverty in Benin by improving access to some basic services, the risk of creating higher inequalities between communes remains.

A second important result is that communes seem to prioritize basic services. Distinguishing local jurisdictions by their wealth allows us to shed light on significant differences in local governments' behaviors. While the poorest jurisdictions neglect primary education, focusing more on access to drinking water, the richest ones pay less attention to sewage services, since they are already provided at a sufficiently high level. Although the latter is not an issue, the former casts some doubt on the efficiency of decentralization.

The chapter is structured as follows: Section 3.2 presents a review of the literature on the impact of decentralization on service delivery and human development indicators in developing countries. Section 3.3 portrays the process of decentralization in Benin. Section 3.4 describes our econometric framework. Section 3.5 presents our results. Section 3.6 concludes.

3.2 The Impact of Decentralization on Services Delivery and Human Development Indicators: A Review of the Literature

A huge portion of economic literature focuses on decentralization in developing countries. A brief review of this literature addresses the strengths and weaknesses of decentralization in reducing poverty, or at least in increasing the efficiency of public goods provision. Many benefits of decentralization are claimed in the fiscal federalism literature, most of them related to the fact that decentralization brings decisions closer to citizens, alleviating information asymmetries, and improving local governments' accountability. The fiscal federalism literature has largely stressed the economic efficiency of intergovernmental competition in providing local public goods. If such a normative prescription seems to fit well with developed countries, this issue remains more complex for developing countries where the "voting with your feet" mechanism is not so relevant. Thus, the logic of decentralization raises some intriguing issues in developing countries that we can summarize from

two perspectives: (a) Why does decentralization entail a better provision of local public goods? and (b) What are the limits of decentralization in such countries, given their institutional and geographical constraints?[3]

A demand-side argument in favor of decentralization is derived from the existence of information asymmetries. Indeed, the seminal idea that decentralization may improve the provision of public services when local governments have an informational advantage goes back at least as far as Hayek (1948) and Oates (1972). Since local decision makers have a better knowledge of local preferences, decentralization is expected to improve the level and quality of public services. This informational gain may induce a better targeting of the poorest populations in a country, as indicated by the research conducted by Alderman (2002) in Albania, Bardhan and Mookherjee (2005) in West Bengal, and Galasso and Ravallion (2005) in Bangladesh.

On the supply side, decentralization should enhance the accountability of policymakers. Decentralization allows for a better provision of public goods and a better match between public policies and local needs. Several authors have established such a link: Bird and Rodriguez (1999) in the Philippines (health, primary education, housing, and infrastructure); Faguet (2004) in Bolivia (education and social services); Galiani, Gertler, and Schargrodsky (2008) in Argentina (education); Robalino, Picazo, and Voetberg (2001) on a panel discussing low- and high-income countries from 1970 to 1995 (mortality rate); and Enikolopov and Zhuravskaya (2007) on seventy-five developing and transition countries for twenty-five years (DPT immunization,[4] infant mortality, illiteracy rate, and pupil-to-teacher ratio). Other studies mitigated the impact of decentralization. For instance, Azfar and Livingston (2010) find little evidence of better provisions in government services by local governments in Uganda; for Winkler and Rounds (1996), the transfer of education competencies in Chile reduced the scores of cognitive tests.

Beyond improving the matching of public policies with local preferences, decentralization is also considered as an essential support of democratization. Thus, the governance of local public goods is expected to strengthen accountability under the strong assumption of well-informed voters, mobility of citizens, and participation in the political market. Seabright (1996) considers allocations of power within local and central governments as alternative means of motivating governments to act in the interests of citizens. This author shows that, although centralization entails benefits from policy coordination, it also induces some costs in terms of diminishing account-

3. Important literature has been devoted to analyzing the benefits of decentralization on human development indicators in the context of the Millennium Objectives. The final impact of decentralization on growth has been studied, for instance, by Zhang and Zou (1998), Wollera and Phillips (1998), Xie, Zou, and Davoodi (1999), Lin and Liu (2000), Akai and Sakata (2002), and Martinez-Vazquez and McNab (2003).

4. Diphtheria, pertussis, and tetanus.

ability. Moreover, interjurisdictional competition may enhance accountability: local citizens encourage incumbents to increase the efficiency of public spending through a "vote with their feet" (Tiebout 1956) or a "yardstick competition" (Salmon 1987; Besley and Case 1995).[5] Few studies have examined the relevance of this phenomenon in developing countries: Arze, Martinez-Vasquez, and Puwanti (2008) suggest a process of yardstick competition between local governments in Indonesia; Caldeira, Foucault, and Rota-Graziosi (2015) establish the existence of strategic complementarities of local public goods among Beninese communes.

However, by expanding the decision space of local governments, decentralization may increase corruption. Bardhan and Mookherjee (2000) point out the theoretical ambiguity of the importance of relative capture at the local and national levels. Huther and Shah (1998), Barenstein and de Mello (2001), and Fisman and Gatti (2002) find a negative relationship between fiscal decentralization and corruption for several countries.[6] In contrast, Reinikka and Svensson (2004) highlight the capture of school grants by local officials in Uganda. At the macroeconomic level, Treisman (2000) and Fan, Lin, and Treisman (2009) conclude that federal states are more corrupt. Using data on 154 countries, Treisman (2000) also suggests that more tiers of government induce higher perceived corruption, less effective provision of public health services, and lower adult literacy, especially in developing countries. Prud'homme (1995) stresses several additional pitfalls of decentralization in developing countries, namely the increase in interjurisdictional disparities, the jeopardizing of macroeconomic stability, the ethnic bias of local elections, and weak capacities of local bureaucracies.

Another supply-side argument against decentralization concerns the risk of diseconomies of scale, or at least a loss of scale economies. However, many of the public goods in question are community and site specific, and it is often possible to exclude nonresidents. Rural communities of poor countries, in particular, are often face to face, and social norms sharply distinguish "outsiders" from "insiders," especially with respect to entitlement to community services (Bardhan 2002).

Finally, decentralization is generally viewed as a trade-off between autonomy and accountability, between costs of coordination and better provision of public goods, and between preference matching and externalities.

5. Citizens can "vote with their feet," that is, move to a nearby jurisdiction to obtain the public service tax package they prefer so that local governments compete to attract people and increase their tax bases. Even in the absence of population mobility, in the context of informational asymmetries between voters and politicians, voters can use the performance cues of other governments as benchmarks for judging whether or not their representative wastes resources and, consequently, whether or not he/she deserves to remain in office. Thus, an action chosen by a politician in one jurisdiction affects the informational set of imperfectly informed voters in other jurisdictions, forcing neighboring politicians to compete in order to avoid being signaled as bad incumbents, so that they might remain in office.

6. Fisman and Gatti (2002) use legal origin as an instrument for decentralization.

Besley and Coate (2003) and Lockwood (2002) confirm Oates' insights by showing that the relative performance of centralized and decentralized provisions of public goods depends upon spillovers and differences in tastes for public spending between jurisdictions.[7]

To our knowledge, no attention has been paid to the consequences of decentralization on well-being conditions in French-speaking African countries. Our chapter fills this gap by focusing on Benin, where microdata (household surveys) and macrodata (local public finance) have been combined for the first time.

3.3 An Overview of Benin

3.3.1 The Democratization Process

In regard to its democratization and decentralization processes, Benin belongs to the group of French-speaking African countries, which include twenty countries and around 243 million inhabitants (2009). Benin is also a lower-income country with an estimated per capita income of US$740 in 2011 and a ranking of 134 out of 169 countries in the 2010 Human Development Index. Benin's population (8.93 million inhabitants in 2009) is fragmented into forty-two different ethnic groups, the most prominent being the Fon and the Adjas in the south, the Baribas and the Sombas in the north, and the Yorubas in the southeast.

Since its independence on August 1, 1960, the political history of Benin has been chaotic. A succession of military governments ended in 1972, with the last military coup—led by Mathieu Kerekou—and the establishment of a government based on Marxist-Leninist principles. A move to democracy began in 1989. Two years later, as a result of free elections, the former prime minister, Nicephore Soglo, became president. Kerekou regained power in 1996. With the political support of the north of the country (Alibori, Atacora, Borgou, and Donga), he won subsequent elections in 2001. Having served two terms and being over seventy years old, he was ineligible to run in the presidential election of 2006. He was succeeded by Thomas Yayi Boni, an independent political outsider. In March 2007, President Yayi Boni strengthened his position after the legislative elections in which his coalition, Force Cauris pour un Benin Emergent (FCBE), won the largest number of seats (thirty-five out of eighty-three) and negotiated a progovernment majoritarian coalition in parliament with seven minor parties. With a strong electoral basis from the northern communes, he was reelected in 2011 with

7. Competition among jurisdictions to attract mobile capital is a way to discipline governments, motivating them to invest more in infrastructure, reduce waste and corruption, and spend less on nonproductive public goods. But Cai and Treisman (2005) emphasize that the required assumptions (perfect mobility, perfect local autonomy, etc.) are often unrealistic, and capital mobility may even weaken the discipline of the poorly endowed units.

the pivotal support of the southern part of the country (Atlantique, Collines, and Mono).

3.3.2 The Decentralization Process

The decentralization process in Benin began in 1998 through the transfer of several competencies to local Beninese jurisdictions, called communes. While an elected local government manages each commune, a representative of the central government is in charge of the *départments* to which the communes belong. Local elections were held in 2002 and 2007. Benin has seventy-seven communes in twelve *départements*.[8] As in many French-speaking African countries,[9] the territorial shape of Beninese communes results from colonial history and not from any economic consideration with regard to efficiency in public goods provision. For instance, Tanguieta stretches out across more than 5,460 square kilometers for a population of 62,321 inhabitants in 2008 (11.4 inhabitants per square kilometer), while Akro-Misserete contains 98,961 inhabitants on only 79 square kilometers (1,252 inhabitants per square kilometer).

In January 1999, Law No. 97-029 defined the competencies transferred from the central government to the seventy-seven communes. Their scope was large, ranging from elementary schooling to economic development, and including transport infrastructure, environmental programs, health services, social goods, tourism, security, and cultural activities. We may distinguish four kinds of competencies: exclusive local competencies, shared competencies, delegated competencies, and specific competencies. For delegated competencies, local jurisdictions act as representatives of the central state. Specific competencies concern some communes that have particular statuses (Cotonou, Porto-Novo, and Parakou). Table 3.1 summarizes these competencies.

The distinction between shared and exclusive local competencies is largely subjective, linked to our interpretation of the relevant law and of observed practices in Benin. First, the transfer of competencies is obviously progressive and may take some time. For instance, the effective role of communes in water and sanitation is limited. The SONEB (Societé Nationale des Eaux du Benin) is a public enterprise still in charge of drinking water supply and sewage disposal in urban areas. A deconcentrated service, the General Direction of Water, remains essential in rural areas. Second, some competencies, such as primary education, require some technical and financial support from the central government.

Usually, a transfer of competencies implies a transfer of financial resources. Table 3.2 presents Beninese communes' revenues, distinguishing local own-revenue (tax and nontax) and other local revenue (central con-

8. Communes are themselves divided into 546 districts.

9. Burkina Faso counts 351 communes for 16.2 million inhabitants, while Mali has 703 communes for 15 million inhabitants.

Table 3.1 Beninese communes' competencies

Type of competencies
Exclusive local competencies
Transport infrastructure: Maintenance of local roads, public lightings
Shared competencies
Hygiene conditions: Sewage and refuse disposal (latrines, septic tanks, etc.), drinking water
Education: Construction and maintenance of public primary schools, adult literacy, cultural public infrastructures, sports, and leisure
Delegated competencies
Public records office, security, publication and application of laws
Specific competencies
Secondary schools, security, communication

Source: Law No. 97-029 of Benin Republic, January 15, 1999.

ditional and unconditional grants, external transfers, loans, and advances), over the period 2006–2007. A local representative of the central tax administration (Directions Departementales des Impots) collects local taxes, mainly property and patent taxes.[10] By contrast, local governments support collection costs of nontax own-revenue, essentially revenue related to occupations in the public domain (market stalls, parking tolls, kiosks, hoardings, etc.), as well as to some administrative services. Central conditional grants represent about 25 percent of local revenue with some huge disparities: less than 3 percent for Atlantic and more than 30 percent for Oueme. Unconditional transfer is another source of Beninese communes' revenue. It corresponds to a retroceded tax, the road tax, collected by customs on exports (0.85 percent of the value of exported goods).[11] Generated revenue is shared among communes following a fixed rule: 80 percent is allocated to three "special" communes (Cotonou, 60 percent; Porto-Novo, 24 percent; and Parakou, 16 percent). The rest is distributed among the seventy-four other communes according to their respective demographic weight.

Beninese communes are characterized by a low average level of per capita revenue with about CFAF 2,200 (US$4.7) over the period studied (2006–2007). Moreover, important inequalities exist among communes: the revenue per capita of the twenty poorest communes represents only 50 percent of the revenue of the five richest ones. Local governments' revenues also differ in their composition. For instance, Parakou and Porto-Novo, despite having similar per capita revenues (around CFAF 6,500), have 50 and 35 percent of local own-revenue, respectively.

Regarding our criteria of financial autonomy, Benin is characterized by

10. Beninese local governments can also tax mining, advertisements, and taxi drivers, and they have the opportunity to collect a tax on local development (see Chambas [2010] for a detailed analysis of local fiscal resources in sub-Saharan Africa, in particular in Benin).

11. The authorities abolished this tax in 2009 for transit goods being exported to landlocked countries such as Niger and Burkina Faso.

Table 3.2 **Average composition of Beninese communes' per capita revenue (CFAF)**

	Average level	Percentage of total resources
Total local revenue	2,175	100
Own-revenue	**1,137**	**52**
Local nontax own-revenue	623	29
Local tax own-revenue	514	23
Other local revenue	**1,038**	**48**
Unconditional central grants	225	11
Conditional central grants	571	26
External transfers	225	10
Loans and advances	17	1

Source: Beninese Ministry of Finance and Economy.

strong geographical disparities (see figure 3.1) where south and northeast communes collect more own-revenue.

3.3.3 Local Public Goods Provision and Poverty

Since 1999, Benin has been involved in a national strategy aimed at reducing poverty for human sustainable development through its successive Growth and Poverty Reduction Strategy (GPRS). The main objective of the latest GPRS for the 2011–2015 period is the improvement of the living conditions of the population with specific attention to water, basic sanitation, primary education, and primary health care sectors in line with the Millennium Development Goals (MDGs). Poverty, which is a general state of deprivation, is multidimensional. It is usually associated with conditions under which people live. Poverty may be viewed in either absolute or relative terms. Absolute poverty is a situation in which a person or group of persons is unable to satisfy the most basic and elementary requirements of human survival in terms of good nutrition, sanitation, transport, health, education, and recreation.

Several approaches exist that enable us to appreciate the level of poverty in Benin. Based on the monetary approach, the proportion of poor people in Benin in 2009 is estimated at 35.21 percent, which means that more than one of every three persons is living below the subsistence level (2011–2015 GPRS). An alternative approach involves looking at nonmonetary poverty, based on a composite index, including variables of household living conditions and property or assets. This measure stated that 30.84 percent of the Beninese population was poor in terms of subsistence and property in 2009. A geographical cleavage between rural and urban communes seems to matter. Indeed, urban communes located in the Littoral, Collines, and Oueme departments display a rate of poverty of 13, 17, and 19 percent respectively, namely two times less that the Beninese average. A final and crucial dimension of poverty in developing countries concerns the dynamic trend of poverty mobility. Availability of data does not allow for a robust

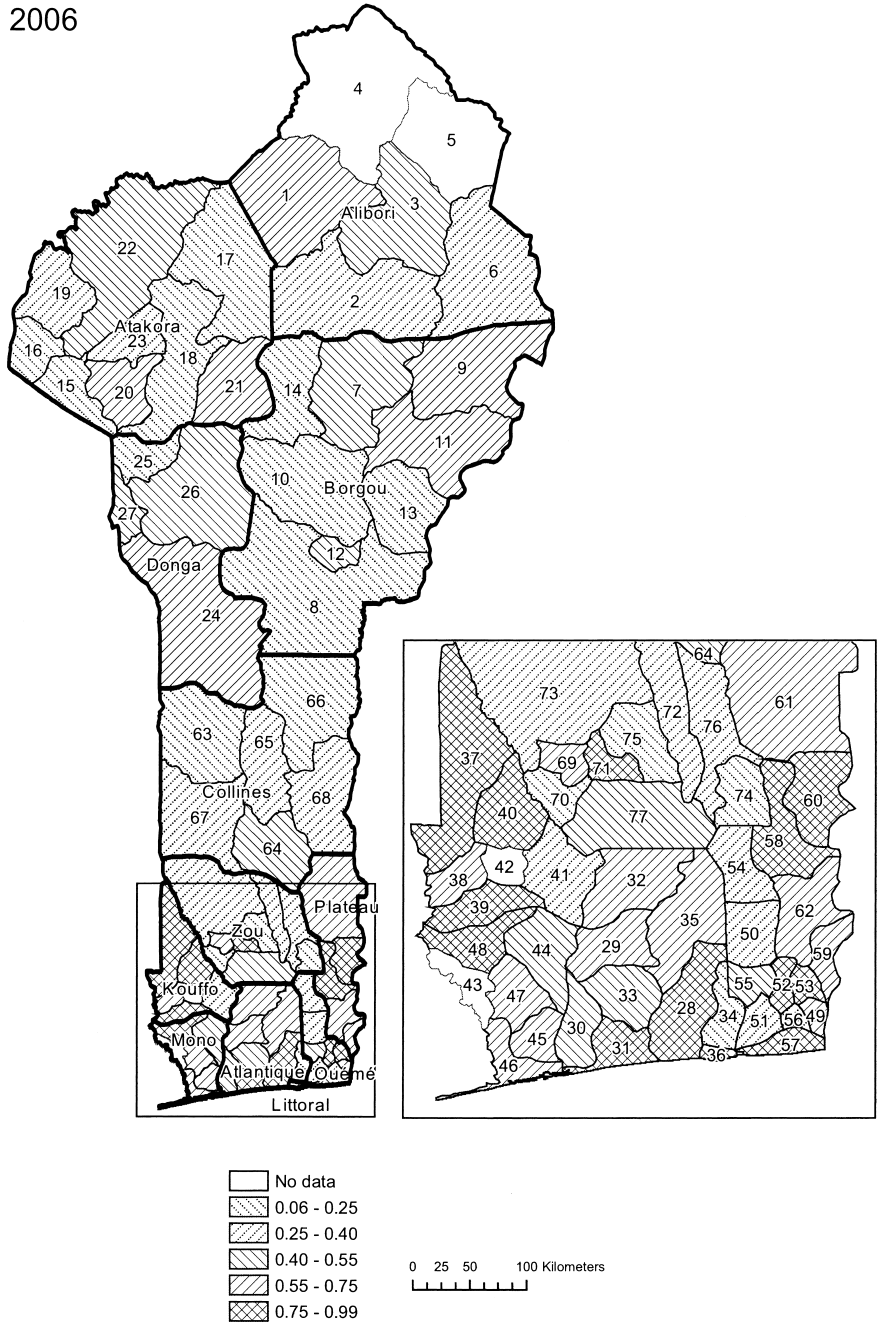

Fig. 3.1 Share of local own-revenue by commune (2006 and 2007)
Source: http://wwwgadm.org/country; authors' calculations.

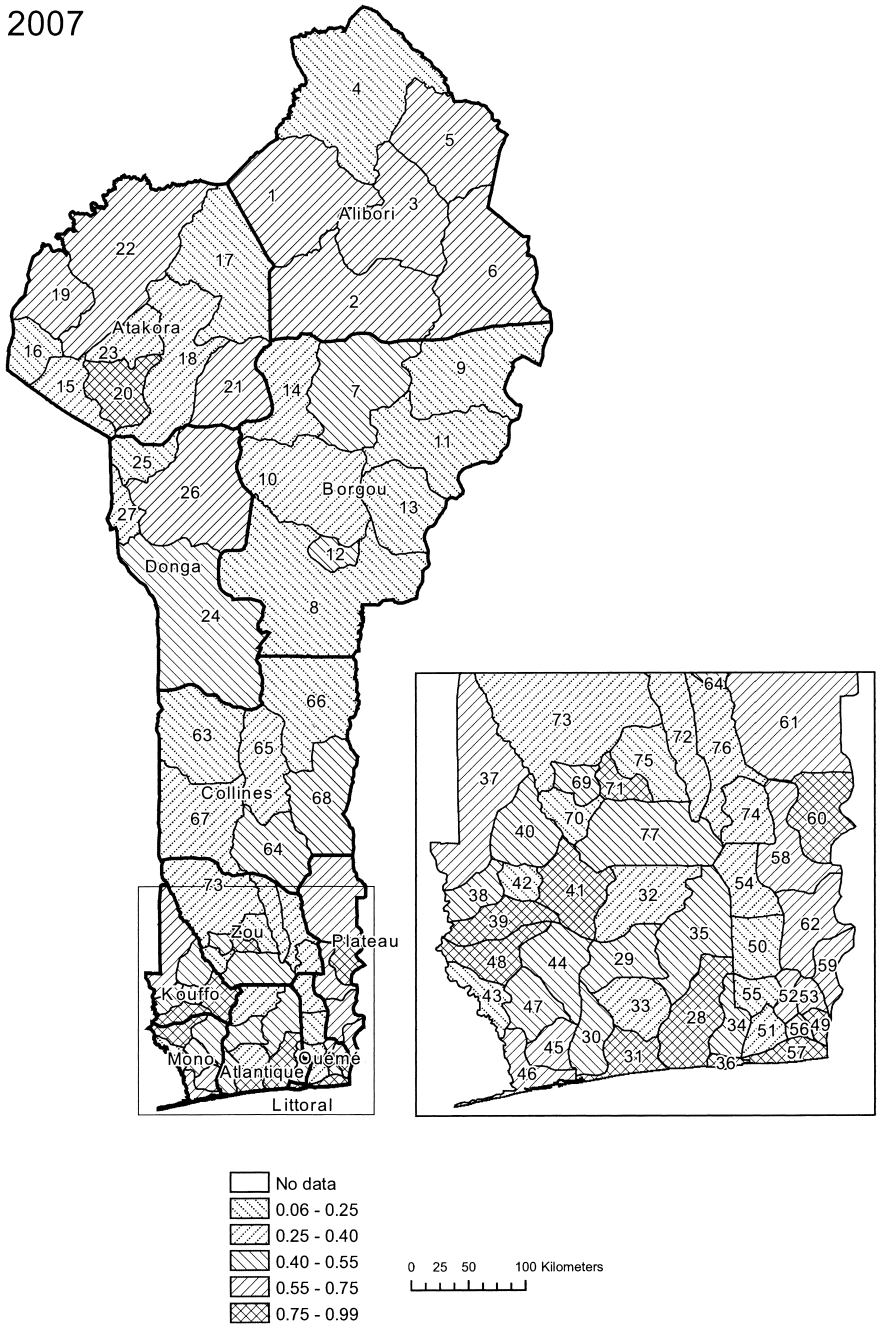
2007
Alibori
Atakora
Borgou
Donga
Collines
Zou
Plateau
Kouffo
Mono
Atlantique
Ouémé
Littoral
No data
0.06 - 0.25
0.25 - 0.40
0.40 - 0.55
0.55 - 0.75
0.75 - 0.99
0 25 50 100 Kilometers

Fig. 3.1 (cont.)

discussion regarding the extent to which the implementation of national and local public policies has positively affected the reduction of poverty. The current situation remains ambiguous. For instance, between 2006 and 2007, income poverty fell by roughly 4 percentage points, versus 2.4 points in the case of nonincome poverty. On the other hand, between 2007 and 2009, income poverty rose by 1.9 percentage points. This increase in income poverty between 2007 and 2009 is the result of the effects of the economic and financial crises, which caused household consumer spending to fall. Nonincome poverty registered a substantial decline of 9 percentage points, falling from 39.6 percent in 2007 to 30.85 percent in 2009. This decline is the result of various actions taken by the government, during the period 2007–2009, to improve access to basic social services. In particular, these actions involved the construction of water points and school infrastructure. Such policies have not only been implemented at the central level, but are also the responsibility of local governments when they have legal competencies for providing local poverty-related goods.

In order to tackle the methodological problems resulting from an overly broad definition of poverty, we have chosen an approach that confines poverty-related issues to five main basic services: toilet facilities, drinking water, sewage, garbage, and primary education. In this way, we are able to assess the impact of decentralization on major dimensions of poverty issues.

3.4 Econometric Framework

In this section, we present our empirical strategy. We first test the average effect of decentralization on access to poverty-related services. We then assess its distributional effect between jurisdictions by distinguishing communes according to their wealth.

3.4.1 Data

We use several sources of information. The Beninese Ministry of Finances and Economy provided us with the communes' accounts. The 2006 and 2007 Integrated Modular Surveys on Household Living Conditions (EMICoV) contain information concerning individual education level, household consumption and wealth, and access to several local public goods. They cover a sample of 18,000 Beninese households across the entire national territory. The sample includes 7,440 urban households and 10,560 rural households.[12] The major uniqueness of these surveys lies in their representative character at the commune level, allowing us to measure aggregated and distributional indicators at the study level as described below. Data concerning population, urbanization rate, and ethnic fragmentation are drawn from the General Population and Housing Census in Benin (1992 and 2002) and seventy-seven

12. This sample is a stratified one, selected in two stages: stratification was achieved by separating every commune into urban and rural areas.

communes' monographs provided by the European Union (Programme d'Appui au Démarrage des Communes).

Testing the Average Effect of Decentralization on Access to Basic Services

Our empirical analysis focuses on universal basic needs, setting aside any normative considerations in terms of welfare. It appears more relevant to study actual access to public services than ultimate effects on individual well-being, which may depend on many factors outside local governments' control. We consider several basic services that have been assessed through the EMICoV surveys: toilet facilities, water access, refuse and sewage disposal, and primary education. Table 3.3 gives the detailed list of indicators, denoted by Y_{it}, for each kind of service.

These indicators are all measured at the household level except for education indicators, which require individual data (level of education of the respondent). To assess public services access we use two indicators: the first measures the share of households or individuals having access to the service (quantity) and the second reflects the qualitative scale of the service provided (quality). By using these two measures, we are able to capture, in a comprehensive way, how decentralization has or has not facilitated access to poverty-related services. Reasoning only on the quantity would be fallacious, as such a measure does not reveal to what extent local citizens have benefited from an improvement in the quality of local public goods.

To better understand how quantitative and qualitative variables have been computed, let us describe the first indicator, namely toilet facilities. The

Table 3.3 Indicators of basic services access

Basic services, Y_{it}	Indicators
Toilet facilities	Share of households having access to a toilet or latrine facility, $SToil_{it}$ Type of toilet facility (no facility, bucket/pan, latrine with composting, suspension latrine, nonflagged pit latrine, nonventilated pit latrine, ventilated pit latrine, own flush toilet, flush toilet), $TToil_{it}$
Water access	Share of households having access to drinking water, $SWat_{it}$ Source of drinking water (rainwater, rainwater in tanker truck, river, pond, protected spring, nonprotected well, protected well, borehole with manual pump, borehole with automatic pump, public tap, piped somewhere, piped into residence), $TWat_{it}$
Refuse disposal	Share of households having access to refuse disposal facilities, $SGarb_{it}$ Type of refuse disposal (nature, courtyard, burning, burying, rubbish dump, collection truck [NGO], collection truck [public]), $TGarb_{it}$
Sewage disposal	Share of households having access to sewage disposal facilities, $SSew_{it}$ Type of sewage disposal (nature, courtyard, well, grid/downstream, open pipe waste, covered pipe waste, draining), $TSew_{it}$
Primary education	Primary school enrollment for children ages six to eleven, SE_{it}

Source: EMICoV surveys, 2006 and 2007.

Table 3.4 Descriptive statistics

Basic services, Y_{it}	Mean	Std. dev.	Min.	Max.
Degree of decentralization, D_{it}	0.484	0.235	0.066	0.986
Public spending per capita, G_{it}	7.218	0.778	4.521	9.436
Per capita consumption, C_{it}	11.754	0.464	10.513	12.970
Population size, Po_{it}	11.356	0.529	10.250	13.500
Population density, De_{it}	338.084	1,050.57	7.382	9,235.63
Urbanization rate, U_{it}	0.278	0.232	0	1
Ethnic fragmentation, F_{it}	0.357	0.232	0.013	0.822
Partisan affiliation, Pa_{it}	0.305	0.461	0	1
Toilet facility				
$SToil_{it}$	0.237	0.208	0	0.969
$TToil_{it}$	2.836	1.541	1	7.958
Water access				
$SWat_{it}$	0.306	0.249	0	0.994
$TWat_{it}$	7.214	1.060	4.748	10.559
Refuse disposal				
$SGarb_{it}$	0.033	0.102	0	0.684
$TGarb_{it}$	1.255	0.466	1	3.785
Sewage disposal				
$SSew_{it}$	0.009	0.026	0	0.184
$TSew_{it}$	1.138	0.156	1	1.785
Primary education, SE_{it}	0.876	0.149	0.236	1

EMICoV survey provides the share of households having access to a toilet. On average, 23.7 percent of Beninese households claim to have a toilet facility (table 3.4). The quality of the toilet measured by the scale in table 3.3 takes the value 1 for no facility to 9 for a flush toilet. Using responses from EMICoV respondents, we compute an average index at the commune level that indicates that households in only one commune (Toucountouna) have no toilet facilities, and 10 percent of the population has at least nonflagged pit latrines. As depicted in figure 3.2, only six communes out of seventy-seven converge toward the best quality of toilets with a score superior to 6, that is, those including either nonventilated pit latrines, ventilated pit latrines, or flush toilets. As local governments are in charge of sanitation facilities, decentralization should produce more efficient and equitable service delivery by making better use of knowledge of local needs. The same coding procedure applies for the four other indicators. Sewage and garbage facilities are respectively depicted in figures 3.3 and 3.4. We observe a small variance for every basic service among jurisdictions, with the exception of Segbana, which displays the highest level of sewage and garbage disposal and drinking water in the region (Alibori). One explanation for this discrepancy is linked to the development of hydraulic plans (DED and PADEAR-DANIDA projects). There exist sixty-seven drillings and fifty-four modern shafts that allow the center to be served by the water supply network (SONEB). Figure 3.5 illustrates the diversity of quality for sources of drinking water.

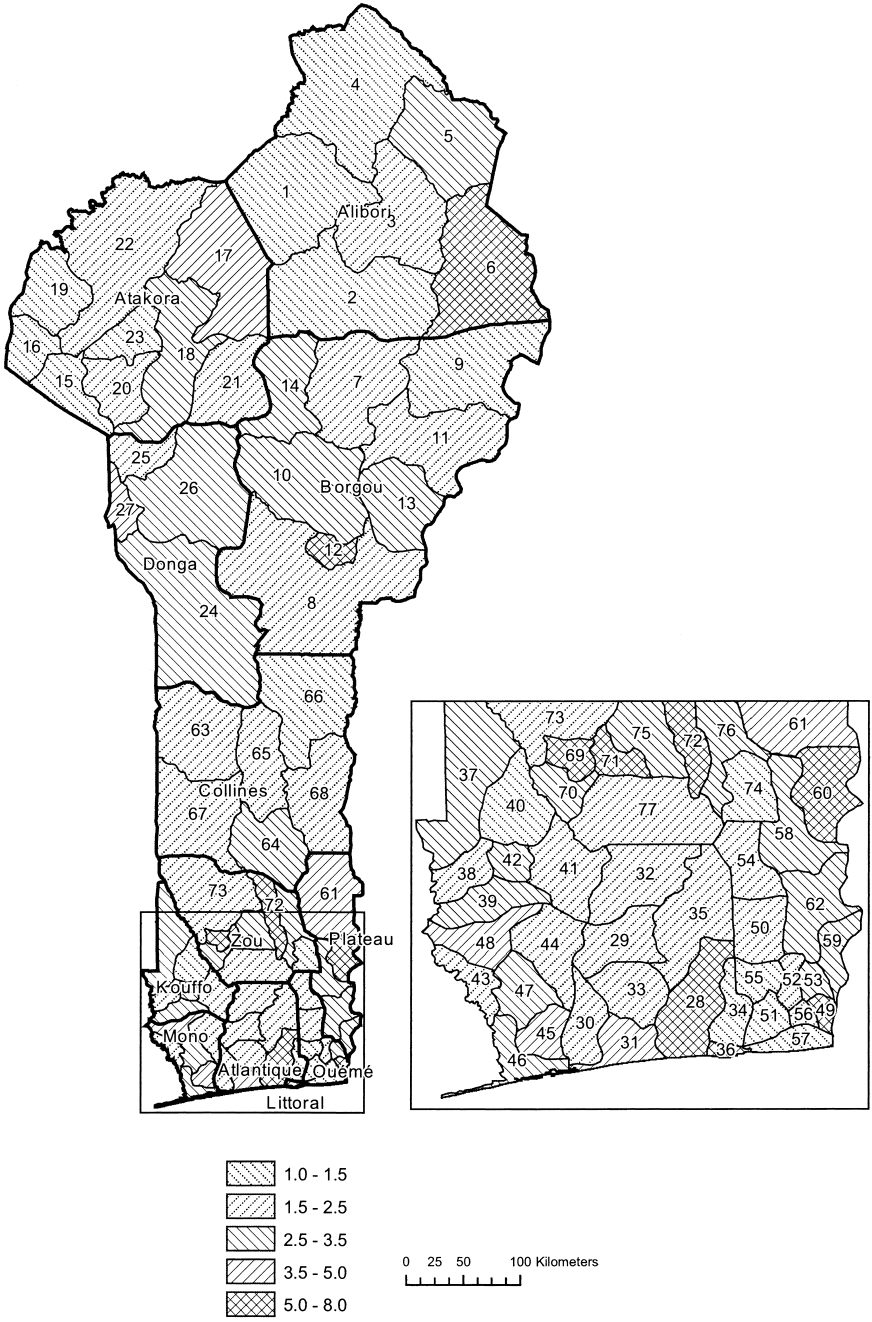

Fig. 3.2 Toilet quality

Source: http://www.gadm.org/country; authors' calculations.

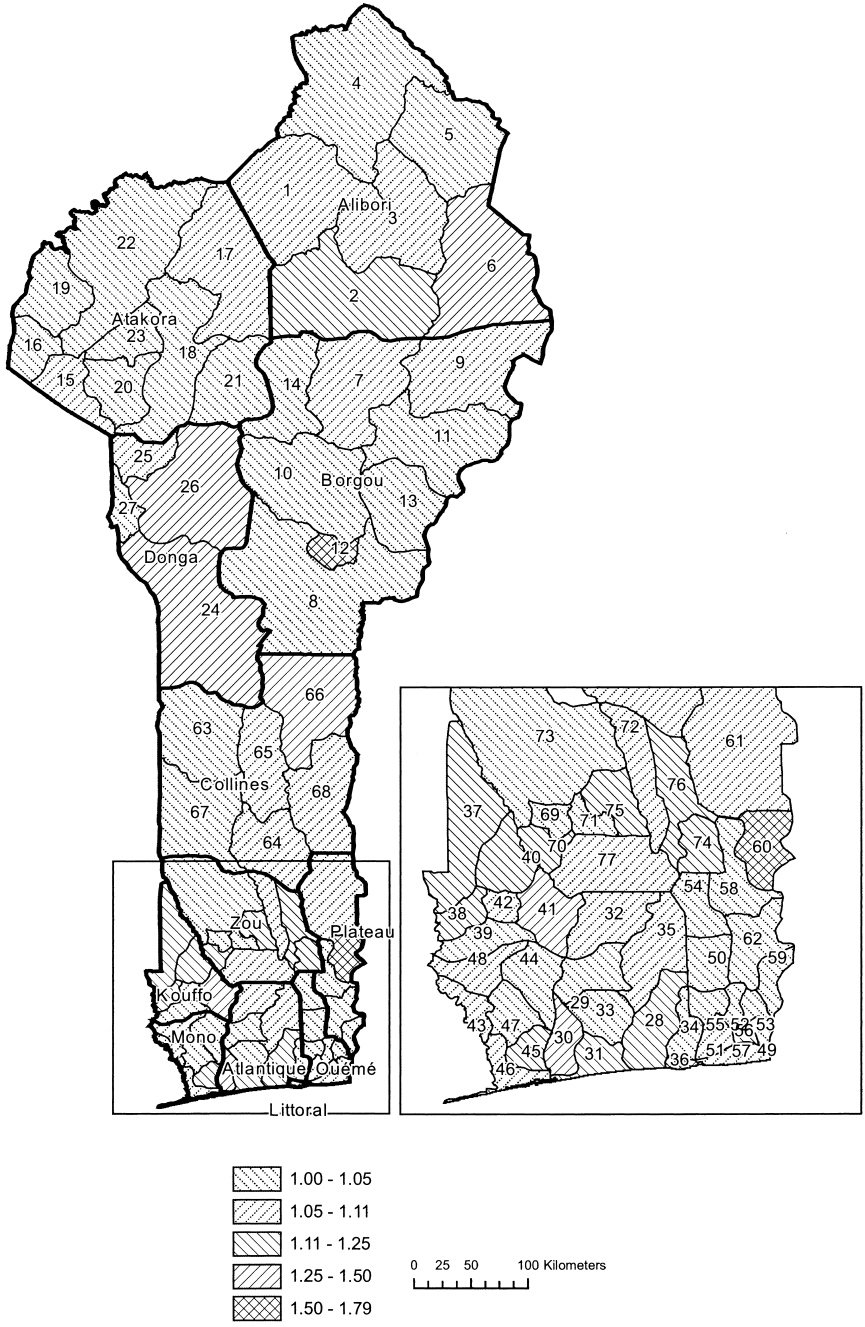

Fig. 3.3 Sewage quality

Source: http://www.gadm.org/country; authors' calculations.

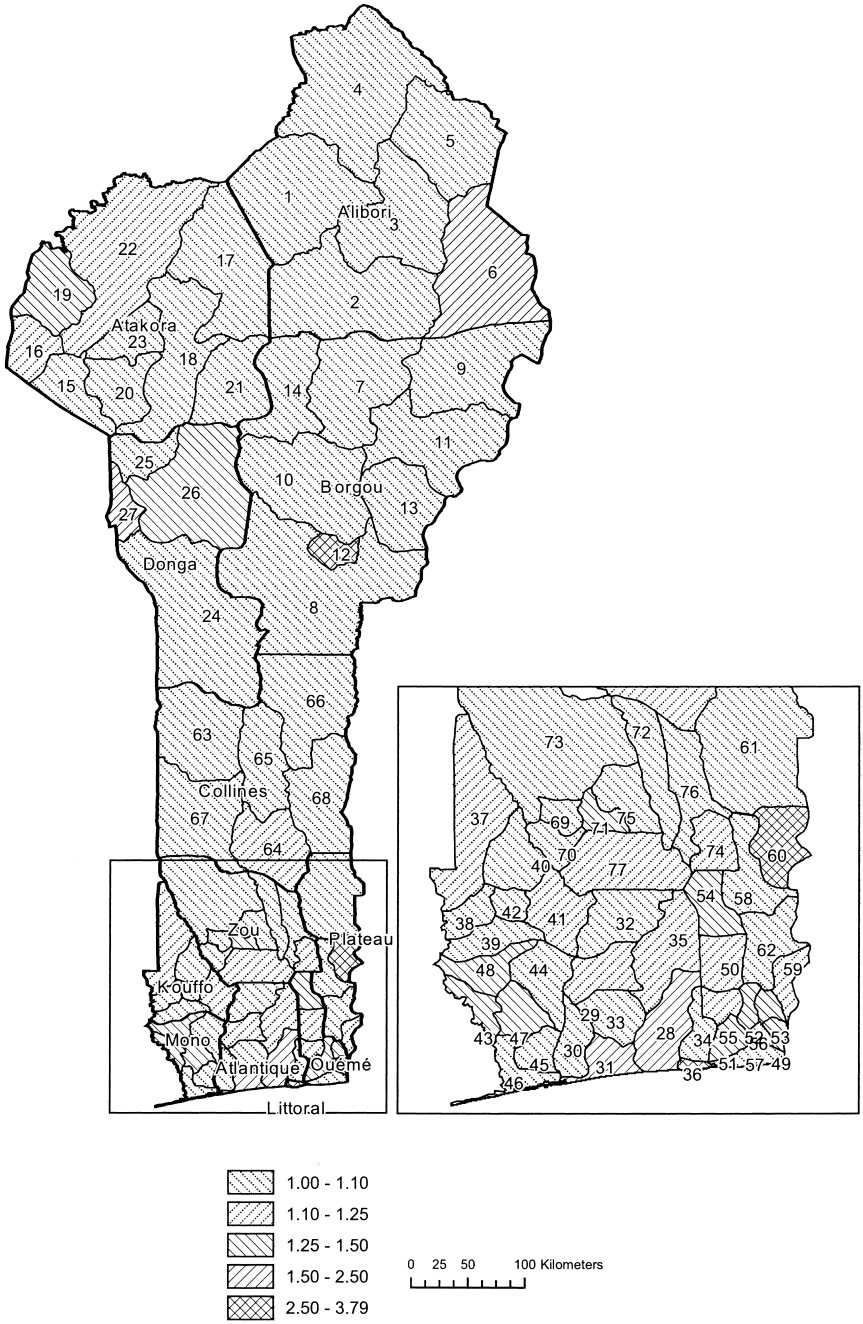

Fig. 3.4 Garbage quality

Source: http://www.gadm.org/country; authors' calculations.

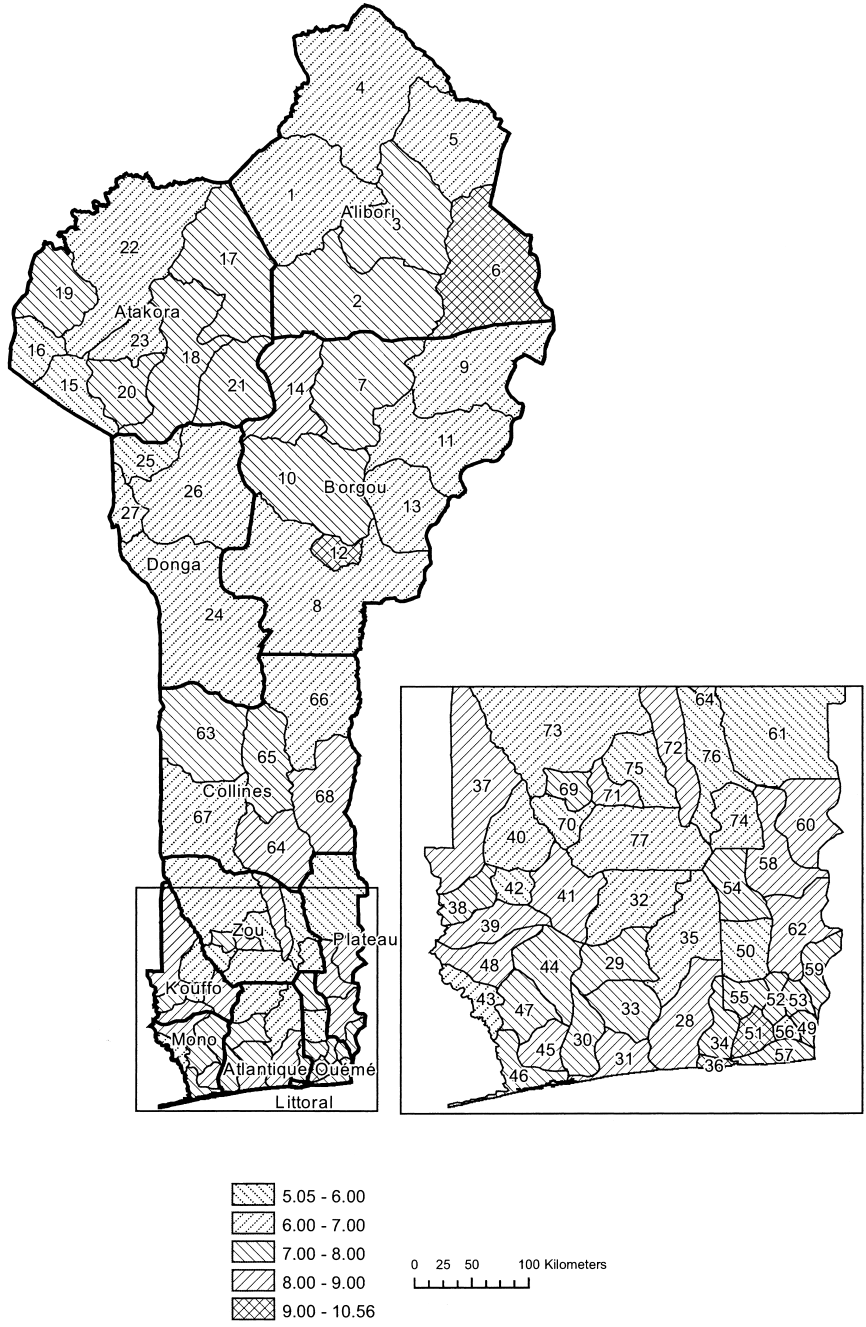

Fig. 3.5 Drinking water quality

Source: http://www.gadm.org/country; authors' calculations.

In sum, combining consolidated household data on access to services, and the nature of locally provided public good quality to local public finance offers a new avenue for evaluating the impact of decentralization in both dimensions.

3.4.2 Empirical Models

The degree of decentralization, denoted by D_{it}, is the share of local own-revenue in a given commune's total revenue. This measure is used in the literature as an indicator of financial autonomy, and also allows us to approximate the accountability of local governments. Indeed, while central transfers are often opaque to taxpayers, who are then unable to judge the efficiency of local policies, the link between local taxes and local public services provided is more immediate and may provide an incentive for local officials to improve their efficiency.

We add several control variables. Time dummies, denoted by t_t, serve as controls for omitted explanatory variables that vary over time, but remain constant between communes, and can influence the share of local governments' own-revenue. We also control for explanatory variables that may be correlated with the degree of decentralization, and that vary across both communes and time. Since we consider the effect of local revenues' composition, and not the impact of local public spending itself, we introduce communes' per capita public spending, denoted by G_{it}. We are then able to see if a higher degree of decentralization affects the efficiency of local policies, given the level of local public spending. This control variable is essential because the communes' public spending affects the level of received transfers, the measured degree of decentralization, and access to basic services.[13] For similar reasons, we introduce per capita consumption, (measured by an index of about 1,200 commodities and services).[14] Studying jurisdiction population size (Po_{it}) and population density (De_{it}) allows us to capture, respectively, overrepresentation of smaller jurisdictions and some scale economies in the provision of public goods studied. We also consider urbanization rates, denoted by U_{it}, since urban areas generally offer better access to basic services and have higher fiscal capacities, especially in terms of the property tax base. Finally, ethnic fragmentation, denoted by F_{it},[15] may be correlated with the degree of decentralization and affects the provision of public goods in quantity and quality (Alesina and Ferrara 2005).

Table 3.4 provides some descriptive statistics. The main independent vari-

13. Although the pursuit of an equitable allocation of resources would lead one to expect a pro-poor allocation of transfers across jurisdictions, most empirical studies (Wallis 1998; Meyer and Naka 1999; Alm and Boex 2002) find that wealthier local governments receive greater intergovernmental transfers, indicating that political considerations outweigh those of equity.

14. Provided by the EMICoV surveys.

15. Ethnic fragmentation in commune *i* on year *t* is defined as the probability that two individuals randomly drawn from one commune are from different ethnic groups.

able (degree of decentralization, D_{it}) is quite normally distributed with a median value and a mean of 0.48. Nevertheless, the mode of distribution indicates that most communes (around 22 percent) have collected about 15 to 22 percent of own-revenue. Conversely, only eight communes located in the southern part of the country perform very well in taxes, having raised more than 85 percent of own-revenue. Among control variables the average value of C_{it} is CFCA 142,598, the median is CFCA 123,042, and the ninety-fifth percentile is CFCA 299,798. To put these numbers in perspective, note that in strongly urbanized communes the average per capita consumption (CFCA 197,645) is higher than the national average due to the better situation of the first quintile, which entails a higher median value (CFCA 223,688). Another wealth measure is provided by W_{it}, a score based on the Demographic and Health Survey's (DHS) wealth index, which provides each household's position on an index of asset wealth at the national level using principal components analysis (PCA) weights.[16] This variable fluctuates between –1.72 (poorest households) and 4.54 (wealthier households). Despite a significant correlation between C_{it} and W_{it}, the latter is a good proxy for permanent wealth, whereas the former is more sensitive to the economic conjuncture. Finally, ethnic fragmentation, measured by probability that two randomly selected individuals belong to the same ethnicity, indicates that the Beninese are strongly fragmented with an average value of 0.36. Such a cultural pattern is expected to affect preferences for public goods provision in the sense that ethnically heterogeneous communities may express contrasted needs or define different priorities for basic services delivery.

We start with the following simplest regression, which assesses the average impact of decentralization on access to basic services:[17]

$$(1) \qquad Y_{it} = \beta D_{it} + \theta G_{it} + \gamma C_{it} + \rho Po_{it} + \tau De_{it} + \omega U_{it} + \phi F_{it} + t_t + \varepsilon_{it}.$$

We also consider a nonmonotone effect of the degree of decentralization by introducing its quadratic term (D_{it}^2):

$$(2) \quad Y_{it} = \beta_1 D_{it} + \beta_2 D_{it}^2 + \theta G_{it} + \gamma C_{it} + \rho Po_{it} + \tau De_{it} + \omega U_{it} + \phi F_{it} + t_t + \varepsilon_{it}.$$

A Heterogeneous Effect between Communes

In addition to the average impact of decentralization on access to public services, we study its effect by distinguishing communes by their respective wealth. This analysis allows us to assess the overall impact of decentralization on intercommune inequalities in terms of access to basic services. We obtain the following regression:

16. The general methodology used to calculate the wealth index is given in Filmer and Pritchett (2001). The specific approach used in the DHS is described in Rutstein and Johnson (2004).

17. Population, per capita public spending, and per capita consumption are given in logarithmic terms.

$$(3) \quad Y_{it} = \beta_1(D_{it}*QP_{it}) + \beta_2(D_{it}*(1 - QP_{it})) + \phi QP_{it} + \theta G_{it} + \gamma C_{it} + \rho Po_{it} + \tau De_{it} + \omega U_{it} + \varphi F_{it} + t_t + \varepsilon_{it},$$

where QP_{it} is a dummy variable taking the value 1 if the commune i belongs to the first quintile of poor communes and zero otherwise. Following Filmer and Pritchett (2001) we define an asset-based measure of wealth, denoted by W_{it} for each commune using the EMICoV.[18] However, the DHS index underestimates the wealth of rural areas since urban populations own many valuable assets. Following Rutstein (2008), we compute a national-level composite index from wealth indexes that have been separately constructed for urban and rural areas. We then consider the average score by communes and divide the latter into quintiles to distinguish the poor from the nonpoor. The same procedure applies for the first quintile of wealthier communes in order to control how decentralization may lead local governments to define priorities in delivering poverty-related services. In so doing, we assume that all local public goods are not provided according to the same economic and political determinants, that is, poor communes are expected to make greater efforts in facilitating access to drinking water than in organizing high-quality systems of waste disposal or sewage facilities.

Econometric Issues and Identification Strategy

Given the small number of time series with respect to cross-sectional observations and the fact that some variables have little within variance, we first estimate pooled ordinary least squares (OLS) regressions with year dummies. This estimation method increases the degree of freedom and allows for inquiry into variables that have low variability. However, it assumes that control variables capture all relevant communes' characteristics.

This estimate may be biased by unobserved heterogeneity between communes. Our panel data allows for controlling a large number of unobserved explanatory variables by using the fixed effects (FE) estimator. However, the traditional FE method fails in estimating the effects of variables that have little within variance, a problem worth considering when analyzing two successive years of observations. To assess coefficients of time-invariant variables and to control for commune-specific effects, we use the Fixed Effects Vector Decomposition estimator (FEVD) developed by Plümper

18. Due to the abundance of household survey data on asset ownership and the considerable bias measurement error associated with reported income or consumption, a substantial body of literature has developed an asset-based measure of wealth. Filmer and Pritchett (2001) conclude that the DHS wealth index actually performed better than the traditional consumption or expenditure index in explaining differences in economic statuses. From the EMICoV, we built such a DHS measure based on a myriad of assets (cars, canoes, hi-fi systems, refrigerators, iron, beds, phones, motorcycles/scooters, radios, VCRs, DVD players, ovens/stoves, washing machines, chairs, sewing machines, cell phones, bicycles, televisions, video recorders/VCRs, fans, foam mattresses, computers, Internet access, land, home ownership, types of fuel, building materials, etc.).

and Troeger (2007).[19] Through a three-step procedure, this estimator allows for a decomposition of the unit fixed effect into two parts: an explained part by time-invariant variables and an unexplained part.[20]

To correct for other potential endogeneity biases in the estimation of the causal effect of decentralization on access to basic services, we instrument the degree of decentralization using a dummy variable, denoted by PA_{it}, taking the value 1 if the commune i has the same political affiliation as the president in office. This dummy variable differs between 2006 and 2007 since Yayi Boni was elected in April 2006, succeeding Mathieu Kerekou. Partisan affiliation is a good instrument of decentralization in a regression involving access to public services. In the relevant literature, a jurisdiction that has greater political support from the central government receives more transfers from the latter (see Cox and McCubbins [1986] for a theoretical argument, Case [2001] for the Albanian case, and Miguel and Zaidi [2003] for the Ghanaian case).

3.5 Estimation Results

This section presents our empirical results using panel data from seventy-seven Beninese communes for 2006 and 2007.

3.5.1 The Average Effect of Decentralization on Access to Basic Services

Figures 3.6, 3.7, 3.8, 3.9, and 3.10 confirm our expectations that a higher degree of decentralization is positively correlated to better access to poverty-related services.[21] However, the most decentralized communes are the richest, most populated, and most urbanized (table 3.5). These variables are also associated with easier access to basic public services (table 3.6). This confirms the important role of our control variables in avoiding endogeneity bias.

To test the average effect of decentralization on access to basic services (equation [1]), we first run the pooled OLS regressions with year dummies, introducing our control variables progressively (columns [1] to [7]). Considering potential unobserved heterogeneity between communes, we then use the FEVD estimator (column [8]). Finally, we instrument for the degree of

19. Based on Monte Carlo simulations, Plümper and Troeger (2007) compare the vector decomposition model with the FE model, the random effects (RE) model, pooled OLS, and the Hausman-Taylor procedure and find that, while the FE model does not compute coefficients for the time-invariant variables, the vector decomposition model performs far better than other procedures.

20. First, the unit fixed effect is estimated by running a fixed effect estimate of the model. Second, the latter is split into its two parts by regressing it on the time-invariant variables of the model. The unexplained part corresponds to the residuals of this equation, h_i. Third, the estimation of the full model is implemented by including the time-invariant variables and the unexplained part of the fixed effect vector estimated in the second step.

21. The relation is relatively weak for primary school enrollment (figure 3.10).

Table 3.5 Correlations of our key variables

Variables	D_{it}	G_{it}	C_{it}	Po_{it}	De_{it}	U_{it}	F_{it}
Degree of decentralization, D_{it}	1						
Public spending per capita, G_{it}	0.3294*	1					
Per capita consumption, C_{it}	0.3128*	0.5646*	1				
Population size, Po_{it}	0.3095*	0.5025*	0.5801*	1			
Population density, De_{it}	0.2431*	0.4656*	0.7571*	0.8080*	1		
Urbanization rate, U_{it}	0.2513*	0.4117*	0.5505*	0.5379*	0.4089*	1	
Ethnic fragmentation, F_{it}	0.0258	0.2696*	0.0817	0.2895*	0.0153	0.3330*	1

*Correlation coefficient significant at the 10 percent level.

Table 3.6 Correlations of our key variables

Variables	G_{it}	C_{it}	Po_{it}	De_{it}	U_{it}	F_{it}
Type of toilet facility, $TToil_{it}$	0.5155*	0.2760*	0.4030*	0.4274*	0.4108*	0.0018
Source of drinking water, $TWat_{it}$	0.5221*	0.3493*	0.3555*	0.3902*	0.2823*	0.1693*
Type of sewage disposal, $TSew_{it}$	0.3826*	0.1831*	0.4420*	0.4618*	0.3018*	0.0911
Type refuse disposal, $SGarb_{it}$	0.2321*	0.2987*	0.5511*	0.6045*	0.3771*	0.0533
Primary school enrollment, SE_{it}	0.2286*	–0.0638	0.0461	0.1058	0.0962	–0.1412

*Correlation coefficient significant at the 10 percent level.

decentralization with the partisan affiliation PA_{it} in column (9). Table 3.7 reports the relevance of our instrument.[22] Moreover, the Sargan overidentifying restriction test[23] indicates that we cannot reject the hypothesis that there is no correlation between the instrument and the error term in the regression stating that the partisan affiliation variable is a valid instrument. In tables 3.8, 3.9, 3.10, and 3.11, we highlight the fact that a higher degree of decentralization is consistently associated with improved access to water sources and sanitation systems. Table 3.8 indicates that the coefficient associated with the degree of decentralization is significantly different from zero and could be interpreted as follows: the impact of a 10 percentage point increase in decentralization represents an extra 3.7 percent in people having access to toilets or latrines. In other words, the standard deviation of the degree of decentralization (23.5 percent) implies an 8.69 percentage point increase for one standard deviation change. When we turn our attention to the quality of basic services, for instance, we find that once controlled for endogeneity bias, such services undergo a 10 percentage point increase

22. As in most empirical studies, political considerations outweigh those of equity: wealthier, smaller, or ethnically fragmented jurisdictions receive more intergovernmental transfers and are less autonomous.

23. We use the dummy variable indicating whether a commune has the same dominant ethnic affiliation as the president in office as another instrument to compute the Sargan test.

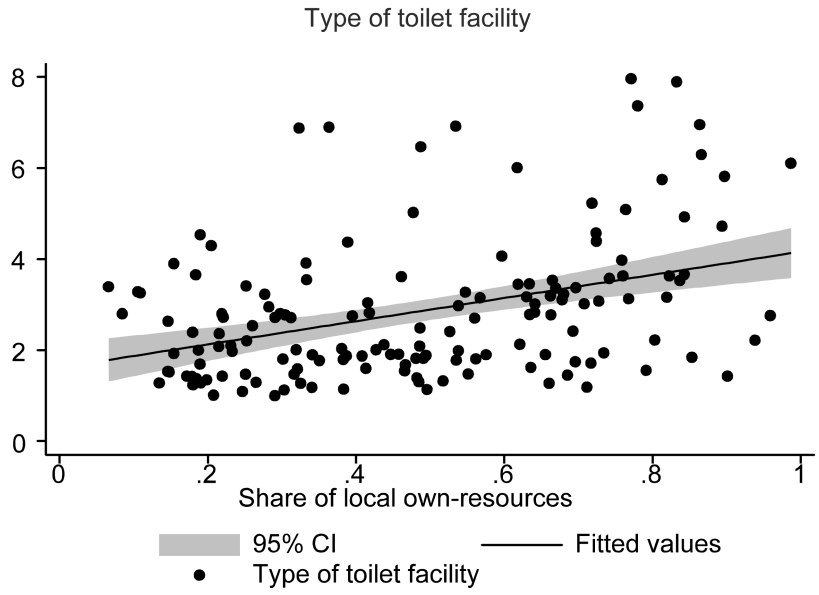

Fig. 3.6 **Share of local own-resources and access to toilet facility**

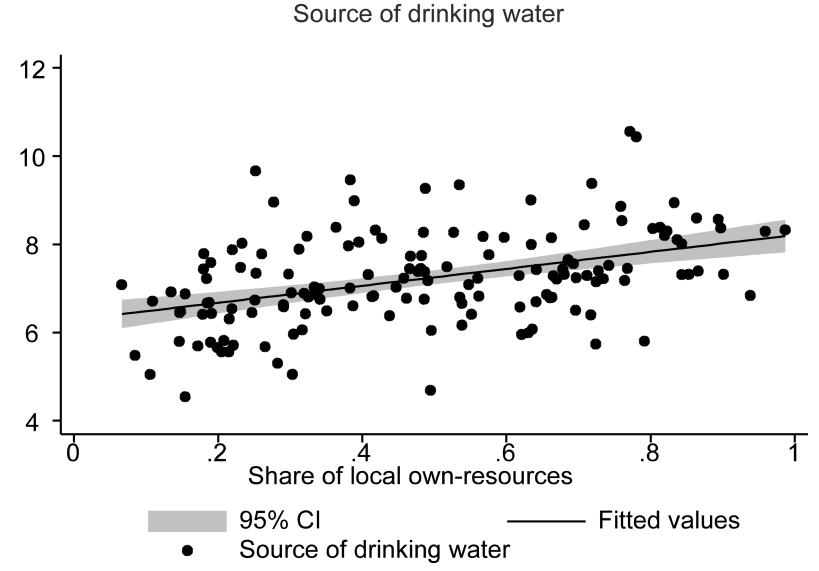

Fig. 3.7 **Share of local own-resources and access to water**

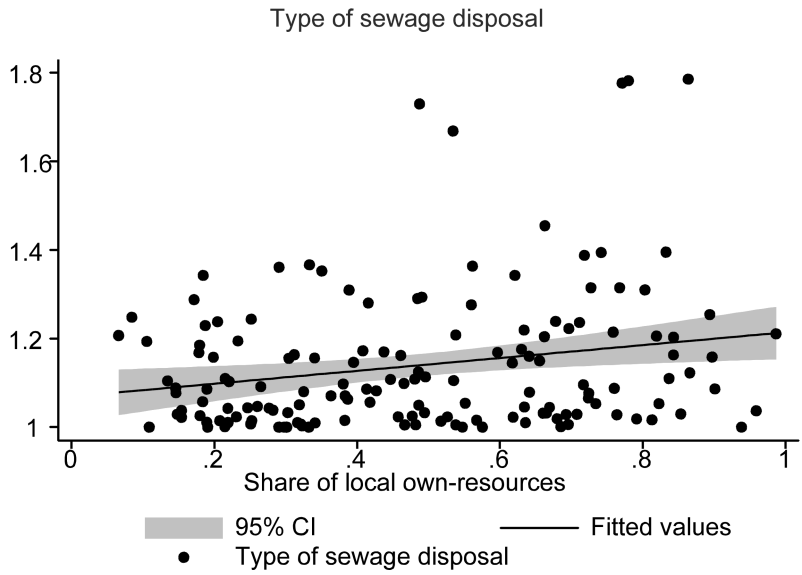

Fig. 3.8 Share of local own-resources and access to sewage disposal

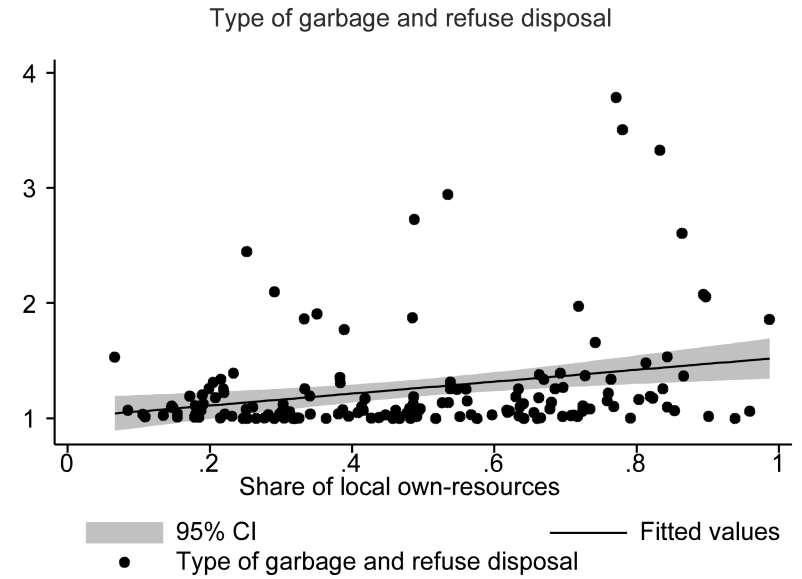

Fig. 3.9 Share of local own-resources and access to refuse disposal

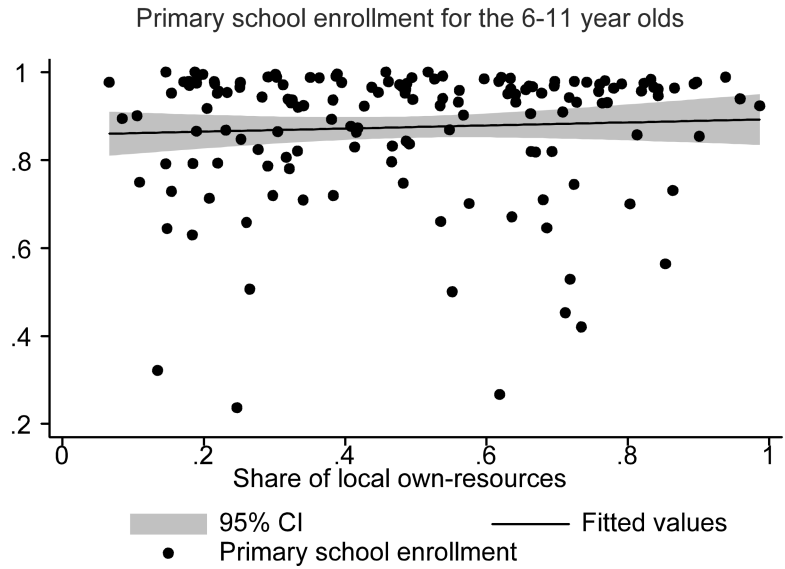

Fig. 3.10 Share of local own-resources and access to primary school enrollment

Table 3.7 Validity of our instrumental variable

	Dependent variable: D_{it}	
Partisan affiliation, PA_{it}	–0.026***	(0.000)
Public spending per capita, G_{it}	–0.027***	(0.002)
Per capita consumption, C_{it}	–0.053***	(0.004)
Population size, P_{it}	0.130***	(0.029)
Population density, De_{it}	0.002***	(0.000)
Urbanization rate, U_{it}	0.155***	(0.017)
Ethnic fragmentation, F_{it}	–0.104***	(0.029)
Constant	–0.182	(0.31)
Number of observations	145	
Adjusted R^2	0.68	
F-statistic	54,680	
Fixed effect	Yes	
Year dummies	Yes	
Sargan test (p -value)	0.519	

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant at the 10 percent level.

Table 3.8 **Estimation results: The average effect of decentralization on the access to toilet facility (quantity)**

Dep. var.: $STOil_{it}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Degree of decentralization, D_{it}	**0.370*****	**0.249*****	**0.184*****	**0.116****	**0.129****	**0.140****	**0.092***	**0.171*****	**0.715*****
	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.08)	(0.025)	(0.01)
Public spending per capita, G		0.126***	0.101***	0.109***	0.090***	0.066*	0.071**	0.030***	0.009
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.004)	(0.01)
Per capita consumption, C_{it}			0.133**	0.094***	0.086**	0.086**	0.099***	0.001	–0.314*
			(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)	(0.21)
Population size, Po_{it}				0.102***	0.064*	0.021	0.049	0.021	–0.057***
				(0.02)	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)
Population density, De_{it}					0.003**	0.003**	0.002**	0.005***	0.004***
					(0.001)	(0.01)	(0.001)	(0.00)	(0.001)
Urbanization rate, U_{it}						0.191***	0.234***	0.301***	0.242***
						(0.08)	(0.08)	(0.02)	(0.02)
Ethnic fragmentation, F_{it}							0.188***	0.131***	–0.052*
							(0.05)	(0.04)	(0.04)
Constant	0.049	–0.779***	–2.165***	–2.893***	–2.253***	–1.641***	–2.090***	–0.397*	–11.72***
	(0.03)	(0.22)	(0.46)	(0.52)	(0.71)	(0.58)	(0.65)	(0.20)	(1.06)
Number of observations	150	149	149	149	149	149	145	145	145
Adjusted R^2	0.17	0.35	0.41	0.46	0.49	0.96	0.54	0.92	0.96
F-statistic	20.55	21.86	20.71	25.54	34.43	30.62	46.74	715.01	622.75
Fixed effect	no	no	no	no	no	no	no	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant at the 10 percent level.

Table 3.9 **Estimation results: The average effect of decentralization on the access to toilet facility (quality)**

Dep. var.: $TToil_{it}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Degree of decentralization, D_{it}	**2.531*****	**1.905*****	**1.871*****	**1.537*****	**1.660*****	**1.734*****	**1.553*****	**1.471*****	**0.692*****
	(0.54)	(0.53)	(0.56)	(0.56)	(0.54)	(0.55)	(0.56)	(0.027)	(0.02)
Public spending per capita, G_{it}		0.718***	0.705***	0.749***	0.565***	0.402*	0.464**	0.273***	0.352***
		(0.19)	(0.20)	(0.20)	(0.21)	(0.22)	(0.21)	(0.019)	(0.02)
Per capita consumption, C_{it}			0.071	–0.119	–0.197	0.199	–0.249	0.189***	0.189***
			(0.36)	(0.34)	(0.34)	(0.35)	(0.37)	(0.006)	(0.007)
Population size, Po_{it}				0.498*	0.142	–0.150	–0.345	–0.411***	–0.260***
				(0.25)	(0.30)	(0.27)	(0.31)	(0.008)	(0.008)
Population density, De_{it}					0.003***	0.003***	0.004***	0.004***	0.003***
					(0.001)	(0.001)	(0.001)	(0.00)	(0.00)
Urbanization rate, U_{it}						1.284*	1.123*	1.298***	1.264***
						(0.68)	(0.73)	(0.01)	(0.01)
Ethnic fragmentation, F_{it}							0.031	–0.229	–0.342
							(0.51)	(0.39)	(0.41)
Constant	1.542***	–3.202**	–3.940	–7.483	–1.405	–2.706	–5.178	–0.397*	0.043
	(0.25)	(1.27)	(3.94)	(4.97)	(5.54)	(5.28)	(5.92)	(0.20)	(0.11)
Number of observations	150	149	149	149	149	149	145	145	145
Adjusted R^2	0.15	0.26	0.26	0.46	0.32	0.35	0.34	0.89	0.87
F-statistic	11.88	12.61	29.43	25.54	57.82	49.10	64.70	10,608.02	992.44
Fixed effect	no	no	no	no	no	no	no	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant a the 10 percent level.

Table 3.10 **Estimation results: The average effect of decentralization on water access (quantity)**

Dep. var.: $SWat_{it}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Degree of decentralization, D_{it}	**0.365*****	**0.260*****	**0.220*****	**0.192*****	**0.212*****	**0.207****	**0.173****	**0.230*****	**0.654*****
	(0.07)	(0.07)	(0.08)	(0.07)	(0.07)	(0.08)	(0.08)	(0.028)	(0.01)
Public spending per capita, G_{it}		0.116***	0.101***	0.105***	0.076***	0.085***	0.087***	0.047***	0.047***
		(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.003)	(0.003)
Per capita consumption, C_{it}			0.081**	0.065	0.053	0.053	0.072	0.021	0.021
			(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.014)	(0.15)
Population size, Po_{it}				0.041	–0.148	0.002	0.022	–0.032	–0.064**
				(0.04)	(0.04)	(0.04)	(0.05)	(0.019)	(0.018)
Population density, De_{it}					0.005***	0.005***	0.004***	0.006***	0.006***
					(0.001)	(0.001)	(0.001)	(0.00)	(0.00)
Urbanization rate, U_{it}						–0.076	0.058	0.002	1.264***
						(0.10)	(0.11)	(0.003)	(0.01)
Ethnic fragmentation, F_{it}							–0.145*	–0.115***	–0.053***
							(0.08)	(0.01)	(0.012)
Constant	0.110***	–0.660**	–1.505***	–1.801***	–0.836	–1.080*	–1.480 **	–0.378*	0.110
	(0.04)	(0.19)	(0.47)	(0.51)	(0.62)	(0.65)	(0.71)	(0.21)	(0.20)
Number of observations	150	149	149	149	149	149	145	145	145
Adjusted R^2	0.12	0.24	0.25	0.26	0.29	0.30	0.34	0.88	0.87
F-statistic	13.51	15.49	13.44	12.62	30.13	25.31	64.70	1,537.87	992.44
Fixed effect	no	no	no	no	no	no	no	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant at the 10 percent level.

in the share of own-revenue, entailing an extra 0.236 point on the quality index of water access in communes (table 3.11). However, while the effect of decentralization on access to refuse disposal facilities is less robust (tables 3.12 and 3.13), decentralization is not found to have a significant average effect on access to sewage disposal facilities and communes' primary school enrollment (tables 3.14, 3.15, and 3.16).

In table 3.17, we consider the nonmonotone effect of the degree of decentralization by introducing its quadratic term (equation [2]). We find a positive coefficient associated with the degree of decentralization and a negative sign for its squared value. The impact of decentralization is then nonmonotone: the relationship between decentralization and access to basic services may be described by an inverted U-shaped curve. Even if we cannot calculate the average optimal decentralization degree due to a combination of different scaled criteria for basic services, we are able to determine it individually. Defined as the ratio of local own-revenue over total revenue (given by $-\beta_1 / 2\beta_2$, equation [2]), the optimal degree of decentralization reaches a 55 percent value for access to toilet facilities, 65 percent for refuse disposal facilities (columns [1] to [3]), and a lower value for sewage disposal facilities (49 percent) and primary school enrollment (52 percent, columns [4] and [5]). We observe that the effect of decentralization is monotone for drinking water access since the optimal level is above 1 (exactly 103 percent).

3.5.2 The Nonlinear Effect of Decentralization between Communes

We now consider the heterogeneous effects of decentralization across communes according to their wealth (equation [3]). Table 3.18 reports that this effect is generally lower for 20 percent of the poorest communes. While toilet, garbage, and drinking water facilities are increasing in quality with decentralization, there is no impact on average on sewage and primary school enrollment. For the latter, it actually has a positive effect on wealthier communes and a negative one on the poorest communes.[24] As a robustness check, we interact a continuous variable, the DHS wealth index scores W_{it}, with the degree of decentralization (see table 3.19). Estimated results confirm that the positive effect of decentralization is contingent on a minimum wealth in communes. Only the effect of decentralization on access to drinking water does not seem to depend on wealth. The coefficient associated with the degree of decentralization measures the impact of decentralization in the absence of any wealth. Its negative sign indicates that a commune with zero wealth would suffer from decentralization.

Finally, we highlight the point that communes may prioritize basic services despite a uniform decentralization process. Such a hierarchy results from their autonomy, and should also be considered by the central government

24. We complete our analysis with Wald tests to ascertain that coefficients for poor communes are significantly different from those in other communes.

Table 3.11 **Estimation results: The average effect of decentralization on water access (quality)**

Dep. var.: $TWat_{it}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Degree of decentralization, D_{it}	**1.935*****	**1.685*****	**1.490*****	**1.360*****	**1.441*****	**1.454*****	**1.591*****	**1.714*****	**2.361*****
	(0.32)	(0.34)	(0.35)	(0.37)	(035)	(0.36)	(0.37)	(0.22)	(0.27)
Public spending per capita, G_{it}		0.327***	0.250**	0.268**	0.147	0.117	0.133	–0.028	–0.028
		(0.12)	(0.12)	(0.12)	(0.12)	(0.14)	(0.13)	(0.034)	(0.037)
Per capita consumption, C_{it}			0.402*	0.327	0.276	0.275	0.143	0.185*	0.185*
			(0.21)	(0.22)	(0.22)	(0.23)	(0.24)	(0.11)	(0.10)
Population size, Po_{it}				0.194	–0.040	–0.092	–0.340	–0.434***	–0.528***
				(0.20)	(0.21)	(0.21)	(0.24)	(0.10)	(0.10)
Population density, De_{it}					0.002***	0.002***	0.003***	0.003***	0.003***
					(0.001)	(0.001)	(0.001)	(0.00)	(0.00)
Urbanization rate, U_{it}						0.228	0.001	0.216*	0.147
						(0.44)	(0.44)	(0.13)	(0.14)
Ethnic fragmentation, F_{it}							–0.934***	–0.933***	1.028***
							(0.34)	(0.02)	(0.03)
Constant	6.364***	4.186***	0.021	–1.363	2.649	3.382	7.297*	8.872***	9.616***
	(0.18)	(0.83)	(0.60)	(3.09)	(3.29)	(3.40)	(3.84)	(1.29)	(1.33)
Number of observations	150	149	149	149	149	149	145	145	145
Adjusted R^2	0.18	0.24	0.26	0.27	0.30	0.30	0.32	0.86	0.84
F-statistic	17.44	14.71	11.33	10.42	51.08	45.16	82.58	142.652	188.52
Fixed effect	no	no	no	no	no	no	no	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant the 10 percent level.

Table 3.12. Estimation results: The average effect of decentralization on the access to refuse disposal facility (quantity)

Dep. var.: $SGarb_{it}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Degree of decentralization, D_{it}	**0.137*****	**0.092*****	**0.081****	**0.018**	**0.035**	**0.040**	**0.048**	**0.038*****	**0.077*****
	(0.04)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.007)	(0.01)
Public spending per capita, G_{it}		0.049**	0.044**	0.053***	0.027**	0.017*	0.019*	0.013***	–0.024***
		(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.001)	(0.001)
Per capita consumption, C_{it}			0.022	–0.012	–0.023	–0.023	–0.036	–0.006*	–0.006
			(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.003)	(0.004)
Population size, Po_{it}				0.019***	0.044**	0.025**	0.002	0.001	–0.012**
Population density, De_{it}				(0.02)	(0.01)	(0.01)	(0.01)	(0.003)	(0.005)
					0.005***	0.005***	0.005***	0.005***	0.005***
					(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Urbanization rate, U_{it}						0.084**	0.065*	0.069***	0.089***
						(0.03)	(0.03)	(0.06)	(0.009)
Ethnic fragmentation, F_{it}							0.074***	0.060***	0.065***
							(0.02)	(0.006)	(0.001)
Constant	–0.033**	–0.357**	–0.595*	–1.258***	–0.424	–0.424	0.205	–0.081**	0.161***
	(0.01)	(0.14)	(0.37)	(0.007)	(0.36)	(0.36)	(0.29)	(0.03)	(0.05)
Number of observations	150	149	149	149	149	149	145	145	145
Adjusted R^2	0.10	0.21	0.22	0.40	0.55	0.57	0.58	0.96	0.95
F-statistic	4.26	4.26	3.30	4.50	67.65	56.65	79.65	89.10	79.30
Fixed effect	no	no	no	no	no	no	no	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant at the 10 percent level.

Table 3.13 **Estimation results: The average effect of decentralization on the access to refuse disposal facility (quality)**

Dep. var.: $TGarb_{it}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Degree of decentralization, D_{it}	**0.510*****	**0.313****	**0.260**	**0.098**	**0.176**	**0.189**	**0.176**	**0.225*****	**1.345*****
	(0.18)	(0.15)	(0.17)	(0.19)	(0.17)	(0.17)	(0.17)	(0.05)	(0.12)
Public spending per capita, G_{it}		0.218***	0.198***	0.219***	0.104*	0.074*	0.089*	0.044**	–0.078***
		(0.08)	(0.01)	(0.07)	(0.06)	(0.05)	(0.05)	(0.02)	(0.008)
Per capita consumption, C_{it}			0.108*	0.016	–0.032	–0.033	–0.067	–0.122***	–0.122**
			(0.09)	(0.11)	(0.11)	(0.11)	(0.11)	(0.03)	(0.05)
Population size, Po_{it}				0.241*	0.018	–0.034	–0.122	–0.144*	–0.365***
				(0.12)	(0.10)	(0.08)	(0.08)	(0.08)	(0.11)
Population density, De_{it}					0.002***	0.002***	0.002***	0.002***	0.003***
					(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urbanization rate, U_{it}						0.023**	0.154	0.213***	0.276***
						(0.21)	(0.21)	(0.03)	(0.02)
Ethnic fragmentation, F_{it}							0.163	0.196***	0.359***
							(0.11)	(0.01)	(0.01)
Constant	0.973***	–0.466	–1.590	–3.308*	0.509	1.249	2.499*	3.568***	6.354***
	(0.07)	(0.56)	(1.58)	(2.05)	(1.72)	(1.30)	(1.37)	(0.92)	(1.30)
Number of observations	150	149	149	149	149	149	145	145	145
Adjusted R^2	0.07	0.18	0.19	0.25	0.41	0.41	0.42	0.83	0.81
F-statistic	4.83	4.41	3.40	3.90	68.32	56.66	58.22	119.60	1,317.32
Fixed effect	no	no	no	no	no	no	no	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant at the 10 percent level.

Table 3.14 **Estimation results: The average effect of decentralization on the access to sewage disposal (quantity)**

Dep. var.: $SSew_{it}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Degree of decentralization, D_{it}	**0.258*****	**0.143****	**0.105**	**–0.061**	**–0.018**	**–0.005**	**0.037**	**0.013**	**0.024*****
	(0.09)	(0.06)	(0.07)	(0.10)	(0.09)	(0.09)	(0.08)	(0.009)	(0.002)
Public spending per capita, G_{it}		0.125**	0.110**	0.132***	0.068*	0.038*	0.034	0.020***	0.009***
		(0.05)	(0.04)	(0.04)	(0.04)	(0.002)	(0.02)	(0.002)	(0.001)
Per capita consumption, C_{it}			0.078	–0.016	–0.043	–0.044	–0.061	0.006	–0.001
			(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.008)	(0.001)
Population size, Po_{it}				0.248***	0.125**	0.072*	0.054	0.051***	0.004***
				(0.07)	(0.05)	(0.03)	(0.04)	(0.01)	(0.000)
Population density, De_{it}					0.001***	0.001***	0.001***	0.001***	0.001***
					(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urbanization rate, U_{it}						0.235*	0.218*	0.226***	0.034***
						(0.13)	(0.13)	(0.05)	(0.01)
Ethnic fragmentation, F_{it}							0.157**	0.124**	0.012
							(0.07)	(0.05)	(0.008)
Constant	–0.038	–0.852**	–1.675*	–3.444***	–1.34	–0.587	–0.221	–0.897***	–0.069***
	(0.03)	(0.38)	(0.001)	(1.29)	(1.21)	(0.85)	(0.98)	(0.17)	(0.003)
Number of observations	150	149	149	149	149	149	145	145	145
Adjusted R^2	0.05	0.17	0.18	0.37	0.52	0.55	0.57	0.91	0.91
F-statistic	4.00	3.17	3.38	3.25	21.06	18.75	19.07	235.90	350.65
Fixed effect	no	no	no	no	no	no	no	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level

**Coefficient significant at the 5 percent level.

*Coefficient significant at the 10 percent level.

Table 3.15 **Estimation results: The average effect of decentralization on the access to sewage disposal (quality)**

Dep. var.: $TSew_{it}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Degree of decentralization, D_{it}	**1.412****	**1.101****	**1.008***	**0.390**	**0.578**	**0.613**	**0.680**	**0.142**	**–2.81*****
	(0.57)	(0.51)	(0.61)	(0.69)	(0.66)	(0.65)	(0.67)	(0.35)	(0.306)
Public spending per capita, G_{it}		0.388	0.352	0.433*	0.152	0.074	0.079	0.049**	0.049***
		(0.26)	(0.25)	(0.24)	(0.25)	(0.22)	(0.22)	(0.02)	(0.01)
Per capita consumption, C_{it}			0.190	–0.163	–0.282	–0.283	–0.357	0.595**	0.595***
			(0.41)	(0.38)	(0.38)	(0.39)	(0.40)	(0.06)	(0.06)
Population size, Po_{it}				0.924**	0.378	0.238	0.254	0.348	0.778**
				(0.36)	(0.34)	(0.30)	(0.34)	(0.36)	(0.38)
Population density, De_{it}					0.005***	0.005***	0.005***	0.004***	0.004***
					(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urbanization rate, U_{it}						0.312*	0.656	0.503*	0.819***
						(0.79)	(0.79)	(0.29)	(0.30)
Ethnic fragmentation, F_{it}							0.274	–0.204	–0.637*
							(0.55)	(0.33)	(0.37)
Constant	–1.48***	7.909***	5.93	–0.634	8.682	10.643**	11.138*	–1.089	–4.494
	(0.23)	(1.83)	(5.07)	(6.16)	(6.19)	(4.92)	(5.66)	(4.13)	(0.003)
Number of observations	150	149	149	149	149	149	145	145	145
Adjusted R^2	0.06	0.10	0.10	0.18	0.26	0.26	0.28	0.64	0.84
F-statistic	6.22	4.61	3.47	3.68	47.77	40.32	49.20	35.87	140.55
Fixed effect	no	no	no	no	no	no	no	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant at the 10 percent level.

Table 3.16 **Estimation results: The average effect of decentralization on the access to primary education**

Dep. var.: SE_{it}	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Degree of decentralization, D_{it}	**0.019**	**–0.010**	**–0.016**	**–0.015**	**–0.011**	**–0.009**	**–0.039**	**0.003**	**0.242****
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.11)
Public spending per capita, G_{it}		0.031**	0.028*	0.028*	0.022	0.017	0.020	0.063**	0.031*
		(0.01)	(0.09)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Per capita consumption, C_{it}			0.122	0.013	0.010	0.010	0.023	0.134***	0.072**
			(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.02)
Population size, Po_{it}				–0.002	–0.013	–0.022	0.001	0.013	–0.036***
				(0.01)	(0.02)	(0.02)	(0.03)	(0.01)	(0.007)
Population density, De_{it}					0.001***	0.001***	0.002***	0.001***	0.001***
					(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urbanization rate, U_{it}						0.038*	0.063	0.030***	0.040***
						(0.04)	(0.05)	(0.009)	(0.01)
Ethnic fragmentation, F_{it}							–0.131**	–0.056	–0.049
							(0.06)	(0.08)	(0.08)
Constant	0.777***	0.573***	0.446*	0.464**	0.652**	0.776*	0.3898*	1.809***	1.765***
	(0.02)	(0.11)	(0.22)	(0.25)	(0.35)	(0.40)	(0.45)	(0.26)	(0.32)
Number of observations	150	149	149	149	149	149	145	145	145
Adjusted R^2	0.35	0.37	0.10	0.37	0.38	0.38	0.41	0.58	0.52
F-statistic	43.21	30.10	3.47	20.60	16.95	14.45	12.77	17.26	14.19
Fixed effect	no	no	no	no	no	no	no	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant at the 10 percent level.

Table 3.17 **Estimation results: A nonmonotone effect of decentralization on the access to basic services**

Dep. var.:	(1) $TToil_{it}$	(2) $TWat_{it}$	(3) $TGarb_{it}$	(4) $TSew_{it}$	(5) SE_{it}
Degree of decentralization, D_{it}	**2.190*****	**3.234*****	**1.700*****	**4.332*****	**6.866*****
	(0.05)	(0.34)	(0.26)	(0.24)	(2.21)
D_{it}^2	**–1.96*****	**–1.56*****	**–1.31*****	**–4.44*****	**–6.60*****
	(0.07)	(0.47)	(0.23)	(0.24)	(2.11)
Public spending per capita, G_{it}	0.030***	–0.026	–0.079***	0.003*	–0.009
	(0.004)	(0.03)	(0.01)	(0.001)	(0.01)
Per capita consumption, C_{it}	–0.008	0.182*	–0.121**	0.062***	0.138***
	(0.01)	(0.12)	(0.05)	(0.006)	(0.04)
Population size, Po_{it}	–0.002	–0.440***	–0.237**	0.088**	–0.112***
	(0.01)	(0.11)	(0.09)	(0.03)	(0.02)
Population density, De_{it}	0.005***	0.003***	0.003***	0.003***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urbanization rate, U_{it}	0.359***	0.270*	0.422***	–0.077**	0.329***
	(0.02)	(0.16)	(0.01)	(0.03)	(0.10)
Ethnic fragmentation, F_{it}	–0.132**	0.921***	0.2131***	–0.021	–0.047
	(0.05)	(0.03)	(0.007)	(0.03)	(0.09)
Constant	–0.552**	8.667***	5.106***	0.212	2.302***
	(0.22)	(1.32)	(1.15)	(0.43)	(0.13)
Number of observations	145	145	145	145	145
Adjusted R^2	0.91	0.84	0.80	0.59	0.53
F-statistic	577.64	96.49	87.06	149.11	19.60
Fixed effect	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes
Instrumental variable	yes	yes	yes	yes	yes

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant at the 10 percent level.

and donors in the struggle against poverty. The absence of a normalized scale for every basic service prevents concluding immediately on such a prioritization. However, through tables 3.18 and 3.19, we pinpoint some significant differences among local governments' behaviors in relation to their wealth. The poorest communes are characterized by the negative impact of decentralization on access to primary education. This suggests that these governments pay less attention to education than they do to both drinking water access and toilet facilities (table 3.18). Table 3.20 focuses on the top 20 percent wealthier communes. For these communes the effect of decentralization on sewage access is negative and significant. In accordance with the reading of the seventy-seven detailed communes' monographs,[25] we may

25. Provided by the European Union through the Programme d'Appui au Démarrage des Communes.

Table 3.18 **Estimation results: A differentiated effect of decentralization between communes (quintiles)**

Dep. var.:	(1) $TToil_{it}$	(2) $TWat_{it}$	(3) $TGarb_{it}$	(4) $TSew_{it}$	(5) SE_{it}
$D_{it} * QP_{it}$	**0.562***	**2.120*****	**0.416****	**0.231**	**–0.24*****
	(0.28)	(0.29)	(0.19)	(1.24)	(0.03)
$D_{it} * (1 - QP_{it})$	**2.544*****	**2.355*****	**1.162*****	**0.139**	**0.656****
	(0.03)	(0.27)	(0.08)	(0.41)	(0.21)
Public spending per capita, G_{it}	–0.006	–0.063	0.088***	0.013	–0.010
	(0.005)	(0.03)	(0.01)	(0.14)	(0.01)
Per capita consumption, C_{it}	0.190***	0.189*	–0.121**	0.598**	–0.13***
	(0.02)	(0.10)	(0.05)	(0.24)	(0.04)
Belong to the first quintile, QP_{it}	–0.233**	–0.278***	–0.126***	–0.124	0.133***
	(0.10)	(0.08)	(0.01)	(0.53)	(0.10)
Population size, Po_{it}	–0.755***	–0.587***	–0.369***	0.313	–0.106***
	(0.01)	(0.10)	(0.12)	(0.25)	(0.03)
Population density, De_{it}	0.004***	0.003***	0.003***	0.004***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urbanization rate, U_{it}	1.400***	0.147	0.231***	0.551*	0.009**
	(0.01)	(0.13)	(0.03)	(0.46)	(0.004)
Ethnic fragmentation, F_{it}	–0.602	0.843***	0.115**	–0.247	–0.088
	(0.48)	(0.04)	(0.04)	(0.44)	(0.11)
Constant	7.575***	10.64***	6.719***	–0.434	3.465***
	(0.35)	(1.23)	(1.39)	(4.03)	(0.31)
Number of observations	145	145	145	145	145
Adjusted R^2	0.88	0.84	0.80	0.63	0.50
Fixed effect	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes
Instrumental variable	yes	yes	yes	yes	yes
Wald test: *p*-value	0.000	0.494	0.011	—	0.000

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant at the 10 percent level.

deduce that the richest local governments, having already reached a certain level of quality in sanitation, choose to redirect their financial resources to other public facilities.

Table 3.21 sums up our empirical results considering the effect of decentralization on the qualitative indicators.

3.6 Conclusion

Benin is a young democracy that has experienced a decentralization process since the end of the 1990s. The main objective of this institutional reform was to improve public policy governance and reduce poverty. Our

Table 3.19 **Estimation results: A differentiated effect of decentralization between communes (wealth)**

Dep. var.:	(1) $TToil_{it}$	(2) $TWat_{it}$	(3) $TGarb_{it}$	(4) $TSew_{it}$	(5) SE_{it}
D_{it}	**–1.70*****	**1.365*****	**–0.94*****	**–3.99*****	**–0.64*****
	(0.07)	(0.24)	(0.16)	(0.73)	(0.18)
$D_{it} * W_{it}$	**1.597*****	**–0.01**	**0.762*****	**2.312*****	**0.399*****
	(0.04)	(0.06)	(0.05)	(0.25)	(0.11)
Public spending per capita, G_{it}	0.017**	–0.065*	–0.084***	0.096***	–0.010*
	(0.008)	(0.03)	(0.01)	(0.02)	(0.005)
Per capita consumption, C_{it}	0.407***	0.052	–0.187***	0.652***	–0.148***
	(0.02)	(0.12)	(0.05)	(0.06)	(0.04)
DHS wealth index scores, W_{it}	0.274***	0.247***	0.114**	0.722***	0.064***
	(0.03)	(0.06)	(0.02)	(0.16)	(0.02)
Population size, Po_{it}	–0.482***	–0.451***	–0.177**	0.621	–0.001
	(0.04)	(0.13)	(0.08)	(0.39)	(0.006)
Population density, De_{it}	0.001***	0.003***	0.001***	0.004	0.006**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
Urbanization rate, U_{it}	–0.048	–0.069	0.034	–0.158	–0.066
	(0.03)	(0.15)	(0.04)	(0.12)	(0.04)
Ethnic fragmentation, F_{it}	–1.265***	0.780***	–0.013	–0.784***	–0.176
	(0.29)	(0.06)	(0.05)	(0.28)	(0.14)
Constant	2.889***	10.93***	6.024***	–3.350	2.898***
	(0.64)	(1.58)	(1.05)	(4.38)	(0.07)
Number of observations	145	145	145	145	145
Adjusted R^2	0.88	0.85	0.81	0.57	0.50
Fixed effect	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes
Instrumental variable	yes	yes	yes	yes	yes
Wald test: *p*-value	0.000	—	0.000	0.000	0.000

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant at the 10 percent level.

analysis focuses on the average and distributional effects of decentralization on access to poverty-related services. An original compilation of data sets concerning the well-being of households and local public finance allows us to study the ultimate effects of decentralization on the Beninese population. This study suggests that decentralization has an unambiguous positive overall effect on access to drinking water and sanitation systems.

Beyond this average pattern, however, decentralization yields some distributional outcomes: its impact is nonlinear and heterogeneous. First, the effect of decentralization on access to basic services follows an inverted U-shaped curve with an optimal degree of decentralization (at 67 percent

Table 3.20 **Estimation results: A differentiated effect of decentralization between communes (quintiles)**

Dep. var.:	(1) $TToil_{it}$	(2) $TWat_{it}$	(3) $TGarb_{it}$	(4) $TSew_{it}$	(5) SE_{it}
$D_{it} * QR_{it}$	**4.073*****	**1.643*****	**1.126*****	**–0.149*****	**0.680*****
	(0.08)	(0.23)	(0.09)	(0.13)	(0.24)
$D_{it} * (1 - QR_{it})$	**2.414*****	**1.569*****	**0.963*****	**0.103***	**0.261****
	(0.05)	(0.25)	(0.08)	(0.05)	(0.10)
Public spending per capita, G_{it}	–0.019**	–0.051	0.088***	0.001	–0.010
	(0.007)	(0.03)	(0.01)	(0.003)	(0.006)
Per capita consumption, C_{it}	0.184***	0.164*	–0.133**	0.054**	–0.133***
	(0.01)	(0.12)	(0.05)	(0.008)	(0.04)
Belong to the fifth quintile, QR_{it}	0.185***	0.498***	0.218***	0.088***	–0.017***
	(0.06)	(0.05)	(0.05)	(0.02)	(0.03)
Population size, Po_{it}	–0.643***	–0.387***	–0.296**	0.021	–0.052***
	(0.02)	(0.12)	(0.11)	(0.04)	(0.01)
Population density, De_{it}	0.003***	0.003***	0.002***	0.005***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urbanization rate, U_{it}	0.823***	0.141	0.100***	0.081***	0.042*
	(0.06)	(0.15)	(0.02)	(0.01)	(0.02)
Ethnic fragmentation, F_{it}	–0.145	0.877***	0.285***	–0.007	–0.027
	(0.39)	(0.03)	(0.01)	(0.03)	(0.08)
Constant	6.143***	8.865***	5.974***	0.079	2.936***
	(0.35)	(1.44)	(1.28)	(0.49)	(0.09)
Number of observations	145	145	145	145	145
Adjusted R^2	0.87	0.84	0.80	0.58	0.49
Fixed effect	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes
Instrumental variable	yes	yes	yes	yes	yes
Wald test: *p*-value	0.000	0.255	0.000	0.000	0.005

Note: Controls for serial correlation of the error term, AR(1) Coccrane-Orcutt transformation. Robust standard errors are in brackets.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant at the 10 percent level.

on average), showing that a minimum level of central transfers is still beneficial. Second, decentralization affects service access differently according to the communes' individual wealth, having a positive effect on any nonmonetary poverty indicators, and a negative effect on the poorest communes. These results are consistent with those of Galiani, Gertler, and Schargrodsky (2008), who conclude that decentralization improves public services only in wealthier areas that have the ability to voice their preferences. Hence, if decentralization is adopted as a policy for improving overall access to basic services, it is essential for the central state to maintain a minimum level

Table 3.21 Main empirical results

	Average effect	Nonmonotone average effect		Between communes			
		D_{it}	D_{it}^2	Poor	Nonpoor	Rich	Nonrich
Toilet facility	0.692***	2.190***	–1.96***	0.562*	2.544***	4.073***	2.414***
Water access	2.361***	3.234***	–1.56***	2.120***	2.355***	1.643***	1.569***
Refuse disposal	1.345***	1.700***	–1.31***	0.416**	1.162***	1.126***	0.963***
Sewage disposal	NR	4.332***	–4.44***	0.231	0.139	–0.14***	0.103***
Primary educ.	NR	6.866***	–6.60***	–0.24***	0.656**	0.680***	0.261***

Note: NR = Nonrobust.

***Coefficient significant at the 1 percent level.

**Coefficient significant at the 5 percent level.

*Coefficient significant at the 10 percent level.

of central transfers, in particular for the poorest communes, to avoid an increase in interjurisdictional inequalities.

Finaly, the decentralization process in Benin has reduced poverty by improving access to some basic services, but increasing inequalities between communes are the counterpart of this process. Decentralization gives control over decisions and resources to local governments, whose aim is to target the poorest households better. In so doing, the central government treats the poor and local democratic institutions as assets and partners in the development process. Our results suggest that the patterns of decentralization in Benin describe improved access to primary services, but raise some issues about the design of transfers in both financial resources and competences. Indeed, certain basic services, mostly in education, have not been delivered to the degree expected. Controlling for different geographical and socioeconomic variables, poor communes do not improve primary education. A potential explanation rests on the idea that these local governments allocate their available resources for other basic services rather than education, which are considered more urgent, such as drinking water access and, to a lesser extent, toilet facilities.

Appendix

Table 3A.1 List of communes (numbered)

Communes	Number	Region	Communes	Number	Region
Banikoara	1	ALIBORI	Klouekanme	40	COUFFO
Gogounou	2	ALIBORI	Lalo	41	COUFFO
Kandi	3	ALIBORI	Toviklin	42	COUFFO
Karimama	4	ALIBORI	Athieme	43	MONO
Malanville	5	ALIBORI	Bopa	44	MONO
Segbana	6	ALIBORI	Come	45	MONO
Bembereke	7	BORGOU	Grand–popo	46	MONO
Tchaourou	8	BORGOU	Houeyogbe	47	MONO
Kalale	9	BORGOU	Kolossa	49	MONO
N dali	10	BORGOU	Adjarra	49	OUEME
Nikki	11	BORGOU	Adjohoun	50	OUEME
Parakou	12	BORGOU	Aguegues	51	OUEME
Perere	13	BORGOU	Akpro–Misserete	52	OUEME
Sinende	14	BORGOU	Avrankou	53	OUEME
Boukoumbe	15	ATACORA	Bonou	54	OUEME
Cobly	16	ATACORA	Dangbo	55	OUEME
Kerou	17	ATACORA	Porto–Novo	56	OUEME
Kouande	18	ATACORA	Seme–Kpodji	57	OUEME
Materi	19	ATACORA	Adja–Ouere	58	PLATEAU
Natitingou	20	ATACORA	Ifangni	59	PLATEAU
Pehunco	21	ATACORA	Pobe	60	PLATEAU
Tanguieta	22	ATACORA	Ketou	61	PLATEAU
Toucountouna	23	ATACORA	Sakete	62	PLATEAU
Bassila	24	DONGA	Bante	63	COLLINES
Copargo	25	DONGA	Dassa–Zoume	64	COLLINES
Djougou	26	DONGA	Glazoue	65	COLLINES
Ouake	27	DONGA	Ouesse	66	COLLINES
Abomey–Calavi	28	ATLANTIQUE	Savalou	67	COLLINES
Allada	29	ATLANTIQUE	Save	68	COLLINES
Kpomasse	30	ATLANTIQUE	Abomey	69	ZOU
Ouidah	31	ATLANTIQUE	Agbangnizoun	70	ZOU
Toffo	32	ATLANTIQUE	Bohicon	71	ZOU
Torri–Bossito	33	ATLANTIQUE	Cove	72	ZOU
So–Ava	34	ATLANTIQUE	Djidja	73	ZOU
Ze	35	ATLANTIQUE	Ouinhi	74	ZOU
Cotonou	36	LITTORAL	Za–Kpota	75	ZOU
Aplahoue	37	COUFFO	Zagnanado	76	ZOU
Djakotomey	38	COUFFO	Zogbodomey	77	ZOU
Dogbo	39	COUFFO			

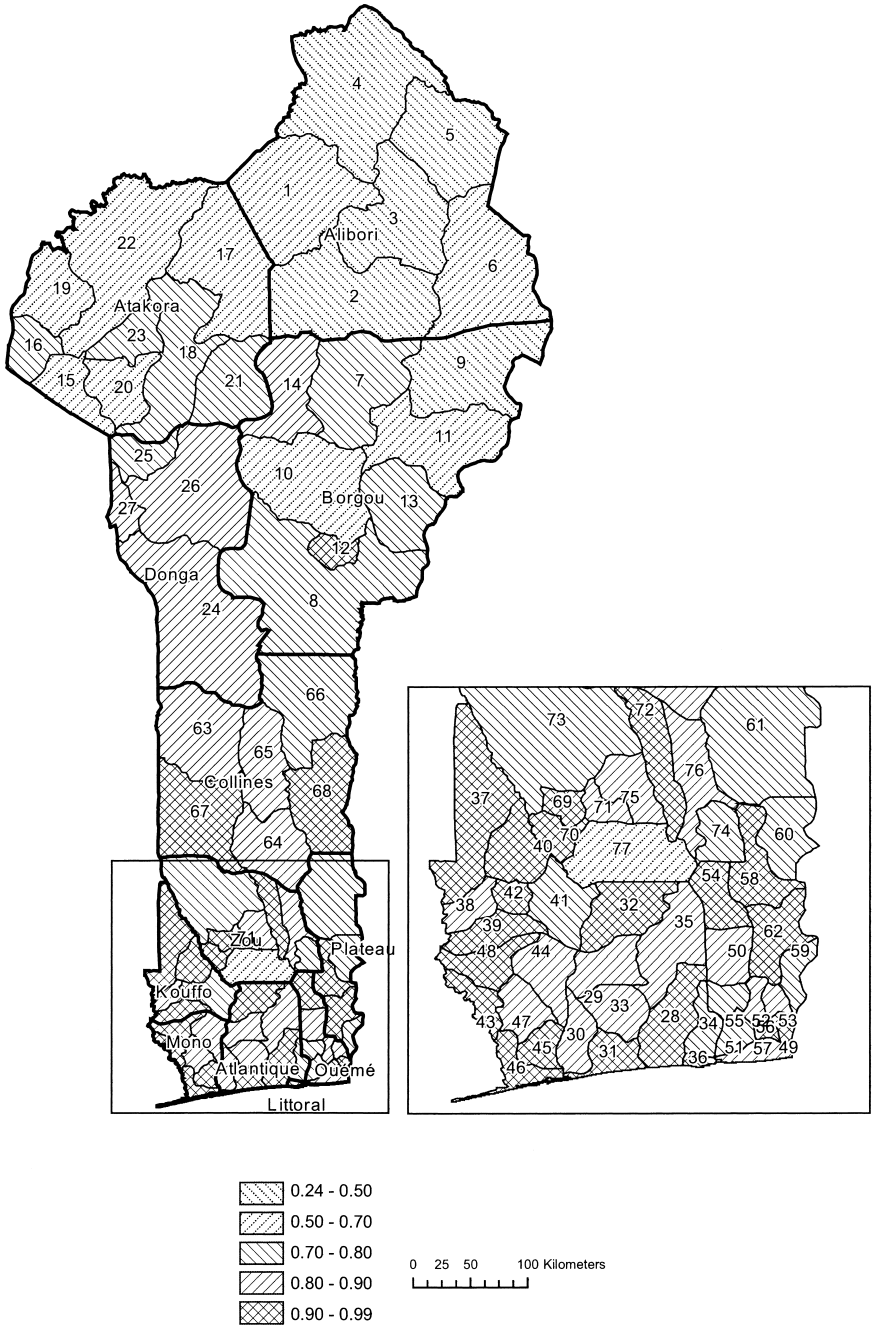

Fig. 3A.1 School enrollment

Source: http://www.gadm.org/country; authors' calculations.

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