

1. Introduction

In recent decades, both researchers and policy-makers have paid increasing attention to the relationship between fiscal decentralization and poverty alleviation. Whether local government revenue autonomy improves citizens' access to public service, and reduces poverty, has become an important policy issue in sub-Saharan Africa.

It has been argued that devolving decision making and revenue mobilization responsibilities to local government makes local authorities more accountable and thereby increases their effectiveness in delivery of public services ([Hayek, 1945](#), [Oates, 1993](#)). Fiscal decentralization has been pursued in developing countries as a main policy reform. Almost all African countries have embarked on ambitious fiscal decentralization programs ([de Mello, 2000](#)). Many studies have tried to investigate the effect of fiscal decentralization on access to public services and poverty reduction. For example, [Gonçalves \(2014\)](#) finds that local citizens' participation in service provision contributes to improving infant mortality and reducing poverty in Brazilian municipalities. By shaping inclusive and equitable development policies, local institutions decision making accounts for cultural values and therefore helps to reduce rural poverty in Burkina Faso ([Donnelly-Roark et al., 2001](#)). The literature has developed several arguments for expecting fiscal decentralization to be relevant to public services delivery and poverty reduction.

First, decentralization enhances accountability in the service delivery process of local governments more than for a distant central government, because the local governments are assumed to be subject to electoral pressures from local citizens ([Bartolucci et al., 2015](#)). Second, local authorities by being

closer to their constituencies may have better access to local information which allows them to provide local goods and services that better match demand (Hayek, 1945). These expectations of efficiency gain from fiscal decentralization are based on many assumptions (Oates, 1993). The local democracy must function effectively, since there is accurate information for voters to evaluate the fiscal decisions of their local authorities. Moreover, local governments must have substantial revenue autonomy and discretion in allocating resources.

In developing countries, there are strong reasons to believe that such presumptions are violated (Smoke, 2001). As Bardhan and Mookherjee (2000) point out, local authorities are likely to be under pressure from local elites and thus divert resources away from poverty reduction programs. The level of literacy and political awareness among citizens may be too limited to apply sufficient political pressure (Bardhan and Mookherjee, 2005).

After three decades of fiscal decentralization, the high levels of poverty and the poor access of citizens to better services have not disappeared in most developing countries. Although several poverty reduction programs are based on devolving responsibilities to local governments, Sub-Saharan Africa accounts for a quarter of the world's 1.2 billion people living on less than US 1 dollar (World Bank, 2016). A large proportion of citizens suffer from limited access to basic services such as education, health and drinking water.

While the effect of fiscal decentralization on public services seems to be context specific, few studies using country-level data have analyzed this effect, especially in sub-Saharan Africa. One problem with the existing literature is that the evidence draws on cross country data, thus ignoring the institutional

arrangements that govern the design and implementation of decentralization, rendering the issue of country specific effects problematic (von Braun and Grote, 2000). In addition, there is no systematic empirical evidence about whether more local heterogeneity increases local governments' efficiency in terms of improvements in the provision of education, health, drinking water, and sanitation services.

This paper sets out to shed light on the relationship between fiscal decentralization and access to public services and income poverty. More precisely, the study analyzes the extent to which fiscal decentralization, measured as the share of local own revenue, affects access to basic public services and poverty in Côte d'Ivoire. This paper investigates also whether the effects of fiscal decentralization vary between local governments according to their internal heterogeneity, defined as the degree of ethnic fractionalization and polarization. The empirical analysis uses a local revenue dataset spanning 11 years (2001-2011) for 115 municipalities in 35 *départements*. An adjusted multi-dimensional poverty index (MPIa) and a headcount poverty index (HPIn) are calculated at *département* level using the 2002 and 2008 Household Living Standard Surveys (HLSS). The Grouped Fixed Effect (GFE) method is used for estimations. This approach allows controlling for unobserved heterogeneity, which may vary or not over time. A two-stage least squares (2SLS) method is combined with the GFE to properly address the potential endogeneity of local revenue. The results suggest that increased local revenue positively affects access to public services, than on poverty. However, there is evidence that fiscal decentralization has a more robust effect on access to public service, rather than poverty. This effect seems to work mainly by

increasing access to education more than to health, water, and sanitation services. Contrary to the existing literature, our results indicate that municipalities are more likely to improve access to public services in less ethnically diverse localities and in rural zones. This study provides evidence that effect of the conflict experienced by the country has been statistically limited.

The remainder of the paper is organized as follows. Section 2 reviews the literature and analyzes the channels through which fiscal decentralization affects citizens' access to public goods and poverty. Section 3 describes the fiscal decentralization process, and the poverty in Côte d'Ivoire with its regional distribution. Section 4 presents the data and the estimation strategy. The main results and the robustness checks are discussed in section 5. Section 6 concludes and provides some policy implications.

2. Literature review

2.1. Fiscal decentralization increases citizens' access to public services and reduces poverty

This section provides an overview of the theoretical predictions and empirical findings by describing the different channels by which fiscal decentralization might affect citizens' access to public services and reduce poverty.

The existing literature on decentralization has shown the potential effect of fiscal decentralization on poverty reduction. The first and classic argument is that fiscal decentralization can provide populations with improved economic efficiency in local public services delivery (Hayek, 1945, Oates, 1993). As Oates (1993) argues “the provision of local outputs that are differentiated according to local tastes and circumstances results in higher levels of

social welfare than centrally determined”. In this regard, by moving decision-making closer to the people, local authorities may have better access to local information and local needs, which may allow them to provide local goods and services that match local demand. This may improve human welfare and thus reduce poverty. For example, [Behrman et al. \(2002\)](#) find that active involvement of local governments in the provision of transport for medical emergencies and supply of contraceptives at health centers improves access to health facilities in India. Many studies reveal that the quality of delivery of public services improves more when provided by local governments. Local governments in Kerala (India) improved the efficiency of delivery of public services by better identifying the beneficiaries for poverty eradication programs ([Heller et al., 2007](#)). The literature also stresses the important role of the accountability of local authorities in the relationship between fiscal decentralization and poverty reduction. [Gonçalves \(2014\)](#) provides a good investigation of the impact of fiscal decentralization on local living conditions by addressing the question of accountability and service provision resulting from “Participatory Budgeting” in Brasilia. She finds that the participatory budgeting, through which the ordinary citizen is given the ability to interact with elected politicians in the planning of local budget, contributes to a reduction in infant mortality rates for those municipalities which adopted it. Consistent with the theory of fiscal federalism, this research shows that the participatory budgeting operates through two channels. First, it improves information flows between citizens and policy-makers and therefore increases the probability that services delivered satisfy local needs. Second, it strengthens politicians’ accountability to their constituents because the politicians’

promises become more visible. [Sow and Razafimahefa \(2015\)](#) investigates the relationship between fiscal decentralization and the efficiency of public expenditures by using a panel data of advanced and developing countries over the two last decades. They conclude that devolving more responsibilities has a noticeable impact on public expenditure efficiency. Their investigation goes further by showing that this efficiency reduces poverty. Another channel is that fiscal decentralization can reduce political instability. By devolving power and resources to lower levels of government, fiscal decentralization relieves political tensions, reduces the risk of violence or secession, and thus improves citizens' well-being. [Jean-Paul \(2014\)](#) examines this relationship through the effects of decentralization on governance. He argues that in the particular context of a country with heterogeneous ethnic or regional identities, local government' autonomy can relieve potential grievances or violence by being more responsive to the demands of such groups. This reduces poverty and creates good conditions for local development. These benefits of fiscal decentralization show clearly how involving local governments in decision making and revenue raising might positively affect access to basic services and reduce poverty.

2.2. Fiscal decentralization increases poverty and worsens delivery of public services

Against the arguments of efficiency gains resulting from involving local governments in decision making, [Prud'homme \(1995\)](#) and [Treisman \(2000\)](#), among others, argue that fiscal decentralization worsens delivery of public services, and as a result increases poverty. The literature has highlighted several mechanisms through which this might operate. First, [Prud'homme](#)

(1995) argues that releasing considerable tax raising responsibilities might increase inequality among regions due to the different tax potential of different regions. Regions with large tax bases will collect more taxes at a lower tax rate, and provide more local public services than poorer regions, leading to a concentration of economic growth in urban areas. Another argument developed by Prud'homme (1995) is that fiscal decentralization has an indirect impact on the living standards of citizens through the competition between municipalities, which reduce the tax rates to attract investments. For him, by lowering tax rates in the absence of central government regulation, local governments' tax autonomy will result in loss of efficiency in delivery of public services. Local authorities' tax responsibility can worsen macroeconomic stability. As they have few incentives to undertake economic stabilization policies, releasing larger tax bases to local governments prevents central government from using tax revenue and/or tax rate to stabilize macroeconomic policy (Bird and Vaillancourt, 2006). The negative effects of fiscal decentralization on poverty can be extremely important because of corruption, which is more likely to prevail at local level than central government. Prud'homme (1995) notes "Local politicians and bureaucrats are likely to be more subject to pressing demands from local interest groups". By this argument, fiscal decentralization induces efficiency loss due to corruption, and increases the aggregate level of corruption in the country. For example, authors have explained that local institutions can formally introduce some exemptions in a tax structure that favor interests groups (Martinez-Vazquez and McNab, 2003, Treisman, 2000). These groups also avoid tax by paying bribes, or kickbacks, to tax assessors who are more vulnerable at the local level. Thus,

fiscal decentralization worsens the population's living conditions through corruption that reduces income, because citizens must pay bribes to receive public services for which they have already paid taxes (Martinez-Vazquez and McNab, 2003, Treisman, 2000). This increases income inequality since local revenue collection favors a minority which consists of high-income individuals (Martinez-Vazquez and McNab, 2003, Treisman, 2000). Local government's taxation can also induce a lack of aggregate fiscal discipline and affect economic growth. Zhang and Zou (1998) argue that devolving more responsibilities to local governments is negatively correlated to economic growth in developing countries, but remains positively correlated in advanced economies. For these authors, the limited administrative capacity of local governments explains this unexpected result. They also find similar results in a country level study focusing on the 28 provinces in China during the period 1986 to 1992. They conclude that fiscal decentralization contributes to lowering regional economic growth in China. Prud'homme (1995) has developed an idea closely related to the specific characteristics of developing countries. He argues that the heterogeneity of the population in developing countries is based on income, and that there is not a substantial difference between different kinds of local government as predicted by the theory of fiscal federalism. The priorities are therefore to satisfy the population's basic needs, which are better managed by central government. However, many studies find local heterogeneity of the population has the potential to reduce the efficiency of public service delivery (Conyers, 2007). Alesina et al. (1999) conclude that ethnic diversity in American cities reduces the performance of a city government in delivering public services. Regarding developing countries, a major problem

with the exiting literature is that there is no systematic empirical evidence on whether higher local heterogeneity increases local government efficiency in terms of improvements in the provision of education, health, drinking water, and sanitation services. The available evidence draws either on cross country data or ignores the institutional arrangements that govern the design and implementation of decentralization, making the issues of specific country effects problematic (von Braun and Grote, 2000). In short, decentralization can undermine the efficiency gain predicted by Hayek (1945), because in many countries, and especially in developing economies, the hypothesis governing the predictions of fiscal federalism are likely to be violated (Smoke, 2001). In summary, both the empirical and the theoretical literature is inconclusive as to whether fiscal decentralization positively or negatively affects poverty. The link between poverty reduction and fiscal decentralization is particularly ambiguous in a fragile state such as Côte d’Ivoire. Using country level data, as in this paper, allows the capture of these particularities, contrary to existing studies that used cross country data. Furthermore, the existing problems of access to public services may be compounded by conflict. In order to consistently estimate the impact of fiscal decentralization on poverty reduction in such a fragile country, it appears important to analyze its specificities in terms of fiscal decentralization and the poverty trend.

3. Background

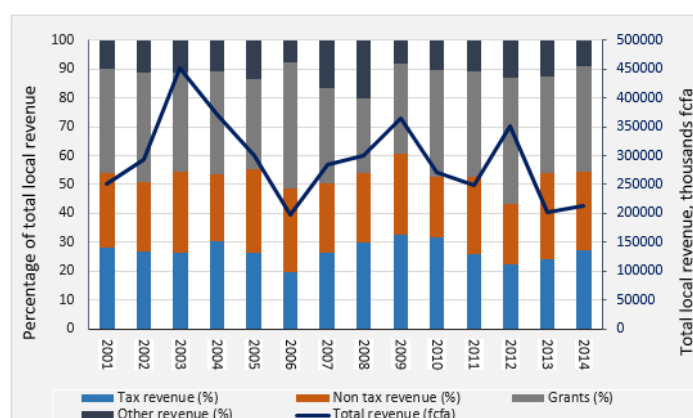
3.1. Fiscal decentralization in Côte d’Ivoire

This section briefly describes the Côte d’Ivoire fiscal decentralization system by focusing on the revenue assignment and local revenue autonomy (LRA)

over the last three decades. The revenue structure of local government in Côte d'Ivoire is largely inherited from the colonial period. The implementation started with law No. 55-1489 of 18 November 1955 which established municipalities in Abidjan, Bouaké and Grand Bassam. These local authorities did not have financial autonomy. The real commitment of the central government to implement decentralization especially the financial autonomy of municipalities, started with Law No. 80-1162 of 17 October 1980. This law defined a specific status and electoral regime for municipalities and created 37 municipality councils in addition to Abidjan. The government has spread the reform to other regions by transferring expenditure and revenue raising responsibilities to local authorities with the aim of improving effectiveness and efficiency in delivery of public services. In 2000, the government adopted a new constitution, which lays out the principle of administration and financial autonomy of local authorities. This Constitution subdivides the country into a multi-tiered system with 19 regions sub-divided into 58 *départements* governed by *départements* councils, and 197 municipalities at the lowest level. Since 2011, although the number of municipalities has remained unchanged, the central government has reorganized the country into 14 districts (with full autonomy for Abidjan and Yamoussoukro), 31 regions, 58 *départements*, and 197 municipalities, each with an elected mayor. However, tax-raising responsibilities are devolved only to the municipality level. The Ministry of Interior manages the decentralization process through the Directorate in charge of decentralization and local development (DDLDD). The Ministry of Economy and Finance collaborates with the DDLDD to define the amounts of transfers from central to local governments and their allocation.

These administrations interact with municipalities organized in the association the Union of Côte d'Ivoire for cities and municipalities (UVICOCI). The relationship between central and local governments is organized through a trusteeship system with two levels, by which the central administration approves decisions and provides assistance to municipalities. In the process of strengthening the fiscal autonomy of municipalities and grassroots participation in the decision-making process, more than 35 legislative decrees and laws have been passed to assign expenditure execution responsibilities, and revenue raising functions to municipalities. These responsibilities are often related to the provision of important public services such as health and education facilities, water and sanitation, local urbanization, and include large sources of revenue. According to the constitution, local own revenue has two main components: non-tax revenue collected exclusively by local tax administration, and tax revenue collected on behalf of local governments by central government through the General Tax Directorate (GTD). Although this local non-tax revenue is smaller than local tax revenue—only 0.13 percent of GDP in 2005 according to the DDL—this revenue remains a key element for increasing accountability and tax compliance at the local level, and so improves the population's well-being. The local authorities have full autonomy in managing this revenue, in contrast to local tax revenue which is often earmarked. Figure 1 shows the composition of total municipality revenue over the period 2001-2014, and the trend of total local revenue. Over this period, transfers from the central government contributed on average more than 35 percent of total municipal revenue. This share decreased slightly in

the three-year period leading up to the 2010 national election ¹. During the same period, municipalities collected a small part of their total revenue, on average less than 20 percent. However, tax revenue represents on average 25 percent of total municipality revenue, and remained relatively constant in absolute terms up to 2014. Combining these two components, local own revenue contributed 45 percent of total revenue. This is relatively low compared to other developing countries such as Benin, where municipalities' own revenue contributed 69 percent of total revenue over the period 2003 to 2008 (Caldeira and Rota-Graziosi, 2014).



Source: By authors with Côte d'Ivoire data from the Ministry of Interior.

Figure 1: Composition of municipality revenue in Côte d'Ivoire 2001-2014

Figure 2 presents the structure of local own revenue. Its principal sources are (i) residential tax, (ii) licenses and various charges (for business, market, construction permit, bars, shows, advertising, hotels, etc.) (iii) service fees (water, sanitation, waste collection, etc.) and (iv) vehicle tax (often shared

¹This trend suggests a possible reassignment of resources to election expenditure since the allocation criteria of these transfers remain mostly at the discretion of central government

with the center). The tax on small local businesses and licenses contributes the highest share of local own revenue at more than 26 percent, and lease fees account for less than 6 percent. Figure 2 shows that market fees combined with flat tax represent more than 50 percent of municipality own revenue. As noted above, municipalities are supposed to use their own revenues to improve access to public services and thus reduce poverty since they are involved in the provision of diverse public services such as health and education facilities, water and sanitation, local urbanization, and construction.

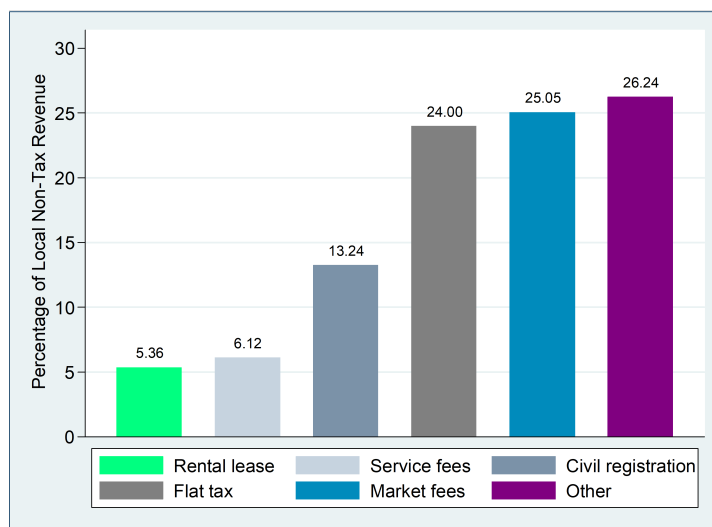


Figure 2: Composition of municipality revenue in Côte d'Ivoire 2001-2014

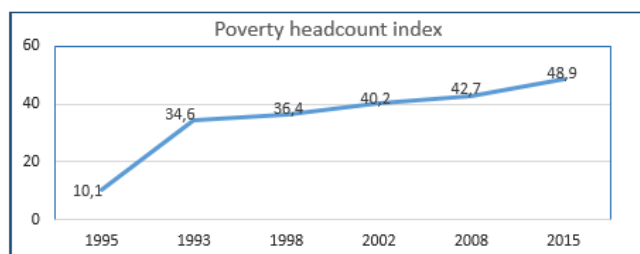
3.2. Public service delivery and poverty trend in Côte d'Ivoire

In this sub-section, poverty trends are analyzed through both the poverty and the access to public services using respectively the poverty headcount ratio and the multidimensional poverty index (MPI) recently developed by (Alkire and Santos, 2010). Three decades after starting its decentralization process, Côte d'Ivoire remains one of the poorest countries in the world, ranked 171 out of 188 countries according to the 2016 Human Development Index. Following its independence from France in 1960, the country enjoyed a period of economic growth and political stability driven by agriculture exports, mainly coffee and cocoa. At end of the 1970s, the country experienced an economic downturn due to an unexpected drop in the world prices of these export goods. This economic crisis increased the incidence of poverty up to the 1990s (Bargain et al., 2014). In order to improve the population access to basic public services, especially in rural areas and thereby reduce regional disparities, the Ivorian government has undertaken a huge process of fiscal decentralization by involving municipalities in tax raising responsibilities and public services delivery. This shift of responsibilities was followed by a fall in poverty by 3.2 percent over the period 1995-1998. Unfortunately, the expected results from fiscal decentralization have been limited, due, to three main reasons. First, like in many developing countries, the central government has been reluctant to provide municipalities with considerable responsibilities of tax raising. Second, the administrative capacity of municipalities is very limited in some areas. The third reason is that the country experienced several episodes of conflict, which compounded the existing problems

of access to public services and of poverty². As a consequence, since 1998, the share of the population living under the poverty line with no access to basic services has increased significantly. The multidimensional poverty rate increased from 31.8 percent in 2008 to 34.4 percent in 2011, while income poverty increased from 48.9 percent to 51.3 percent over the same period (Alkire and Santos, 2010). Figure 3 shows the poverty trends from 1985 to 2015. Income poverty, defined as the percentage of population living with less than US dollar 1 a day, increased from 10 percent in 1985 to 36.4 percent in 1995. From 1999, the income poverty ratio has been increasing, and exceeded 46 percent in 2015 (HLSS, 2015). Access to public services also remains a concern in Côte d'Ivoire and there is considerable disparities between municipalities. There is a widespread geographical variation in access to public services (graph a), and local revenue autonomy (graph b). In urban area, on average 75 percent of the population has access to education, health, and sanitation, while this figure is only 30 percent in rural areas. The water distribution, education, and health services are poor, especially in the northern and western regions. A possible explanation is a significant populations displacement across the country, as highlighted by (Furst et al., 2010). In particular, the conflict-ridden areas in the north and the west, such as the region of Tonpki (Man) and the Savannah, remain the poorest areas (Figure 4). Minoiu and Shemyakina (2014) report that 70 percent of professional health workers and 80 percent of government-paid teachers abandoned their post in

²Since 1999, Côte d'Ivoire has experienced the 1999 coup d'état, the 2002 political conflict and the post-electoral conflict of 2010/2011. This period was characterized by sporadic events with different intensity and location (Dabalén et al., 2012).

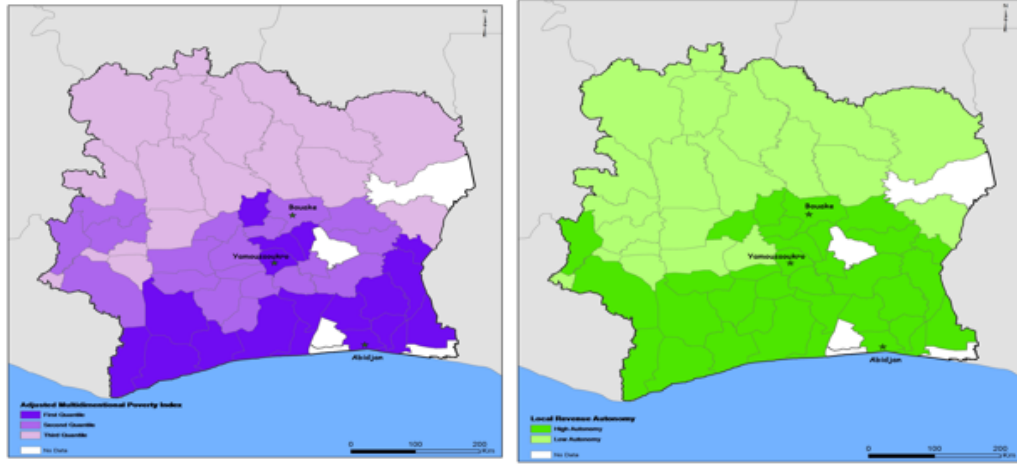
the north during the 2002-2007 conflict. Figures 4 shows the distribution of multidimensional poverty and local revenue autonomy by *département*, the darker shades denote lower multidimensional poverty rate and higher revenue autonomy. Interestingly, most of the poorer areas in the country are in the north and west of the country and coincide with the areas of lower local revenue autonomy.



Note: The poverty line in CFAF-75,000 per capita annually in 1985, 101,340 in 1993, 144,800 in 1995 and 162,800 in 1998
Source: Authors with data from the World Bank

Figure 3: Poverty Headcount Ratio at national poverty line (percentage of population)

Note: Graph (a), the Adjusted Multidimensional Poverty Index (MPIa) is calculated by multiplying the incidence of poverty by the average intensity of poverty across the poor ($MPI = H \times A$); as a result, it reflects both the share of people in poverty and the degree by which they are deprived. See more details in the following section. Darker shades indicate a lower poverty index reported as a ratio of the number of multidimensional poor to the total local population. Graph (b): The local own revenue is calculated as the share of revenue collected by local governments over the total local revenue (It is the mean of four years after conflict, 2010, 2011, 2012 and 2013). Darker shades indicate a higher autonomy of internal revenue collection.



Source: Author with the 2008 Household Living Standard Surveys.

Source: Author with Côte d'Ivoire data, The Ministry of Interior.

(a) MPIa

(b) Local Own Revenue

Figure 4: The adjusted Multidimensional Poverty Index (MPIa) and the Local Own Revenue distribution pattern (As percentage of Total Local Revenue), 2010-2013

4. Empirical analysis

This section describes the data and the methodology used in this paper.

4.1. Data

Two sets of variables are particularly important for this study: measures of access to public services / poverty, and fiscal decentralization measures. To this end, the data are collected using three sources of information. In sub-Saharan Africa, one of the biggest challenges of doing research on fiscal decentralization is the scarcity of reliable and long term data. The first source used here is the local government revenue and expenditures dataset constructed from the administrative account of municipalities provided by the Ministry of Interior and the Ministry of Economy and Finances. This

dataset provides information on own revenue, transfers from central government, and local expenditure for 115 municipalities over the period 2001-2011. The analysis follows (Lessmann, 2012) in using the degree of revenue (tax and/or non-tax) decentralization, defined as the per capita revenue collected by local tax administrations. This measure reflects local revenue autonomy and allows an approximation of municipalities' autonomy in decision-making. A high value for this measure indicates a high degree of fiscal decentralization, since local authorities have decision making autonomy in using this revenue according to the constitution as noted above.³ The second source is the 2002 and 2008 Household Living Standard Surveys for Côte d'Ivoire from which the social and demographic indicators are calculated. The HLSS⁴ is a national survey which provides information on different dimensions of household living conditions. Its design ensures representativeness for the 57 Côte d'Ivoire *départements*. Approximately 10,800 households in 2002 and 13,657 households in 2008 were surveyed in the country (HLSS, 2002, 2008). Based on this information, a number of control variables are assumed to account for the effects that socioeconomic factors might have on access to public services and poverty. Additionally, information relative to the geographical distribution of the population from the National Statistical Institute is used to calculate the density of population and the share of urban population.

³Another measure of fiscal decentralization is “vertical imbalance” which represents the transfer dependence of local governments. It is the degree to which the local government expenditure depends on transfers from central government. It is worth noting that a high value on this measure indicates little local financial autonomy.

⁴The surveys provide information on household access to several facilities like running water, electricity, health, and education infrastructures. They contain data about whether households own certain durable goods such as fridge, computer, car, etc.

Third, conflicts indicators are calculated using data from the Armed Conflict Location and Event Dataset (ACLED) (Raleigh et al., 2010). ACLED contains information on the exact dates and locations of political violence and type of events weighted with a fatality index⁵ The fatality index measures the intensity of events and represents the number of deaths due to each event. The fatality index varies from one to ten, with ten for the highest incidence of violence, and one for the lowest. These three data sources are combined and aggregated at the *département* level to construct a panel spanning 11 years (2001-2011) for 35 départements of the 57 *départements* in Côte d’Ivoire.⁶

How are the dependent variables computed?

As an indicator to measure poverty, the headcount poverty index is calculated as the percentage of the population living with less than US dollar 1 a day in each *département*⁷. Access to public services is measured using the multidimensional poverty index (MPI) method developed by (Alkire and Santos, 2010), which captures a set of direct deprivations experienced by a person at the same time. In order to capture the dimensions for which local

⁵The conflict events selected in this data are of three types (violence against civilians, remote violence, and rioting), protests (non-violent demonstrations), and non-violent events. As the interest period is characterized by political instability and sporadic conflict events, it is reasonable to think that this context may have compounded the existing problems of access to public services.

⁶The data are aggregated at *département* level because the 2008 HLSS is not available at the municipal level like the first data source. The 2002 HLSS is used for the sub-periods 2001-2008 while the 2008 HLSS is used for the sub-period 2009-2014.

⁷The data are corrected for inflation using the national prices deflator index and the poverty index is computed following the national poverty line calculation method (Percentage of total local population of each locality).

governments intervene in terms of public service delivery, different indicators for each dimension are used in this analysis. I, therefore, adjust the MPI measure, hereafter MPIa, by using indicators for each dimension in which local governments intervene. This indicator allows testing of at the same time wealth/poverty and access to basic services. As argued by (Alkire and Santos, 2010), “the MPI is the product of two numbers: the Headcount H or percentage of people who are poor, and the Average Intensity of deprivation A – which reflects the proportion of dimensions in which households are deprived.” Following this method, the MPIa has three dimensions composed of 10 indicators: two each for education and health, and six for living standards (Table 1). I take advantage of the HLSS survey and use both the person and the household as units of the analysis, which makes the index more accurate than indices which use only households as units of observation⁸. Table 1 presents the dimensions, indicators, and weights used to compute the MPIa. There are several reasons for the choice of the dimensions used to calculate MPIa in this analysis. First, local fiscal policies can significantly influence the access to public services for local citizens. Since the 2001 law on decentralization, there has been an ongoing shift of responsibility for education, water, and sanitation, and health management, to local governments. Second, it is easier to interpret, and is well suited for analyzing the access to basic services at local level. The limited number of dimensions simplifies comparison with the HPIa. Third, the HLSS surveys in Côte d’Ivoire are well documented for the chosen indicators. This measure is calculated for each *département*

⁸For some questions, the responses from households are used while for other the individual responses are used.

reflecting the percentage of people who are deprived of public services. A cutoff of 30 percent is used to define a poor person. Thus, a person is poor if the weighted indicators for which he or she is deprived add up to 30 percent (i.e. deprived in some combination of two to six indicators). Table A1 provides descriptive statistics for all variables (north and south), and Table A3 shows more information on the sources and definitions of these data.

Table 1: Dimensions and indicators used for the MPIa

Dimensions	Indicators	Deprived if..	Weight
Education 1	Adult illiteracy	The person is not able to read nor write a short simple statement on his everyday life	16.7
Education 2	No access to Education	School-aged child is not attending school in years 1 to 8 because of school remoteness or absence	16.7
Health 1	Food Access	Main household food problem is the lunch or the dinner	16.7
Health 2	Access to health services	No access to health services because of hospital remoteness or absence	16.7
Standard of Living 1	Sanitation	The household has no access to improved sanitation facilities (No toilet)	5.6
Standard of Living 2	Electricity	The household has no access to electricity	5.6
Standard of Living 3	Water Access	The household does not have access to clean drinking water	5.6
Standard of Living 4	Floor	The household has dirt, sand or dung floor	5.6
Standard of Living 5	Cooking Fuel	The household cooks with dung, wood or charcoal	5.6
Standard of Living 6	Assets	Does not own more than one of radio, TV, telephone, bike, motorbike or refrigerator	5.6

Note: The selected weighting between the dimensions follows the UNDP's MPI convention

4.2. Model specification

The previous studies commonly use cross-country data and also consider the heterogeneous characteristics as time invariant by using a fixed effect approach. One drawback of this method is that the estimates of parameters may be subject to substantial bias in the context that unobserved heterogeneity is not constant over time (Knight, 2002)⁹. To deal with this problem and account for both varying and unvarying heterogeneity between *départements*, this analysis uses the Grouped Fixed Effect (GFE) approach

⁹Knight (2002), by analyzing the impact of Federal Grants on US State Government Spending, argues that some aspects of US states' demands, such as attitudes towards public transport, are unobservable. He finds that a fixed effect may mitigate, but not eliminate this problem, since the demand for highway construction varied significantly over time.

proposed by [Bonhomme and Manresa \(2015\)](#), which was characterized by a series of events with different intensity and location, as shown by [Dabalén et al. \(2012\)](#). As the *départements* are affected differently by conflict and have different revenue potential, their revenue performance trends could follow different paths based on their specific unobserved characteristics. Such shocks may induce time-varying unobservable individual characteristics that cannot be accounted by the standard fixed effects approach ([Bartolucci et al., 2015](#)). More evidence about the consistency of this method and the presence of time-varying effects is given in Appendix. The empirical model has the following form:

$$\begin{aligned} \ln(\text{PovMPIa})_{it} = & \lambda + \theta_1 \ln(\text{FD})_{it} + \theta_2 \text{Hetero}_{it} + \theta_3 \ln(\text{FD}) * \text{Hetero}_{it} \\ & + \theta_4 x_{it} + \alpha_{g_{it}} + \eta_i + \varepsilon_{it} + \end{aligned} \quad (1)$$

$\ln(\text{PovMPIa})$ is the dependent variables $\ln(\text{Poverty})$ or the $\ln(\text{MPIa})$ representing respectively the log of the poverty headcount ratio and the adjusted multidimensional poverty index of *département* i at time t . The contribution of education and health in MPI is also used as a dependent variables. It represents the number of habitants who do not have sufficient income or food to meet some defined minimum living conditions over the total population of *département* i at time t . The interest variable $\ln(\text{FD})$ is measured by the log of per capita internally generated funds of *département* i at time t . *Hetero* represents the local heterogeneity of preference (local demand het-

erogeneity). This heterogeneity is approximated by two variables: Ethnic fractionalization and ethnic polarization as they measure the extent of cultural diversity and thus local taste ¹⁰. These variables are assumed to play a key role in the effect of local revenue autonomy on access to basic services and poverty since the literature has shown that heterogeneity of demand matters in the analysis of the effect of fiscal decentralization on delivery of services (Bird and Vaillancourt, 2006). The literature is inconclusive as to whether these indicators positively or negatively affect access to public services and poverty. As noted above, the analysis follows the literature by identifying control variables including transfers from central government and economic, demographic and social characteristics, represented by x_{it} . The group-specific unobservable effects $\alpha_{g,it}$ is modified to take into account the *département*-specific fixed effect η_i as well¹¹. ε_{it} represents an idiosyncratic disturbance.

The conflict effects are measured through the number of conflict events in each *département* and these numbers are weighted by the fatality index. Conflict variables are expected to negatively affect the dependent variables. Before discussing the empirical results, it is necessary to address some issues concerning the estimation strategy. First, there are reasons to consider local own revenue as an endogenous variable that can induce a bias in estimations. *Départements* with a high access to services or a low income poverty

¹⁰Ethnic fractionalization measures the probability that two randomly selected individuals in a *département* (in the context of this study) will not belong to the same ethnic group. Ethnic Polarization measures how far the distribution of the ethnic groups is from a bipolar distribution. The higher these indices, the stronger the heterogeneity of local demand.

¹¹See in appendix for the definition of the optimal number of groups.

rate may have higher potential to increase their revenue collection. The resulting reverse causality from this relation may bias the estimation results. Moreover, the internal effectiveness of each *département* in terms of implementing programs and technical staff training are unobservable in the models. This unobservable heterogeneity may be correlated with both the variables of interest and the dependent variables. To address these issues, equation (1) is estimated using a two-stage least squares (2SLS) methodology with panel corrected standard errors clustered by *département*. An instrumental variable for local revenue autonomy is constructed following a method proposed by [Martinez-Vasquez et al. \(2011\)](#). The value of the local revenue autonomy ratio instrumental variable is, calculated as:

$$LRA * IV_{it} = \frac{1}{\sum_{j=1}^n \frac{1}{d_j}} \sum_{j=1}^n \frac{1}{d_j} Ownrev_{jt} \quad (2)$$

Where $LRA * IV$ is the value of the instrumental variable for *département* i in year t . d is the distance between the largest cities in *département* i and *départements* j , and $Ownrev$ is the per capita own revenue of *département* j in year t . This instrument is the weighted average of the own revenue ratio for all other *départements* in the corresponding year, and the weights are the inverse of the distance between the two *départements*.

There are two principles hypotheses holding the use of this instrument as argued by [Martinez-Vasquez et al. \(2011\)](#). First, the poverty rate or access to basic services in one *département* relative to others generally should not have an effect on the local revenue mobilization of other , so the dependent variable should not be correlated with the instrument. Second, the design

of the own revenue raising system in a *département* should be affected by the design of the own revenue raising system in a neighboring *département*. The lagged variables of Local Revenue Autonomy (LRA) are also used as instruments under the hypothesis of an inter-temporal dependence of local revenue mobilization.

5. Empirical results and implications

This section presents the econometric results for the relationship between fiscal decentralization and access to basic services and poverty. Table 3 shows the estimation results of equations 1 concerning the effect of municipal revenue autonomy on MPIa or HPIIn. As defined above, a negative (positive) sign of a coefficient suggests a positive (negative) impact of the corresponding exogenous variable. All standard errors are clustered at the *département* level. In columns 1 and 7, the results show a positive effect of local revenue autonomy on MPIa and HPIIn respectively. This effect is statistically significant for MPIa and insignificant for HPIIn. These results underline the importance of considering poverty as a multidimensional phenomenon which reflects deprivations in multiple dimensions as highlighted by [World Bank \(2016\)](#) such as education, health, and living standards. The difference between the MPIa and HPIIn results suggests that municipalities can help reduce deprivations in some dimensions without having significant effects on individuals' income. For example, an individual living under the poverty line and deprived in four dimensions could become deprived in three dimensions

due to local government action, but could remain under the poverty line ¹². Columns 2 and 8 report the GFE estimation results controlling for potential endogeneity of municipal revenue autonomy. The results show a significant effect of municipal revenue autonomy on access to basic services (column 2, table 3). A 10 percent increase in revenue collected by municipalities induces a 0.78 percent decrease in the share of citizens deprived in at least 30 percent of the selected dimensions . This result is significant at the 1 percent level. The results support the theory that involving local governments in delivery of public services can help to better account for local demand and improve public services. Column 8 replicates the specification of column 2 by using HPIn as the dependent variable. Once endogeneity is controlled for, municipal revenue autonomy appears to have a positive and statistically significant effect on income poverty (HPIn) at the 5 percent level. Comparing this coefficient with those of MPIa, the result shows that the coefficient for MPIa is significant at the 1 percent level, but HPIn is not significant at the same level. Moreover, the estimated coefficients for other control variables have the expected signs only for MPIa.

Note that these results are consistent with the theoretical predictions of (Oates, 1993) and contrast with the findings of Sepulveda and Martinez-Vazquez (2011) who report that fiscal decentralization increases poverty. The difference between our result and those of Sepulveda and Martinez-Vazquez (2011) could be explained by the country-specific context and the method

¹²The poverty index using a threshold is limited to many aspects: First, it fails to take into account the severity of poverty. Second, it assumes that poverty is uniformly distributed across a given household ignoring the vulnerable family number such as children and elderly population.

used in their study. Although they use fixed effect estimation, the cross-country regressions might not account for individual country effects which may affect poverty. Moreover, the log of population and openness to international trade which they use as instruments of fiscal decentralization are likely to be correlated with both endogenous and dependent variables. This violates the exogenous hypothesis required for valid instrument and could possibly bias estimation results.

Does local heterogeneity matter in the relationship between fiscal decentralization, access to basic services and poverty?

The subsequent columns of Table 3 (columns 3 to 6 for MPIa and columns 9 to 12 for HPIn) report the indirect effect of local heterogeneity on access to basic services (MPIa) and poverty (HPIn). These estimations test whether the effect of fiscal decentralization on MPIa depends on the degree of the heterogeneity of demand.

Columns 3 and 5 show the estimation results with interaction of municipal revenue autonomy crossed with the ethnic fractionalization and polarization index respectively for MPIa and HPIn. Columns 4 and 6 present level variables and interaction terms in the same specification for each index. The coefficient of interaction terms crossed with ethnic fractionalization is a negative and significant at the 1 percent level (column 3). This suggests that in a less ethnically diverse *départements*, local authorities have a higher propensity to satisfy citizens in terms of access to basic services and reduce poverty. In fact, as the literature argues, ethnic diversity has a negative impact on

social cohesion and human development ([Alesina et al., 1999](#)). Therefore, the significant effect of heterogeneity of demand on MPIa can be explained by the fact that social cohesion helps to increase of cooperation and maintain social pressure against corruption and elite capture. This provides local governments with more efficiency in the implementation of poverty reduction programs and facilitates their actions¹³. Another possible explanation is that local diversity can force local authorities to be more accountable to citizens. These findings are consistent with the results by [Montalvo and Reynal-Querol \(2005\)](#) who find that fractionalization has an important effect on economic development. They find also however that, local ethnic polarization plays no significant role in the relationship between fiscal decentralization and service delivery.

Columns 9 to 12 report estimates for municipal revenue autonomy on HPIIn using the same specifications as in columns 3 to 6. The coefficients of the interactive terms between municipal revenue autonomy and ethnic fractionalization and polarization are negative, but not significantly different from zero at any reasonable level of significance (columns 9 and 11). These results are the same with the inclusion of ethnic fractionalization and polarization (columns 10 and 12). The estimated coefficients of the other control variables have the expected signs and plausible magnitudes. The coefficient associated with the share of the informal sector is positive and statistically significant for the MPI. This indicates that the informal activities negatively affect access to basic services. One explanation might be that informal activities

¹³For example, [Alesina et al. \(2003\)](#) point out the negative effect of ethnic fractionalization on the quality of government.

induce loss of revenue for local governments that could have been used for service delivery. However, the coefficients for informal sector are negative, but not significantly different from zero, when taking HPIn as the dependent variable. This means that informal activities increase the income of citizens. This result is intuitive and consistent with the context of developing countries, because many local businesses are not registered, which are the main sources of citizens' income. The coefficient for central government transfers is positive, and not significant, revealing the potential inefficiency of transfers from central government to local government. As argued in the literature, local authorities can divert transfers away from its centrally defined objective for personal gain (Prud'homme, 1995)¹⁴. The share of urban population shows the expected sign. Its coefficient is negative for both MPI and HPIn, suggesting that local governments with a large share of urban populations likely to improve access to basic services and reduce poverty¹⁵. In addition, time-varying département specific effects are controlled for. The reported coefficients are statistically different from zero for both of MPI and HPIn, increasing confidence in the econometric method.

In table 3, the analysis assumes that MPIa is a good proxy for households' access to basic services, because by design this index represents the deprivation of citizens in several dimensions of poverty. The estimations show that municipal revenue autonomy has a positive and significant effect on MPIa.

¹⁴See Sanogo and Brun (2016) for more arguments on the effectiveness of central transfers.

¹⁵This result is consistent with the findings of (Sepulveda and Martinez-Vazquez, 2011).

Table 2: Effect of local revenue autonomy (LRA) on Multidimensional Poverty Index and Headcount poverty Index, GFE 2SLS estimation

Dependent variable	Multidimensional Poverty Index						Headcount poverty Index					
	GFE	GFE_IV	GFE_IV	GFE_IV	GFE_IV	GFE_IV	GFE	GFE_IV	GFE_IV	GFE_IV	GFE_IV	GFE_IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
LRA	-0.068*** (0.011)	-0.078*** (0.013)	-0.050*** (0.01)	-0.10*** (0.03)	-0.06*** (0.01)	-0.08** (0.03)	-0.16 (0.01)	-0.094** (0.04)	-0.11 (0.09)	-0.18 (0.16)	-0.13* (0.079)	-0.15 (0.17)
Central Transfers	0.029 (0.0277)	0.032 (0.0321)	0.002 (0.0166)	0.007 (0.0169)	0.013 (0.0179)	0.016 (0.0189)	-0.013 (0.0123)	0.003 (0.0108)	0.013 (0.0126)	0.012 (0.00826)	0.0057 (0.0079)	0.0083 (0.007)
Urban population	-0.790*** (0.107)	-0.758*** (0.118)	-0.609*** (0.0925)	-0.61*** (0.0976)	-0.647*** (0.0902)	-0.64*** (0.0949)	-0.129 (0.149)	-0.119 (0.147)	-0.0620 (0.0751)	-0.0715 (0.0603)	-0.093 (0.098)	-0.12 (0.099)
Informal sector	1.064*** (0.338)	1.165*** (0.373)	0.704*** (0.216)	0.664*** (0.217)	0.869*** (0.219)	0.871*** (0.216)	-0.573 (0.550)	-0.587 (0.520)	-0.00982 (0.158)	-0.0142 (0.158)	-0.062 (0.17)	-0.047 (0.18)
Ethnic frag.*Local aut			-0.029*** (0.0105)	0.0428 (0.0390)					-0.0328 (0.0249)	0.189 (0.190)		
Ethnic frag.				-0.337* (0.178)						-0.0249 (0.893)		
Ethnic polarization					-0.0101 (0.0119)	0.009 (0.0321)					0.021 (0.016)	0.075 (0.10)
Ethnic pol*Local aut						-0.102 (0.113)						-0.31 (0.43)
Group fixed effect	0.0662 (0.112)	-0.113*** (0.037)	-0.20*** (0.034)	-0.22*** (0.046)	-0.243*** (0.076)	-0.295** (0.136)	0.589*** (0.043)	0.515*** (0.054)	0.249*** (0.08)	0.298*** (0.069)	0.43*** (0.06)	0.49*** (0.04)
Constant	-2.124***	-1.465***	-0.977***	-1.07***	-1.164***	-1.16***	-0.444	-0.00444	-0.323	-1.29***	-0.278	-0.61
Observations	250	182	147	147	147	147	250	182	147	147	147	147
R-squared	0.846	0.832	0.897	0.895	0.890	0.888	0.950	0.938	0.970	0.974	0.96	0.96
Hansen (p-value)	0.036	0.327	0.853	0.247	0.325	0.324	0.187	0.237	0.225	0.29	0.25	0.22
Cragg-Donald Wald F statistic		313.02	256.33	35.53	252.37	49.31		313.02	256.33	35.53	252.72	49.31
Anderson canon (P-value)		0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.00	0.00
Départements FE		Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes

Robust standard errors clustered at the départements level in parentheses / *significant at 10%; ** significant at 5%; *** significant at 1%

However, this result may hide considerable difference in the effect of LRA on the different dimensions of poverty (education, health, water-electricity-sanitation, and living standards). To explore this possibility, the contribution of each dimension in MPIa is calculated. Table 3 presents the results where each dependent variable represents the share of individuals deprived in 30 percent of the corresponding dimensions. One might think that there is a significant degree of correlation between control variables, such as the share of urban population and municipal revenue autonomy. In order to avoid the potential problem of multicollinearity resulting from this correlation, I regress only the municipal revenue autonomy on the MPIa for each dimension (columns 1 and 3). The second specification for each dimension includes the lagged MPIa index to alleviate the potential intertemporal dependence between current decisions and previous level of deprivation. In the third column for each dimension, the benchmark specification (columns 2 and 8,

table 3) are replicated to control for endogeneity. Apart from access to water, the estimates of municipal revenue autonomy are significant for education, health and living standard, however interesting differences in the magnitude of the coefficients are worth noting. First, it seems that local governments are more likely to increase access to education than to health. The coefficient for education is negative and significant at the 1 percent level of significance, and higher than that for health. It is easier for local governments to implement programs for access to education, for example by constructing schools, than for health. The devolution of responsibilities in the health sector to municipalities is limited compared to education because of the sensitivity of this sector.

This result is consistent with Côte d'Ivoire's circumstances, since the central government carries out functions such as licensing health professionals, registration and quality-control of drugs. The results (columns 7, 8, and 9) show that the effects of municipal revenue autonomy on access to water are not significant. A possible explanation is that, by design the index concerns the citizens' access to tap water which is the responsibility of central government, which has field offices responsible for delivering water at local level. In columns 10, 11, and 12 about living standard, which includes cooking fuel, sanitation assets, floor, and electricity, the results are difficult to interpret, since the exogenous instruments are not valid (the Hansen p-value=0.001). By design, these dimensions seem less affected by the actions of municipalities.

In order to identify more clearly the area on which local governments must focus on, the sample is divided into two subgroups: urban population and

Table 3: Effect of municipal revenue autonomy on Multidimensional Poverty Index by dimension, GFE 2SLS

Dependent variable :	MPI_Education			MPI_Health			MPI_Water			MPI_Living standard		
	GFE	GFE	GFE_2SLS	GFE	GFE	GFE_2SLS	GFE	GFE	GFE_2SLS	GFE	GFE	GFE_2SLS
MPI by dimension	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
LRA	-0.07*** (0.01)	-0.03*** (0.008)	-0.09*** (0.02)	-0.05** (0.02)	-0.04** (0.02)	-0.06** (0.02)	-0.05 (0.06)	0.001 (0.02)	-0.09 (0.09)	-0.09*** (0.029)	-0.02* (0.01)	-0.11*** (0.02)
lagMPI_Educ		0.59*** (0.08)										
lagMPI_Health					0.04*** (0.0172)							
lagMPI_water								0.71*** (0.120)				
lagMPI_living										0.70*** (0.0746)		
Central Transfers			0.025 (0.03)			-0.03 (0.039)			-0.08 (0.13)			-0.0409 (0.04)
Urban population			-0.43*** (0.079)			-0.31* (0.19)			-2.66** (1.06)			-1.15*** (0.20)
Informal sector			0.94** (0.40)			0.24 (0.37)			1.82 (2.110)			2.36*** (0.741)
Constant	-1.9***	-0.8***	-2.5***	-3.8***	-3.70***	-1.4***	-4.7***	-1.7***	-4.18**	-1.76***	-0.45**	-3.2***
Observations	277	276	182	277	276	182	235	213	163	277	276	182
R-squared	0.576	0.803	0.643	0.939	0.940	0.941	0.439	0.823	0.567	0.416	0.805	0.63
Hansen (P-value)			0.053			0.58			0.34			0.001
Cragg-Donald Wald F statistic			300.4			370.9			357.66			313.27
Anderson canon (P-value)			0.00			0.00			0.00			0.00
Départements FE Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors clustered at the départements level in parentheses /* significant at 10%; ** significant at 5%; *** significant at 1%

rural population. The analysis is interested in whether deprived urban and rural populations respond differently to changes in municipal revenue autonomy. All variables in table 3 are included in specification 2 and 3 respectively for rural and urban populations MPIa index. In table 4, the results are consistent with the previous findings, however there is a significant difference between the two subgroups. The coefficients for municipal revenue autonomy for rural populations are higher than those for urban populations. This suggests that local governments are more likely to reduce deprivation in access to public service for rural population than urban ones. This result is intuitive since urbanization increases the need of citizens. These needs may limit the effect of local governments.

Table 4: Effect of LRA on multidimensional poverty index by subgroup: urban and rural population

Dependent variable:	MPIa			
	Rural		Urban	
	GFE	GFE_2SLS	GFE	GFE_2SLS
MPIa for rural and urban area	(1)	(2)	(3)	(4)
LRA	-0.0917** (0.0365)	-0.133*** (0.0327)	-0.130* (0.0754)	-0.124** (0.0534)
Central Transfers		-0.0162 (0.0658)		-0.0651 (0.112)
Urban population		-1.586*** (0.385)		-2.782*** (0.499)
Informal sector		-0.252 (0.250)		0.490 (1.274)
Constant	-0.442*	2.003***	-0.200	1.143
Observations	131	85	174	112
R-squared	0.881	0.933	0.220	0.745
Hansen (p-value)		0.953		0.349
Cragg-Donald Wald F statistic		99.06		198.31
Anderson canon (P-value)		0.00		0.00

Robust standard errors clustered at the départements level in parentheses
 / *significant at 10%; ** significant at 5%; *** significant at 1%

Does conflict affect access to services and poverty?

Côte d'Ivoire experienced a conflict over the period being studied. It is therefore reasonable to think that this context may have negatively affected the local government capacity to implement programs of poverty reduction and to increase access to public services. To deal with this possibility, the conflict effect is controlled for through an index represented by the number of conflict events weighted with a fatality index for each event by locality. The fatality index reports the number of deaths due to each event, it varies from one to 10 with 10 for the highest incidence of violence, and one the lowest. The estimated coefficients are negative and not statistically significant for both MPIa and HPIn (Table 5). This suggests that although conflict has a negative effect on poverty and access to public services, the effect is not statistically significant. This unexpected result could be explained by the fact the conflict was characterized by several short periods of conflict events with different intensity and location (See in Appendix). With the exception of Abidjan, the economic capital, the regions with a higher incidence of violence are concentrated in the rebel-held, northern and western parts of the country. Because the data mainly (approx. 80 percent) covers the southern regions, which have lower levels of conflict, it does not allow for properly assessing the conflict effect. Note also that the conflict measures used in this analysis are not exhaustive. Further analysis should be based on household surveys.

Table 5: Effect of municipal revenue autonomy and conflict on access to basic service and poverty reduction

Dependent variable	Multidimensional poverty index			Headcount poverty Index		
	GFE_2SLS	GFE_2SLS	GFE_2SLS	GFE_2SLS	GFE_2SLS	GFE_2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Local revenue autonomy	-0.0782*** (0.0136)	-0.0788*** (0.0134)	-0.0325 (0.0229)	-0.0946** (0.0418)	-0.0939** (0.0383)	-0.164** (0.0712)
Central Transfers	0.0322 (0.0321)	0.0266 (0.0290)	0.0330 (0.0346)	0.00329 (0.0108)	-0.000310 (0.00961)	-0.00257 (0.00958)
Urban population	-0.758*** (0.118)	-0.764*** (0.115)	-0.781*** (0.0976)	-0.119 (0.147)	-0.130 (0.151)	-0.0990 (0.220)
Informal sector	1.165*** (0.373)	1.198*** (0.364)	1.318*** (0.314)	-0.587 (0.520)	-0.575 (0.518)	-0.627 (0.547)
Conflict events		-0.0144 (0.0233)			-0.0247* (0.0131)	
Conflict events weighted			0.0111 (0.0116)			0.00556 (0.0128)
Constant	-1.465***	-1.442***	-1.884***	-0.00444	0.0234	0.528
Observations	182	182	148	182	182	148
R-squared	0.832	0.833	0.867	0.938	0.939	0.925
Hansen (p-value)	0.286	0.013	0.62	0.134	0.21	0.491
Crag-Donald Wald F statistic	305.96	286.59	265.23	9.83	10.15	5.911
Anderson canon (P-value)	0.00	0.00	0.00	0.00	0.00	0.00

Robust standard errors clustered at the départements level in parentheses
/ *significant at 10%; ** significant at 5%; *** significant at 1%

Are the instruments valid and relevant?

A relevant econometric issue when addressing endogeneity is whether the excluded exogenous variables are valid instruments. In order to address this issue, for all specifications, the p-value for the Hansen over-identification test is reported. The null hypothesis is that the excluded exogenous variables are valid. The reported Hansen p-values are higher than the 5 percent conventional level of significance, which suggests that these variables satisfy the requirement for valid instruments and are not uncorrelated with the dependent variables. Another issue is whether the instruments are significant in explaining the extent of local revenue autonomy. The reported Anderson

Canon p-values confirm that the instruments explain significantly the fiscal decentralization measured here by local revenue autonomy. The instruments are globally relevant. The statistical significance of the coefficients on the excluded variables in the first-stage estimates was derived¹⁶.

Robustness checks

The benchmark results (column 2, Table 2) are not sensitive to the inclusion of other covariates such as the heterogeneity measures and the conflict variables. For example, the effect of local revenue on MPIa does not disappear no matter which measure of heterogeneity is included in the regression and the statistical significance remains for almost all specifications (columns 3 to 6, Table 3). However, this statistical significance does not hold in many specifications for the effect on HPIIn (columns 7 to 12, table 3). The analysis goes further by examining whether the 2007 peace agreement signing boosted the implementation program of public services delivery, which may not have been fully captured by grouped fixed effect. I proceed by dividing the sample into two sub-sample periods: 2001-2006 and 2007-2011 and replicate the specification of table 3. This does not alter the previous findings. Municipal revenue autonomy positively affects access to public services across the two sub-periods. However, the results suggest that the effect is higher for the period (2007-2011), after the signing of the agreement, than the period before the signing (2001-2007) (Table 6). In Côte d'Ivoire, the 2007 peace agreement was signed by all political parties in the country, and marked the

¹⁶The results (first step regression) are available upon request

end of tension. Both sides agreed to a free and fair general election to be held in 2008. This event might have induced a change in the behavior of local governments.

Table 6: Effect of local revenue autonomy (LRA) on Multidimensional Poverty Index (MPI), before and after the 2007 peace agreement signing, GFE 2SLS estimation

Dependent variable	Before 2007 Peace agreement				After 2007 Peace agreement			
	GFE	GFE	GFE_2SLS	GFE_2SLS	GFE	GFE	GFE_2SLS	GFE_2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Local Revenue A.	-0.0434** (0.0213)	-0.0596** (0.0228)	-0.0783*** (0.0266)	-0.0682** (0.0321)	-0.0761*** (0.0181)	-0.0851*** (0.0205)	-0.102*** (0.0270)	-0.120*** (0.0424)
Central Transfers		-0.00603 (0.0498)	-0.0108 (0.0509)	-0.0582 (0.0498)		-0.0111 (0.0548)	-0.0242 (0.0522)	-0.0374 (0.0687)
Urban population		-0.784** (0.292)	-0.794*** (0.287)	-0.745*** (0.251)		-0.827*** (0.275)	-1.164*** (0.298)	-0.856*** (0.258)
Informal sector		0.383 (0.538)	0.378 (0.654)	0.770 (0.652)		0.884** (0.380)	1.045 (0.705)	0.814 (0.668)
Ethnic frag.*Local aut				-0.00206 (0.0243)				0.0170 (0.0198)
Group fixed effect	0.801*** (0.225)	0.342 (0.329)	0.355** (0.150)	0.351** (0.145)	0.574*** (0.183)	0.00975 (0.223)	0.164 (0.150)	-0.0156 (0.148)
Constant	-1.899***	-1.368**	-0.919**	-1.037**	-1.557***	-1.473***	-0.918**	-0.546
Observations	172	159	120	99	105	91	62	48
R-squared	0.735	0.817	0.790	0.795	0.772	0.886	0.845	0.826
Hansen (p-value)			0.359	0.106			0.0068	0.42
Cragg-Donald Wald F statistic			185.77	69.319			60.205	14.54
Anderson canon (P-value)			0.00	0.00			0.00	0.00

Robust standard errors clustered at the *départements* level in parentheses / significant at 10%; ** significant at 5%; *** significant at 1%

6. Conclusion

Providing local governments with decision making and revenue raising responsibilities enhances accountability and thereby increases social welfare through efficient public services delivery (Oates, 1993). The study poses two questions. First, does the effect of fiscal decentralization, measured as the per capita municipality own revenue differ, when considering either the access to public services or the poverty in Côte d’Ivoire. The second is relative to the role played by the local heterogeneity in this relationship. The empirical study uses the GFE model of Bonhomme and Manresa (2015) and a local government revenue dataset spanning 11 years (2001-2011) for 115 municipalities in 35 *départements*. An adjusted multidimensional poverty index and a headcount poverty index at *département* level using the 2002 and 2008 Household Living Standard Surveys (HLSS) are calculated. The results suggest that devolving municipality revenue mobilization positively affects the access to public services and reduces poverty. However, there is evidence that fiscal decentralization has more robust effect on access to public service, than poverty. This effect seems to work mainly through enhancing access to education, rather than health, water and sanitation services. Contrary to existing literature, our results indicate that municipalities are more likely to improve access to public services in less ethnically diverse localities and in rural zones. The study provides evidence of the effect of the conflict experienced by the country has been statistically limited. This study provides some important implications for the design of anti-poverty programs and fiscal decentralization in Côte d’Ivoire and more broadly in Sub-Saharan Africa. Since several countries consider fiscal decentralization as part of their

fiscal reforms, the positive findings concerning the impact of local revenue autonomy in the analysis legitimate and give more credence to this policy objective. Moreover, the research highlights the importance of the context (rural or urban), and the dimensions of access to public service in which municipalities may be more effective, and reveals the importance of considering the multiple dimensions of public services as shown by ([World Bank, 2016](#)). From the policy perspective, this is crucial for both policy makers and researcher focusing on local government autonomy. However, there is a need to construct more accurate decentralization indicators which reflects the real decision-making power devolved to local authorities. These indicators might include the power to set tax rates, and the political and institutional processes that assign the responsibility to raise taxes and undertake public spending as noted by ([Lessmann, 2012](#)).

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Appendix A.

Appendix A.1. Statistics

Table A.7: Descriptive statistics

Variable	ALL Sample			Northern localities		Southern localities	
	Obs	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Population	385	98190	116880	126560	180587	85188	67276
Poverty headcount index (HPI _n)	385	0.38	0.16	0.42	0.18	0.36	0.14
Adjusted Multidimensional poverty index (MPI _a)	385	0.28	0.10	0.34	0.08	0.26	0.09
MPI _a _Education	385	0.09	0.02	0.12	0.07	0.08	0.02
MPI _a _Health	385	0.09	0.07	0.09	0.07	0.08	0.06
MPI _a _Water	385	0.04	0.02	0.06	0.03	0.03	0.01
MPI _a _Living standard	385	0.10	0.04	0.12	0.04	0.08	0.03
Ethnic fractionalization	311	0.66	0.20	0.59	0.24	0.68	0.17
Ethnic Polarization	311	0.81	0.33	0.76	0.26	0.83	0.36
Conflict Events (number of conflict events)	385	5.99	9.36	4.74	5.14	6.57	10.71
Conflict Events (weighted with fatality index)	378	899.49	4264.63	63.6	312.93	1260.44	5059.12
Urban (share of urban population)	352	0.45	0.23	0.46	0.16	0.44	0.26
Household annual consumption (fefa)	385	930755.9	545811	841559.2	521151.1	971637.7	552910
Informal (share of informal sector)	380	0.61	0.1	0.62	0.09	0.61	0.1
Local Non-Tax Revenue (LNTR) per capita	385	666.33	767.19	109.45	344.99	921.57	772.65
Local Tax-Revenue (LTR) per capita	385	662.26	1068.76	100.91	287.06	919.54	1191.11
Total Own Revenue per capita	385	2213.49	3636.71	811.01	1199.53	4163.44	31933.32
Central transfers per capita	385	1551.24	3491.70	710.10	1067.34	1936.76	4099.59
Miscellaneous revenue per capita	385	378.85	1564.62	135.95	390.41	490.18	1861.51

Table A.8: Composition of Municipality Non-Tax Revenue, 2002-2007

Revenue source	Flat rate tax	Civil Registration	Market fees	Lease fees	Fees for the use of public facilities	Other (bars, shows, advertising, hotels licenses)	Total
Value (million fca)	23559.36	12996.90	24590.43	5257.85	6009.82	25763.23	98177.62
Percentage (%)	24.00	13.24	25.05	5.36	6.12	26.24	100

Source: Calculation by authors with Côte d'Ivoire data from the Ministry of Interior (DGDDL).

Table A.9: Main variables and sources

Main variables	Description	Source
Adjusted Multidimensional poverty index (MPIa)	For each département, the number of people who are deprived of public services as a percentage of total population. A cutoff of 30% is used to define a poor individual. Thus a person is poor if the weighted indicators in which he or she is deprived sum up to 30% or more, as suggested by Alkire & Santos (2010)	The 2002 and 2008 Household Living Standard Surveys (HLSS), Ministry of Interior Côte d'Ivoire
MPIa_Education	For each département, the number of people who are deprived of education services as a percentage of total population. A cutoff of 30% is used to define a deprived individual.	The 2002 and 2008 HLSS, Ministry of Interior Côte d'Ivoire
MPIa_Health	For each département, the percentage of people who are deprived of Health services to total population. A cutoff of 30% is used to define a poor	The 2002 and 2008 HLSS, Ministry of Interior Côte d'Ivoire
MPIa_Water	For each département, the number of people who are deprived of clean water as a percentage of total population. A cutoff of 30% is used to define a deprived individual	The 2002 and 2008 HLSS, Ministry of Interior Côte d'Ivoire
MPIa_Living standard	For each département, the number of people who are deprived of a set of basic living standards of total population. A cutoff of 30% is used to define a deprived individual	The 2002 and 2008 HLSS, Ministry of Interior Côte d'Ivoire
Poverty headcount index	For each département, the percentage of the population living with less than US dollar 1 a day	The 2002 and 2008 HLSS, Ministry of Interior Côte d'Ivoire
Ethnic fractionalization	The probability that two randomly selected individuals in a département will not belong to the same ethnic group. The higher this index is, the stronger is the heterogeneity of demand.	The 2002 and 2008 HLSS, Ministry of Interior Côte d'Ivoire
Ethnic Polarization	How far the distribution of the ethnic groups is from the bipolar distribution in a département. The higher this index is, the stronger is the heterogeneity of demand	The 2002 and 2008 HLSS, Ministry of Interior Côte d'Ivoire
Informal sector	The share of local businesses not registered with the tax administration	The 2002 and 2008 HLSS, Ministry of Interior Côte d'Ivoire
Conflict Events	The number of conflict events by département	The Armed Conflict Location and Event Dataset (ACLED)
Conflict weighted Events	The number of conflict events weighted with a fatality index of each event by département. The fatality index reports the number of deaths due to each event, one represents least violence and 10 represents the highest incidence of violence	The Armed Conflict Location and Event Dataset (ACLED)
Local revenue autonomy	The per capita revenue collected by local tax administrations	Ministry of interior Côte d'Ivoire

Source: Author

Appendix A.2. Grouped patterns and consistency of the GFE approach

In order to avoid arbitrary setting of the group number that may cause a bias in parameter estimates, the analysis follows [Bonhomme and Manresa \(2015\)](#) in using a Bayesian Information Criterion (BIC) to derive the optimal number of groups. The following equations are used to calculate this optimal number of groups:

$$\text{BIC}(G) = \frac{1}{NT} \sum_{i=1}^N \sum_{t=1}^T (y_{it} - x'_{it} \hat{\theta}^{(G)} - \hat{\alpha}_{it}^{(G)})^2 + \hat{\sigma}^2 \frac{GT + N + K}{NT} [\ln(NT)]$$

with

$$\hat{\sigma}^2 = \frac{1}{NT - G_{\max}T - N - K} \sum_{i=1}^N \sum_{t=1}^T (y_{it} - x'_{it} \hat{\theta} - \hat{\alpha}_{git})^2$$

I then run the model to assign groups to *département*. The mis-specification of the number of groups depends on whether the number of groups is above or below the true one. To avoid this bias, I consistently estimate equation (1) for several numbers of groups to identify the optimal number of groups that minimize the bias from the estimation. Table B1 reports the BIC, the GFE coefficient estimates for total transfers, and selected covariates and the standard errors. The parameter

$$\hat{\sigma}^2$$

and the BIC are computed using a maximum number of groups $G_{\max}=5$. In order to compare with the Fixed Effect (FE) method, I present in the

last row of the table the results of FE regression with the same specification. The results suggest that a substantial amount of cross-*département* heterogeneity is time-variant. This finding is consistent with those reported in (Bonhomme and Manresa, 2015). In fact, the objective function of FE is higher than the one of GFE for G=4, suggesting that a substantial amount of *département* heterogeneity might be time-variant. Moreover, the standard errors of the GFE are lower than those of FE, confirming the consistency of GFE approach on the data. Interestingly, Table B1 shows that the value of the BIC decreases steadily as G increases, and reaches a minimum once G=4. This BIC increases for G=5. This result suggests that the optimal number of groups according to BIC is G=4. Thus, the following estimations in this analysis will be use G=4. It is worth noting that the homogenous characteristics within a group remain an important issue that could be further explored by surveys of local governments.

Table A.10: Bayesian Information Criterion and the optimal number of groups

Groups	Obs	BIC	Objective function	Coefficient estimated (transfer)	Standard errors bootstrapped
1	385	0.69	-	-	-
2	385	0.64	52.93	0.066	0.96
3	385	0.50	37.28	0.102	0.87
4	385	0.24	23.27	0.259**	0.90
5	385	0.36	15.64	0.307***	1.03
Fixed effects		-	22.61	0.225**	0.11

Source : Author

There are several reasons in favor of using the GFE estimator rather than the FE approach to control for local governments' unobserved specific characteristics. The first motivation comes from the conflict that the country

experienced, which was characterized by several episodes of events with different intensity and location around the *départements*, as shown by [Dabalén et al. \(2012\)](#), combined with the capacity of each *département* to recover from an economic downturn, tends to cluster *départements* in time and space in terms of revenue performance. To sum up, the shocks from the conflict affect each individual *département* differently. The GFE model allows for time-variance unobservable in a period that is characterized by a large number of phases, as in this case. As argued by [Bartolucci et al. \(2015\)](#), the omitted individual characteristics or shocks may induce time-varying unobservable individual characteristics. They also highlight the importance of accounting for these effects by using GFE methods. Second, the GFE method is well-suited to deal with the characteristics of the data that have a short length of time (2001-2011), and which have a small within-*département* variance of revenue. In fact, according to [Bonhomme and Manresa \(2015\)](#), the GFE estimator performs well with such small panel data, and produces consistent estimates as long as the number of groups is correctly specified. Figure A7 reports the unobserved trends of revenue performance using four groups ($G=4$), and highlights trends in the variables of interest. I find the presence of time-varying patterns across different groups in the data. Figure B1 shows that the four groups experience unstable trends over time. For example, the left panel reports a high dispersion of groups' patterns in the periods of high incidence of conflict (2002 and 2010)¹⁷. The left panel shows that the

¹⁷As the *départements* are affected differently by conflict and characterized by disparities in revenue potential, the trend of their revenue performance may follow different paths according to their specific unobserved characteristics.

parameter estimated

$$\hat{\alpha}_{git}$$

varies over time. In the right panel, the paths of own revenue differ from one group to another, though groups 2 and 4 seem to follow very similar paths. I find therefore several cases of robust evidence of *départements'* heterogeneity that need to be grouped according to their performance in revenue mobilization. These differences could not be accounted for by considering only the fixed specific effects.

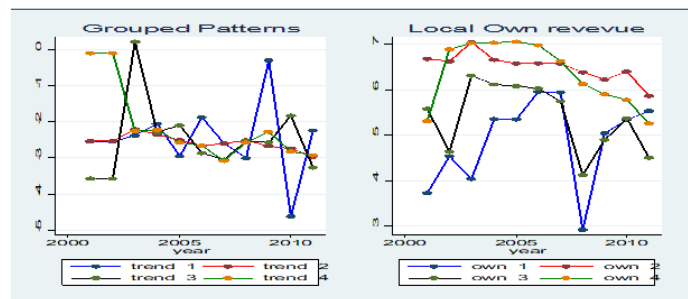


Figure A.5: Group-specific time effects