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Does fiscal decentralization enhance citizens' access to public services and reduce poverty? Evidence from Côte d'Ivoire municipalities in a conflict setting

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► To cite this version:

Tiangboho Sanogo. Does fiscal decentralization enhance citizens' access to public services and reduce poverty? Evidence from Côte d'Ivoire municipalities in a conflict setting. *World Development*, 2019, 113, pp.204 - 221. 10.1016/j.worlddev.2018.09.008 . hal-01875189

HAL Id: hal-01875189

<https://hal.science/hal-01875189v1>

Submitted on 12 Nov 2021

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Development

Manuscript Draft

Manuscript Number: WD-8756R2

Title: Does fiscal decentralization enhance citizens' access to public services and reduce poverty? Evidence from Côte d'Ivoire municipalities in a conflict setting

Article Type: Manuscript

Keywords: Fiscal decentralization, local tax and non-tax revenues, multidimensional poverty, Local development, Côte d'Ivoire

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Abstract: Fiscal decentralization has been implemented in many countries with an explicit objective of improving public service delivery and reduce poverty. However, its effectiveness in achieving these goals is much debated and the empirical literature has mostly focused on poverty reduction using cross-country analysis.

This paper analyses whether, and how, the devolution of revenue raising responsibilities to Côte d'Ivoire' municipalities enhances access to public services and contributes to reducing poverty. Local revenue sources that reflect municipalities' autonomy in decision-making are considered to measure revenue decentralization. An adjusted multidimensional poverty index for access to public services and a headcount poverty index are also calculated at the local level using the Household Living Standard Survey. The empirical analysis uses a grouped fixed effect approach, combined with a two-stage least squares methodology with panel corrected standard errors clustered by département to address both time-varying heterogeneity and local revenue endogeneity. Our study finds that increased local revenue positively affects access to public services and reduces poverty. However, there is evidence that revenue decentralization has a more robust effect on access to public service, than on poverty. This effect seems to work mainly through enhancing access to education more than access to health, water, and sanitation services. Interestingly, our results indicate that municipalities are more likely to improve access to public services in less ethnically diverse localities and in urban zones. The study shows that the conflict has compounded the existing problems of access to public services with no statistically significant effect on poverty.

Does fiscal decentralization enhance citizens' access to public services and reduce poverty? Evidence from Côte d'Ivoire municipalities in a conflict setting

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Abstract

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*Acknowledgements

Acknowledgements

The author would like to thank Jean-François Brun (CERDI) and Antonio Savoia (University of Manchester) for helpful comments. This work was supported by the LABEX IDGM+ (ANR-10-LABX-14-01) within the program “Investissements d’Avenir” operated by the French National Research Agency. The data construction has been supported by the International Centre for Tax and Development in the UK under the project no. GO/12001. This paper has also benefited from discussions at the Centre for European Economic Research (ZEW) Conference on Public Finance and Development (Germany, Mannheim, May 2017). I also wish to thank the participants in the Gates Foundation and University of Oxford Workshop on Public Finance in Developing Countries hosted by Johns Hopkins University (Washington D.C, November 2017), for useful suggestions.

I am greatly indebted to the officials at “la Tutelle Economique et Financière (D.T.E.F) de la

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Direction Générale de la Décentralisation”, and selected municipalities in Côte d’Ivoire, for facilitating access to data and relevant documents.

I also thank the anonymous referees for extensive comments. Any remaining errors are mine.

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***Highlights (WITHOUT author details)**

Highlights

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- Increasing municipal-raised revenues improve access to public services and reduce poverty.
- Revenue decentralization has a more robust effect on access to public service, than on poverty.
- This effect works mainly through enhancing access to education than on access to health.

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19 □ Local heterogeneity and urbanization play a key role in access to public services. 20

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□ The conflict has compounded the existing problems of access to public services.

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Interestingly, our results indicate that municipalities are more likely to improve access to public

services in less ethnically diverse localities and in urban zones. The study shows that the conflict ⁴⁷

has compounded the existing problems of access to public services with no statistically

significant effect on poverty.

Keywords— fiscal decentralization, local tax and non-tax revenues, multidimensional poverty,

Local development, Côte d’Ivoire

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1. Introduction

Over the past decades, fiscal decentralization has been implemented by an increasing number of African countries, with an explicit objective of improving public service delivery, becoming thus a key public-sector reform (Gradstein, 2017; Kis-Katos & Sjahrir, 2017; Ramírez, Díaz, &

10 Bedoya, 2017; Rodríguez-Pose & Ezcurra, 2010)¹. This interest has stemmed largely from a 11

12 belief that decentralizing revenue raising and spending decisions to sub-national governments

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enhance accountability in the service delivery process (Hayek, 1945; Oates, 1993a; Tiebout, 1959). However, in these countries, where the level of literacy and political awareness among citizens is often too limited to apply sufficient political pressure (Bardhan & Mookherjee, 2005), local authorities are likely to be under pressure from elites (R. Bird & Rodriguez, 1999) and prone to corruption (Prud'homme 1995). In sub-Saharan Africa, there is little empirical evidence on the effects of fiscal decentralization on poverty and the delivery of public services such as education and health, especially focusing on one country².

This paper contributes to the literature by analyzing whether revenue decentralization, measured as the ratio of municipal own revenues to total revenues, improves the access to public services and reduces poverty in Côte d'Ivoire conflict setting, over the period 2001-2011.

The issue is particularly relevant for Côte d'Ivoire, where 35% of the population are deprived of basic services (Alkire & Santos, 2014) and where marked income disparities exist among regions¹. The country is an interesting case study for three main reasons. One, responsibilities in raising local taxes and delivering services such as education, health, roads and drinking water have been devolved to municipalities, though the central government still plays a crucial role in

¹ While there are municipalities where internally collected revenues represent almost 90% of their total revenue, other municipalities depend on central transfers at more than 70% (Brun & Sanogo, 2017).

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¹Although the implementation of fiscal decentralization reforms often remains incomplete (Joanis, 2014) and there is a difference between countries “announcement” of embarking and the real implementation of the process. ²

The term poverty refers only to monetary poverty in this paper.

ensuring citizens’ access to services. Second, the country has a large ethnic diversity of different culture and preferences, which heterogeneity might be of interest for fiscal decentralization reforms. In addition, the relationship between fiscal decentralization and poverty is particularly ambiguous in a fragile context such as Côte d’Ivoire, as the conflict, that the country experienced, has compounded the existing problems of access to public services and has potentially increased the role of local authorities in most affected areas.

In the theoretical literature, the overall effects of decentralization on public service delivery and poverty are ambiguous. One strand of this literature argues that the benefits of decentralization stem from inter-jurisdictional competition that should result in higher responsiveness to local needs (Tiebout, 1959). Through this idea, based on the mobility of citizens across local jurisdictions and the resulting electoral pressures, decentralization enhances accountability of local governments in the service delivery (Bardhan & Mookherjee, 2005). In developing countries, this mechanism might not work because citizen’s mobility is often limited (Bardhan, 2002). Decentralization is also claimed to improve service provision efficiency by providing informational advantages to local governments (Hayek, 1945; Oates, 1993). Local government

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‘autonomy can relieve potential grievances, reduce the risk of violence and then create a better

environment for local development (Tranchant, 2007), particularly in the countries of high ethnic

heterogeneity or regional identities (Faguet 2014). Numerous other studies have stressed the

benefits from decentralization regarding access to public services and poverty reduction

(Hindriks, Peralta, & Weber, 2008; Weingast, 2014), but for a country to gain from improved

efficiency, the local democracy must function effectively and local authorities must have

substantial revenue autonomy and power in allocating resources (Oates, 1993). In developing

countries, however, there are strong reasons to believe that such presumptions are violated

(Smoke, 2001).

Against these advantages, Prud’homme (1995) and Treisman (1997), among others, suggest that

decentralization may worsen delivery of public services. Tax decentralization might increase

inequality among regions due to the different tax potential of regions and the competition between

jurisdictions that could result in reduced tax rates to attract investments and subsequent

loss of efficiency in the delivery of public services (Treisman, 2000). Local elites’ capture in the

decision-making process (Bardhan & Mookherjee, 2000) might increase income inequality since

local revenue collection favors a minority of high-income individuals (Martinez-Vazquez &

McNab, 2003). Heterogeneity of the population in developing countries is mostly based on

income, rather than difference in tastes. The priorities are therefore to satisfy the population’s

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22 basic needs, which are better managed by central government (Prud'homme 1995).
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24 The empirical evidence on the effects of fiscal decentralization and poverty reduction and access
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27 to public services delivery are also inconclusive. While Gonçalves (2014) finds that local
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29 citizens' participation in service provision contributes to improving infant mortality and reducing 30

31 poverty in Brazilian municipalities, Galiani, Gertler, & Schargrotsky (2008) suggest that it
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34 increases inequalities in the provision of education services in Argentina. One potential 35

36 explanation is that local elites can capture public resources to their preferred uses (Reinikka &
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39 Svensson, 2004) and thus limit the scope of local populations monitoring initiatives (Olken, 40

41 2007). Similarly, Francis & James (2003) conclude that decentralization in Uganda failed to
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44 reduce poverty because of local governments capture by local elites. Local institutions decision 45

46 making accounts for cultural values and therefore helps to reduce rural poverty in Burkina Faso 47

48 (Donnelly-Roark, Ouedraogo, & Ye, 2001). In India, active involvement of local authorities
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51 allows a better targeting of beneficiaries for poverty eradication programs in Kerala (Heller, 52

53 Harilal, & Chaudhuri, 2007). Many research find a positive effect of fiscal decentralization on
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poverty and access to public services (Emilie Caldeira, Martial, & Rota-Graziozi, 2012;
Cavalieri & Ferrante, 2016; Faguet & Sánchez, 2008), while others report opposite results
(Bahiigwa, Rigby, & Woodhouse, 2005).

Local heterogeneity is found to play a key role in these mixed evidences (R. M. Bird &

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Vaillancourt, 2006). For example, Alesina, Baqir, & Easterly (1999) find ethnic diversity reduces
10 the performance of city government in delivering public services in America. And regional
11 heterogeneity of preferences increases the positive effect of decentralization on the delivery of
12 public services (Besley & Coate, 2003). Despite this critical importance of country context, few
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14 studies using country-level data have analyzed this relationship, especially in sub-Saharan
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16 Africa, ignoring thus the institutional arrangements that govern the design and implementation of
17 decentralization (Ramírez et al., 2017; von Braun & Grote, 2000).
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19 This study analyses how revenue decentralization to municipalities affects access to public
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21 services and poverty in Côte d'Ivoire. Local revenue sources that reflect municipalities'
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23 autonomy in decision-making are considered. Contrary to Ramírez et al., (2017), who leave aside
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25 monetary poverty, this paper considers both access to public service, measured using an adjusted
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27 multidimensional poverty index (MPIa) and a headcount poverty index (HPIa) calculated as the
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29 ratio of population living with less than US \$ 1 a day to total population of each locality. The
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39 paper assesses also whether the effects of revenue decentralization vary between local
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41 governments according to their internal heterogeneity, defined as the degree of ethnic
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43 fractionalization and polarization. The analysis accounts for the potential effects of conflict,
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45 which might affect the ability of local governments to raise revenue and provides public services.
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The original contribution of this paper to the literature is twofold. First, the study focuses on one developing country which allows to properly control for country-specific heterogeneity than cross-country studies. The second contribution comes from the improved empirical approach using the Grouped Fixed Effect (GFE) method for estimations and an innovative construction of instruments for endogeneity. The GFE estimator allows controlling for unobservable individual heterogeneity, which may vary or not over time, that cannot be accounted for by the standard fixed effects approach used in previous studies on the effects of decentralization (Bartolucci, Belotti, & Peracchi, 2015). A two-stage least squares method is combined with the GFE to properly address the potential endogeneity of local revenues.

The empirical analysis uses a local revenue dataset spanning 11 years (2001-2011) for 115 municipalities aggregated in 35 *départements*. The overall result shows that local revenues have a positive and significant effect on access to public services which are consistent with the findings in Colombia by Ramírez et al., (2017) and contradict those in Uganda by Bahiigwa, Rigby, & Woodhouse (2005). However, there is evidence that revenue 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. The 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 has been statistically limited.

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The remainder of the paper is organized as follows. Section 2 describes the fiscal decentralization process, and the poverty in Côte d’Ivoire with its regional distribution. Section 3 presents the data and the model specification. The results and the robustness checks are discussed in section 4. Section 5 concludes and provides some policy implications.

2. Background

2.1 Fiscal decentralization in Côte d’Ivoire

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 for which 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. 801162 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 the delivery of public services. In 2000, a new constitution was adopted, which lays out the principle of administration and financial autonomy of local authorities. This Constitution subdivides the country into a multi-

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17 tiered system with 19 regions sub-divided into 58 *départements* governed by *départements* 18
19 councils, and 197 municipalities. Since 2011, although the number of municipalities has
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22 remained unchanged, the central government has reorganized the country into 14 districts (with 23
24 full autonomy for Abidjan and Yamoussoukro), 31 regions, 95 *départements*, and 197
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27 municipalities, each with an elected mayor.
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29 The Ministry of Interior manages the decentralization process through the Directorate in charge 30
31 of decentralization and local development (DDLDD). The Ministry of Economy and Finance
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34 collaborates with the DDLDD to define the amounts of transfers from central to local governments 35
36 and their allocation. These administrations interact with municipalities organized in the
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39 association the Union of Côte d'Ivoire for cities and municipalities. The relationship between 40
41 central and local governments is organized through a trusteeship system with two levels, by
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44 which the central administration approves decisions and helps municipalities.
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46 In the process of strengthening the fiscal autonomy of municipalities and grassroots participation 47
48 in the decision-making process, more than 35 legislative decrees and laws have been passed to
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51 assign expenditure execution responsibilities, and revenue raising functions to municipalities. 52
53 These responsibilities are often related to the provision of important public services such as
54 health and education facilities, water and sanitation, local urbanization, and include large sources
of revenue.

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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. Although this local non-tax revenue is smaller than local tax revenue, this revenue remains a key element for increasing accountability and tax compliance

10 at the local level. Local non-tax revenue is likely to be used to improve the population's access
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12 to public services as the local authorities have full autonomy in managing this revenue, in
13 contrast to local tax revenue which is often earmarked. 15

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this period, transfers from the central government contributed on average more than 35% of total

22 municipal revenue. This share decreased slightly in the three-year period leading up to the 2010 23

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national election.² During the same period, municipalities collected a small part of their total revenue, on average less than 20%. However, tax revenue represents on average 25% of total municipality revenue and remained relatively constant in absolute terms up to 2014. Combining these two components, local own revenue contributed 45% of total revenue. This is relatively low compared to other developing countries such as Benin, where municipalities' own revenue contributed 69% of total revenue over the period 2003 to 2008 (E. Caldeira & Rota-Graziosi, 2014).

[FIGURE 1]

Figure 2 presents the structure of local non-tax revenue aggregated for the period 2002 to 2007.

Small business revenues and licenses contributes the highest share of local non-tax revenue at

⁴ This analysis focuses on the municipal level because there is no recent data on revenue covering all levels of subgovernments in the country (districts, regions, *départements*, and municipalities).

² This 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.

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more than 26%, while revenue from rental lease account only 5.36%. The figure shows also that market fees (25.5%) combined with flat tax (24%) represent almost half of municipality non-tax 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

10 diverse public services such as health and education facilities, water and sanitation, local
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12 urbanization, and construction.

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[FIGURE 2]

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2.2 Public service delivery and poverty trends in Côte d’Ivoire

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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 & Santos (2010).

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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

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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

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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, Donni, & Kwenda, 2014). To improve the population access to basic public services, especially in rural areas and thereby reduce regional disparities, the Ivorian government has undertaken a 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% 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 conflict³, which compounded the existing problems

of access to public services and of poverty.

Since the last three decades, the share of the population living under the poverty line has increased significantly. Figure 3 shows the evolution of poverty headcount ratio in percentage of total population from 1985 to 2015. The poverty rate increased from 10.1% in 1985 to 48.9% in 2015 (HLSS, 2015). Access to public services also remains limited in the country. The

³ Since 1999, Côte d'Ivoire has experienced the 1999 "coup d'etat", the 2002 political conflict and the post-electoral conflict of 2010/2011. This period was characterized by sporadic events with different intensity and location (Dabalen et al, 2012).

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multidimensional poverty rate, assessing the privation of citizen in several dimensions of public services, increased from 31.8% in 2008 to 34.4% in 2011 (Alkire & Santos, 2014). There is also a widespread disparity between municipalities in access to public services (Figure 4), and a geographical variation regarding local revenue autonomy (Figure 5)⁴. In urban area, on average 75% of the population has access to education, health, and sanitation, while this figure is only 30% 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 (Korhogo), remain the poorest areas (Figure 4). Minoiu & Shemyakina (2014) report that 70% of professional health workers and 80% of government-paid teachers abandoned their post in the north during the 2002-2007 conflict. This spatial distribution of access to public services could be explained by the low population density in these areas which implies higher transportation costs to access to public services and technology. The poorer regions in the country seem to have less revenue autonomy. Figure 6 shows the distribution of conflict events by *département*. Reported violence against civilians and battles were located mostly in the northern and western *départements* and in Abidjan.

[FIGURE 3]

[FIGURE 4]

⁴ “Hight autonomy” refers to localities those own revenue is higher than 50% of total revenue, the others are defined as “Low autonomy”.

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[FIGURE 5]

[FIGURE 6] 10

11 **3. Empirical analysis**

12 13 **3.1 Data**

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17 First, local government revenue and expenditures dataset is constructed from the administrative 18
19 account of municipalities produced by the Ivorian Ministry of Interior and the Ministry of
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21 Economy. This dataset provides information on own revenue, transfers from central government,
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23 and local expenditure for 115 municipalities over the period 2001-2011. Following Grisorio & 25
26 Prota (2015), the study measures the degree of revenue decentralization as the ratio of own
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28 revenues raised and/or controlled by the municipalities (tax and/or non-tax) to the total revenues. 30
31 This reflects local revenue autonomy and allows an approximation of municipalities' autonomy
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33 in decision-making. A high value for this measure indicates a high degree of fiscal 35
36 decentralization, since local authorities have decision-making autonomy in using this revenue.⁸

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39 The second source is the 2002 and 2008 Household Living Standard Surveys for Côte d'Ivoire 40
41 from which the social and demographic indicators are calculated. The HLSS⁵ is a national survey 42
43 which provides information on different dimensions of household living conditions. Its design
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⁵ The 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.

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ensures representativeness for the 57 Côte d’Ivoire *départements*. Approximately 10,800⁴⁷ households in 2002 and 13,657 households in 2008 were surveyed in the country (HLSS, 2002, 2008).

⁸ Another measure of fiscal decentralization is “vertical imbalance” calculated as the ratio of transfers from central government to municipalities total revenue. It represents the degree to which the local government depends on transfers from central government. A high value of this measure indicates little local financial autonomy.

Additionally, information on 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.

Third, conflicts indicators are calculated using data from the Armed Conflict Location and Event

Dataset (ACLED) (Raleigh, Linke, Hegre, & Karlsen, 2010). ACLED contains information on

the exact dates and locations of political violence and type of events weighted with a fatality

index¹⁰. 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. ²⁰

¹¹ to construct a
These three data
sources are
combined and
aggregated at
the
départements
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panel spanning 11 years (2001-2011) for 35 *départements* of the 57 *départements* in Côte d'Ivoire.

How are the dependent variables computed?

Two dependent variables are used: The headcount poverty index (HPI_n) calculated as ratio of

⁶. Access population living with less than US \$ 1 a day to total population of each *département*

to public services is measured using the multidimensional poverty index (MPI) method

developed by Alkire & Santos (2010), which captures a set of direct deprivations experienced by

a person or a household at the same time. The MPI basic dimensions are adjusted (MPI_a) by

using different indicators relevant for each dimension to properly capture those for which

municipalities intervene in terms of public service delivery (Table 1). Based on the Alkire-Foster

(AF) dual cut-off methodology, the weights are assigned to household for each of the

⁶ To allow comparison between the two censuses, the data are corrected for inflation using the national prices deflator index.

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¹⁰ The conflict events selected are battles (violence against civilians, remote violence, and rioting), protests (non-violent demonstrations), and non-violent events.

¹¹ The data are aggregated at *départements* level because the 2008 HLSS is not available at the municipal level like the first data source. The data are aggregated at *départements* level because the 2008 HLSS is not available at the municipal level like the first data source.

deprivations and those weights are summed up to generate the weighted deprivations matrix for each household (Alkire & Foster, 2011; Alkire & Santos, 2014). A household is considered as deprived of access to public service (in the case of this study) if it has more than 30% of the weighted sum of the considered dimensions of deprivation (i.e. deprived in some combination of

two to six indicators following Alkire & Santos (2010)). Thus, the ratio of people who are deprived of public services to total population is calculated for each *département*. By

construction, this indicator has the advantage of being the product of the Headcount (H) (percentage of people whose weighted deprivation lies above the cut-off), and the Average intensity of deprivation (A), which reflects the sum of deprivation for only the multidimensionally poor households within each *département*, and thereby the average intensity of poverty for these households.

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

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responsibility to local governments for education, water, and sanitation, and health services.

[TABLE 1]

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 HPIn. Third, the

HLSS surveys in Côte d’Ivoire are well documented for the chosen indicators and allow using

both the individual and the household as units, which makes the index more accurate than those using only households as units of observation.

The 2002 HLSS is used for the sub-period 2001-2006 while the 2008 HLSS covers the subperiod 2007-2011. The variables constructed from the survey data are thus considered fixed for the periods around the household survey. The main reason is that HLSS is collected only every six to seven years and data from each survey are published within 12 months of the end of field

work. To deal with this data scarcity, the study follows Kis-Katos & Sjahrir (2017) in

considering changes in socio-economic variables as probably limited to be considered and not

instantaneous from one year to the next, especially for the main dimensions considered in this

study such adult illiteracy, school-aged child not attending school in years 1 to 8, access to health

services. For example, Deaton (1997) shows that some living standards do not vary in short-term

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from one year or two to the next. Using HLSS data from Côte d’Ivoire, he concludes that when the time between surveys is longer, reported expenditures do not increase proportionately. This hypothesis might raise a concern from a potential persistence of dependent variables. Sensibility tests of the results are undertaken in robustness section.

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.

3.2 Model specification

The previous studies commonly use cross-country data and consider the heterogeneous characteristics as time invariant by using a standard 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)⁷. To deal with this problem and account for both varying and unvarying heterogeneity between *départements*, this analysis

⁷ For example Knight (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.

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uses the Grouped Fixed Effect (GFE) approach proposed by Bonhomme & Manresa (2015). The main motivation for using the GFE method comes from the conflict that the country experienced, 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). Second, the GFE method produces consistent estimates as long as the number

of groups is correctly specified, on data that of a short length of time (2001-2011), and which have a

The empirical model has the following form:
small within- *départements* variance of revenue.

$$(1) \log(Pov_mpia)_{it} = \lambda + \theta_1 \log(FD)_{it} + \theta_2 Hetero_{it} + \theta_3 \log(FD)_{it} * Hetero_{it} + \theta_4 x_{it} + \alpha_{git} + \eta_i + \varepsilon_{it}$$

Pov_mpia is the dependent variables $\log(poverty)_{it}$ or the $\log(MPIa)_{it}$ 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 variable. It represents the number of habitants who do not have sufficient income or

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food to meet some defined minimum living conditions over the total population of *département* 42

i at time *t* . The interest variable $\log(FD)_{it}$ is the log of the ratio of own revenues to total 44

i at time *t*. *Hetero*_{*it*} represents the local heterogeneity approximated revenues of *département*

by two variables: Ethnic fractionalization and ethnic polarization as they measure the extent of 49

cultural diversity and thus local taste⁸. Ethnic fractionalization measures the probability that two

randomly selected individuals in a *départements* will not belong to the same ethnic group.

Following José G. Montalvo & Reynal-Querol, (2005), ethnic fractionalization is calculated as:

$$\text{Fractionalization} = \sum_{k=1}^K \phi_k (1 - \phi_k);$$

Ethnic polarization measures how far the distribution of the ethnic groups is from a bipolar

distribution⁹. It is calculated as:

$$\text{Polarization} = 4 \sum_{k=1}^K \phi_k^2 (1 - \phi_k); \text{ Where } \phi_k \text{ is the share of population belonging to ethnic}$$

⁸ The five major ethnic groups are considered: Akan, Krou, Mande North, Mande South and Voltaic. The higher these indices, the stronger the heterogeneity of local demand. Ethnic fractionalization and Ethnic Polarization are calculated based on the 2002 and 2008 surveys and considered fixed for the periods around the household survey. The motivations holding his hypothesis are explained above.

⁹ The purpose of the ethnic polarization index is to record how far the distribution of the ethnic groups is from the bipolar distribution. See more in José G. Montalvo & Reynal-Querol (2005).

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group k , K equals total number of ethnic groups the two equations. These variables are assumed to play a key role in the effect of local revenue autonomy on access to basic services and poverty.

Consistent with existing literature, control variables include transfers from central government, economic, demographic and social characteristics, represented by x_{it} . The group-specific unobservable effects α_{git} is modified to consider the *département*-specific fixed effect η_i as well

¹⁰. 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 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

¹⁰ See appendix B for the definition of the optimal number of groups.

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both the variables of interest and the dependent variables. To address these issues, model (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, Vulovic, & Liu, (2011)¹¹. The value of the local revenue autonomy ratio instrumental variable is, calculated as:

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$$LRA_{IVit} = \frac{1}{\sum_{j=1}^n \frac{1}{d_j}} \sum_{j=1}^n \frac{1}{d_j} Ownrev_{jt} \quad i \neq j \quad (2)$$

17 Where LRA_{IVit} is the value of the instrumental variable for *départements* i in year t . d_j is the 18
19 distance between the largest cities in *départements* i and *département* j , and $Ownrev_{jt}$ is
the
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22 ratio of local own revenues to total revenues of *département* j in year t . This instrument is the 23
24 weighted average of the own revenue ratio for all other *départements* in the corresponding year,
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27 and the weights are the inverse of the distance between the two *département*. There are two 28
29 principles hypotheses holding the use of this instrument as argued by Martinez-Vasquez et al.,
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32 (2011). First, the poverty rate or access to basic services in one *département* relative to others 33
34 generally should not influence the local revenue mobilization of other *départements*, so the
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37 dependent variable should not be correlated with the instrument. Second, the design of the own

¹¹ Lee & Gordon (2005) also use similar way to instrument the corporate tax rate.

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39 revenue raising system in a *département* should be affected by the design of the own revenue 40

41 raising system in a neighboring *département*. The lagged variables of Local Revenue Autonomy
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44 (LRA) are also used as instruments under the hypothesis of an intertemporal dependence of local
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46 revenue mobilization.

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Grouped patterns and consistency of the GFE approach

A Bayesian Information Criterion (BIC) is used to derive the optimal number of groups that minimize the bias from the estimation of equation (1)¹². The results in Table A2 (Appendix) suggest that the optimal number of groups according to BIC is G=4, corresponding to the minimum BIC, which is then used in the GFE estimations throughout the paper. Figure A1

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(Appendix) reports the unobserved trends of revenue performance using the four groups, and

highlights trends in the group specific effects ($\hat{\alpha}_{git}$). Figure A1 shows that the four groups

experience unstable trends over time, highlighting the presence of time-varying patterns across

¹² The following equations are used
$$BIC(G) = \frac{1}{NT} \sum_{t=1}^N \sum_{i=1}^T (y_{it} - x'_{it} \hat{\theta}^{(G)} - \hat{\alpha}_{it}^{(G)})^2 + \hat{\sigma}^2 \frac{GT+N+K}{NT} [\ln(NT)]$$
 with $\hat{\sigma}^2 = \frac{1}{NT - G_{max}T - N - K} \sum_{i=1}^N \sum_{t=1}^T (y_{it} - x'_{it} \hat{\theta} - \hat{\alpha}_{git})^2$, with G the number of groups, \hat{G} the optimal number of groups that minimize the BIC, an upper bound of \hat{G}_{max} , $\hat{\sigma}^2$ is a low bias estimates of the variance of the idiosyncratic disturbance, K the number of parameters of estimation.

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17 distinct groups in the data that need to be grouped. The left panel shows that the parameter 18

19 estimated $\hat{\alpha}_{git}$ varies over time which appears to have a high dispersion of groups' patterns in

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22 the periods of high incidence of conflict (2002 and 2010). In the right panel, the paths of own

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25 revenue differ from one group to another, though groups 2 and 4 seem to follow very similar

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27 paths. It is worth noting that the homogenous characteristics within a group remain a critical 28

29 issue that could be further explored by surveys of local governments.

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33 **4. Empirical results and implications**

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36 Table 2 shows the estimation results of equations 1 concerning the effect of local revenue

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39 autonomy on MPIa or HPIIn. As defined above, a negative (positive) sign of a coefficient 40

41 suggests a positive (negative) impact of the corresponding exogenous variable. All standard

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44 errors are clustered at the *département* level.

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46 In columns 1 and 7, the results show a positive effect of local revenue autonomy on MPIa and 47

48 HPIIn respectively. This effect is statistically significant for MPIa and insignificant for HPIIn.

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51 These results underline the importance of considering poverty as a multidimensional 52

53 phenomenon which reflects deprivations in multiple dimensions as highlighted by the World

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Bank (2016). Sen (1999) shows that income poverty is limited because welfare can depend on other dimensions 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

10 individual living under the poverty line and deprived in four dimensions could become deprived
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12 in three dimensions due to local government action, but could remain under the poverty line¹⁹.
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14 Columns 2 and 8 report the GFE estimation results controlling for potential endogeneity of
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16 municipal revenue autonomy. The results show a significant effect of municipal revenue
17 autonomy on access to public services (column 2; table 2). A 10% increase in revenue collected
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19 by municipalities induces a 0.94% decrease in the share of citizens deprived in at least 30% of
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21 the selected dimensions¹³. This result is significant at the 1% level. The results support the
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23 theory that involving local governments in the delivery of public services can help to better
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25 account for local demand and improve access to public services.
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31 Column 8 replicates the specification of column 2 by using HPIIn as the dependent variable.
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34 Once endogeneity is controlled for, municipal revenue autonomy appears to have a positive and
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36 statistically significant effect on HPIIn at the 5% level. Comparing this coefficient with those of

¹³ As noted above, a person is multidimensionally poor if the weighted indicators in which he or she is deprived add up to 30%. This means that the MPIa measures for each locality, the share of population deprived in at least 30% of the selected dimensions.

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MPIa, the result shows that the coefficient for MPIa is significant at the 1% level, but HPIIn is not significant at the same level. Moreover, the estimated coefficients for other control variables have the expected signs only for MPIa. In absolute term, the effect is lower when considering poverty. A 10% increase in revenue collected by municipalities induces only a 0.89% decrease in the percentage of the citizens living with less than US \$ 1 a day.

¹⁹The poverty index using a threshold is limited to many aspects: First, it fails to consider 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 old people.

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

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23 **Does local heterogeneity matter in the relationship between fiscal decentralization, access**
24 **to public services and poverty?**
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27 The subsequent columns of Table 2 (Columns 3 to 6 for MPIa and columns 9 to 12 for HPIIn)
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30 report the direct and indirect effects of local heterogeneity on access to basic services (MPIa) and 31
32 poverty (HPIIn). These estimations test whether the effect of fiscal decentralization on MPIa
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35 depends on the degree of the heterogeneity of demand. The results for direct effect of ethnic 36
37 fractionalization and ethnic polarization are reported in columns 3, and 5, for MPIa and in
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40 columns 9 and 11, for HPIIn. Columns 4, 6, 10 and, 12 present the interaction of local revenue 41
42 autonomy crossed with the ethnic fractionalization and polarization index and these level 43
44 variables in the same specifications for each of MPIa and HPIIn. The coefficients for both ethnic
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47 fractionalization and ethnic polarization are negative in the four specifications and significant for 48
49 columns 5 and 9, highlighting the importance of the homogeneity of local preference in the
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52 satisfaction of local need as predicted. Noteworthy, the coefficients of interaction terms are also 53
54 negative and significant at 5% level (columns 5 and 6) only for the MPIa. This suggests that in a

less ethnically diverse *départements*, local authorities have a higher propensity to satisfy citizens
in terms of access to public services. In fact, as the literature argues, ethnic diversity has a

negative impact on social cohesion and human development (Alesina et al., 1999; Hlepas, 2013).

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

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10 corruption and elite capture. This provides local governments with more ability in the

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12 implementation of poverty reduction programs and facilitates their actions¹⁴. Another possible 13

14 explanation is that local diversity can force local authorities to be more accountable to citizens.

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17 These findings are consistent with the results by Montalvo & Reynal-Querol (2005) who find
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19 that fractionalization has an important effect on economic development.

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22 The estimated coefficients of the other control variables have the expected signs and plausible 23

24 magnitudes. The coefficient associated with the share of the informal sector is positive and

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27 statistically significant for the MPI. This indicates that the informal activities negatively affect

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29 access to basic services. One explanation might be that informal activities induce loss of revenue 30

31 for local governments that could have been used for service delivery. However, the coefficients

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34 for informal sector are negative, but not significantly different from zero, when taking HPIIn as

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36 the dependent variable.

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40 The coefficient for central government transfers is negative, and statistically significant, 41

42 revealing that transfers from central government to local government contribute to increasing

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45 access to public service. This effect may work through the positive incentives transfers create for 46

¹⁴ Alesina, Devleeschauwer, Easterly, & Kurlat (2003) point out the negative effect of ethnic fractionalization on the quality of government.

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local governments to provides public services by crowding in local spending (Richard M. Bird & Smart, 2002; Bracco, Lockwood, Porcelli, & Redoano, 2015). Transfers are often used to bridge the gap between spending responsibilities and revenues endowment of municipalities in Côte d'Ivoire (Brun & Sanogo, 2017). The share of urban population shows the expected sign. Its coefficient is negative for both MPI and HPIIn, suggesting that local governments with a large share of urban populations are likely to improve access to basic services and reduce poverty¹⁵.

[TABLE 2]

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. However, this result may hide considerable difference in the effect of local revenue autonomy 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% 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

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

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municipal revenue autonomy. 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, 4, 7, and, 10). 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 of table 2) 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% 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. For example, local governments are often involved in the provision of public education by village schools although teacher management powers are retained by central government. The

devolution of responsibilities in the health sector to municipalities is limited compared to

education because of the sensitivity of this sector. This might also be driven by the idea that health services have larger spillovers effects and economies of scale than education services

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(Besley & Coate, 2003; Cavalieri & Ferrante, 2016)

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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.

[TABLE 3]

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 rural population in whether deprived urban and rural populations respond differently to changes in municipal

¹⁶ The literature suggests that, within jurisdictions, there is a large disparity between the urban and rural sectors regarding the access to public services such as education and health (West & Wong, 1995).

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²³Health prevention initiatives promoted by one jurisdiction are likely to benefit neighbors and the aggregate production and provision of health services, and the joint administration of healthcare structures such as hospitals may not perfectly prompt for a fiscal decentralized solution (Cavalieri & Ferrante, 2016).

revenue autonomy. All variables in table 3 are included in specifications 1 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 urban populations are higher than those for rural

populations. This suggests that local governments are more likely to reduce deprivation in access

to public service for urban population than rural ones. This result is intuitive since urbanization ¹³

increases density of population. And decentralization may not have as significant an impact in

rural areas because of low population density and lower relative levels of per capita income

which may limit the actions of local governments compared to urban areas.

[TABLE 4]

Does conflict affect access to services and poverty? ³⁰

the period being studied. It is therefore reasonable to Côte d'Ivoire experienced a conflict over

think that this context may have negatively affected the local government capacity to implement ³⁵

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programs of poverty reduction and increase in 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 annual number of deaths due to each event, it varies from one to 10 with 10 for the
highest incidence of violence, and one the lowest²⁵. 47

The estimated coefficients are negative and not statistically significant for HPIIn. The coefficient
of conflict event for MPIa is, however significant at 5% level of significance (Table 5). This

²⁵ The conflict data used is an annual data that codes the dates and locations of all reported political violence and protest events over the period being studied in Côte d'Ivoire. An alternative measures of conflict can either be the onset or the duration of conflict event as suggested by Murshed & Tadjoeeddin (2009). Those are not available in the ACLED data for Côte d'Ivoire.

suggests that conflict may have compounded the existing problems of access to public services with no statistically significant effect on poverty. The conflict may have affected municipal administrations which faced problems of their staff and the staff of local services displacement such as education and health. As shown in figure 6, the conflict was characterized by several short periods of conflict events with different intensity and location. A large part of *départements* has been affected by conflict with a higher incidence of violence concentrated in the rebel-held, 13 northern and western parts of the country. This forced populations to move from this areas to safe locations.

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[TABLE 5]

Are the instruments valid and relevant?

A relevant econometric issue when addressing endogeneity is whether the excluded exogenous variables are valid instruments. 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% 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 derived¹⁷.

¹⁷ The results (first step regression) are available on request.

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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 disappears no matter which measure of heterogeneity is included in

10 the regression and the statistical significance remains for almost all specifications (columns 3 to
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12 6, table 2). However, this statistical significance does not hold in many specifications for the 13
14 effect on HPIn (columns 7 to 12, table 2).

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17 The above estimations may be sensitive to the inclusion of alternative control variables such as 18
19 local GDP and other proxy of local heterogeneity¹⁸. As a robustness check, the estimations
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22 results controlling for local GDP and horizontal inequality is reported in table 6 using both 23
24 individual fixed effect method and group fixed effect approach, as well. Yet, local revenue
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27 autonomy contributes to increase access to public services, confirming that the findings are
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29 robust to different specifications. Interestingly, the coefficient for local revenue autonomy result 30
31 obtained with individual fixed effect (column 3) are not statistically significant giving credence
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34 to the GFE approach and that is more efficient. The results are also robust to the inclusion of
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36 horizontal inequality as measure of heterogeneity (column 5).
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¹⁸ The index calculated as: $\text{Horizontal Income Inequality} = 1 - \ln(Y_{\text{worst}})/\ln(Y_{\text{best}})$. It measures inequality between the richest and the poorest ethnic group.

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[TABLE 6]

Another concern relates to the sensibility of the estimations to alternative the level of cutoff⁴⁷ considered to define a person as deprived of access to public service. The main specifications are thus re-estimate, using 40% and 20% as thresholds. As shown in Tables 7, previous results are overall confirmed. Finally, the robustness of the findings is checked regarding the choice of interpolating data for off census years. Results obtained controlling for both local GDP and central transfers are in line with those presented in this study (columns 7 and 8).

[TABLE 7]

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 2. This does not alter the previous findings. Local 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 8). In Côte

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d'Ivoire, the 2007 peace agreement was signed by all political parties in the country, and marked the end of tension. Both sides agreed to a free and fair general election to be held in 2008. This event might have changed the behavior of municipalities. The reported coefficients of GFE are statistically different from zero for both of MPI and HPIIn, giving more credence to the econometric approach.

[TABLE 8]

5. 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 ratio of municipality own revenue to total revenues differs, 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 & 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 *départements* level using the 2002 and 2008 Household Living Standard Surveys are calculated.

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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 on poverty. This effect seems to work mainly through enhancing access to education, rather than health, water and sanitation services. Interestingly, the 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 a key 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

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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

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1 institutional processes that assign the responsibility to raise taxes and undertake public spending
2 as noted by Lessmann & Markwardt, (2012).

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1 **Appendix A**

2 **Table A1 : Descriptive statistics**

Variables	ALL Sample					Northern localities		Southern localities	
	Obs	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Mean	Std. Dev.
Population	385	98190.00	116880.00	15086.00	758178.0	126560.00	180587.00	85188.00	67276.0
Poverty headcount index (HPIn)	385	0.38	0.16	0.07	0.76	0.42	0.18	0.36	0.14
Multidimensional poverty index (MPIa)	385	0.28	0.10	0.08	0.51	0.34	0.08	0.26	0.09
MPIa_Education	385	0.35	0.08	0.22	0.57	0.35	0.06	0.35	0.09
MPIa_Health	385	0.28	0.17	0.02	0.55	0.26	0.17	0.29	0.17
MPIa_Water	385	0.15	0.06	0.00	0.38	0.17	0.07	0.14	0.06
MPIa_Living standard	385	0.35	0.11	0.14	0.61	0.37	0.12	0.35	0.11
Informal (share of informal sector)	380	0.61	0.10	0.09	0.70	0.62	0.09	0.61	0.10
Ethnic fractionalization	311	0.66	0.20	0.13	0.99	0.59	0.24	0.68	0.17
Ethnic Polarization	311	0.81	0.33	0.06	0.83	0.76	0.26	0.83	0.36
Horizontal Inequality	385	0.96	0.04	0.71	0.99	0.97	0.02	0.95	0.05
Urban (share of urban population)	352	0.45	0.23	0.07	1.00	0.45	0.16	0.43	0.26
Conflict Events (number of events)	385	5.99	9.36	1.00	54.00	4.74	5.14	6.57	10.71
Conflict weighted with fatality index	378	899.48	4264.63	0.00	43578.00	63.59	312.92	1260.43	5059.12
Household annual consumption (fcfa)	385	930755.9	545811.00	204843.60	1910229.0	841559.20	521151.10	971637.70	552910.0
Local Tax Revenue	303	0.25	0.21	0.00	1.00	0.11	0.20	0.28	0.20
Local Non-Tax-Revenue	303	0.19	0.17	0.00	0.92	0.07	0.11	0.22	0.17
Central transfers	303	0.46	0.29	0.00	1.00	0.70	0.26	0.40	0.27
Miscellaneous revenue	303	0.09	0.13	0.00	0.84	0.11	0.16	0.09	0.12

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5 **Table A2: Bayesian Information Criterion and the optimal number of groups**

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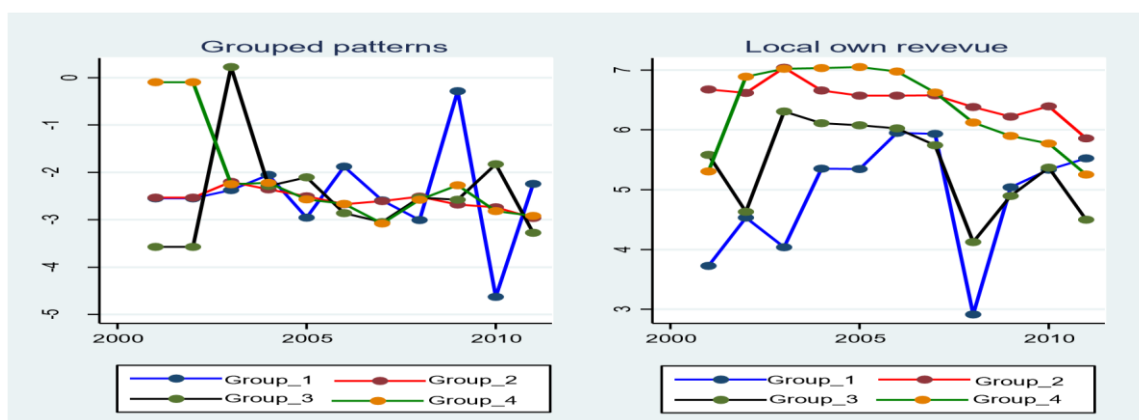
Groups	Obs	BIC	Objective function	Coefficient estimated	Standard errors bootstrapped
1	385	0.69	-	-	-
2	385	0.64	52.93	0.066	0.96
3	385	0.50	37.28	0.102	0.87
4	385	0.24	23.27	0.259**	0.90

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5	385	0.36	15.64	0.307***	1.03
Fixed effects	-	22.61	0.225**	0.11	

7 Source: Author

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10 Source: Author

11 Figure A1: Group-specific time effects

12 Table A3. Main variables

Main variables	Description	Source
Adjusted Multidimensional poverty index (MPIa)	For each <i>département</i> , the percentage 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 <i>département</i> , 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.	
MPIa_Health	For each <i>département</i> , the percentage of people who are deprived of Health services to total population. A cutoff of 30% is used to define a poor	
MPIa_Water	For each <i>département</i> , 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	
MPIa_Living standard	For each <i>département</i> , 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	
Poverty headcount index	For each <i>département</i> , the percentage of the population living with less than US \$ 1 a day	

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Ethnic fractionalization	The probability that two randomly selected individuals in a <i>département</i> will not belong to the same ethnic group. The higher this index is, the stronger is the heterogeneity of demand.	
Ethnic Polarization	How far the distribution of the ethnic groups is from the bipolar distribution in a <i>département</i> . The higher this index is, the stronger is the heterogeneity of demand	
Informal sector	The share of local businesses not registered with the tax administration	
Conflict Events	The number of conflict events by <i>département</i>	The Armed Conflict
Conflict Events weighted	The number of conflict events weighted with a fatality index of each event by <i>département</i> . The fatality index reports the number of deaths due to each event, one represents least violence and 10 represents the highest incidence of violence	Location and Event Dataset (ACLED) (Raleigh et al., 2010).
Local revenue autonomy	The ratio of local own revenues to total revenues.	Ministry of interior Côte d'Ivoire

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Figures and Tables

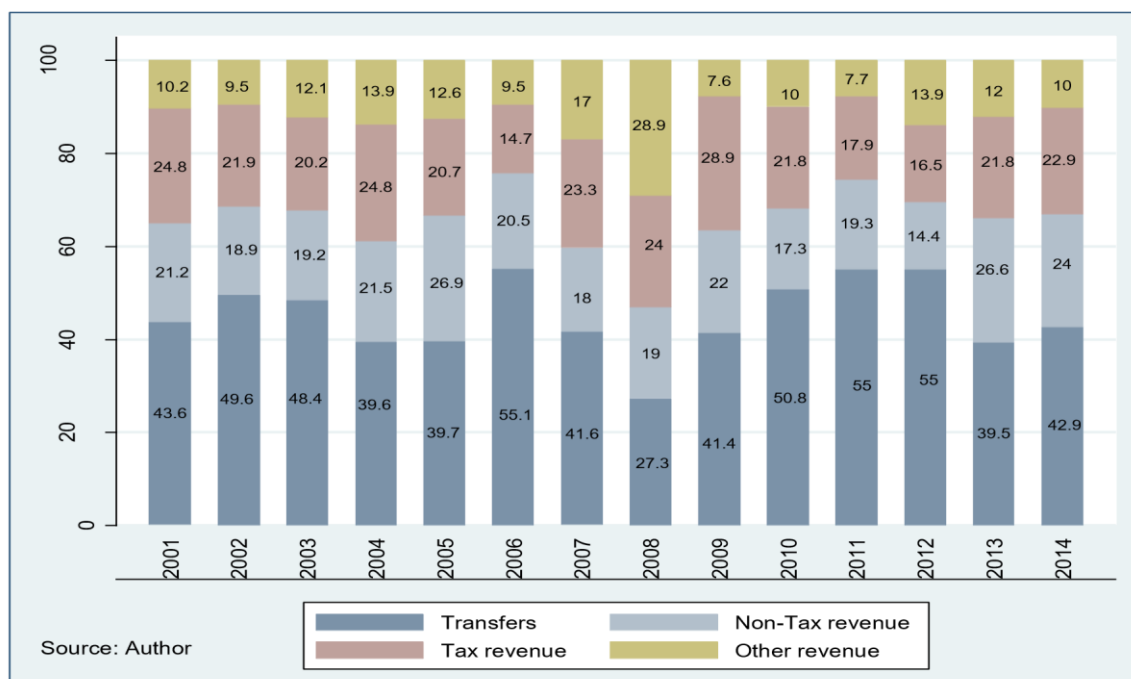
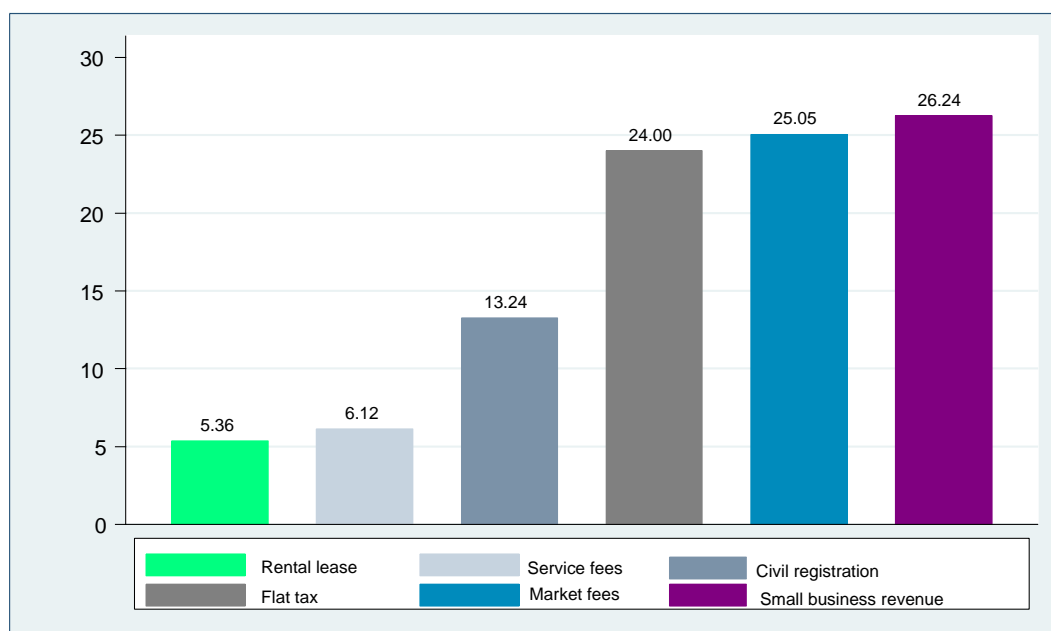


Figure 1: Composition of municipality revenue in Côte d'Ivoire 2001-2014



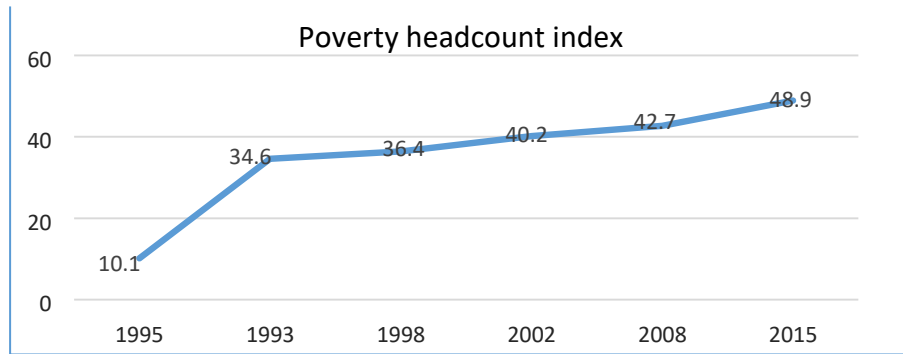
Source: By author with Côte d'Ivoire data from the Ministry of Interior.

Figure 2 : Structure of local non-tax revenue Côte d'Ivoire, 2002-2007.

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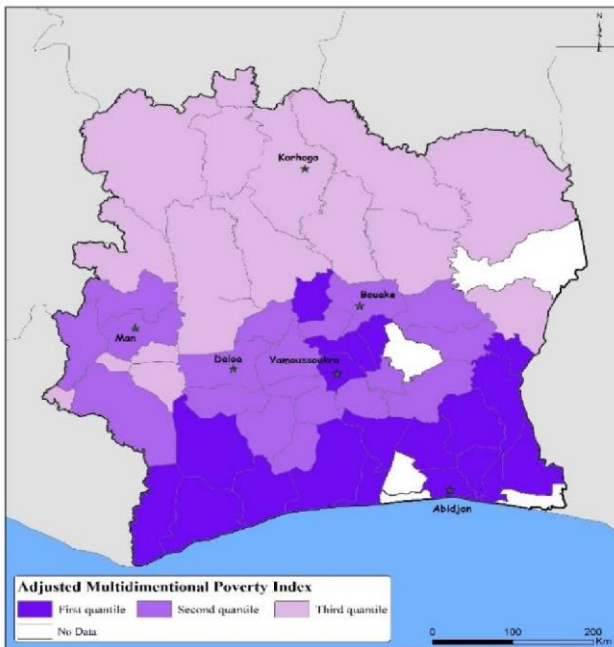
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Note: The poverty line in CFAF-75,000 per capita annually in 1985, 101, 340 in 1993, 144, 800 in 1995 and 162, 800 in 1998 Source: Author with data from the World Bank

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



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Figure 4: Adjusted Multidimensional Poverty Index

Figure 5: Local Own Revenue distribution pattern (As

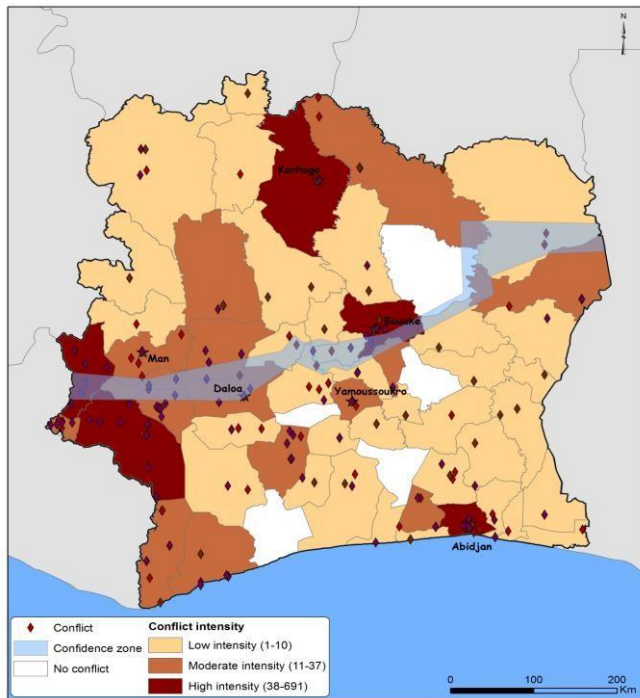
11 Source: A uthor distribution pattern in Côte from the Household Living Standard Surveys (HLSSd'Ivoire, 2008 - Source:
12 Author with Côte d'Ivoire data from the Ministry of Interior % of Total Local Revenue), 2010-2013
13 2008). (DGDDL).

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Note:



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Figure 4: The Adjusted Multidimensional Poverty Index

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(MPIa) is calculated by multiplying the incidence of poverty by the average intensity of poverty across the

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poor; as a result, it reflects both the share of people in

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poverty and the degree by which they are deprived. See more details in the following section. Darker shades

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indicate a lower poverty index reported as a ratio of the

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number of multidimensional poor to the total local population.

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Figure 5: The local own revenue is calculated as the share

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of revenue collected by local governments over the total local revenue (It is the mean of four years after conflict,

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2010, 2011, 2012 and 2013). Darker shades indicate a

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higher autonomy of internal revenue collection.

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Figure 6: The map depicts conflict regions; dark shades

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indicate more intensity conflict such as violence against

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civilians, battles, and riots reported in ACLED. The blue

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confidence zone

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Figure 6: The distribution of violence against civilians and part indicates the confidence zone which divided the the

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confidence zone country into two parts. In the legend, the “No conflict”

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Data sources: Authors based on ACLED

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category stands for no reported incidents and is treated as

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zero exposure to conflict.

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47 Table 1: Dimensions and indicators used for the MPIa

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

48 *The weighting between the dimensions follows the UNDP's MPI convention

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Table 2: Effect of local revenue autonomy (LRA) on Multidimensional Poverty Index and Headcount Poverty Index, GFE_2SLS estimation

Dependent variable	Multidimensional Poverty Index (MPIa)						Headcount poverty Index (HPIa)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	GFE	GFE_IV	GFE_IV	GFE_IV	GFE_IV	GFE_IV	GFE	GFE_IV	GFE_IV	GFE_IV	GFE_IV	GFE_IV
LRA	-0.0856*** (0.0224)	-0.0949*** (0.0265)	-0.0706*** (0.0266)	0.0363 (0.0506)	-0.0708*** (0.0248)	-0.0197 (0.0346)	-0.00191 (0.0129)	-0.0896** (0.0445)	-0.120* (0.0716)	-0.137 (0.0886)	-0.117 (0.0791)	-0.151 (0.107)
Central Transfers	-0.0545* (0.0272)	-0.0531** (0.0253)	-0.0763*** (0.0275)	-0.0474** (0.0221)	-0.0466** (0.0230)	-0.0229 (0.0234)	0.0134 (0.0162)	0.00762 (0.0127)	0.0104 (0.0130)	0.0170 (0.0130)	0.00319 (0.0143)	0.00924 (0.0146)
Urban population	-0.732*** (0.161)	-0.753*** (0.190)	-0.689*** (0.213)	-0.739*** (0.161)	-0.636*** (0.215)	-0.690*** (0.167)	-0.145*** (0.0446)	-0.168 (0.145)	-0.110*** (0.0424)	-0.127*** (0.0480)	-0.143*** (0.0464)	-0.172*** (0.0568)
Informal sector	0.948*** (0.257)	1.008*** (0.262)	0.865*** (0.289)	0.680*** (0.263)	0.896*** (0.324)	0.755** (0.354)	-0.555*** (0.158)	-0.598 (0.514)	-0.0655 (0.125)	-0.0751 (0.127)	-0.101 (0.138)	-0.113 (0.144)
Ethnic frag			-0.109 (0.0857)	0.333** (0.138)					-0.238*** (0.0411)	-0.597* (0.322)		
Ethnic fragmentation*LRA				-0.114*** (0.0399)						0.0744 (0.0658)		
Ethnic polarization					-0.0934** (0.0391)	0.0657 (0.0702)					-0.00581 (0.0439)	-0.190 (0.160)
Ethnic polarization*LRA						-0.0433** (0.0205)						0.0402 (0.0329)
Constant	-1.936***	-1.502***	-1.249***	-0.399	-1.472***	-1.123***	-0.637***	-0.691	-1.227***	-1.756***	-1.163***	-1.461***
Observations	250	182	147	147	147	147	250	182	147	147	147	147

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R-squared	0.829	0.832	0.830	0.859	0.839	0.858	0.749	0.738	0.773	0.773	0.767	0.765
Hansen (p-value)		0.08	0.68	0.95	0.43	0.1		0.04	0.85	0.64	0.07	0.102
Cragg-Donald Wald F statistic		126.04	108.03	25.21	111.781	48.43		103.63	86.42	12.3	83.87	37.47
Anderson canon (P-value)		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
GFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Départements FE	No	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%

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59 Table 3: Effect of municipal revenue autonomy on Multidimensional Poverty Index by dimension,
60 GFE_2SLS

LRA	-0.08*** (0.02)	-0.03*** (0.01)	-0.13*** (0.02)	-0.05* (0.03)	-0.05* (0.03)	-0.09** (0.03)	-0.02 (0.02)	-0.01 (0.01)	-0.03 (0.06)	-0.08** (0.03)	-0.01 (0.01)	-0.15*** (0.03)
lagMPI_Educ		0.60*** (0.08)										
lagMPI_Heath					0.04** (0.017)							
lagMPI_water								0.38*** (0.08)				
lagMPI_living											0.72*** (0.069)	
Central Transfers			-0.032 (0.026)			-0.068* (0.035)			0.008 (0.03)			-0.10** (0.04)
Urban population			-0.40*** (0.08)			-0.32* (0.19)			-0.13 (0.20)			-1.19*** (0.20)
Informal sector			0.98** (0.40)			0.208 (0.361)			-0.011 (0.16)			2.39*** (0.72)
Constant	-2.5***	-1.01***	-3.05***	-4.2***	-4.0***	-1.7***	-2.3***	-1.5***	-1.9***	-2.5***	-0.5***	-3.78***
Observations	277	276	182	277	276	182	272	266	179	277	276	182
R-squared	0.55	0.79	0.66	0.93	0.93	0.94	0.71	0.80	0.67	0.65	0.70	0.60
Hansen (p-value)			0.58			0.56			0.13			0.001
Cragg-Donald Wald F statistic			149.45			175.80			155.33			149.12
Anderson canon (P-value)			0.004			0.00			0.00			0.00
GFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Départements FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dependent variable: MPIa by dimension	MPI_Education			MPI_Health			MPI_Water			MPI_Living standard		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	GFE	GFE	GFE_IV	GFE	GFE	GFE_IV	GFE	GFE	GFE_IV	GFE	GFE	GFE_IV

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

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

Dependent variable: MPIa for rural and urban area	MPIa_Rural		MPIa_Urban	
	(1)	(2)	(3)	(4)
	GFE	GFE_2SLS	GFE	GFE_2SLS
LRA	-0.103* (0.0505)	-0.166*** (0.0594)	-0.132*** (0.0459)	-0.184*** (0.0574)
Central Transfers		-0.0812 (0.0700)		-0.128* (0.0759)
Urban population		-1.441*** (0.377)		-1.552** (0.699)
Informal sector		0.100 (0.251)		0.0320 (0.968)
Constant	-1.138*** (0.0896)	0.954 (0.614)	-0.595 (0.381)	0.558 (1.036)
Observations	131	85	174	112
R-squared	0.869	0.930	0.610	0.780
Hansen (p-value)		0.20		0.328
Cragg-Donald Wald F statistic		29.23		71.81
Anderson canon (P-value)		0.00		0.00
GFE	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes

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

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

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Dependent variable	Multidimensional poverty index			Headcount poverty Index		
	(1) GFE_2SLS	(2) GFE_2SLS	(3) GFE_2SLS	(4) GFE_2SLS	(5) GFE_2SLS	(6) GFE_2SLS
LRA	-0.121*** (0.0286)	-0.128*** (0.0267)	-0.0831** (0.0372)	-0.0896** (0.0445)	-0.0865** (0.0421)	-0.186 (0.133)
Central Transfers	-0.0365 (0.0334)	-0.0506 (0.0328)	-0.0152 (0.0328)	0.00762 (0.0127)	0.00660 (0.0129)	0.0112 (0.0233)
Urban population	-0.983*** (0.0845)	-1.015*** (0.0806)	-1.024*** (0.0792)	-0.168 (0.145)	-0.176 (0.151)	-0.139 (0.205)
Informal sector	0.973** (0.469)	1.033** (0.461)	0.945* (0.489)	-0.598 (0.514)	-0.589 (0.512)	-0.683 (0.452)
Conflict events		-0.0540** (0.0250)			-0.0148 (0.0137)	
Conflict events weighted			0.00477 (0.0155)			0.00985 (0.0177)
Constant	-1.691*** (0.365)	-1.605*** (0.366)	-1.783*** (0.385)	-0.691 (0.448)	-0.686 (0.445)	-0.696* (0.404)
Observations	182	182	148	182	182	148
R-squared	0.77	0.79	0.78	0.638	0.64	0.61
Hansen (p-value)	0.202	0.064	0.831	0.091	0.117	0.12
Cragg-Donald Wald F statistic	141.41	139.05	112.77	103.63	96.24	75.59
Anderson canon (P-value)	0.00	0.00	0.00	0.00	0.00	0.00
GFE	Yes	Yes	Yes	Yes	Yes	Yes
Departement FE	Yes	Yes	Yes	Yes	Yes	Yes

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

82

Table 6: Effect of LRA on MPIa, controlling for Département GDP and alternative measure of heterogeneity

Dependent variable: MPIa	(1)	(2)	(3)	(4)	(5)		(6)
	Controlling for Département GDP				Controlling for Département GDP		
					Alternative GFE VI	measur GFE VI	heterogeneity GFE VI
	FE	GFE	FE IV	GFE_2SLS			
LRA	-0.0427** (0.0193)	-0.0627** (0.0275)	-0.233 (0.175)	-0.0842** (0.0407)	-0.0872** (0.0414)		-1.628 (3.010)
Local_GDPPhbt	0.0137 (0.0254)	-0.0801*** (0.0278)	-0.132 (0.111)	-0.0909*** (0.0301)	-0.0884*** (0.0288)		-1.616 (3.011)
Urban population	-0.523** (0.221)	-0.746*** (0.173)	-0.423* (0.244)	-0.875*** (0.227)	-0.871*** (0.222)		-0.866*** (0.234)
Informal sector	-2.181** (0.807)	0.622* (0.332)	-2.180** (0.862)	0.481 (0.452)	0.579 (0.490)		0.520 (0.446)
Horizontal_inequality					-0.365 (0.335)		-10.21 (19.50)
Horizontal-inequality *LRA							1.587 (3.111)
Constant	0.693	-1.461***	1.628	-0.961***	-1.076***		-1.403**
Observations	256	256	185	185	185		185
R-squared	0.574	0.828	0.772	0.790	0.792		0.735
Hansen (p-value)			0.61	0.12	0.15		0.21
Robust standard errors clustered at the départements level in parentheses / *significant at 10%; ** significant at 5%; *** significant at 1%			Cragg-Donald Wald F statistic	5.41	181.54	173.42	1.60
			Anderson canon (P-value)	0.00	0.00	0.00	0.14
GFE	No	Yes	Yes	Yes	Yes	Yes	Yes
Departement FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 7: Effect of LRA on MPIa, different cutoffs for deprivation

Dependent variable: MPIa	Controlling for Central transfers			Controlling for Département GDP			Test for off census years	
	20% Cutoff	30% Cutoff	40% Cutoff	20% Cutoff	30% Cutoff	40% Cutoff	30% Cutoff	30% Cutoff
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LRA	-0.098*** (0.031)	-0.11*** (0.0376)	-0.16*** (0.0555)	-0.07** (0.0342)	-0.084** (0.04)	-0.134** (0.06)	-0.018** (0.008)	-0.025*** (0.007)
Transfers		-0.066* (0.037)	-0.0752* (0.045)	-0.0565 (0.081)	-0.017** (0.0087)			
Urban population		-0.763*** (0.260)	-0.888*** (0.306)	-1.148*** (0.439)	-0.748*** (0.194)	-0.875*** (0.227)	-1.19*** (0.31)	-0.194*** (0.0488)
Informal sector	0.534 (0.0962)	0.635 (0.11)	0.782 (0.11)	0.397 (0.11)	0.481 (0.11)	0.67 (0.11)	0.0950 (0.11)	0.131 (0.11)
loc_GDPPhbt				-0.0788*** (0.0255)		-0.09*** (0.03)	-0.11*** (0.042)	-0.0210*** (0.00634)

	-1.124***								
	182	47		Constant	-1.333***	-2.015***	-0.810***	-0.96***	-1.38***
					0.459***	0.37***			
48				Observations	182	182	185	185	185
					182				
49				R-squared	0.770	0.780	0.784	0.781	0.790
					0.791	0.943	0.941		
50				Hansen (p-value)		0.41	0.38	0.34	0.12
					0.12	0.24	0.159	0.55	
51					140.54	140.54	140.54	171.42	181.54
					183.05	140.54			142.35
52				Cragg-Donald Wald F statistic			0.00	0.00	0.00
					0.00	0.00	0.00	0.00	0.00
53				Anderson canon (P-value)					
54				GFE	Yes	Yes	Yes	Yes	Yes
					Yes	Yes			
55				Departement FE		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%

Table 8: Effect of LRA on MPIa, before and after the 2007 peace agreement signing, GFE_2SLS estimation

	Before 2007 Peace agreement				After 2007 Peace agreement			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	GFE	GFE	GFE_2SLS	GFE_2SLS	GFE	GFE	GFE_2SLS	GFE_2SLS
LRA	-0.0799***	-0.0977***	-0.0931**	-0.0638	-0.0466***	-0.0752**	-0.123**	-0.0960
	(0.0342)	(0.0293)	(0.0372)	(0.0512)	(0.0155)	(0.0322)	(0.0496)	(0.0594)
Central Transfers	-0.0145	-0.0298	-0.0546	-0.0780	-0.0968	-0.141*		
	(0.0357)	(0.0342)	(0.0364)	(0.0579)	(0.0638)	(0.0737)		
Urban population		-0.664**	-0.791***	-0.791***	-0.795**	-0.920***	-0.816**	
	(0.241)	(0.251)	(0.235)	(0.302)	(0.355)	(0.329)		
Informal sector	1.037***	0.977***	0.875**	0.490	0.331	1.069		
	(0.388)	(0.810)	(1.018)	(1.160)	(0.329)	(0.377)		
Ethnic frag.*LRA					-0.0292	0.000745		
					(0.0216)	(0.0354)		
Grouped fixed effet					0.629***	0.148	0.240**	0.328**
					0.290*	0.278*	0.290**	0.283*
					(0.104)	(0.226)	(0.119)	(0.142)
					(0.149)	(0.165)		
Constant								-1.148***
								112
Observations	158	138	91	76	119	91	71	
R-squared	0.753	0.863	0.838	0.811	0.331	0.507	0.531	0.543

22	Hansen (p-value)	0.0454	0.08	0.73	0.73					
23	Cragg-Donald Wald F statistic	117.67	71.04	71.07	43.59	2.4	Anderson canon (P-value)	0.00	0.00	0.00
25	GFE	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
26	Departement FE	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%

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***Conflict of Interest Statement**

'Conflicts of interest: none'

Tiangboho Sanogo

A handwritten signature in blue ink, appearing to read 'Tiangboho Sanogo', with a long horizontal line extending to the left.