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Abstract

This paper analyzes the effect of the transfers from central government to municipalities on the revenue mobilization by municipalities in Côte d'Ivoire over the period 2001-2014. The analysis is based on a new carefully-constructed dataset covering the conflict and post conflict periods for 115 municipalities. A two-stage least squares estimator is combined with the Grouped Fixed Effects estimator to address a potential endogeneity bias and to allow for unobserved heterogeneity varying over time. The results show a statistically significant and positive effect of central transfers on revenue mobilization by municipalities for both tax revenue and non-tax revenue. The effect of transfers is found to be higher for tax revenue than for non-tax revenue. The conflict eroded the capacity of municipalities to raise revenue. During the conflict, a 10 percent increase in transfers is associated with a 3.3 percent increase in revenue mobilized by municipalities, while this increase reaches 5.9 percent after the conflict.

Keywords

Municipality, Own revenue, Fiscal decentralization, Grouped fixed effect, Conflict, Côte d'Ivoire.

JEL Codes

H3, H7, O1.

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1. Introduction

Since the 1980s, many Sub-Saharan African countries have considered fiscal decentralization as a main reform to foster development. However, in most of these countries, central governments have been reluctant to delegate taxing responsibilities to local governments resulting in a considerable imbalance between responsibility for expenditure and revenue collected (Bird, 2010, Dahlberg et al., 2008). Therefore, transfers from central government constitute an important source of revenue for local governments. In recent years, a growing literature has highlighted the potential (dis)incentive effect of transfers from central government to local governments on local revenue mobilization. The dependence of local governments on central transfers has led to a number of effects which have been analyzed in the literature (Cyan et al., 2013, Caldeira and Rota-Graziosi, 2014, Knight, 2002). Local governments may be discouraged from collecting their own revenue, thus reducing their financial autonomy and accountability to citizens. Transfers are often tied to specific projects, with limited decision-making responsibilities for local authorities (Rajaraman and Vasishtha, 2000). However, central transfers can also stimulate local revenue mobilization when the distributional formula includes local tax effort as a determinant of the amount of transfers (Bahl, 1999, Faguet, 2004). In Côte d'Ivoire, where the process of fiscal decentralization started in the 1980s, transfers represent nearly 80 percent of total local revenue in some municipalities (DDLD, 2014). This dependence on central transfers may have increased with the conflict that the country experienced from 2001 to 2008¹. Moreover, the conflict may have eroded the local tax base and affected the capacity of municipalities to raise taxes. Central government

¹The 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. We believe that this agreement might have induced a change in the behavior of municipal government.

may also have diverted revenue away from municipalities to military/security spending.

The purpose of this paper is to look at the impact of central transfers on revenue mobilization by municipalities in Côte d'Ivoire, and also to explore the channels through which they operate. The hypothesis is that the effect of transfers is different for the mobilization of municipal tax revenue from for the mobilization of municipal non-tax revenue².

Indeed the conflict might affect the municipal tax base and municipal non-tax base differently, because the municipal tax base appears to be more regular than the municipal non-tax base. This study also investigates whether the effect of transfers on revenue mobilization by municipalities was different in the conflict period from the post-conflict period³.

This paper makes 3 contributions to the literature. First, the paper analyses the effect of central transfers both during the conflict period and the post-conflict period. Second, it uses a new database for Côte d'Ivoire, consisting of municipal revenue combined with conflict indicators and the national Household Living Standard Survey (HLSS). To the best of our knowledge, this study is the first to analyze the effect of transfers on municipal revenue mobilization with such a disaggregated dataset for Côte d'Ivoire. Third, the paper uses an improved econometric method based on Grouped Fixed Effects (GFE), which estimates group membership from the data, and controls for both time-varying and time-non-varying heterogeneity. Previous studies assume that unobserved heterogeneity is constant over time. The principal finding is that central transfers increase municipal revenue mobilization. This result is opposite to those of [Mogues and Benin \(2012\)](#), who find that external transfers to

²According to legislation, municipal own revenue has two principle components: revenue collected by municipalities, and revenue collected on behalf of municipalities by the General Tax Directorate and shared according to a formula.

³In Côte d'Ivoire property tax, essentially based on urban residential and commercial buildings and local businesses, represents the most important part of the municipal tax base. It appears to be more stable and less likely to be affected by conflict than municipal non-tax revenue, which is based on fees and charges – as shown in Sections 2.2 and 2.3.

Ghana's districts do not encourage local revenue-raising. A possible explanation is that the effect differs depending on the specific country context, including the scope of the delegation of revenue raising responsibilities to municipalities, the local government's discretion in setting local tax rates, and other potential constraints which affect its ability to increase its own revenue. Another potential explanation comes from the allocation formula in Ghana, which does not contain a criteria which encourages improvements in local revenue mobilization, as shown by [Mogues and Benin \(2012\)](#). The difference might also be explained by the econometric method used in our paper which allows for controlling of time-varying heterogeneity. As expected, the effect of transfers is bigger for tax revenue than for non-tax revenue. The results also suggest that conflict has a negative and significant impact on revenue performance. This effect seems to work mainly by diverting revenue away from transfers to conflict related expenditures. The remainder of the paper is organized as follows. Section 2 provides an overview of the literature, highlighting channels through which transfers might affect revenue mobilization by municipalities. Section 3 focuses on the characteristics of the decentralization process in Côte d'Ivoire. Section 4 contains a statistical analysis of Côte d'Ivoire's transfer system and presents the potential correlation of transfers with local revenue mobilization. Section 4 describes the data and econometric approach used. The main results are presented and interpreted in section 5 which also contains robustness tests. Section 6 concludes and discusses the policy implications.

2. Intergovernmental transfers and local revenue mobilization in the literature

The theory of fiscal federalism has long studied the optimal design of the transfer between different levels of governments, and proposes that various equalization schemes may be adopted to address the issue of fiscal imbalances between local governments. These transfer systems

can generate efficiency gains by internalizing the fiscal externality (Boadway and Flatters, 1982, Wildasin, 1983, Bird and Slack, 1990). In addition, Hines and Thaler (1995) conclude that central transfers equalize the citizens' access to public services across local governments by adding resources to locally generated revenue⁴. Wildasin (1983) highlights the features of transfers as the main determinant of their effects on local revenue mobilization. Based on a general equilibrium model, Wildasin (1984) shows that matching transfers are preferable to lump-sum transfers. This is particularly relevant when transfers can be optimally designed for each local government. Caldeira and Rota-Graziosi (2014) highlight a virtuous circle between transfers from central government and local own revenue using an optimal tax theory model and unconditional central transfers. Central transfers can increase local public spending, which improves public service delivery and reinforces the accountability of local authorities. The resulting higher accountability in turn leads to stronger voluntary tax compliance boosting local own revenue mobilization. However, these positive views on transfers have been challenged by the second generation of fiscal federalism. Weingast (2009) argues that equalization transfers may have adverse fiscal incentives. Local governments are more likely to improve public services delivery, and to increase revenue mobilization, if they are able to withhold a substantial share of their local revenue⁵.

Transfers might be perceived as a kind of windfall resource in recipient municipalities, crowding out local own revenue. Transfers may also reduce local tax compliance by severing the connection between local authorities and taxpayers. According to Oates (1993), the preferences of the citizens are better accounted for, when local authorities are provided with increased tax-raising responsibilities. The assumption that being taxpayers who receive the

⁴(Smart, 1998, Figuières et al., 2004, Kothenburger, 2002, Nagarajan et al., 2014)

⁵Buettner (2006) finds that the amount of transfers can lead to more inequality among German municipalities.

expected services will be more tax compliant, resulting in less resistance to cost-recovery of user charges (Bahl, 1999). Bahl and Linn (1992) and Moore (2008) argue that in developing countries a high dependence on central transfers can make local governments less accountable for their fiscal decisions and reduce local tax effort. The improved efficiency in service delivery predicted by the first generation of fiscal federalism literature is based on competition between local governments (Tiebout, 1959). This competition is based on a budget constraint for local governments which must bear the full financial consequences of their policy decisions Weingast (2009). Thus, in a context of soft budget constraints, the dependence on matching transfers may mitigate the expected results from fiscal decentralization, and as a consequence reduce local revenue mobilization. Transfers between levels of government may also worsen local revenue performance due to corruption. Prud'homme (1995) suggests that 'local politicians and bureaucrats are likely to be more subject to pressing demands from local interest groups'. Therefore, local authorities can divert transfers away from their intended objectives for personal gain, especially in countries where local elections are based on tribal and/or on political affiliation (Banful, 2011). According to Bucovetsky and Smart (2006), equalization transfers designed to increase equity in revenue across local governments, induce excessive local tax rates, and so increase the dead-weight loss from distortionary taxation when tax bases are immobile. However, beyond the theoretical arguments, the empirical effects of central transfers on local revenue mobilization are inconclusive. Dahlberg et al. (2008) establish a crowding-in effect in a study which addresses the potential endogeneity of transfers. They find that larger external transfers do not significantly affect local tax rates nor local tax revenue. Caldeira and Rota-Graziosi (2014) investigate the incentive effect of unconditional transfers collected centrally, and allocated to municipalities according to population size, in Benin. They find support for an incentive effect of transfers on local own revenue. However,

the analysis is concerned only with road tax. [Brun and Elkhadari \(2016\)](#) assess the fiscal incentive effect of both unconditional and conditional transfers in Morocco. Their results support the existence of a significant incentive effect of unconditional transfers and a non-significant effect of conditional transfers. The assignment criteria for transfers play a key role in the relationship between central transfers and revenue mobilization by local governments. [Bird and Vaillancourt \(2006\)](#) conclude that assignment criteria should not discourage local authorities from collecting their own revenue. Unfortunately, in most countries, the allocation is often motivated by political rather than economic and social considerations ([Solé-Ollé and Sorribas-Navarro, 2008](#), [Chambas, 2010](#)). However, many studies empirically identify a negative effect of transfers from central governments to local governments. [Zhuravskaya \(2000\)](#) shows that local governments in Russia have no incentive to exert any tax-raising effort when transfers from higher level government increase. A high transfer dependency is likely to induce a lack of fiscal discipline among local governments ([Martinez-Vazquez and Rider, 2006](#)). Indeed, in a context in which transfers are used to loosen local budget constraints, local governments have an incentive to increase their deficit as they expect support from central government ([Bordignon et al., 2001](#)). Along these lines, [Rodden \(2005\)](#) and [Martell and Smith \(2004\)](#), focusing on Germany and the United States respectively, find that local governments expecting a bailout tend to borrow more than those that do not. Local governments facing soft budget constraints are potentially suffering from ‘flypaper effect’⁶. This is likely to create instability, which will, in turn, reduce tax effort ([Weingast, 2009](#), [Bird, 2010](#), [Ter-Minassian, 1997](#))⁷.

⁶According to the flypaper effect, an increase in transfers leads to greater local public spending rather than a rise in the private revenue of the local population ([Filimon et al., 1982](#), [Hines and Thaler, 1995](#), [Knight, 2002](#)).

⁷Local authorities are also more likely to spend efficiently the resources they have raised themselves locally than external resources as highlighted by [Bird and Smart \(2002\)](#).

3. Fiscal decentralization in Côte d'Ivoire

3.1. Overview of Côte d'Ivoire

Côte d'Ivoire is a sub-Saharan African country; more than 54 percent of its population lives in urban areas (World Bank, 2015). Since 1980, Côte d'Ivoire has attempted to implement decentralization by transferring responsibility for expenditure and revenue-raising to local governments, with the aim of improving effectiveness and efficiency in the delivery of public services. From 2001 to 2008 the country experienced a political conflict marked by sporadic events of different intensity across the municipalities. A peace agreement was signed by all political parties, and marked the end of tension in 2007. Both sides agreed to a free and fair general election to be held in 2008⁸. This agreement might have induced a change in the behavior of municipalities. Thus, the study considers the post conflict period starting from 2008. The revenue structure of local government in Côte d'Ivoire is largely inherited from the colonial period. Law No. 55-1489 of 18 November 1955 established municipalities in Abidjan, Bouaké, and Grand Bassam, but they did not have financial autonomy. After independence in 1960, decentralization, especially the financial autonomy of municipalities, was clearly not a priority for the central government. Although municipal council members and mayors were elected, the central government only started the process of decentralization under Law No. 80-1162 of 17 October 1980. This law defined a specific status and electoral regime for municipalities, and created 37 municipal councils in addition to Abidjan. In 2000, the government adopted a new constitution, which sets out the principles of administration and financial autonomy of local authorities. This constitution divides the country into a multi-tiered system with 19 regions which are sub-divided into 58 départements led by *département* councils,

⁸Although some events may have occurred after 2008, but these events are less likely to influence the overall effect of central transfers (see appendix B for the distribution of conflicts events in the country).

which are again sub-divided into 197 municipalities. Since 2011, although the number of municipalities has remained unchanged, the central government has reorganized the country into 14 districts (with full autonomy for Abidjan and Yamoussoukro), 31 regions, 95 *départements*, and 197 municipalities, each with an elected mayor. The Directorate in charge of decentralization and local development (DDLDD), part of the Ministry of Interior, manages the decentralization process. The Ministry of Economy and Finance collaborates with the DDLDD to define the amount of transfers and their allocation. These administrations interact with municipalities organized in the Côte d'Ivoire association of cities and municipalities. The relationship between central and local government is organized through a trusteeship system with two levels, in which central administration approves decisions and provides assistance to municipalities. In the process of strengthening the fiscal autonomy of municipalities, more than 35 legislative decrees and laws have been passed to delegate expenditure responsibilities, tax base and revenue raising capacities to municipalities. These responsibilities are often related to the provision of important public services such as health and education facilities, water and sanitation, local urbanization, and also include responsibility for raising revenue.

3.2. Structure of local revenue in Côte d'Ivoire

In Côte d'Ivoire, as in many developing countries, total local revenue represents a small fraction of GDP. Figure 1 shows as a percentage of GDP, the contribution of different types of local revenue. Total local revenue represented only 0.64 percent of GDP in 2004 and 0.53 percent in 2005⁹. Local tax revenue represents the largest share of this total revenue, with, on average, 0.26 percent of GDP for the 2 years. At the same time, central transfers account

⁹The data used do not allow creation of a graph for more recent years as they are aggregated for all sub-national levels (figure 1). These data represent all levels of sub-government in the country (districts, regions, *départements* and municipalities) while the figure 3 concerns only the municipal level.

for 0.20 percent of GDP. Local non tax revenue, collected by local governments was 0.13 percent of GDP. Other Revenue accounted for about 0.1 percent of GDP in 2005.



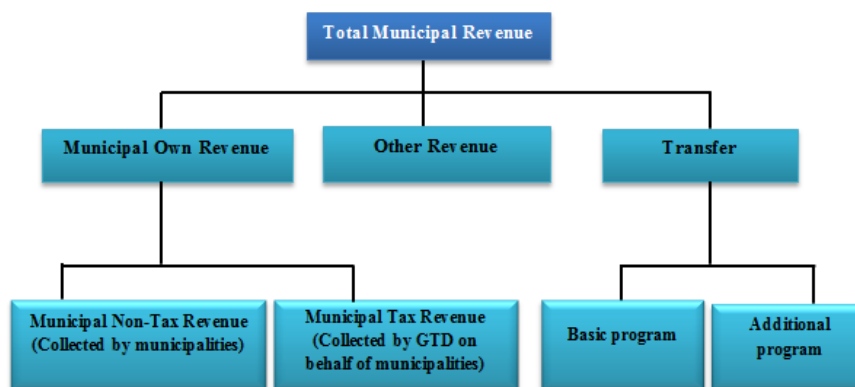
Figure 1: Local government revenue structure as percentage of GDP, Côte d'Ivoire 2004 and 2005 (all levels of sub-central government)

Figure 2 shows that municipal own revenue has three components: The first component is the revenue collected on behalf of the municipality by the central General Tax Directorate (GTD), called Municipal tax revenue (MTR) and paid to municipalities¹⁰. The second is the revenue collected by municipalities, called Municipal non-tax revenue (MNTR)¹¹. The third component is named Other Revenue. MTR is raised with the help of municipalities. For instance, the identification of the tax base requires an effective participation by municipalities. Moreover, some of them provide central government with a significant number of staff and resources (e.g. Bouaké, Daloa, San-Pedro).

Figure 3 presents the composition of total municipal revenue from 2001 to 2014. Transfers

¹⁰Central government transfers this revenue excluding management costs.

¹¹Municipal non-tax revenue, although called non-tax, contains municipal revenue that can be classified as taxes.



Source: Authors

Figure 2: Municipal revenue structure

from central government contributed, on average, more than 50 percent of total municipal revenue. The share of transfers slightly decreased in the three-year period leading up to the 2010 national election ¹². MNTR accounted for, on average, less than 25 percent of municipal total revenue while MTR was on average, 20 percent, and was relatively constant in absolute terms in the years up to 2014. Adding these 2 components, own revenue is 45 percent of municipal total revenue. This share is relatively low compared to some developing countries like Benin, where municipalities' own revenue contributed 69 percent of total revenue over the period 2003 to 2008.

As noted by [Bahl \(2000\)](#) for developing countries, Côte d'Ivoire is characterized by wide revenue disparities between regions particularly between the large urban municipalities and the rural ones. Table 1 shows for 2012, the structure of total municipal revenue according to population size. Municipalities in Abidjan District and large urban municipalities (e.g. Daloa and Korhogo) internally mobilize (MNTR) for more than 45 percent of their total revenue. Small municipalities (e.g. Bédiala and Kaniasso) collect less than 10 percent of total revenue, and so are heavily dependent on transfers from central government. Some

¹²This trend suggests a possible reassignment of resources to election expenditure, since the allocation criteria of these transfers remain mostly under the discretion of central government.

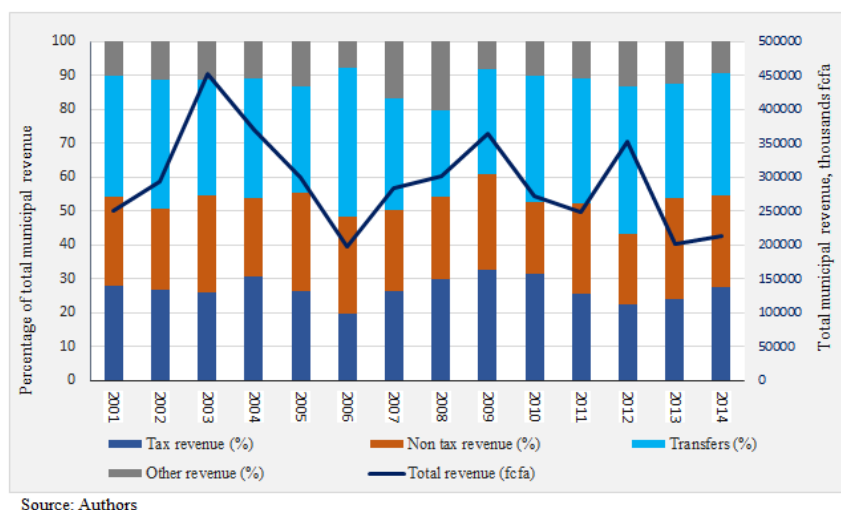


Figure 3: Composition of municipality revenue as a percentage of total municipality revenue, Côte d'Ivoire 2001-2014

northern municipalities (e.g. Kanakono and Kouto) collect almost no revenue, and MNTR accounts for less than 1 percent of their total revenue (DDLD, 2014). These disparities justify the use of transfers to reduce the inter-regional inequality in revenue potential. In order to make this equalization policy more effective and pro-poor, as well as to improve local revenue mobilization, a number of issues must be considered: the type of these transfers, the formula used to allocate resources, and the expenditure responsibilities of local government.

Table 1: Revenue structure across different categories of municipalities, Côte d'Ivoire, 2012

Category	Municipality	Tax revenue		Non-tax revenue		Central transfers		Other		Total revenue value
		Value*	Percentage	Value	Percentage	Value	Percentage	Value	Percentage	
Abidjan	Adjame	923.85	44.12	973.03	46.47	197.21	9.42			2094.09
	Abobo	581.26	25.80	911.59	40.46	179.09	7.95			2252.83
Large	Daloa	241.59	25.13	441.53	45.92	278.40	28.95			961.52
	Kohorgo	168.40	34.19	200.28	40.67	51.15	10.39	72.67	14.75	492.49
Middle	Tanda	37.83	21.45	26.58	15.07	98.70	55.97	13.23	7.50	176.35
	Biankouma	8.72	6.89	24.46	19.32	47.74	37.71	45.68	36.08	126.60
Small	Bédiala	0.38	0.40	11.18	11.61	82.33	85.52	2.38	2.48	96.27
	Kaniasso	0.30	0.47	1.79	2.86	60.06	95.87	0.50	0.80	62.65

*Base data - millions of Franc (Fr) CFA unless otherwise specified. TLR – Total Local Revenue percentage
Source: Calculation by authors with Côte d'Ivoire data from the Ministry of Interior (DDLD).

3.3. *Transfers from central government and municipality own revenue*

Central transfers are the most important source of financing for a large number of municipalities in Côte d'Ivoire. There are 2 main components of central transfers: unconditional transfers and a conditional transfer program¹³. For the unconditional transfers, the total amount of the transfers is determined annually by the Directorate General for budget in collaboration with local governments, and approved by the Parliament. It is a mix of finance for capital expenditure, and finance for operating expenditure¹⁴. The mix aims to help municipalities to provide a minimum level of public services to their citizens. The distributional formula is based on several indicators: size of population, presence of decentralized entities of central government, tax capacity, etc. The amount of transfers for capital expenditure is largely discretionary. The conditional transfers serve to cover exceptional expenditures faced by Abidjan, Bouaké, Korhogo and Yamoussoukro according to legislation¹⁵.

Figure 4 shows that over the 3 post-conflict years, transfers made for current expenditure are higher than those made for capital expenditure for all municipalities¹⁶. In the regions, most affected by the conflict (western and northern regions), transfers for capital are almost equal to transfers for current expenditure¹⁷. This may reflect the central government's goals of improving the supply of basic services after the conflict, and reducing regional disparities. The literature has shown that transfer systems organized to reduce differences between regions (horizontal imbalance), can have disincentive effects. Some municipalities can free-ride and under-exploit their tax potential, as shown by Weingast (2014).

¹³It is called 'aide exceptionnelle'

¹⁴The transfers for capital expenditure are called 'dotation générale pour investissement'; and the transfers for recurrent expenditure are called 'dotation générale de fonctionnement'.

¹⁵The conditional transfers are called "aide exceptionnelle".

¹⁶Data not available for the most recent years.

¹⁷Disaggregated data do not allow to report for the recent years.

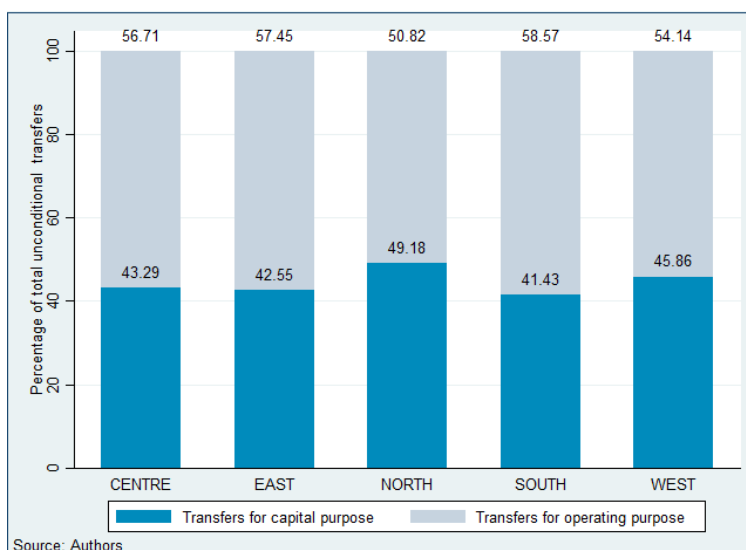


Figure 4: Composition of unconditional transfers, post-conflict Côte d'Ivoire, 2010-2012

Figure 5 presents the main components of MNTR for the period 2002 to 2007: business licenses, residential tax, and various fees (for business, market, construction permits, bars, shows, advertising, hotels, etc.); service fees (water, sanitation, waste collection, etc.); and motor vehicle tax. On average, the tax on small businesses and licenses contributed most to MNTR, more than 26 percent, lease charges were less than 6 percent. Market fees and residential tax together were almost 50 percent of municipal own revenue (DDL, 2014). Table 2 presents the formula for the distribution of the local tax revenue. The collection of local tax by central tax administration on behalf of local governments aims to increase the efficiency of the tax system because the administrative capacity of municipalities is often limited. Local tax revenue includes property tax¹⁸, public road network tax, water and sanitation fees. These taxes are distributed between 6 levels of governments (municipalities, cities¹⁹, *départements*, regions, districts, and central government). Other taxes consist of

¹⁸In Côte d'Ivoire, the availability of relevant property registers is limited and agricultural land is not yet included in the property tax base.

¹⁹The legislation introduces exceptionally the notion of "city" in the distributional formula. Only the cities of Abidjan and Yamoussokro are concerned, receiving 5 percent of the revenue from business license, motor vehicle tax, property tax and land tax.

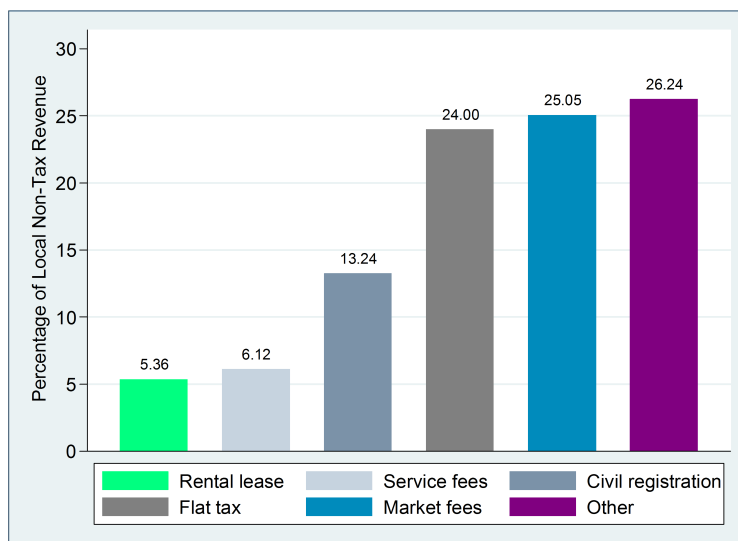


Figure 5: Composition of municipal non-tax revenue, Côte d'Ivoire, 2002-2007

motor vehicle tax, synthetic tax, business licenses, and gambling tax (casino). Except for Motor vehicle tax, 40 percent of these taxes are allocated to municipalities. As municipalities are the only level of local government with tax-raising responsibilities, this redistribution scheme may negatively affect their tax effort.

Table 2: Distributional formula for the revenue collected by GTD in Côte d'Ivoire

Type of revenue	Distributional formula (Percentage)						
	Municipality	City	District	Département	Region	Central government	
Business licenses	40	5	5	25	15	10	
Other taxes	Synthetic tax	40	no	no	25	10	15
	Tax on casinos	no	no	100	no	no	no
Vignette	Motor vehicle tax	20	5	100	30	15	20
Property tax	Tax on public road network, hygiene and sanitation	40	5	5	25	15	10
	Property tax	40	5	5	25	15	10
	Land tax (non-built or vacant lands)	40	5	5	25	15	10
	Local residence tax	40	no	no	no	no	60

Source GTD-Côte d'Ivoire

Table 3 summarizes the distribution of tax revenue between local governments in 2012. Central government kept more revenue than would be expected according to the formula. Municipalities received slightly less than the predefined 40 percent. On average, this share was 35.4 percent (FCFA 36.87 billion). Only the revenue from the motor vehicle tax complies with the distributional formula, with 20 percent allocated to municipalities (FCFA 2.13 billion). The

central government withheld 29 percent of local tax revenue. Even though business licenses are intended to be a significant revenue source for local government, the share retained by the central government is more than 25.2 percent, well above the 10 percent fixed by the law.

Table 3: Local tax revenue collected by GTD and distributed between different levels of government, post-conflict Côte d’Ivoire, 2012

Government level *	Business licenses				Synthetic tax	Gambling tax	Motor vehicle tax	Stamp duties	Property Tax	Sub-Total 2	Total
	Purchasers	Traders	Public Transport	Sub-Total 1							
Central Government	76	8912.4	769.9	9758.3	2715.5	0	1756.2	4290.5	11727.8	20490.1	30248.5
	32%	25%	26%	25.2%	52.5%	0.0%	16%	97.7%	26%	31.3%	29%
District	0.8	10182.9	546.4	10730.1	441.5	161.2	3394.1	0	10269.5	14266.5	24996.7
	0.3%	28.7%	18.5%	27.7%	8.5%	100.0%	31.9%	0.0%	22.7%	21%	24%
Département	67.3	2194	474.4	2735.8	101.6	0	976.5	0	1536	2614	5350
	28%	6%	16%	7%	1.9%	0.0%	9.1%	0.0%	3.4%	4%	5%
Municipality	88	14181	1160	15430	1914.1	0	2138.6	0	17387.6	21440.4	36871.2
	38%	39.9%	39.3%	40%	37%	0%	20%	0.0%	38.5%	32.7%	35.4%
Other	0	0	0	0	0	0	2378.31	100.74	4164.5	6643.5	6643.5
	0%	0%	0%	0%	0%	0%	22.3%	2.3%	9.2%	10.1%	6.3%
TOTAL	232.6	35471	2951.5	38655.1	5172.9	161.2	10644	4391.2	45085	65455	104110.2

* Base data - millions of Franc CFA, unless otherwise specified.

4. Data sources, Descriptive statistics and Econometric approach

4.1. Data

The analysis draws on 3 sources of data: The local government revenue and expenditure dataset is constructed from the Administrative Accounts of municipalities collected by the DDL, and the National Accounts from the Ministry of Economy and Finance. This dataset provides information for 115 municipalities over the period 2001-2014. It includes Municipal Own Revenue, transfers from central government, other revenue, and data on expenditure.

The socioeconomic and demographic variables are taken from the national Household Living Standard Survey (HLSS) for the years 2002 and 2008. The HLSS is a national demographic and economic survey which provides information on living conditions, infrastructure, poverty, education, employment, and other covariates²⁰. The design of the HLSS ensures a representative sample of Côte d’Ivoire’s 196 municipalities. Approximately 10,800 households were

²⁰The surveys provide information on whether the household has access to several facilities like running water, electricity, health, and education services. They also contain information about households own durable goods such as fridge, computer, car, etc.

surveyed in 2002 and 13,657 households in 2008. Additionally, information relative to geographical distribution of the population from the Institut National des Statistiques (National statistical office) is used to calculate the density of population and the share of urban population for the period under study. The conflict indicators were computed from the Armed Conflict Location and Event Dataset (ACLED) (Raleigh et al. 2010). ACLED contains information on the exact dates and location of political violence, the conflict events, and a fatality index which measures the intensity of each event. The conflict events selected in this data include battles (violence against civilians and rioting), protests (non-violent demonstrations), and other non-violent events²¹. As the data for the 2008 HLSS survey are not available at the municipal level, the data are aggregated at *département* level. Thus the dataset covers 14 years (2001-2014) for 35 *département*²².

4.2. Descriptive statistics

Table 4 presents descriptive statistics. For the whole sample, the average transfer per capita is FCFA 1551.2 with a standard deviation of 3491.7. This amount is higher in the Southern *département* (4099.6) than in the Northern *département* (1067.3), which suffered from a higher incidence of conflict. The difference between the northern and southern areas is also seen in household living conditions and tax base. For example, the mean poverty headcount in the north is 42 percent, but only 36 percent in the south.

The correlation between municipal revenue mobilization and transfers from central government. The Logarithm of per capita own revenue (tax and non-tax) is used to measure munic-

²¹As the period under study period is characterized by political instability and sporadic conflict events, it is reasonable to think that this context may have negatively affected the capacity of local government to raise taxes.

²²Since the original revenue data are at the municipal level, the paper continues to use the term “municipal revenue”.

Table 4: Summary statistics

Variable	All Sample			Northern		Southern	
	Obs.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Population	385	98190	116880	126560	180587	85188	67276
Poverty headcount	385	0.38	0.16	0.42	0.18	0.36	0.14
Density (people per km2 land area)	385	56.36	41.09	27.21	13.29	69.72	42.59
Urban (share of urban population)	352	0.45	0.23	0.46	0.16	0.44	0.26
Household annual consumption	385	930755.9	545811	841559.2	521151.1	971637.7	552910
Illiteracy rate	385	0.6	0.14	0.73	0.12	0.54	0.1
Education (primary school degree-CEPE)	385	0.3	0.08	0.28	0.08	0.31	0.08
Share with no access to electricity	380	0.44	0.21	0.51	0.2	0.41	0.2
Informal (share of informal sector)	380	0.61	0.1	0.62	0.09	0.61	0.1
Share of households with no access to water	365	0.57	0.2	0.59	0.18	0.56	0.21
Population health index	380	0.16	0.09	0.16	0.09	0.16	0.1
Conflict events (number of conflict events)	385	5.99	9.36	4.74	5.14	6.57	10.71
Conflict events (weighted with fatality index)	378	899.49	4264.63	63.6	312.93	1260.44	5059.12
Share with access to credit	365	0.45	0.4	0.5	0.41	0.42	0.39
Local Non-Tax Revenue (LNTR) per capita	385	666.33	767.19	109.45	344.99	921.57	772.65
Local Tax-Revenue (LTR) per capita	385	662.26	1068.76	100.91	287.06	919.54	1191.11
Total Local Own Revenue per capita	385	2213.49	3636.71	811.01	1199.53	4163.44	31933.32
Central transfers per capita	385	1551.24	3491.70	710.10	1067.34	1936.76	4099.59
Miscellaneous revenue per capita	385	378.85	1564.62	135.95	390.41	490.18	1861.51
Total Expenditure	385	3062994	19000000	79808.01	89162.37	4430288	22900000

ipal revenue mobilization. Figures 6 and 7 show the relationship between central transfers, municipal tax revenue and non-tax revenue respectively during the conflict (2001-2008). Figure 6 suggests that an increase in transfers seems to positively affect the revenue collected by municipalities (MNTR) (correlation = 0.28). However, Figure 7 shows that the trend of this relationship is different for MTR (correlation = 0.130). Figures 8 and 9 compare the same positive correlation in the post conflict period (2009-2014). However, the magnitude of the correlation is lower than that for the conflict period. Nevertheless, these graphs suggest a positive relationship between the transfers received by municipalities and their performance in raising their own revenue, although this correlation appears to be higher for MNTR. This difference between MNTR and MTR in terms of correlation also reveals the importance of disaggregating local own revenue when assessing the relationship between transfers and municipal revenue performance, which will be examined in detail in the following section. There is also a need to distinguish the conflict period from the post-conflict period in the empirical analysis.

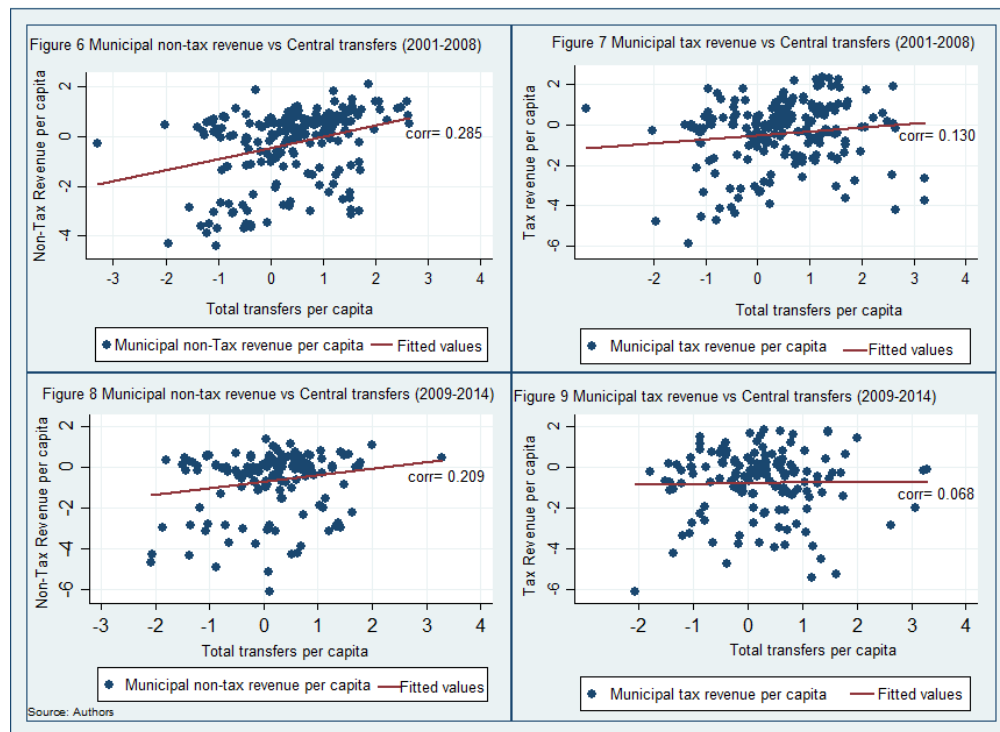


Figure 6: Correlation between municipal revenue vs central transfers

4.3. Choice of estimator and econometric specification

We start by adopting [Mogues and Benin \(2012\)](#) specification in which local revenue is measured by per capita local own revenue and depends on the level of central transfers. However, contrary to their approach, we assume that local governments' unobserved heterogeneity is not constant over the period under study. The Grouped Fixed Effects (GFE) model allows for time-varying unobservable characteristics ([Bonhomme and Manresa, 2015](#)). There are several other reasons for using the GFE estimator rather than the FE estimator to control for local government's unobserved specific characteristics in this study. First, the conflict that the country experienced was characterized by several rounds of events with different intensity and location across the *département* as shown by [Dabalén et al. \(2012\)](#). Combined with the capacity of each *département* to recover from an economic downturn, conflict tends to cluster

département in time and space in terms of revenue performance²³. The conflict shocks affect each *département* differently. As argued by [Bartolucci et al. \(2015\)](#), the omitted individual shocks may induce time-varying unobservable individual characteristics. They also highlight the importance of accounting for these time varying effects by using GFE methods. Second, the GFE method is well-suited to deal with the characteristics of data with short time periods (2001-2011), and which have a small within variance for transfers. Also according to [Bonhomme and Manresa \(2015\)](#), the GFE produces consistent estimates as long as the number of groups is correctly identified. Thus, the specification incorporates time-invariant fixed effects and time-variant grouped effects using the following equation:

$$\ln(MGOR)_{it} = \lambda + \theta_1 \ln(MGOR)_{it-1} + \theta_2 \ln(transfer)_{it} + \theta_3 X_{it} + \alpha_{g_{it}} + \eta_i + \varepsilon_{it} \quad (1)$$

The dependent variable $\ln(MGOR)_{it}$ is the logarithm of per capita Municipal own revenue (MNTR or MTR) generated by municipality in *département* i at time t . The variable of interest $\ln(transfer)_{it}$ is the logarithm of transfers per capita to municipalities in *département* i at time t (unconditional and conditional allocation). The lagged tax revenue may affect the current decisions taken by municipalities, it is thus included as a regressor in equation (1).

The control variables X_{it} are taken from literature and include economic, demographic, and social characteristics (ref. Table 4). The conflict is controlled for with 2 indices: The first

²³See the country maps in appendix for the distribution of the conflict around the country.

is the number of conflict events in a *département* and the second is this number weighted by the fatality index of each event. The fatality index reports the number of deaths due to each event; the scale is from 1 to 10 with higher numbers representing a higher incidence of violence.

An important contribution of this paper is the inclusion of the group-specific unobservable effects α_{g_it} where g_it spanning from 1 to G , is a group membership which maps individual units into groups that are estimated endogenously with the estimation of parameters. Both the group-specific time patterns and individual group membership are left unrestricted and estimated from the data. ε_{it} represents an idiosyncratic disturbance. The *département* fixed effects η_i are also included in equation 1.

Endogeneity is an important issue when analyzing the effect of central transfers on the revenue performance of municipalities. First, simultaneity bias arises if municipal own revenue affects transfers from central government. For instance, central government may reward municipalities which are more efficient in providing public services from their own revenue (Knight, 2002). A second potential source of endogeneity bias is that some features of municipalities, such as effectiveness of tax collecting, are unobservable. The omitted variables may induce bias by being correlated with an explanatory variable such as transfers. It is therefore impossible to consider the transfers as an exogenous variable.

We follow Knight (2002) in using the political affiliation of local government as an instrumental variable for central transfers. Thus, a dummy variable takes 1 if the *département* has the same political affiliation as central government, and 0 otherwise. Being a member of the majority party is a key determinant for a local government to receive a greater share of

transfers²⁴.

Moreover, the dataset allows calculation of the rate of budget implementation for each municipality. This rate is aggregated at the *département* level and calculated from municipal budget expenditures as the difference between budgeted and actual expenditure at the end of each fiscal year through the following formula:

$$Rate_t = \frac{Expenditures\ executed_t}{Forecasts\ of\ expenditure_t}$$

The rate of implementation of the budget is a good instrumental variable for transfers since the municipality that spends more than the amount budgeted receive larger transfers the following year. Thus, the rate of implementation is likely to be correlated with transfers allocated. The rate of implementation is also unlikely to be directly correlated with revenue collected by municipality, because the central government applies a formula for setting the overall amount of transfers for each municipality. Following [Bonhomme and Manresa \(2015\)](#), equation (1) is estimated in first-difference as presented in equation (2):

$$\Delta \ln(MGOR)_{it} = \lambda + \theta_1 \Delta \ln(MGOR)_{it-1} + \theta_2 \Delta \ln(transfer)_{it} + \theta_3 \Delta X_{it} + \Delta \alpha_{g,it} + \eta_i + \varepsilon_{it} \quad (2)$$

²⁴The central government allocates more finance to members of their own party across the country in order to increase the likelihood of re-election of their fellow party members, and therefore to increase the probability retaining majority control ([Knight, 2002](#)).

5. Main results

5.1. Estimation results

This section presents the empirical results from estimating several specifications of equation (2) above, for 115 municipalities over 14 years covering conflict and post-conflict periods²⁵. The results of the regression for total municipal revenue are presented in table 5, which shows estimations with ordinary least square (OLS), fixed effects (FE), GFE, GFE correcting for endogeneity. The GFE estimator has a better explanatory power (57 percent, Column 3) than OLS and FE (Column 1 and 2 respectively). Moreover, the parameter estimates for GFE are consistent with the signs predicted by theory, and are significant at the 5 percent level. A 10 percent increase in total central transfers to local government induces approximately a 4.2 percent increase in municipal own revenue (Column 3). The subsequent columns show the results of the two-stage least squares (GFE 2SLS) procedure. We check the validity and the relevance of the instrumental variables used for estimation. The Hansen p-values reported for all specifications are relatively high, and exceed the 5 percent level of significance. The joint null hypothesis (exogeneity) cannot be rejected at any reasonable significance level. This suggests that the instruments are valid. The relevance of the instruments is tested by looking at the p-values for their coefficients in the first-stage estimates. The results do not reject that the instruments are relevant. The Anderson-Canon p-values confirm that the instruments are correlated with the endogenous regressors (transfers). We reject the null hypothesis that the equations are under-identified. The Cragg-Donald Wald F statistic for weak identification test exceeds the Stock-Yogo critical values at any size. This suggests

²⁵The regressions are made at the *département* level since the 2008 HLSS data are not available at the municipal level as explained in section 4. Thus the 115 municipalities are aggregated into 35 *département*.

that these instruments are not weakly correlated with the endogenous regressors²⁶. The baseline specification is shown in column 4. Central transfers have a positive and statistically significant effect on revenue collected by municipalities and the standard deviation of lag municipal own revenue decreases. The unweighted conflict index has a no impact on municipal revenue mobilization (columns 5 and 7, Table 5). This result highlights the importance of weighting the conflict event with the intensity of each event as shown in column 7 and 8. The sign and significance of the interaction terms between conflict and total transfers (columns 7 and 8) suggest that municipal revenue mobilization was negatively affected by the joint effect of conflict and central transfers.

Table 5: The effect of central transfers on total municipal revenue OLS, FE, GFE and GFE 2SLS estimations

Dependent Variable: Total revenue	OLS	FE	GFE	GFE_2SLS	GFE_2SLS	GFE_2SLS	GFE_2SLS	GFE_2SLS
	1	2	3	4	5	6	7	8
Central transfers	0.481*** (0.0814)	0.644*** (0.0740)	0.427*** (0.131)	0.645*** (0.118)	0.650*** (0.118)	0.491*** (0.112)	0.753*** (0.174)	0.843*** (0.289)
Lag_municipal_own_revenue			0.454*** (0.126)	0.404*** (0.0666)	0.403*** (0.0682)	0.221*** (0.0800)	0.390*** (0.0674)	0.221** (0.0864)
Education	3.362*** (0.672)	-0.190 (0.943)	2.095** (0.775)	1.698** (0.723)	1.678** (0.737)	0.886 (0.734)	1.931*** (0.736)	1.721** (0.776)
Poverty_headcount_rate	-1.894*** (0.596)	-0.274 (0.713)	-0.135 (0.686)	-0.589 (0.654)	-0.589 (0.661)	-0.367 (0.626)	-0.457 (0.656)	-0.384 (0.666)
Informal sector part	-0.589 (1.024)	-0.163 (1.155)	-1.650 (1.051)	-2.801** (1.143)	-2.850** (1.161)	-2.945*** (1.082)	-3.981*** (1.441)	-4.254** (1.710)
Other revenue	0.0753** (0.0308)	0.0483* (0.0256)	0.0586 (0.0433)	0.0231 (0.0228)	0.0223 (0.0231)	0.0208 (0.0207)	0.0254 (0.0230)	0.0285 (0.0221)
Density	0.00740*** (0.00193)	-0.00989 (0.0104)	0.00477** (0.00183)	0.00555*** (0.00148)	0.00564*** (0.00151)	0.00535*** (0.00148)	0.00435*** (0.00146)	0.00342** (0.00151)
Conflict events					-0.0127 (0.0969)		-0.254 (0.116)	
Conflict_event_weighted						-0.0949** (0.0427)		-0.894* (0.674)
Conflict_transfers							-0.279* (0.146)	
Conflict_weighted_transfers								-0.165* (0.0911)
Constant	-0.454 (1.121)	2.802 (1.740)	0.763 (1.338)	1.521 (1.283)	1.574 (1.303)	2.072 (1.263)	2.452* (1.489)	2.744 (1.674)
No. of Observations	251	251	216	163	163	144	163	144
R-squared	0.307		0.566	0.496	0.494	0.530	0.485	0.448
Sargan-Hansen (P-value)				0.15	0.16	0.16	0.16	0.14
Cragg-Donald Wald F statistic				74.17	88.18	68.37	88.591	87.31
Anderson canon (P-value)				0.00	0.00	0.00	0.00	0.00
Group FE	No	No	No	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Département FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes

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

Table 6 compares the effect of central transfers during and after the conflict with the same

²⁶The results are available on request to the authors.

specifications. The results are consistent with the findings in the Table 5. The transfers from central government to municipalities have a statistically significant effect on municipal revenue mobilization. However, the magnitude of the coefficient is higher after the conflict. A 10 percent increase in total transfers to municipalities is associated with approximately a 3.3 percent increase in municipal revenue mobilized during the conflict, and this increases to 5.9 percent after the conflict (columns 4 and 8 of Table 6).

Table 6: The effect of central transfers on total municipal revenue GFE 2SLS estimation during and post conflict

Dependent Variable: total revenue	During Conflict (2001-2008)				Post-Conflict (2009-2014)			
	OLS	FE	GFE	GFE_2LS	OLS	FE	GFE	GFE_2ls
	1	2	3	4	5	6	7	8
Central transfers	0.477*** (0.0907)	0.606*** (0.0774)	0.253*** (0.0781)	0.334*** (0.0655)	0.364** (0.142)	0.971*** (0.173)	0.175** (0.0750)	0.594*** (0.148)
Lag_municipal own revenue			0.183** (0.0731)	0.0411 (0.0657)			0.288*** (0.0667)	0.341*** (0.0911)
Education	2.764*** (0.769)	-1.290 (1.125)	0.759 (0.475)	0.889* (0.519)	3.816*** (0.928)	-4.045 (18.15)	-1.219 (0.795)	-1.509* (0.838)
Poverty headcount rate	-2.387*** (0.689)	-0.623 (0.915)	-0.237 (0.565)	-0.624 (0.453)	-0.936 (0.754)	-18.33 (29.83)	-1.203** (0.533)	-1.197** (0.581)
Informal sector part	-1.035 (1.138)	-0.513 (1.414)	-1.387** (0.564)	-1.569*** (0.582)	-0.390 (2.009)	-20.34 (15.94)	-3.952*** (0.978)	-5.134*** (1.279)
Other revenue	0.0581* (0.0332)	0.0360 (0.0267)	0.211*** (0.0444)	0.159*** (0.0467)	0.241*** (0.0607)	0.0847 (0.0584)	0.134*** (0.0408)	0.105** (0.0426)
Density	0.00835*** (0.00246)	-0.00493 (0.0168)	0.00319*** (0.00101)	0.00394*** (0.00111)	0.00545*** (0.00201)	0.0291 (0.0407)	0.00130** (0.000491)	0.00268** (0.00108)
Constant	0.380	3.346	0.740	-1.634**	-0.880	24.19*	5.139***	6.056***
No. of Observations	180	180	155	113	150	150	125	91
R-squared	0.322		0.878	0.857	0.323		0.897	0.822
Sargan-Hansen (P-value)				0.16				0.14
Cragg-Donald Wald F statistic				57.32				85.71
Anderson canon (P-value)				0.00				0.00
Group FE	No	No	No	Yes	No	No	No	Yes
Year FE	No	No	Yes	Yes	No	No	Yes	Yes
Départements FE	No	No	Yes	Yes	No	No	Yes	Yes

Robust standard errors clustered at the département level in parentheses
* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

The first part of Table 7 (columns 1 to 6) shows the results of equation (2) during and after the conflict, using as dependent variable the municipal non-tax revenue per capita. The second part (columns 7 to 12) replicates equation (2), but using the municipal tax revenue as the dependent variable. Column 3, which corrects for endogeneity, provides evidence that

per capita central transfers to municipalities are likely to increase their non-tax revenue. A 10 percent increase in total to municipalities is associated with an approximately 3.6 percent increase in non-tax revenue. Transfers do not have a disincentive effect on revenue mobilized by municipalities, rather, they boost the local tax base as demonstrated in the literature ([Boadway and Anwar, 2007](#), [Hindriks et al., 2008](#)). However, the effect increases during the post conflict period, when a 10 percent increase in transfers leads to an approximately 7 percent increase in non-tax revenue. Interestingly, although tax revenue is not directly mobilized by municipalities, transfers from central government have a positive and statistically significant effect on municipal tax revenue mobilization (columns 7 to 12). It is worth noting that the coefficients of the effect on municipal tax revenue are higher than those on municipal non-tax revenue during the conflict. A plausible explanation for this difference might be that the tax base for municipal revenue is less sensitive to conflict. In addition, central administration was less affected by the conflict than the municipal administrations which faced problems of staff displacement. This supports the idea that some parts of local taxes can be well managed by the central government, as [Bird \(2000\)](#) argues²⁷. These results are consistent with those of [Caldeira and Rota-Graziosi \(2014\)](#) who report a positive impact of transfers on Benin's communes' own-source revenue, but contradict those of [Mogues and Benin \(2012\)](#), who find that bigger previous transfers to Ghana's district governments discourage local revenue generation.

A possible explanation for the divergent results is that the effect depends on the specific country context, such as the scope of local government revenue responsibility, the discretion in setting tax rates, and other potential constraints which affect the ability of local governments

²⁷For example, residential property in urban areas and property tax on big companies.

to increase their own revenue. It seems that the effect of transfers on municipal revenue mobilization depends on the characteristics of the process of fiscal decentralization that the country adopts. The difference might also be explained by the method applied in this paper, which allows for controlling for time-varying specific unobserved municipal characteristics. Another potential explanation comes from the allocation formulas in Ghana which do not contain sufficient criteria to encourage improvements in municipal revenue mobilization, as shown by [Mogues and Benin \(2012\)](#). A distributional formula including a predetermined percentage of revenue allocated to local governments, as presented in Section 2.3, seems to encourage internal revenue generation in Côte d'Ivoire. Our results are consistent with the theoretical prediction from the fiscal federalism theory supported by [Bahl \(2000\)](#), who argues that transfers to local government might increase their fiscal capacity. The other explanatory variables have the expected sign on tax and non-tax revenue mobilization. For example, the lagged own revenue, which controls for intertemporal dependence has a positive and statistically effect at 10 percent (Table 7). The share of households where an occupant has a primary school qualification has a positive effect on municipal revenue mobilization. When controlling for endogeneity, the poverty headcount ratio has a negative effect on municipal revenue mobilization for the 2 types of municipal own revenue both during and after the conflict (column 3; Table 7). This unexpected result can be explained by the fact that during the conflict poverty increased and the wealthier people probably moved to more secure areas and thus avoided municipal taxation. The share of the informal sector has a negative and significant effect on municipal revenue mobilization, especially for non-tax revenue. This is intuitive as municipal collects MNTR from small businesses.

5.2. GFE patterns and robustness

This section presents the robustness of the GFE estimator to the Ivorian context by highlighting the presence of heterogeneities that vary over time. The optimal number of groups, which is 4, is calculated using a Bayesian Information Criterion (Appendix A2). Figure 10 displays the unobserved trends. Across the 4 groups, time-varying patterns are present, highlighting unstable paths of revenue performance over time. For example, panel (a) shows a big variability in the pattern of groups although this variability tends to decrease in the post conflict period²⁸; it also shows that the group-specific time effects $\alpha_{g,t}$ varies over time. For panels (b) and (c), the paths of transfer and local own revenue differ from one group to another, though groups 2 and 4 follow similar paths. Thus, robust evidence of *départements* heterogeneity has been found, which implies that *départements* must be grouped according to their revenue mobilization performance and the amount of transfers received. These heterogeneities could not be accounted for by only considering the standard fixed effects²⁹. The figures show also that the heterogeneity between the groups tends to reduce up to 2014, which reflects the fact that the country was recovering from the conflict.

The assignment of the *départements* to the 4 groups is made according to their local revenue autonomy. Local own revenue is divided into 3 percentiles (high, middle, and low). The results show that group 4 contains 85 percent of the *départements* with high revenue (“High-revenue localities”), while group 1 is 100 percent composed of *départements* with low revenue autonomy (“Low-revenue localities”). Group 3, which includes 64 percent of the *départements*

²⁸As the *départements* are affected differently by conflict and characterized by disparities in revenue potential, the trend of their revenue performance may follow different paths according to their specific unobserved characteristics.

²⁹For example, Knight (2002) demonstrates that some aspects of US states’ preferences are unobservable, and that a fixed effect may not correct this endogeneity problem if these unobservable characteristics within a state vary over time.

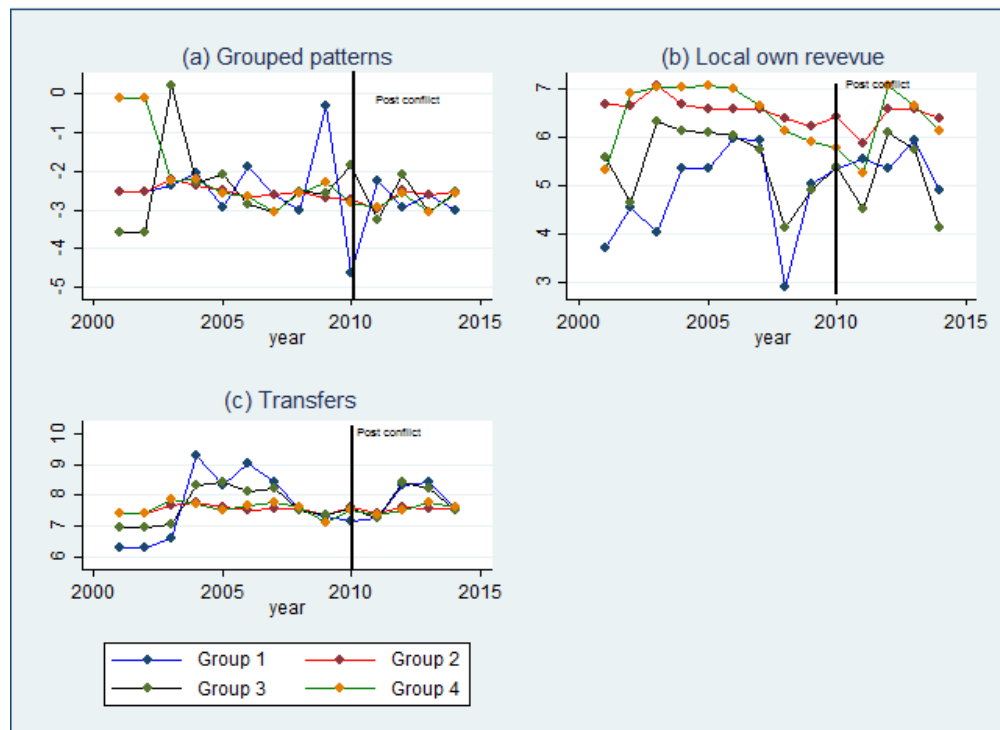


Figure 7: Group-specific time effects

with relatively high autonomy, is then classified as Upper/middle-revenue localities. Group 2 is classified as Lower/middle-revenue localities (Figure 8). Although group membership does not assume a particular spatial distribution, the maps show its geographical basis (Figure 8). The *départements* of “Low-revenue” and “Lower/middle-revenue” are located in the Northern region while the other *départements* (“High-revenue” and “Upper/middle-revenue”) are located in the South of the country. This reflects the distribution of revenue potential across *départements*, the southern areas have high revenue potential with cocoa, coffee, rubber three as principal sources of revenue while the northern areas are relatively poor with cotton.

6. Conclusion

This paper analyses the effect of the transfer from central government to municipalities on revenue mobilization by municipalities in Côte d’Ivoire during the period 2001-2014. The study relies on the existing literature to highlight the relevant channels through which central

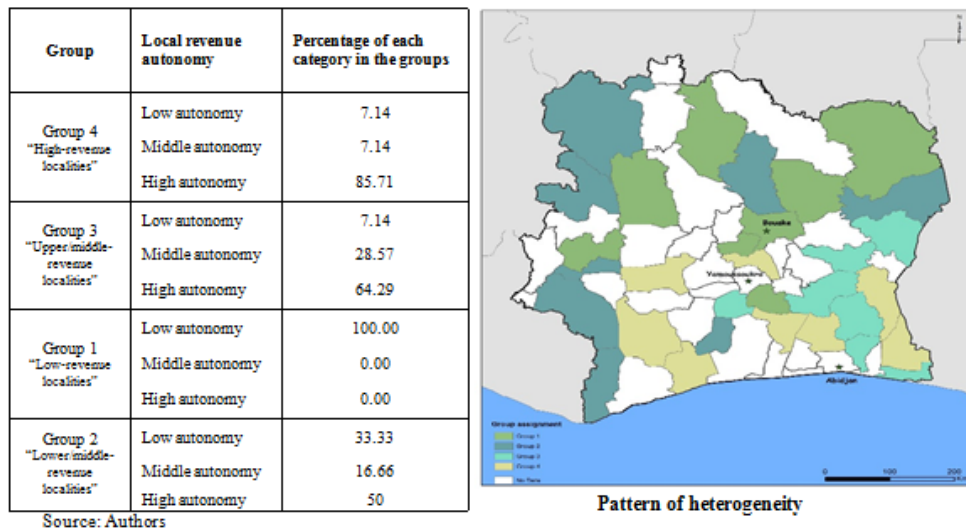


Figure 8: *Départements*, group membership and revenue autonomy

transfers may affect revenue mobilization of municipal governments. Based on a carefully-constructed new dataset, the analysis uses an appropriate econometric estimator (Grouped Fixed Effects, GFE). The GFE method assumes that unobserved heterogeneity can be constant and/or varying over time among *départements*. An instrumental variable regression in a two-stage least squares procedure is combined to the GFE to control for endogeneity of transfers. The first hypothesis is that the effect of transfers is different for the collection of municipal tax revenue and the collection of municipal non-tax revenue. Conflict might affect the municipal tax base and municipal non-tax base differently, as the former appears to be more regular than the latter. The second hypothesis investigates whether the effect of transfers on municipal revenue mobilization varies between the conflict period and the post-conflict period. The first finding is that central transfers increase municipal revenue mobilization. These results contradict those of [Mogues and Benin \(2012\)](#), who find that greater past external transfers to Ghana's districts discourage internal revenue-raising. A possible explanation for the difference is that the effect might differ depending on the specific country's fiscal decentralization policy process – such as the scope of the delegation of revenue

raising to municipal governments, local government's discretion in setting rates on their tax and fee bases, and other potential constraints affecting the ability of local governments to increase their own revenue. In addition, the method used in this paper which allows controlling for time-varying heterogeneities could explain the difference. The second finding is that the magnitude of the effect of central transfers differs between the two components of municipal own revenue. This can be explained by the fact that the tax base for municipal revenue is less sensitive to conflict. Also, the central administration was less affected by the conflict than the municipal administrations, which were affected by staff displacement. The effect of transfers is higher for municipal tax revenue than municipal non-tax revenue, especially during the conflict. The third finding is that the impact of transfers is different between the conflict period and the post-conflict period. This study finds that the conflict experienced by the country negatively affected the capacity of local government to raise revenue. The magnitude of the coefficient is higher after the conflict. During the conflict, a 10 percent increase in total transfers to municipalities is associated with approximately a 3.3 percent increase in municipal revenue mobilized, but this increases to 5.9 percent after the conflict. The heterogeneity between local governments tends to decrease up to 2014 reflecting the fact that the country was recovering from conflict effects. However, it appears that a considerable difference remains between the northern and southern municipalities, this difference needs to be tackled with a strong and well-designed fiscal policy.

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Appendix A.

Appendix A.1. Revenue structure and statistics

Table A.8: Municipal tax revenue collected by GTD and distributed across governments, post-conflict Côte d'Ivoire, 2012

Government level*	Business licenses				Synthetic tax	Game tax	Vignette	Stamp duties	Property Tax	Sub-Total2	Total
	Purchasers	Traders	Public Transport	Sub-Total1 Patent							
Central Government	75.99 (32.66)	8912.47 (25.12)	769.92 (26.08)	9758.39 (25.24)	2715.50 (52.49)	0 (0.00)	1756.24 (16.49)	4290.5 (97.7)	11727.89 (26.01)	20490.15 (31.3)	30248.54 (29.05)
District	0.8 (0.34)	10182.92 (28.70)	546.45 (18.51)	10730.18 (27.75)	441.53 (8.53)	161.28 (100.00)	3394.18 (31.89)	0 (0.00)	10269.54 (22.78)	14266.55 (21.80)	24996.73 (24.01)
Département	67.37 (28.95)	2194.01 (6.18)	474.48 (16.07)	2735.88 (7.07)	101.68 (1.96)	0 (0.00)	976.57 (9.17)	0 (0.00)	1536.05 (3.41)	2614.3 (3.99)	5350.18 (5.14)
Municipality	88.46 (0.00)	14181.63 (0.00)	1160.63 (0.00)	15430.73 (0.00)	1914.19 (0.00)	0 (0.00)	2138.67 (20.09)	0 (0.00)	17387.6 (38.57)	21440.47 (32.76)	36871.21 (35.42)
Other	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2378.31 (22.34)	100.74 (2.29)	4164.51 (9.24)	6643.57 (10.15)	6643.57 (6.38)
TOTAL	232.64	35471.04	2951.50	38655.19	5172.92	161.28	10643.99	4391.24	45085.59	65455.04	104110.24

*Percentage of different revenue allocated to each level of government

Source: Calculation by authors with Côte d'Ivoire data from Directorate General of Taxation

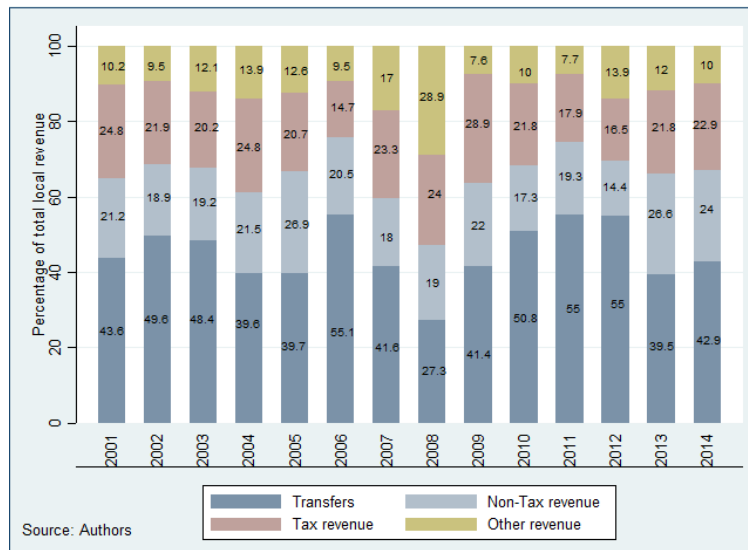


Figure A.9: Municipal revenue as a percentage of total municipal revenue in Côte d'Ivoire

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

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

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

$$\hat{\sigma}^2 = \frac{1}{NT - G_{max}T - N - K} \sum_{i=1}^N \sum_{t=1}^T (y_{it} - \hat{x}_{it}\hat{\theta} - \hat{\alpha}_{git})^2$$

With G the number of groups, \hat{G} the optimal number of groups that minimize the BIC, an upper limit of \hat{G}_{max} , $\hat{\sigma}^2$ is a low bias estimate of the variance of the idiosyncratic disturbance, K the number of parameters of estimation.

The misspecification of the number of groups depends on whether the number of groups is above or below the true number. To avoid this bias, we consistently estimate equation (2) for several numbers of groups to identify the optimal number of groups that minimize the bias from the estimation. Table B reports the BIC, the GFE coefficient estimates for transfers and selected covariates and the standard errors. The parameter σ^2 and the BIC are computed using a maximum number of groups $G_{max}=5$. In order to compare with the Fixed Effect (FE) method, the results of the FE regression under the same specification are reported in the last row. The results suggest that a substantial amount of cross-country heterogeneity is time-varying. This finding is consistent with those reported in [Bonhomme and Manresa \(2015\)](#). In fact, the objective function of FE is higher than that of GFE for $G=4$, suggesting that a substantial amount of *département* heterogeneity might be time-varying. Moreover, the standard errors of GFE are lower than those of FE, confirming the consistency of the GFE approach for our data. Interestingly, Table B shows that the value of the BIC decreases steadily as G increases, and reaches a minimum once $G=4$. BIC increases for $G=5$. This result suggests that the optimal number of groups according to BIC is $G=4$. Thus, the estimations which follow in this analysis use $G=4$. It is worth noting that the homogenous characteristics within a group remain an important issue that could be further explored through surveys of local governments.

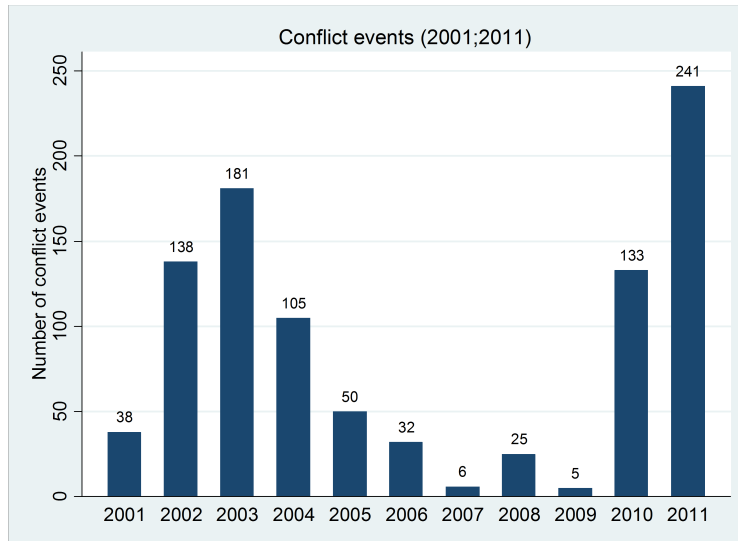


Figure A.10: Number of conflict events in Côte d'Ivoire

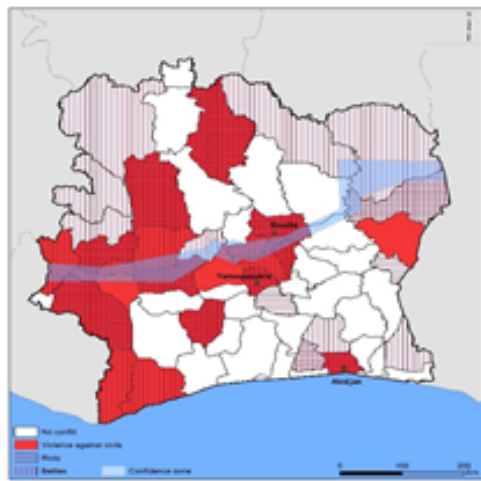


Figure B1 : Conflict distribution

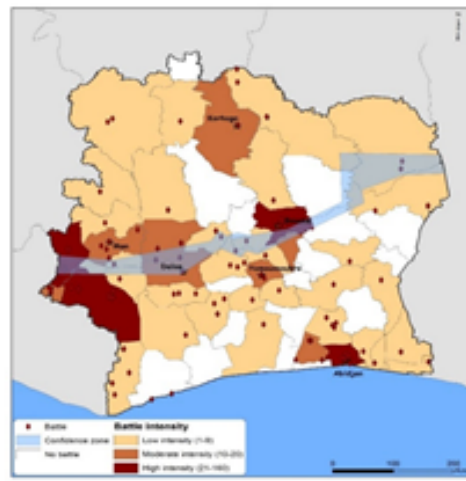


Figure B2 : Battle distribution

Source: Authors

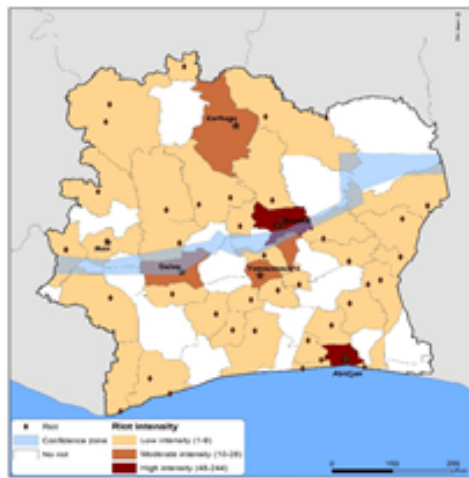


Figure B3 : Riot distribution

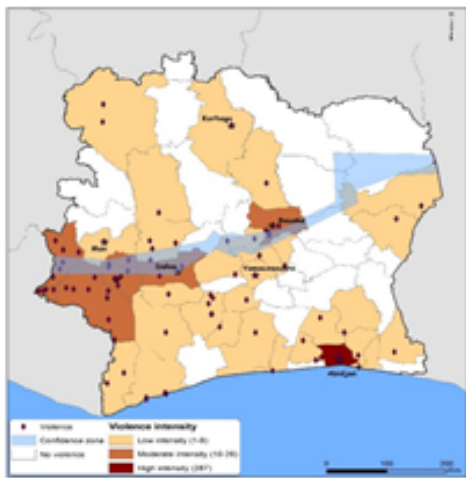


Figure B4 : Violence distribution

Source: Authors

Figure A.11: Conflict distribution in Côte d'Ivoire

Table A.9: Bayesian Information Criterion and the optimal number of groups

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

Source: Authors

Table A.10: Group assignment and départements' revenue autonomy

SOUTH			NORTH		
Département	Group membership	Revenue autonomy (Quantile)	Département	Group membership	Revenue autonomy (Quantile)
ALEPE	1	Middle	BONDOUKOU	1	High
BONGOUANOU	1	High	BOUNA	1	High
MAN	1	High	DABAKALA	1	High
SAKASSOU	1	High	BOUNA	1	High
TIEBISSOU	1	High	DABAKALA	1	High
TOULEPLEU	1	High	KATIOLA	1	High
ABENGOUROU	2	High	SAKASSOU	1	High
ABOISSO	2	High	SEGUELA	1	Low
ADIAKE	2	Middle	TOUBA	2	Low
ADZOPE	2	High	BOUAKE	2	High
AGBOVILLE	2	High	KOHORGO	3	Low
AGNIBILEKRO	2	High	ODIENNE	3	Low
DALOA	2	High	TANDA	4	Low
MBAYAKRO	2	High			
SANPEDRO	2	Middle			
SASSANDRA	2	Middle			
TIASSALE	2	High			
DAOUKRO	2	Middle			
TOUMODI	3	Low			
BANGOLO	4	High			
GUIGLO	4	High			
LAKOTA	4	Low			
OUME	4	High			
SOUBRE	4	Middle			

Source : Authors