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# Exploring Tilly's Theory: Violent Conflicts and Tax Revenue in Sub-Saharan Africa

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## **Abstract**

This article explores the relationship between violent conflicts and tax revenue in Sub-Saharan countries. In a first stage, I estimate the effects of conflicts for 42 countries using panel data analysis. I find that an outbreak of violent conflict leads to an average 1.5 percent loss of tax revenue per capita. The results show that due to the outbreak of violence, government cannot successfully raise revenue, and because the conflict also negatively affects key macroeconomic variables, the tax base shrinks and the overall loss is higher. The results also point to an important role of some specificities of Sub-Saharan countries such as ethnic division and natural resource endowment. Drawing on these results, I conduct a case study for Central African Republic, Cote d'Ivoire, Congo Republic, Guinea and Guinea Bissau in a second stage using synthetic control method. The results show that the 2002 conflict in Cote d'Ivoire and the 1998 conflict in Guinea-Bissau led to a significant drop in tax revenue. The outbreak of conflict did not have significant effects on tax revenue for the remaining three countries.

## **Keywords**

Tax, Internal conflict, Government revenue, Sub-Saharan Africa

## **JEL Codes**

H2, H56, H11, F5

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## 1. Introduction

A widely accepted belief is that wars make states stronger through its effects on public expenditure and taxation. Indeed, wars triggered many tax-policy reforms around the world, many of which persisted and remained even after the war. For instance, the share of countries using withholding taxes doubled during World War II, the American civil war saw the United States adopt an income tax (see Besley and Persson, 2014; Hill, 1894; Tilly, 1985). Two important features drives tax policy in time of war: the sheer necessity to finance war and the shared sacrifice or as called by Feldman and Slemrod (2009) “we’re in this together” mentality. Studies extending the war-making/state-making framework to developing countries have resulted in mixed conclusions about whether the process is occurring in similar fashion to that in Europe (Taylor and Botea, 2008). Moreover, empirical evidence on this matter for Sub-Saharan Africa is scarce, even though the region has recorded the most conflicts since World War II.

This article investigates the impact of conflicts on tax revenue in Sub-Saharan countries. I use data on violent conflicts and non-resource tax revenue for 42 countries for the period 1980 to 2015. Using Ordinary Least Squares (OLS) and entropy balancing, I find a negative and significant effect of violent conflicts on tax revenue. I establish that an outbreak of violent conflicts leads to an average 1.7 percent loss of tax revenue per capita. I furthermore rely on Synthetic Control Method (SCM) and the Pesaran (2006) Correlated Common Effect (CCE) estimator to measure the effects of actual conflicts on five countries (Central African Republic, Cote d’Ivoire, Republic of Congo, Guinea and Guinea-Bissau).<sup>1</sup> Our results suggest that conflicts resulted in loss of tax revenue in Cote d’Ivoire and Guinea-Bissau. I also find negative but not robust effects of violent conflicts in Central African Republic and Congo Republic. The results reveal that Sub-Saharan African countries are having what Centeno (1997, p.1591) called the “wrong kind of war”. Due to the outbreak of violence, government cannot successfully raise revenue and because the conflict negatively affects key macroeconomic variables such as the Gross Domestic Product, the tax base shrink, resulting in a higher overall loss of revenue. This loss of tax revenue can be particularly acute in countries where the tax administration was already poorly performing before the violence erupted. Some specificities of these countries such as ethnic division and natural resource endowment also matter in studying how conflict affects tax revenue.

The analysis presented here has three essential contributions. First, it tackles a subject with mixed results and concludes that the war-making/state-making connection does not work in Sub-Saharan Africa, where most conflicts have their root causes in inequalities, ethnic division along with political instabilities. I estimate the average

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<sup>1</sup> The five countries were selected according to our methodology to have robust synthetic control (see section 4.2).

effects of conflicts on tax revenue and focus on the effects of actual wars on specific states.<sup>2</sup> Second it identifies another determinant of tax revenue in developing countries. This is particularly important given the crucial role of domestic revenue mobilization for developing countries to finance their development and reduce poverty.

My research is related to three strands of previous work. First, the is related to the literature on war-making/state-making connection, most associated with Charles Tilly. This literature provides insights on the relationship between conflicts and the states capacity to raise revenue (see for instance Hintze, 1906, Peacock and Wiseman, 1961, Tilly, 1985). This article is also related to the literature on the cost of wars and conflicts. The cost of wars has been studied extensively but mostly on economic growth (see for instance Abadie and Gardeazabal, 2003; Brück and De Groot, 2013, Collier, 1999, Costalli et al. 2017). Third, the analysis can be linked to the literature on the determinants of the tax revenue in developing countries, in particular research explaining differences in the level of tax revenue (see Burgess and Stern, 1993 and more recently Besley and Persson, 2013; 2014).

The remainder of the paper is organized as follows. Section 2 briefly discusses the literature on taxation and conflicts. Section 3 introduces conflicts in Sub-Saharan Africa and chronicles the origin of the conflict in the five studied countries. Section 4 discusses the empirical strategy and the data. Section 5 presents the results and I conclude in Section 6.

## **2. Taxation and conflicts: a review**

This section briefly presents some results from the literature on the links between conflicts and taxation and provides some insights on why the relationship may differ by region. For a more discussion on the related literature and the mechanisms by which conflict affects state formation see (Rodriguez-Franco, 2016 and Taylor and Botea, 2008).

The literature generally associates wars and conflicts with state formation, in particular its ability to extract/raise revenue. Most studies analysing how war triggered tax reform or shaped the way tax revenue were levied focus on the two world wars and or on the European experiences. Hintze (1906) as well as Tilly (1985, 1990), highlighted the importance of war in building a state's fiscal capacity. Tilly (1985), in particular, explains the increase in countries debt and taxes from seventeenth century onward as a function of increasing cost of war making. Besley and Persson (2014), showed that the share of countries using withholding taxes doubled during WWII.

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<sup>2</sup> Taylor and Botea (2008) declares that one striking feature of the debate on war-making/state-making connection is that relatively little attention is focused on the effects of actual wars on specific states.

Peacock and Wiseman (1961 and 1979) underlined the role of conflict's crisis, especially those of the two WW in explaining the levy behaviour of authorities. They argued that the increase in taxation caused by wars has a "ratchet effect", so that the post-war levels of taxation do not return to their pre-war levels. Leroy (2007) explains that during peace public interventions are restricted by the reluctance to pay tax, while war increases the tolerance to taxation. This characteristic was noticed in the structure of France public finance throughout world war I, especially in the implementation and collection of new taxes (see Cardoni, 2014). Hill (1894) chronicles the introduction, shaping and evolution of income tax in the United States during the American civil war and said that the country seemed fully prepared to accept this form of taxation as part of the burden made necessary by the war. Of Course, income tax was not the most important element in raising the revenue needed to finance the war effort. But the context of civil war allowed it and other form of direct taxation (interests on bonds for example).

The positive association between war and taxation can be explained through three main mechanisms. The first is the war-making/state making thesis. War is meant to dominate a territory, but since it requires resources, it implies an increase in extraction (mainly taxation). Moreover, the building up of war-making capacity increases the capacity to extract and ultimately leads to an organization with tax-collection agencies, protection services, etc. Second, in an already organized tax system, war periods can be associated to tax reforms because of the sheer necessity and the lower level of resistance from taxpayers. In discussing how war can shape tax system, Hill (1894, p.416) stated: "There were measures which the boldest innovator would hardly have dared propose in time of peace; but under the stress of war they were enacted, sometimes with little opposition and little discussion". War periods can facilitate tax reforms and the introduction of new tax instruments. Some of these measures therefore persist and remain even after the conflict or laid the foundation for sustainable funding of public goods. Finally, War periods can increase taxpayers' willingness to comply with tax obligations. This can be through an increase in patriotism. Feldman and Slemrod (2009) assess the empirical relationship between conflict and tax compliance and show a positive correlation between tax compliance and conflict. They note however that the positive response can be eroded as fatalities grow. This literature shows that wars were proven to be favourable to reforms, contributed to develop some tax systems as well as governments' sources of income.

However, the applicability of this positive relationship beyond Europe remains controversial. Looking at other regions in particular Sub-Saharan, and/or other types of war the effects are not always positive. Latin America, for instance, did not fund its war expenditures by taxes. (Jones, 1915 and Centeno, 1997). Economies nowadays, have more access to borrowing. Consequently, the financing of wars slowly shifted from

taxation to debt. Financing war through debt is particularly appealing as the population does not directly bear the cost of war. Moreover, in a context of high poverty and inequality, the government is expected to resort to a debt financing strategy because they are unable to strike a bargain of fiscal sacrifice (see for example Chang, 2020). In a post-conflict situation, tax issues may just receive less attention as the state may choose to focus on reconstruction, humanitarian services or simply be reluctant to impose new tax burdens on already struggling communities (Van Den Boogaard et al., 2018). It is also possible that the low priority given to tax issues may simply reflect the structure of contemporary international relations, with significant aid flows from partners in the conflict-affected country.

Scholars of internal wars believe these wars to cause state disintegration (see for instance, Centeno, 1997; Fearon and Laitin, 2003). They usually oppose the effects of war depending on the type. Interstate wars are supposed to have a positive effect on taxation, while intrastate/civil wars have negative effect. Internal conflicts cause deterioration of governance and institutional quality – failure of the tax administration, deregulation of tax procedures, thus leading to inefficiency in the mobilization of tax revenues. This deterioration can be particularly acute in countries where institutional quality was already poor before the violence erupted. Violent conflicts also negatively affect key macroeconomic variables such as the GDP and trade (see for instance Abadie and Gardeazabal, 2003; Brücker and De Groot, 2013; Glick and Taylor, 2010). These two variables are two main determinants of the tax-to-GDP ratio in developing countries. Most empirical analysis associate them positively to tax revenue.<sup>3</sup> The erosion of the tax base may lead to a decrease in tax revenue. Some specificities of Sub-Saharan countries, such as ethnic fractionalization, natural resources abundance may also alter the positive effects of war on taxation. In a context of natural resource abundance, the “loot seeking” opportunity can be a motivation for rebellion and violent conflicts (see Collier and Hoeffler, 2004). Tax revenue may decrease because of the resource abundance as a result of the eviction effects (see James, 2015; Jensen, 2011). Government will rely on natural resources because they are easier to tax. Weak institutions may also alter the positive effects of war on taxation. In Tilly’s framework, the state making effect on war depend on the ability of the state to dominate a territory and be the unique supplier of protection as it

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<sup>3</sup> GDP has a direct relationship with tax revenue: fiscal instruments diversify with economic development, which can lead to a broadening of the tax base (see Musgrave, 1969). GDP is strongly correlated with most of the determinants of tax revenue: increase in administrative capacity with economic development, for example. See (Besley and Persson, 2013, 2014, for more discussion). Importation constitutes the tax base for many taxes. In developing countries tax revenue on international trade still represent a significant share of tax revenue. In addition, collecting tax revenue at the import stage is relatively easier and requires less administrative capacity (see Baunsgaard and Keen, 2010 for more discussion).



extracts revenue. The evidence in Sub-Saharan African rather points to a different direction as most conflicts lead to more insecurities (remote violence, attacks by bandits, control of some territories by rebel groups). The current insecurity in Mali is an illustration. Although the government, backed by French army (re)gained control over most territories, remotes violence and isolated attacks still occur. Another channel through which the weak institutions may prevent government from raising tax revenue to finance war is the perceived corruption. When populations become increasingly fatigued by and disgruntled with a predator states, they are less willing to share the sacrifice of the conflict by raising revenue for the government. This may even explain their logics behind joining armed groups /Jihadists (see Benjaminsen et Ba, 2019). Ethnic fractionalization also stands as an important trait of Sub-Saharan African countries. It has helped fuel many political instabilities leading to violent conflicts (see examples below). Post-war situation in weak states also gives rises to ethnic based violence (see Cline, 2021 for the case of the ethnic violence between Fulani and Dogon in Mali following the outbreak of the conflict).

Three main mechanisms appear as a possible explanation to the negative effects of internal violent conflicts on tax revenue. First, the inability to successfully extract revenue due to the violence, associated to the shrink in the tax base resulting from the decrease in economic variables. Second, the specificities of Sub-Saharan African countries (ethnic division, natural resources abundance, weak institutions) may alter the positive effects of conflicts on taxation. Third, the existence of alternative sources of income such as the increasing access to borrowing and international aid may shift the funding of wars away from taxation.

### **3. Conflicts in Sub-Saharan Africa**

One striking feature of the African continent is that almost every country has dealt with a conflict since their independence.<sup>4</sup> The number of active conflicts increased substantially in this region during the 1980s and 1990s: looking at the conflicts recorded by UCPD/PRIIO 60% of countries analysed in this study were involved at least once in a conflict during the period 1980 to 2015. This number reaches 70% when considering all countries of the African continent. Figure 1 presents the conflict-ridden countries in Africa over the period 1980-2015. The number of years in active conflicts as well as the strength of those conflicts is different from one country to another. Ethiopia, Uganda and Sudan are among the countries that had the most year in active conflicts (see Figure A 1). On average, the strength of conflict increased from the 1960s

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<sup>4</sup> All the recorded conflicts (from 1980 to 2015) but four were internal (internal or internationalized internal). The four exceptions were interstate conflicts: Chad and Nigeria in 1983; Burkina Faso and Mali in 1985; Chad and Libya in 1987; and Cameroon and Nigeria in 1996.



later Esteban et al. (2012) provide empirical evidence of the relationship. The civil wars in the five countries studied are perfect illustrations. Conflicts in the Central African Republic and in Cote d'Ivoire are results of ethnical based political instabilities. Guinea-Bissau and Congo were never able to organize successful transfer of power in a context where income inequalities were growing. The conflict in Guinea stands as the only exception as it was mainly imported and exacerbated by tension between the country and its neighbours, Liberia and Sierra Leone. In the following subsections, I present some backgrounds on the conflicts in these five countries. I complement the description with a detailed chronology of the conflicts in Table A 1.

### 3.1. The Central African Republic (2001)

The Central African Republic experienced its first outbreak of conflict in 2001 after a military faction attempted a coup against President Ange-Félix Patassé. The conflict is the result of years of ethnic division (see to Kłosowicz, 2016; United Nations Security Council, 2002 for further details). The country has more than eighty ethnic groups, and not only the largest of them, Gbaja, Banda, Mandija and Sara, compete for power (Kłosowicz, 2016). In 1981, General André Kolinga, a member of the Yakoma tribe, came to power after a coup d'état. The selection of collaborators for state and military offices was based on patronage as well as ethnic and tribal affiliation. The Yakoma tribe, originally from the south of the country, with a population of no more than 5 percent, took over most key positions in the state and army (Kłosowicz, 2016). When Kolinga was replaced by Patassé, from the north of the country, the latter could not trust the army dominated by the Yakoma tribe. He created a well-paid presidential guard as well as a militia both made up of members of the northern tribes. During the attempted coup in 2001, Patassé received help from the Libyans and engaged the notorious bloodthirsty rebels from the *Mouvement pour la Libération du Congo* (MLC). The latter patrolled the south of the country massacred, raped and robbed the population, resulting in hundreds of deaths in 2001 (see Pettersson et al., 2019's UCDP/PRIO dataset) and thousands of displaced (Kłosowicz, 2016). The conflict still continues, alternating calm and turmoil. The highest number of fatalities was recorded in 2013 (see Pettersson et al., 2019's UCDP/PRIO dataset).

### 3.2. Cote d'Ivoire (2002)

The conflict in Côte d'Ivoire began in 2002 when soldiers mutinied and took control of the northern part of the country. As in the Central African Republic, the conflict in Côte d'Ivoire is the result of deep-rooted cleavages around ethnicity (for further insights, see Crook, 1997; Ogwang, 2011; Reuters, 2007; Turner, 2014a). In the aftermath of independence, the country recorded remarkable growth rates, mainly driven by the export of cocoa and coffee, whose plantations relied on immigrant workers. President Félix Houphouët-Boigny initiated policies favouring immigration

from neighbouring countries and improved the rights of immigrant workers. As a result, immigrants and their descendants counted for almost a quarter of the population in 1998 (Ogwang, 2011). In 1990, in the country's first multiparty elections, the two main candidates were Houphouët-Boigny and Laurent Gbagbo. Gbagbo's *Front Populaire* accused the *Parti Démocratique* and Houphouët-Boigny of promoting the interests of the Baoulé – one of the largest ethnic groups and the tribe of Houphouët-Boigny. From that time on, ethnicity became a major political factor. But it was not until five years later, as the presidential elections approached, that an identity politics would emerge. Houphouët-Boigny won the 1990 elections and died 3 years later. He was succeeded by Henri Konan Bédié, candidate for his own re-election in 1995. Bédié seeing the rise of Alassane Ouattara, from the *Rassemblement des Républicains*, who drew support from people with northern or Muslim background, will initiate steps to block Ouattara from running for President. On December 8, 1994, a new electoral code, that would require eligible candidates to have both their parents to be Ivorian nationals in order to run for president, was adopted. In 1995, Bédié also initiated a policy of Ivorian nationalism, called "Ivoirité". The policy was another manoeuvre to make Ouattara candidacy difficult, if not impossible. Bédié was subsequently elected president in 1997, running against Francis Wodié alone, candidate from the *Parti Ivoirien des Travailleurs* (PIT). The campaign for the 2000 presidential election once again announced an ethnic dimension to political life. The division of the political elite, identity politics, inequalities between north and south, and diversity, not only ethnic but also cultural and religious, led to a coup headed by General Robert Gueï in December 1999. Once in power, Gueï had a new constitution adopted by referendum in 2000, which emphasized that presidential candidates “must be Ivorian by origin, born to father and mother who are themselves Ivorian by origin; and must have never availed himself of another nationality”,<sup>5</sup> thus eliminating Ouattara.<sup>6</sup> Gueï lost the presidential elections in 2000 to Gbagbo. The hard-line stance of Gbagbo against northerners prompted disgruntled elements of the army, mainly from the north, to attempt an unsuccessful coup in Abidjan in 2002. Following this failed coup, Gbagbo attempted to demobilize two contingents of the army that were recruited during Gueï's short transition. This led to a mutiny which ended in civil war. More than six hundred casualties were recorded in 2002 (see Pettersson et al., 2019's UCDP/PRIO dataset). The conflict lasted until 2004 and another episode erupted in 2011 following the 2010 elections between Gbagbo and Ouattara.

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<sup>5</sup> Article 35 of *Loi n°2000-513 du 1er Août 2000 portant constitution de la Côte d'Ivoire*. Available at <http://www.unesco.org/education/edurights/media/docs/ea778cb20fbdd7a77fe62ae0c85bbd87c0757abd.pdf>

<sup>6</sup> Note however that on December 18, 2001, a national reconciliation forum bringing together all political leaders recognized Ouattara's Ivorian nationality.

### 3.3. The Republic of Congo (1993)

The 1993 civil war in the Republic of Congo began following the opposition contesting the results of the parliamentary elections. Even though ethnicity was not at the root of the conflict, politicians overtly stimulated ethnic consciousness to mobilize political supporters (For more details, see Clark, 1998; United Nations Office for the Coordination of Humanitarian Affairs, 2000). After 30 years of one-party political system, the country experimented for the first time a multiparty government in 1991. At the demand of the opposition, President Sassou-Ngesso allowed a sovereign national conference of important political and social figures. A multiparty constitution followed, which was adopted in March 1992. A transitional government was formed with the mandate of organizing the elections (parliamentary and presidential). Pascal Lissouba, candidate of the *Union Panafricaine pour la Démocratie Sociale* (UPADS) is elected president in 1992. UPADS had formed a coalition with the *Parti Congolais du Travail* (PCT) to gain a majority in parliament. But, a month after his installation as president, the coalition broke down with the withdrawal of the PCT. The PCT joined forces with Bernard Kolélas, who had finished second in the presidential elections and whose party, the *Mouvement Congolais pour le développement et la démocratie Intégrale* (MCDDI), held the second most seats in the parliament. Lissouba proceeded to dissolve the parliament (against constitutional procedure) and scheduled new parliamentary elections for the following year. After the new elections, UPADS and its minor allies gained a majority. The opposition demanded that many seats be rerun and boycotted the second round of the elections. As the situation became intense, the three main politicians formed private militias to control access to various areas of the capital and the country slipped into civil war. Very quickly the country found itself in a tripartite division along ethno-regional lines. The constituency of Lissouba was made up of the three southern regions of Niari, Bouenza and Lekoumou. Kolélas gained votes in Brazzaville and in the surrounding area of Pool region. Sassou led in four of the northern regions, Likouala, Sangha, Cuvette and Cuvette-Ouest. Clashes between the militias later gave way to mob action by alienated youth. The recorded number of deaths from UCPD/PRIO is 53, but Clark (1998) reported two thousand deaths. The war continued and 1997 was one of the most devastating episodes. Another episode happened in 2016.

### 3.4. Guinea (2000)

The 2000 civil war in Guinea is the result of a long-lasting civil war that engulfed Liberia then Sierra Leone (two border countries) in 1990s. It was mainly imported and was exacerbated by tension between Guinean president Lassana Conté and his regional nemesis Charles Taylor, president of Liberia (See Arieff, 2009; Turner, 2014c for additional details). Conté Backed rebel movements opposed to Taylor. The support

for anti-Taylor rebels played a role in inciting armed attacks on Guinean soil in regions bordering Liberia and Sierra Leone. In September 2000, Guinean dissidents, backed by the Liberian government, militia from ULIMO and rebels from the Revolutionary United Front (RUF) attacked Guinea. Attacks started in the southern part of Guinea (the border areas with Liberia and Sierra Leone) and gradually spread north. More than two hundred deaths were recorded in 2000 (see Pettersson et al., 2019's UCDP/PRIO dataset), and a quarter million people were internally displaced. Clashed continued in 2001, the year that marked the end of the conflict. The Guinean conflict is different from most civil wars in Sub-Saharan Africa, as it resulted from neighbouring government retaliation – by financing an insurgency across border. It was also shorter and concerned mostly bordering areas with neighbours Liberia and Sierra Leone.

### 3.5. Guinea-Bissau (1998)

The Guinea-Bissau civil war was triggered by an attempted coup d'état led by General Ansumane Mané against the President Joao Bernardo Vieira. The civil war is a result political instability in a country that failed to organize successful transfer of power since the independence (see Peace Direct, 2015; Turner, 2014b). In 1980, Vieira, then Prime minister, toppled the government of Luis Cabral and remained president since. In January 1998, Vieira suspended Mané, an army General and former chief of staff. Mané was accused of negligence in regard to controlling the illegal sale of Guinean arms to the *Mouvement des Forces Démocratiques de la Casamance* (MFDC), in neighbouring Senegal. Mané, who was very popular among soldiers, was later home-arrested. As a reaction, he and a group of allies from the armed forces took over the main military bases and arms depots. That was the beginning of the civil war. Neighbouring Senegal and Guinea intervened as they sent troops in to aid the government. In 1999, Vieira was ousted by Mané and the military junta. Mané briefly headed the junta before National Assembly speaker Malam Bacai Sanha took power as acting president. In the following presidential elections of 2000, Kumba Iala gained the presidency. Iala rejected a demand from the junta to have a special consultative status. He was overthrown in a coup three years later. Vieira returned from exile and won the 2005 election. He was murdered in 2009 by a group of soldiers. The country has been experiencing a series of political instabilities that still continues.

## 4. Methodology and data

### 4.1. Data

Here I present the data and the empirical strategy to measure the causal effects of conflicts on tax revenue. Data on conflicts are from the UCPD/PRIO armed conflict dataset, version 19.1 (see Gleditsch et al., 2002; Pettersson et al., 2019). The dataset

records armed conflicts concerning States and characterized by the use of force between the two parties, and which result in a death toll of at least 25 deaths during a calendar year. Our analysis covers the period 1980-2015. In this timeframe, all the recorded conflicts but four were internal (internal or internationalized internal). The four exceptions were interstate conflicts: Chad and Nigeria in 1983; Burkina Faso and Mali in 1985; Chad and Libya in 1987; and Cameroon and Nigeria in 1996. I use data on non-resource tax revenue from Caldeira et al. (2019). The authors provide annual country-level panel data for the period of 1980-2015 for 42 countries of Sub-Saharan Africa. Along with GDP per capita (in 2010 constant US dollar), Trade openness (sum of total import and export as percentage of GDP), the structure of the economy (measured by the added value of agriculture in share of GDP) are the control variables. I collected them from World Bank, World Development Indicators. To explore the role of the specificities of Sub-Saharan African countries, I use ethnic fractionalization, natural resources endowment, the institutional quality. The ethnic fractionalization index is from Alesina et al. (2003). I use natural resources rent as percentage of GDP from World Bank World Development Indicators to measure countries resource endowment. Institutional quality is measured using the International Country Risk Guide (ICRG) database. Following Frankel et al. (2013), I compute an index of institutional quality based on an average of four normalized variables: investment profile, corruption, law and order, and bureaucratic quality. Higher values of the index indicate strong economic and political institutions. I also use alternative source of revenue in developing countries as further controls. I use net development assistance and official aid as a share of GDP and public and publicly guaranteed external debt stocks as share of GDP. The first is obtained from World Bank, World Development Indicators and the second is from World Bank, International Debt Statistics.

For the SCM framework, I use ethnic fractionalization as special predictor to capture the effect of ethnic division.

Table 1 presents the descriptive statistics of the variables included in the analysis.

**Table 1: Descriptive statistics**

Variables	Obs.	Mean	Std. Dev.	Min	Max
Non-resource tax	1435	312546.40	553222.40	1582.75	4000083.00
Conflict	1512	0.18	0.39	0.	1
GDP per capita	1474	1892.50	2780.36	131.65	20333.94
Agriculture added value	1345	27.42	15.70	0.89	72.03
Total trade	1334	73.97	47.07	6.32	531.74
Ethnic fractionalization	41	0.65	0.24	0.00	0.93
Resource endowment	1431	11.61	11.92	0.00	89.17
ICRG Index	878	0.45	0.11	0.11	0.78
Net development assistance and official aid	1448	10.79	10.49	-0.25	94.44
Public and publicly guaranteed external debt	1357	56.66	50.92	0.00	424.98

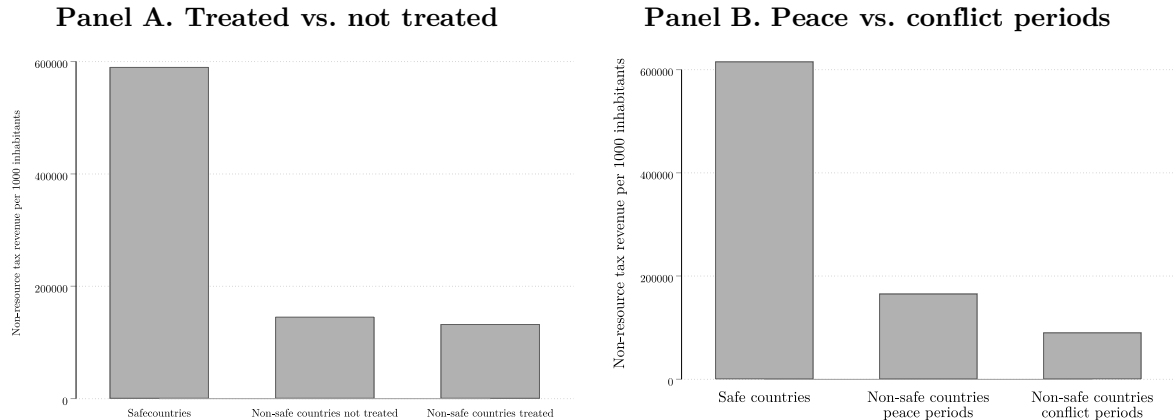
Note: Non-resource tax revenue is expressed in 2010 constant US\$ per thousand inhabitants. Conflict is a dummy variable that takes 1 if there is a conflict in the country in a given year. GDP per capita is also expressed in constant 2010 US\$. Agriculture added value and total trade are in percentage of GDP. Ethnic fractionalization is measured by an index ranging from 0 to 1 see Alesina et al. (2003). Resource endowment is measure by natural resource rent as percentage of GDP. Net development assistance and official aid as well as Public and publicly guaranteed external debt are expressed as percentage of GDP.

Table B 1 presents the relationships between the variables used in the analysis and statistical significance at the critical level of 5%. Conflicts are negatively associated with most of the variables. The negative association of conflicts and economic growth has been well documented (see e.g., Abadie and Gardeazabal, 2003; Brück and De Groot, 2013). Glick and Taylor (2010) present evidence of the negative effects of war on international trade. By shrinking economic activities, conflicts contribute to increasing the share of agricultural activities in the economy. Highly divided societies are breeding grounds for conflicts (see e.g., Montalvo and Reynal-Querol, 2005; Esteban et al., 2012 for discussion on the matter).

Figure 2 and Figure 3 present further stylized facts on the relationship between conflicts and the main predictors. Non-resource tax revenue is higher, on average, in countries that have never faced conflicts (Panels A and B in Figure 2). Countries where conflicts occurred at least once have higher non-resource tax revenue during peace period than during conflicts periods (Panel B in Figure 2). Panel A in Figure 2 shows that the five countries studied have similar tax revenue with countries that I do not study in the SCM framework.



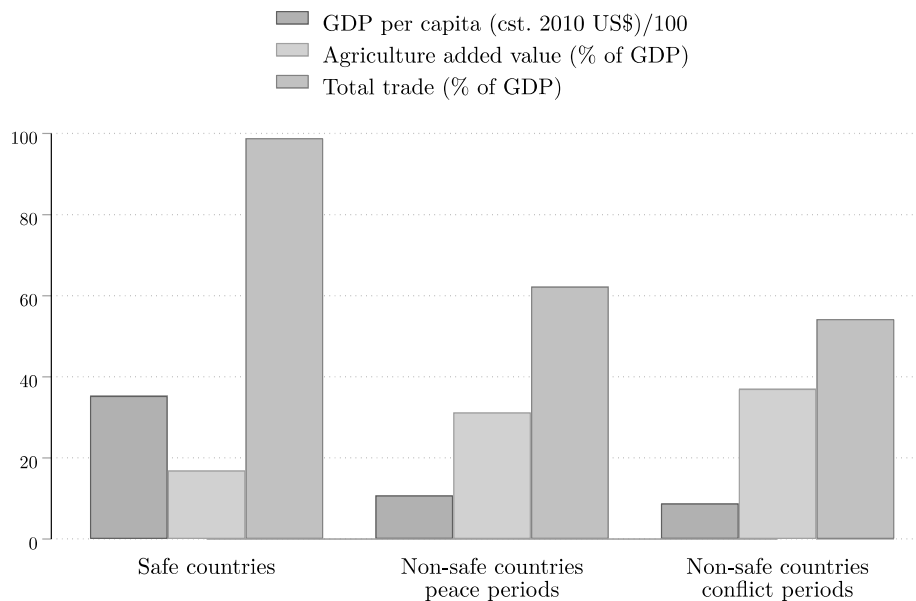
**Figure 2. Non-resource tax revenue in safe and conflict-ridden countries (average 1980-2015)**



Sources: Tax revenue Dataset for SSA, UCDP/PRIO and authors' own calculations. Non-resource tax revenue is expressed in constant 2010 US\$ per thousand inhabitants. Non-safe countries treated included Central African Republic, Cote d'Ivoire, republic of Congo, Guinea, Guinea-Bissau

Figure 3 presents the predictors variables according to exposure to conflicts. On average, the GDP per capita is lesser during conflict periods than during peace periods and safe countries have the highest level. The added value of agriculture in the share of GDP becomes more important during conflict periods. This is because of the contraction of activities, which in turn, may negatively affects tax collection. Indeed, tax collection is more complicated in the primary sector see (Caldeira et al. 2019). Additionally, in developing countries, this sector largely evades taxes due to exemptions policies, the means of administration and to the liability of tax thresholds. Total trade variable has similar trends with GDP per capita.

**Figure 3. Predictors according to exposure to conflict (average 1980-2015)**



Sources: Tax revenue Dataset for SSA, UCDP/PRIO and authors' own calculations. To manage scales, the GDP per capita was divided by 100.

Figure B 1 presents the evolution of non-resource tax revenue in the five countries studied and compare them to the evolution in safe countries and non-safe countries which do not fit the condition to be treated. Non-tax revenue in Central African Republic is amongst the lowest in the sample and is decreasing over the period. The characteristics of predictors are complicated as well. The lower level of tax revenue is associated to a higher, (almost the highest) level of agriculture added value, lower GDP per capita and international trade. Republic of Congo stands at a direct contrast to Central African Republic. Non-resource tax revenue per thousand inhabitants is high.<sup>7</sup> The country relies a lot on natural resources. International trade is high and mostly about primary resources. Agriculture has a small share of the economy. The GDP per capita is also very high.<sup>8</sup> As public revenue in the country is strongly related to resource tax revenue, it is unsteady and replicates a lot of variations. This may make hard the construction of the counterfactual. Non-resource tax revenue is decreasing in Cote d'Ivoire. Primary activities are an important part of the economic activities. The GDP per capita is above the average level of GDP per capita in conflict-ridden countries. Non-resource tax revenue in Guinea is low compared to the average level of the sample. Guinea-Bissau presents the same characteristics both in outcomes variables and predictors as the Central African Republic.

#### 4.2. Empirical strategy

As a first step to our analysis, I estimate the effects of wars on non-resource tax revenue for an unbalanced panel of 42 countries over the period 1980-2015. I estimate the following equation:

$$y_{i,t} = \beta c_{i,t} + \delta y_{t-1} + \gamma x_{i,t} + \alpha_i + \theta_t + u_{i,t}, \quad (1)$$

$c_{i,t}$  is a dummy indicator for whether country  $i$  experience conflict at time  $t$ .  $u_{i,t}$  represents the error term  $\alpha_i$  and  $\theta_t$  are respectively country and time fixed effects. The first accounts for unobservable country-specific factors and the second for time specific factors.  $y_{i,t}$  and  $y_{i,t-1}$  represents the non-resource tax revenue in country  $i$  respectively at time  $t$  and  $t - 1$ . Finally,  $x$  is a vector of control variables.

At first, I use Ordinary Least Square (OLS) to estimate (1). This provides an average effect of conflict, assuming that the effects are homogeneous over time and across country. To test the sensibility of the OLS estimates from (1), I rely on the entropy balancing method proposed by Hainmueller (2012). Entropy balancing is a

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<sup>7</sup> Bear in mind that the population is very low, and the country is very rich in natural resources.

<sup>8</sup> We do not address the true distribution of wealth in the country and issues of inequality are beyond the scope of our analysis.

generalization of conventional matching methods that use a re-weighting scheme to incorporate covariate balance into a weight function that is applied to the sample.<sup>9</sup>

Since equation (1) includes the lagged dependent variable in the right-hand side, the fixed effect estimator is inconsistent because of the correlation between the lagged dependent variable and the error term (see Nickell, 1981). I use the Generalized Methods of Moments (GMM) System estimator, which allows controlling for both unobserved country-specific effects and potential endogeneity of the explanatory variables. Basically, Blundell and Bond (1998) show that this extended GMM estimator is preferable to that of Arellano and Bond (1991) when the dependent variable, the independent variables, or both are persistent. I rely on the two-steps system GMM estimator of Blundell and Bond (1998), which is considered to produce more robust estimates toward heteroscedasticity and other disturbances.

I furthermore estimate the average medium-term effect of conflicts episodes using the local projection method from Jordà (2005). Local projection requires estimation of a series of regressions for each horizon  $h$ . I apply a more general specification of (1) to our panel data. In the identification strategy, I consider the conflict as an external shock. The equations to be estimated are:

$$y_{i,t+h} = \beta_h c_{i,t} + \delta_h y_{t+h-1} + \gamma x_{i,t+h} + a_i + u_{i,t+h}, \quad h = 0, 1, \dots, 10 \quad (2)$$

After, I turn to exploring the effects of some of the specificities of sub-Saharan countries, with the aim of discovering the main channels through which the negative effects work. I will systematically test how the inclusion of ethnic fractionalization, natural resources abundance, corruption affect the relationship between conflicts and tax revenue. I will also evaluate how access to alternative sources of revenue such as borrowing, or aid affects the relationship. I use entropy balancing as it allows to weight the sample. I also present the results from the GMM-system.<sup>10</sup>

The second stage of our analysis is to estimate the effects of actual conflicts on specific countries. Our methodology is inspired by Abadie et al. (2015) and Bove et al. (2014). I use SCM to estimate the effect of conflict. Not only does the synthetic control method provide an effective way to define the counterfactual but it provides a way to bridge the quantitative/qualitative divide in comparative politics (Abadie et al., 2015). The SCM framework seems particularly suited to the analysis of conflicts in Africa. Given the heterogeneous nature of conflicts in Sub-Saharan Africa, comparative case studies are likely to provide a better understanding of the effects of conflicts. Another reason

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<sup>9</sup> See Balima (2020) for an application of this method to estimate the effects of political instability.

<sup>10</sup> One potential limitation to these results may be the fact that most of these variables have been used as determinant of conflicts.

why case study is great is that the intensity of conflict varies, and countries resilience are not the same. The gap between the conflict-ridden country and its artificial counterfactual and the cumulative stream of gaps can identify the yearly effect as well as the cumulative effects of conflicts on subsequent collection of the tax resources over extended periods of time.

I investigate the impact of the conflict for five countries, selected according to the following conditions:

- The treated unit and the control group must not have missing data on the outcome in the 23-year sample period. This is because, I require 13-year pre-conflict to calibrate the synthetic control and 10-year post-war observations to forecast the effect of the civil war.
- In case of multiple conflicts, I select the first one in the chronological order.
- Accordingly, the treated country must have experienced its first conflict in 1993 or later, so as the pre-intervention period can be 13 years. In a similar manner, the treated unit must have experienced a conflict at the latest in 2005, to have 10 years of post-conflict window.

The potential donor pool of a treated unit contains countries which did not experience any conflict in that particular 23-year-long time frame. Finally, I construct the donor pool by restricting the size of the potential donor pool to consider only units similar to the treated units (see Abadie et al. 2015 for discussion related to the construction of the donor pool). For that matter, I rely on a simple arithmetic approach.

Let us say the potential donor pool of country  $i$  is made up of  $n$  countries,  $country_1, country_2, \dots, country_n$ . For each year in the pre-intervention period, I calculate the percentage difference of the dependent variable between country  $i$  with respect to each country in the potential donor pool as follows:

$$p.diff = (y_{i,t} - y_{n,t})/y_{i,t}$$

I subsequently select countries where the standard deviation of  $p.diff$  is less than or equal to the unit.<sup>11</sup> To evaluate the statistical significance of our estimates, I conducted placebo studies following the paper of Abadie et al. (2010), which addressed methodological shortcomings of case study analysis using SCM. I apply the synthetic control method to countries in the donor pool of each treated country. From the placebo test analysis, I calculate the associated p-value of the treated unit post/pre MSPE ratio. It is the proportion of units (placebos and treated) that have a ratio equal

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<sup>11</sup> We alternatively selected 1.5 and 2 as cut-off. We also used a scenario with no restriction, selection all the countries in the potential donor pool. The synthetic control weights did not change except for Cote d'Ivoire.

or higher than that of the treated unit.<sup>12</sup> The hard-to-overcome difficulty regarding our SCM framework is the presence of missing values in our dataset. The computation of the synthetic version does not allow missing values of the dependent neither for the treated unit nor for the donor pool. This leads to the inability to estimate the effects for Democratic Republic of Congo and Lesotho. Missing values also lead to shortening the countries in the donor pool.

In addition to our SCM framework, I look at individual separate effect using Pesaran (2006) Correlated Common Effect (CCE) estimator for the five treated countries. As the sample used is large,  $T = 36$ , I can apply the CCE estimator and estimate individual separate effect for the five treated countries (see Pesaran, 2006).

## 5. Empirical results

### 5.1. Average effects of conflicts on tax revenue

I now turn to our benchmark results. Table 2 presents the OLS estimates of the impacts of conflicts on tax revenue. In all specification, conflict is estimated to have a highly significant negative impact on tax revenue. Column 1 does not include any effects. I successively add fixed effects (column 2), and both fixed and time effects (column 3). Columns 4 and 5 include control variables. The coefficient in column 5, which include all the variables and both fixed and time effects, is -13.4. It means that conflicts induce a drop in non-resource tax revenue per capita of about 13 US\$, which represents a loss of 4.3%. Estimates using entropy balancing depict smaller loss of revenue (c.f. Table 3). The coefficient in column 5 suggests that conflicts induce a 5.4 loss in non-resource tax revenue, which represents 1.7%. Using the GMM-system estimator, I obtain similar results with a drop of about 1.5% in non-resource tax revenue (c.f. Table 4). The average negative effect of conflicts hovers around 10 US\$ per capita in the medium term, representing a loss of 3.2% (c.f. Figure C1).

An insightful result is that the coefficients associated with conflict is higher in column 5 than in column 3 for both Table 2 and Table 3. This suggests that due to the outbreak of violence government cannot successfully raise revenue and because the conflict also negatively affects key macroeconomic variables, the tax base shrink and the overall loss is higher.

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<sup>12</sup> See the associated R-Package <https://cran.r-project.org/web/packages/SCtools/SCtools.pdf>.

**Table 2: Impact of conflict on tax revenue (OLS)**

Non-resource tax Per capita (Constant 2010 US\$)	(1)	(2)	(3)	(4)	(5)
Conflicts Dummy	-4.156*	-5.733**	-5.940*	-12.285*	-13.411*
	(2.316)	(2.535)	(3.240)	(6.951)	(7.507)
Non-resource tax Per capita (Constant 2010 US\$) <sub>(t-1)</sub>	1.014***	0.938***	0.919***	0.707***	0.704***
	(0.012)	(0.027)	(0.026)	(0.063)	(0.062)
GDP per capita (constant 2010 US\$)				0.078***	0.075***
				(0.017)	(0.017)
Agriculture, value added (% of GDP)				-0.021	0.281
				(0.292)	(0.332)
Total trade (% of GDP)				-0.270	-0.376
				(0.312)	(0.285)
Constant	3.948	27.353***	28.664***	-23.353	-18.151
	(2.729)	(8.527)	(10.363)	(19.615)	(14.921)
Country FE	No	Yes	Yes	Yes	Yes
Time FE	No	No	Yes	No	Yes
Observations	1393	1393	1393	1199	1199
Number of countries		42	42	40	40
R-squared	0.9819	0.8328	0.8407	0.8659	0.8706
Adjusted R-squared	0.9819	0.8326	0.8365	0.8654	0.8662

Note: Robust standard errors in parentheses (\*\*\*)  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ). The table reports the OLS estimates of the regression of non-resource tax revenue per capita in constant US\$ on the conflict dummy and a set of control variables.

**Table 3: Impact of conflict on tax revenue (entropy balancing)**

Non-resource tax Per capita (Constant 2010 US\$)	(1)	(2)	(3)	(4)	(5)
Conflicts Dummy	-2.171*	-4.123**	-4.918***	-4.184***	-5.350***
	(1.276)	(1.643)	(1.538)	(1.521)	(1.525)
Non-resource tax Per capita (Constant 2010 US\$) <sub>(t-1)</sub>	1.018***	0.930***	0.908***	0.757***	0.759***
	(0.012)	(0.032)	(0.033)	(0.055)	(0.055)
GDP per capita (constant 2010 US\$)				0.045**	0.045**
				(0.018)	(0.019)
Agriculture, value added (% of GDP)				0.041	0.061
				(0.099)	(0.088)
Total trade (% of GDP)				0.089	0.063
				(0.080)	(0.087)
Country FE	No	Yes	Yes	Yes	Yes
Time FE	No	No	Yes	No	Yes
Observations	1393	1393	1393	1199	1199
Number of countries	42	42	42	40	40
R-squared	0.976	0.978	0.979	0.981	0.982
Adjusted R-squared	0.976	0.977	0.978	0.981	0.981

Note: Robust standard errors in parentheses (\*\*\* p<0.01, \*\* p<0.05, \* p<0.1). The table reports the estimates of the second step of the entropy balancing methods. I regress non-resource tax revenue per capita in 2010 constant US\$ on the conflict dummy and a set of control variables.

**Table 4: Impact of conflict on tax revenue (GMM-system)**

Variables	(1)	(2)
Conflicts Dummy	-5.377** (2.124)	-4.737*** (1.584)
Non-resource tax Per capita (Constant 2010 US\$) <sub>(t-1)</sub>	0.992*** (0.012)	0.941*** (0.014)
GDP per capita (constant 2010 US\$)		0.014** (0.007)
Agriculture, value added (% of GDP)		-0.260 (0.354)
Total trade (% of GDP)		0.070 (0.077)
Observations	1393	1199
Number of countries	42	40
Instruments	6	9
AR1 P-value	0.02	0.03
AR2 P-value	0.67	0.68
Hansen P-value	0.29	0.94
Long Run conflict effects	-703.543	-80.200**
Standard error	1109.67	33.562

Note: Robust standard errors in parentheses (\*\*\*)  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ). The table reports the GMM-system estimates of a regression of non-resource tax revenue per capita in 2010 constant US\$ on the conflict dummy and a set of control variables. The computed long run estimates and its standard error is displayed in the table.

## 5.2. Exploring the specificities

In this section, I will explore the effects of some of the specificities of Sub-Saharan countries. As discussed earlier, Sub-Saharan African countries present some particularities. It is therefore interesting to investigate how those particularities affect the relationship between conflicts and taxation. In Table 5, I successively include ethnic fractionalization, the endowment in natural resources, and the quality of the institutions. The negative impact of conflict on tax revenue is robust to the inclusion of these additional variables. Moreover, coefficients of the variable of interest in columns 2, and 4 are not only higher than that in column 3 of Table 3, but they are also higher than the coefficient in column 5 of Table 3. The results show that these specificities discussed, ethnic division and resource endowment do matter in studying the impact of conflict on tax revenue. Internal division makes it tougher for government to secure support for the conflict. Resource endowment has an eviction effect on tax revenue as the government rely more on them in financing the conflict, resulting in less tax revenue mobilisation. Results in columns 1 and 2 of Table 6 point to the same direction. A counterintuitive result arises from the inclusion of quality of institutions in Table 5. The absolute value of the magnitude increases. However, it is lower in Table 6.



Table 7 and Table 8 include control for alternative source of funding. Again, the negative impact of conflict on tax revenue is robust. The relationship between the alternative source of funding and the tax revenue is negative. However, the magnitude of the coefficient of the conflict variable becomes smaller when I control for aid and debt.

**Table 5: Impact of conflict on tax revenue (entropy balancing) – Controlling for specificities**

Non-resource tax Per capita (Constant 2010 US\$)	(1)	(2)	(3)	(4)	(5)	(6)
Conflicts Dummy	-4.489*** (1.576)	-5.670*** (1.584)	-5.287** (2.085)	-6.308*** (2.004)	-6.940*** (2.538)	-8.272*** (2.557)
Non-resource tax Per capita (Constant 2010 US\$) <sub>(t-1)</sub>	0.773*** (0.050)	0.775*** (0.049)	0.798*** (0.032)	0.803*** (0.032)	0.747*** (0.058)	0.758*** (0.053)
GDP per capita (constant 2010 US\$)	0.042*** (0.016)	0.042** (0.017)	0.037*** (0.008)	0.035*** (0.008)	0.040*** (0.012)	0.037*** (0.012)
Agriculture, value added (% of GDP)	0.055 (0.095)	0.075 (0.088)	0.076 (0.082)	0.127 (0.085)	0.240 (0.149)	0.339** (0.152)
Total trade (% of GDP)	0.096 (0.081)	0.065 (0.087)	0.072 (0.132)	0.048 (0.131)	0.189 (0.136)	0.151 (0.139)
Ethnic Fractionalization	-111.391* (65.970)	-106.942 (67.528)				
Total natural resources rents (% of GDP)			-0.089 (0.200)	-0.155 (0.193)		
ICRG index					4.979 (10.691)	-0.930 (13.125)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	No	Yes	No	Yes	No	Yes
Observations	1,199	1,199	1,199	1,199	771	771
Number of countries	40	40	40	40	28	28
R-squared	0.983	0.982	0.986	0.986	0.982	0.984
Adjusted R-squared	0.982	0.982	0.985	0.985	0.982	0.982

Note: Robust standard errors in parentheses (\*\*\*)  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ). The table reports the estimates of the second step of the entropy balancing methods. I regress non-resource tax revenue per capita in 2010 constant US\$ on the conflict dummy and a set of control variables.

**Table 6: Impact of conflict on tax revenue (GMM-system) – Controlling for specificities**

Variables	(1)	(2)	(3)
Conflicts Dummy	-4.897*** (1.439)	-6.257*** (2.185)	-4.700 (3.109)
Non-resource tax Per capita (Constant 2010 US\$) <sub>(t-1)</sub>	0.937*** (0.015)	0.922*** (0.012)	0.881*** (0.076)
GDP per capita (constant 2010 US\$)	0.014** (0.007)	0.018*** (0.006)	0.021* (0.013)
Agriculture, value added (% of GDP)	-0.296 (0.361)	-0.052 (0.362)	0.187 (0.286)
Total trade (% of GDP)	0.017 (0.080)	0.170** (0.076)	0.270** (0.105)
Ethnic Fractionalization	-30.837** (15.583)		
Total natural resources rents (% of GDP)		-1.675*** (0.625)	
ICRG index			71.490** (29.381)
Observations	1,199	1,199	771
Number of countries	40	40	28
Instruments	10	10	10
AR1 P-value	0.03	0.03	0.04
AR2 P-value	0.69	0.65	0.12
Hansen P-value	0.95	0.83	0.74
Long Run conflict effects	-77.646***	-80.246**	-39.496
Standard error	29.553	31.166	35.564

Note: Robust standard errors in parentheses (\*\*\*)  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ). The table reports the GMM-system estimates of a regression of non-resource tax revenue per capita in 2010 constant US\$ on the conflict dummy and a set of control variables. The computed long run estimates and its standard error is displayed in the table.

**Table 7: Impact of conflict on tax revenue (entropy balancing) – Controlling for alternative sources of funding**

Non-resource tax Per capita (Constant 2010 US\$)	(1)	(2)	(3)	(4)
Conflicts Dummy	-1.989 (1.235)	-2.760** (1.252)	-1.860 (1.188)	-2.669** (1.163)
Non-resource tax Per capita (Constant 2010 US\$) <sub>(t-1)</sub>	0.597*** (0.088)	0.610*** (0.084)	0.641*** (0.087)	0.651*** (0.084)
GDP per capita (constant 2010 US\$)	0.048*** (0.015)	0.047*** (0.016)	0.038*** (0.011)	0.036*** (0.011)
Agriculture, value added (% of GDP)	-0.048 (0.078)	-0.032 (0.079)	-0.059 (0.064)	-0.029 (0.070)
Total trade (% of GDP)	0.178** (0.087)	0.172* (0.089)	0.161* (0.086)	0.138 (0.089)
Aid	-0.178** (0.082)	-0.202** (0.083)		
Public debt			-0.016 (0.016)	-0.018 (0.026)
Country FE	No	Yes	Yes	Yes
Time FE	No	No	Yes	No
Observations	1,175	1,175	1,099	1,099
Number of countries	40	40	37	37
R-squared	0.922	0.926	0.930	0.934
Adjusted R-squared	0.919	0.920	0.927	0.929

Note: Robust standard errors in parentheses (\*\*\*)  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ). The table reports the estimates of the second step of the entropy balancing methods. I regress non-resource tax revenue per capita in 2010 constant US\$ on the conflict dummy and a set of control variables.

**Table 8: Impact of conflict on tax revenue (GMM-system) – Controlling for alternative sources of funding**

Variables	(1)	(2)
Conflicts Dummy	0.942*** (0.014)	0.797*** (0.066)
Non-resource tax Per capita (Constant 2010 US\$) <sub>(t-1)</sub>	-4.379** (1.764)	-4.891*** (1.664)
GDP per capita (constant 2010 US\$)	0.014** (0.007)	0.036*** (0.013)
Agriculture, value added (% of GDP)	-0.314 (0.327)	-0.099 (0.239)
Total trade (% of GDP)	0.060 (0.084)	0.130* (0.072)
Aid	0.064 (0.202)	
Public debt		-0.091* (0.047)
Observations	1,175	1,111
Number of countries	40	37
Instruments	10	10
AR1 P-value	0.03	0.02
AR2 P-value	0.69	0.58
Hansen P-value	0.76	0.92
Long Run conflict effects	-74.975**	-24.092*
Standard error	33.884	12.561

Note: Robust standard errors in parentheses (\*\*\* p<0.01, \*\* p<0.05, \* p<0.1). The table reports the GMM-system estimates of a regression of non-resource tax revenue per capita in 2010 constant US\$ on the conflict dummy and a set of control variables. The computed long run estimates and its standard error is displayed in the table.

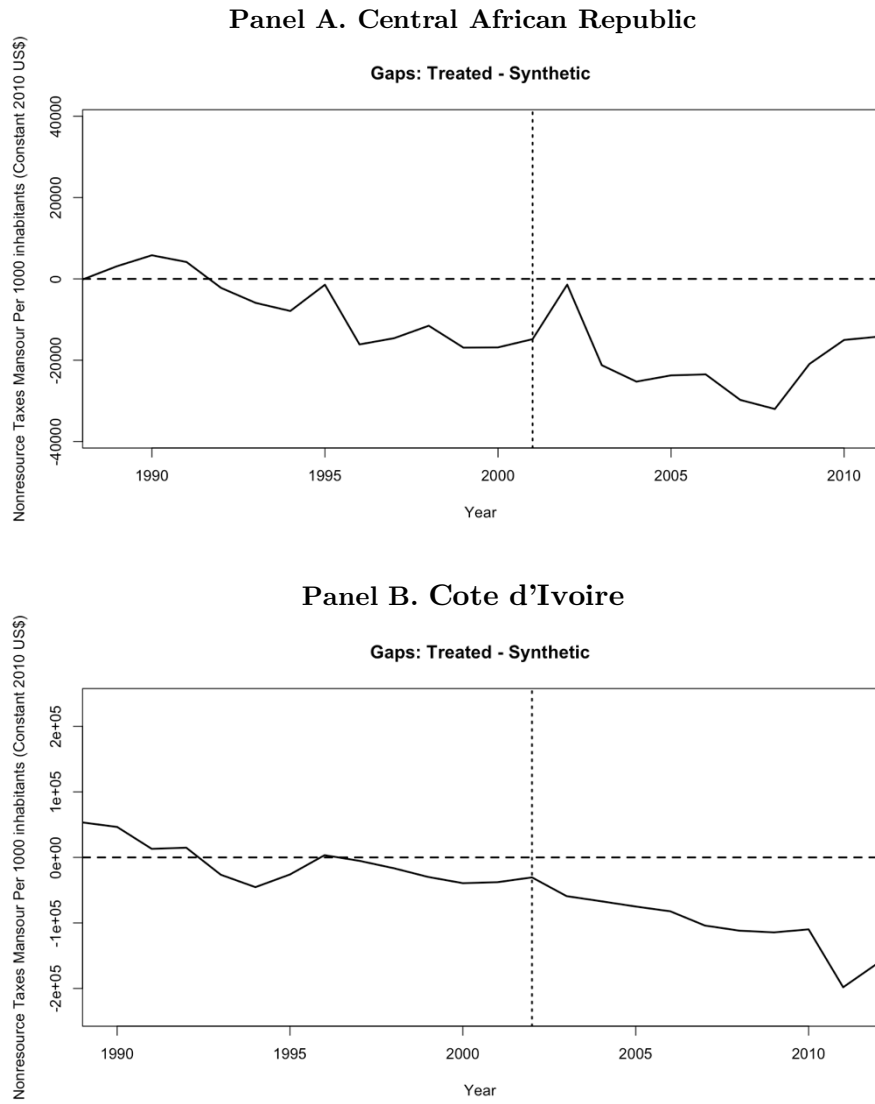
### 5.3. Effects of conflicts on tax revenue in specific countries

#### 5.3.1. Results using synthetic control method

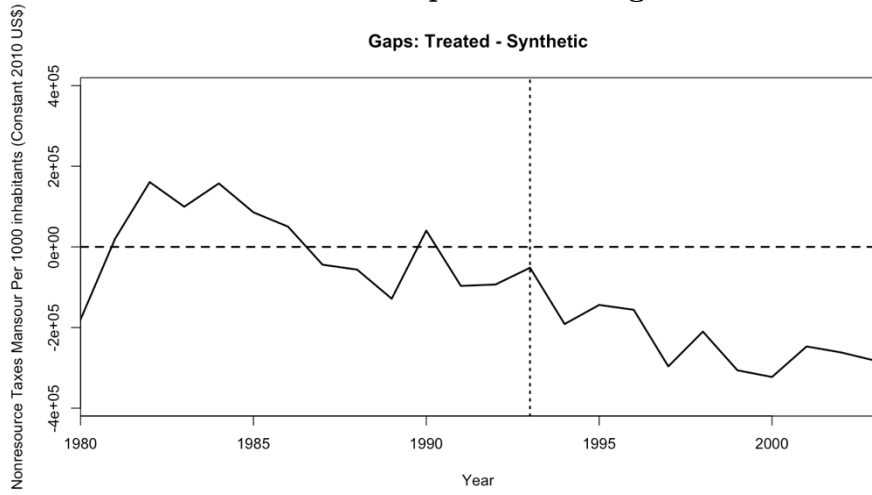
Here I present the effects of conflicts using SCM. For each country, I present the estimated unit weight for donor pool (Table D 1), describing countries used according to SCM algorithm to build the synthetic control of each treated country; the trends in outcome variables of the treated country versus its synthetic control (Figure D 1), measuring the effect of conflict for each year; the gap between the true value of the outcome variable and its synthetic control (Figure 4); the placebo analysis (Figure D 2), where I randomly assign the treatment to countries that did not experience conflicts; and the associated p-value of the treated unit post/pre MSPE ratio (Table D 2).

The estimated effect of conflict on non-resource tax revenue is the difference between non-resource tax and its synthetic version. The divergence between the non-resource tax revenue and its synthetic control after the outbreak of conflict in Cote d'Ivoire and Guinea-Bissau indicates that conflicts have had significant negative impact on non-resource tax revenue.

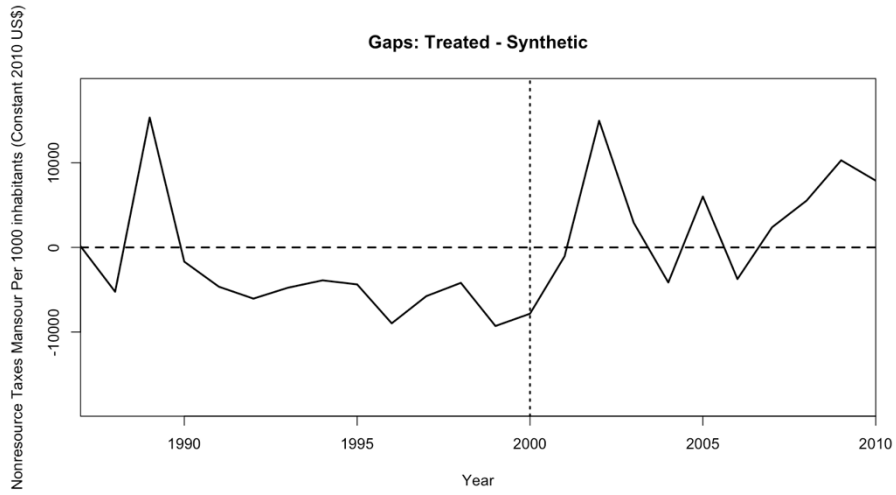
**Figure 4. Gap between tax revenue and the synthetic tax revenue**



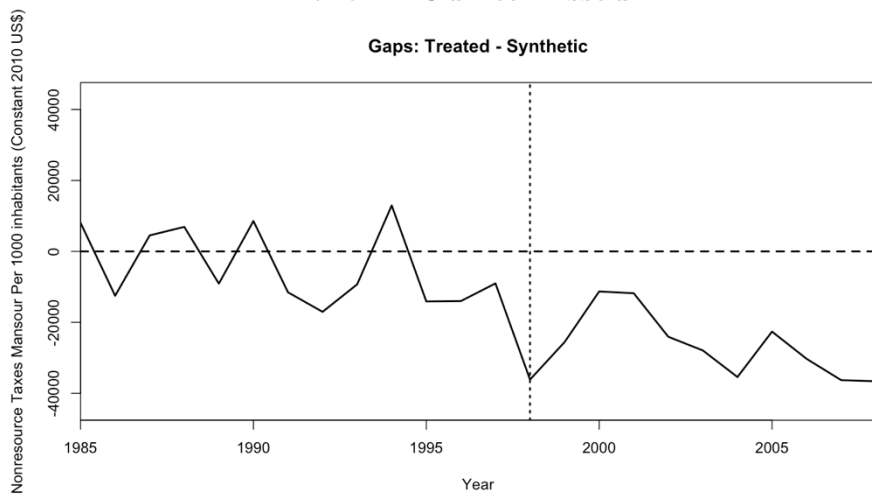
**Panel C. Republic of Congo**



**Panel D. Guinea**



**Panel B. Guinea-Bissau**



Note: The figure presents the yearly gap between the non-resource tax revenue in 2010 constant US\$ for 1000 inhabitants and its synthetic control for Central African Republic, Cote d'Ivoire, The Republic of Congo, Guinea and Guinea-Bissau.

In Cote d'Ivoire, the average yearly estimated gap is 90000<sup>13</sup> (90 US\$ per capita). The p-value of the treated unit post/pre MSPE ratio is 0.18, which means that only 18% of the 17 countries (Cote d'Ivoire and its 16 control countries) have a ratio of post/pre MSPE equal of higher than that of Cote d'Ivoire. Two countries have a higher post/pre MSPE ratio than Cote d'Ivoire: Swaziland and Zimbabwe. In Figure E 1, I provide additional insight on the post/pre MSPE ratio. I present the gap between the non-resource tax revenue and its synthetic control in Cote d'Ivoire Swaziland and Zimbabwe. The figure shows that the high MSPE in Swaziland and Zimbabwe – which resulted in a higher unit post/pre MSPE ratio than Côte d'Ivoire – can hardly be interpreted as an effect of a treatment in 2002. I then present the trends in outcome variables of the treated country versus its synthetic control (Figure E 2) as well as the yearly gap (Figure E 3) excluding Swaziland and Zimbabwe. The results barely changed.

The average yearly estimated gap in Guinea-Bissau is 26000 (26 US\$). The p-value of the treated unit post/pre MSPE ratio is 0.25, with Guinea-Bissau having the highest post/pre MSPE ratio.

The divergence between the non-resource tax revenue and its synthetic control after the outbreak of conflict in the remaining countries are not statistically significant. The p-value of the treated unit post/pre MSPE ratio is relatively high. The Central African Republic, the Republic of Congo and Guinea-Bissau all experienced an important loss of tax revenue after the outbreak of the violent conflict. However, our estimates are not statistically significant. Guinea stands in the analysis as the only country, where there was no drop in tax revenue after the conflict. The average gap between the non-resource tax revenue and its synthetic control is positive, about 4000 (4 US\$ per capita).

### 5.3.2. Robustness checks

As alternative method, I estimated individual separate effects of conflicts on treated countries using the Pesaran (2006) CCE estimator.

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<sup>13</sup> I considered the gap up to 2010 as the financial crisis started right after.



**Table 9: Impact of conflict on tax revenue using Pessaran (2006)**

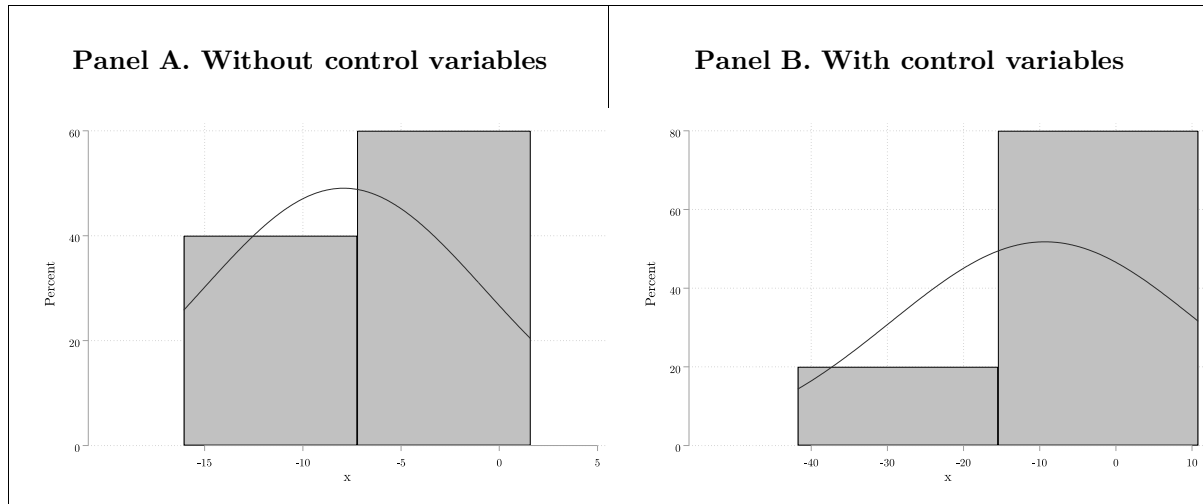
<b>Panel A. Averages across groups</b>		
	(1)	(2)
Variables		
Conflicts Dummy	-7.954** (3.461)	-5.854 (10.424)
Non-resource tax Per capita (Constant 2010 US\$) <sub>(t-1)</sub>	0.621*** (0.182)	0.074 (0.101)
GDP per capita (constant 2010 US\$)		0.202** (0.079)
Agriculture, value added (% of GDP)		1.609** (0.759)
Total trade (% of GDP)		0.278 (0.245)
Constant	15.135 (12.974)	-74.050 (96.433)
Observations	169	169
Number of countries	5	5

Note: Robust standard errors in parentheses (\*\*\*)  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The table reports the Pesaran (2006) CCE coefficients of the regression of non-resource tax revenue per capita in constant US\$ on the conflict dummy.

<b>Panel B. Country-specific coefficients</b>						
		CAR	CIV	Congo	Guinea	Guinea-Bissau
Variables						
(1)	Conflicts Dummy	1.596 (3.852)	-16.065 (13.818)	-6.983 (18.793)	-4.299 (6.419)	-13.868* (7.905)
(2)	Conflicts Dummy	3.184 (2.468)	-13.022 (10.059)	10.804 (17.853)	-5.820 (5.372)	-41.759*** (8.119)

Panel A in Table 9 presents the average effects of conflicts across the five treated countries over the period 1980-2015. The coefficient becomes non-significant when I include the control variables. Panel B in Table 9 shows the individual separate effects of conflicts. The results are line with those from the SCM framework. Conflict is estimated to have a highly significant negative impact on tax revenue in Guinea-Bissau. However, in Cote d'Ivoire, the coefficients are not statistically significant. The distribution of estimated coefficients of conflict is presented in Figure 5.

**Figure 5. Gap Distribution of individual effects of conflicts for the five treated countries**



Note: The figure is the histogram of the individual coefficients obtained for the dummy conflict using Pesaran (2006) CCE.

## 6. Conclusion

Starting from the reference work of Tilly (1985), who has stressed the importance of war in building a state's fiscal capacity, this paper estimates the impact of conflicts in Sub-Saharan Africa. The results show that while wars in Western Europe and US were favourable to reforming tax structure and increasing taxes, conflicts, in this case, internal conflicts rather led to a decrease of tax revenue in Sub-Saharan Africa. Internal conflicts not only alter government capacity to collect revenue, but they also reduce economic variables that constitutes the base of many taxes. Specificities such as ethnic division and natural resource endowment associated with the limited capacity to control rebellions hamper the mechanisms through which wars, especially internal wars lead to state building (see Rodriguez-Franco, 2016). Our results show the importance of stability and peace in developing Sub-Saharan Africa for a steady improvement of domestic revenue mobilization.

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Appendix

Appendix A: Occurrence and intensity of conflicts in Africa, 1980-2015.

Figure A 1. Number of years in active conflicts over the period 1980-2015

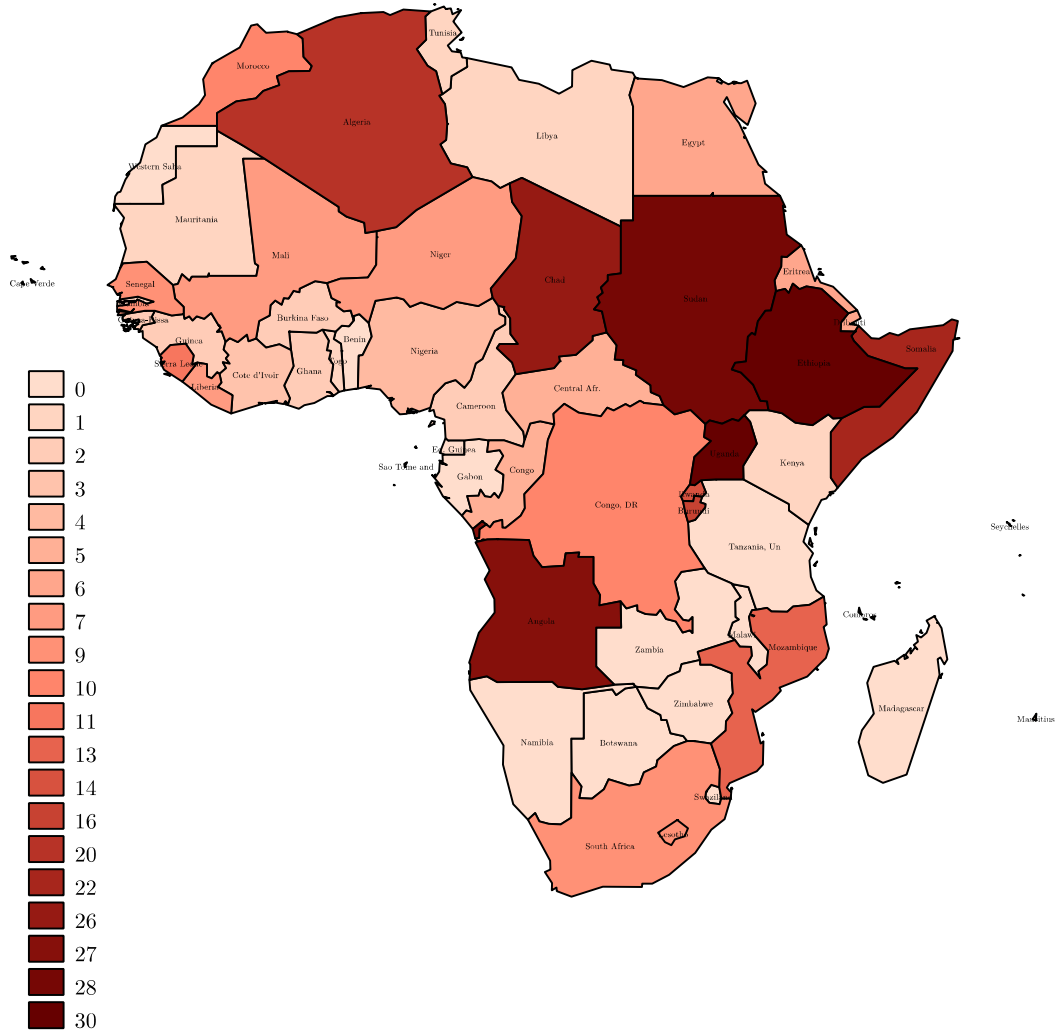
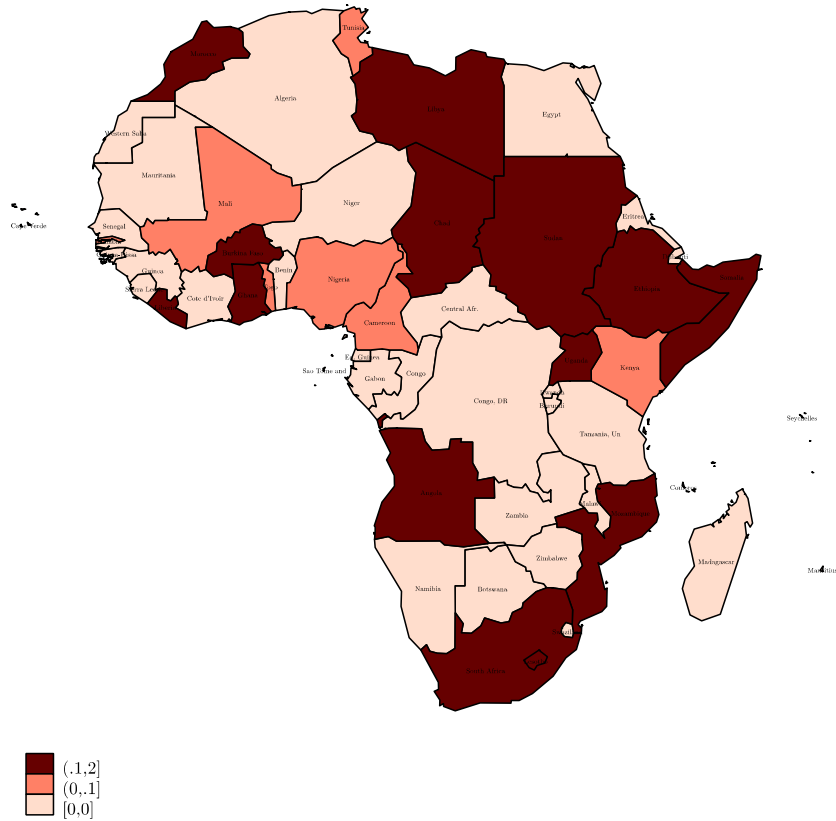


Figure A 2. Average intensity level of active conflicts in the 1980s and 2000s

Panel A: Average intensity level over the period 1980-1989



Panel A: Average intensity level over the period 2000-2010

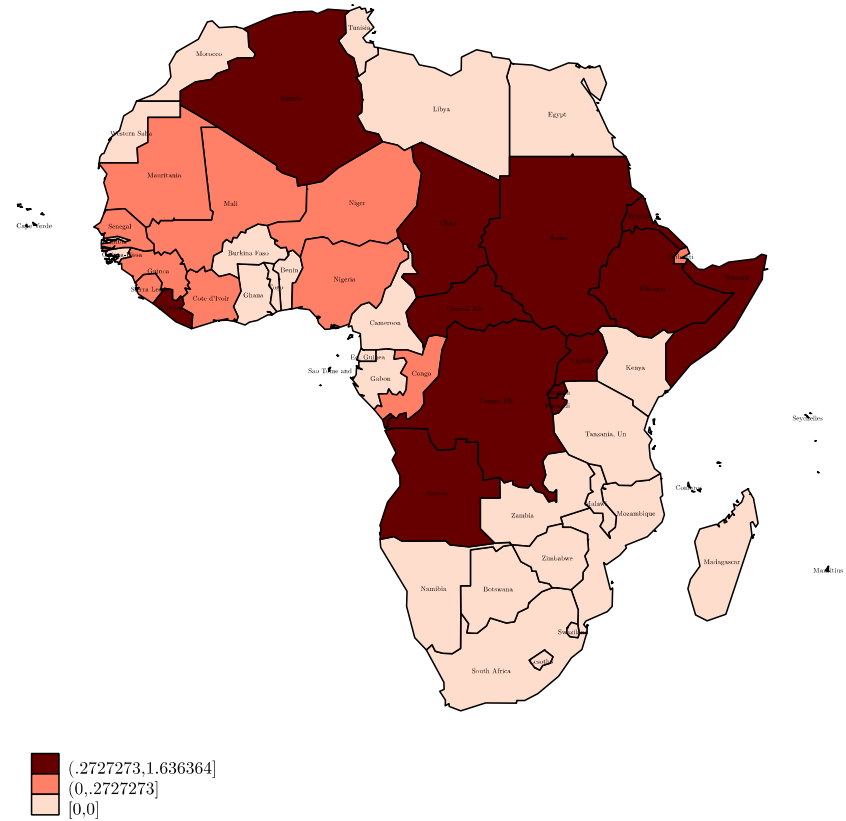


Table A 1: Detailed chronology of conflicts

Start date	Country	Country2	Opposition actor(s)	Opposition2	year	Int.	Start date2
27/05/01	Gov. of CAR*	Gov. of Libya	Military faction (forces of André Kolingba)		2001	1	01/06/01
			Forces of Francois Bozize		2002	1	01/06/01
		Gov. of France	Seleka		2006	1	28/11/06
			CPJP		2009	1	26/11/09
			CPJP		2010	1	26/11/09
			CPJP		2011	1	26/11/09
			Seleka anti-Balaka, Seleka		2012 2013	1 1	26/11/09 26/11/09
19/09/02	Gov. of CI		MPCI, MPIGO		2002	1	20/09/02
			MJP, MPIGO		2003	1	20/09/02
			FRCI		2004	1	20/09/02
			FDSI-CI, FRCI		2011	1	25/02/11
03/11/93	Gov. of Congo*		Ninjas		1993	1	11/11/93
		Gov. of Angola, Gov. of Chad	Cobras, Cocoyes	Gov. of Angola, Gov. of Chad	1997	2	06/06/97
		Gov. of Angola, Gov. of Chad	Cocoyes, Ninjas, Ntsiloulous		1998	2	06/06/97
		Gov. of Angola, Gov. of Chad	Cocoyes, Ninjas, Ntsiloulous		1999	1	06/06/97
		Gov. of Angola	Ntsiloulous		2002	1	10/04/02
01/09/00	Gov. of Guinea		RFDG		2000	1	17/09/00
			RFDG		2001	1	17/09/00
07/06/98	Gov. of GB	Gov. of Guinea, Gov. of Senegal	Military Junta for the Consolidation of Democracy, Peace and Justice		1998	1	07/06/98
		Gov. of Guinea, Gov. of Senegal	Military Junta for the Consolidation of Democracy, Peace and Justice		1999	1	07/06/98

Notes: \* denotes countries with an episode that started after 2015. All conflicts are internal. Conflicts where there is country2/opposition2 actors are internationalized internal. Country2: lists countries that enter the conflict with troops to actively support the country in conflict. Opposition2: actors on the opposition side. Int: is the intensity; 1 means less than 1000 deaths in a given year, 2 more than 1000 deaths in a given year. Start date2: date when a given episode of conflict activity reached 25 battle related deaths in a year. CAR is Central African Republic, CI is Cote d'Ivoire, Congo is Republic of Congo, GB is Guinea-Bissau.

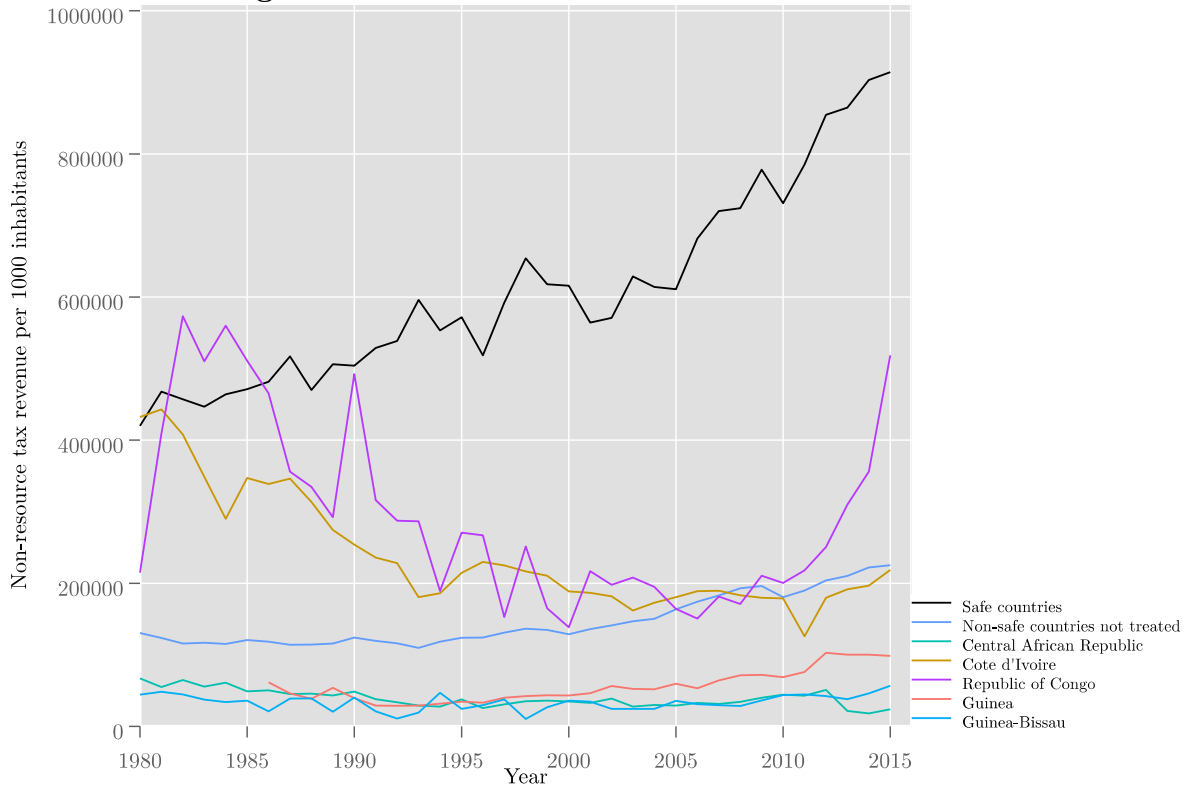
## Appendix B: Trends and correlation

**Table B 1: Correlation between variables**

Variables	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Non-resource tax [1]	1									
Conflict [2]	-0.1843*	1								
GDP per capita [3]	0.7735*	-0.1733*	1							
Agriculture added value [4]	-0.5977*	0.2936*	-0.6384*	1						
Total trade [5]	0.3022*	-0.1885*	0.3717*	-0.6133*	1					
Ethnic fractionalization [6]	-0.3246*	0.1725*	-0.2293*	0.2678*	-0.3251*	1				
Resource endowment [7]	-0.1520*	0.1783*	0.1417*	0.1016*	0.3065*	0.2705*	1			
ICRG Index [8]	0.4016*	-0.1669*	0.2996*	-0.4228*	0.048	-0.1907*	-0.2925*	1		
Net assistance & aid [9]	-0.3214*	0.0335	-0.3746*	0.3790*	-0.0743*	-0.0524*	-0.0366	-0.2161*	1	
Public external debt [10]	-0.2568*	0.034	-0.2165*	0.2334*	-0.0591*	0.1930*	0.2029*	-0.2784*	0.5268*	1

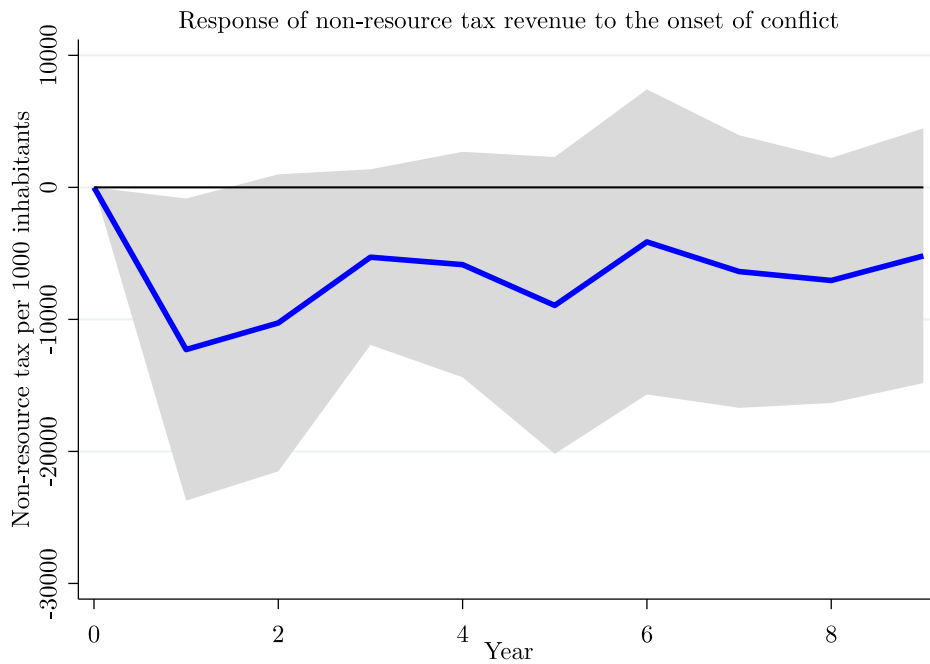
Note: \* significant at 5%

**Figure B 1. Evolution of non-resource tax revenue**



Appendix C: Impact of conflict on tax revenue over 10 years (OLS).

**Figure C1. Impact of conflict on tax revenue over 10 years (OLS).**



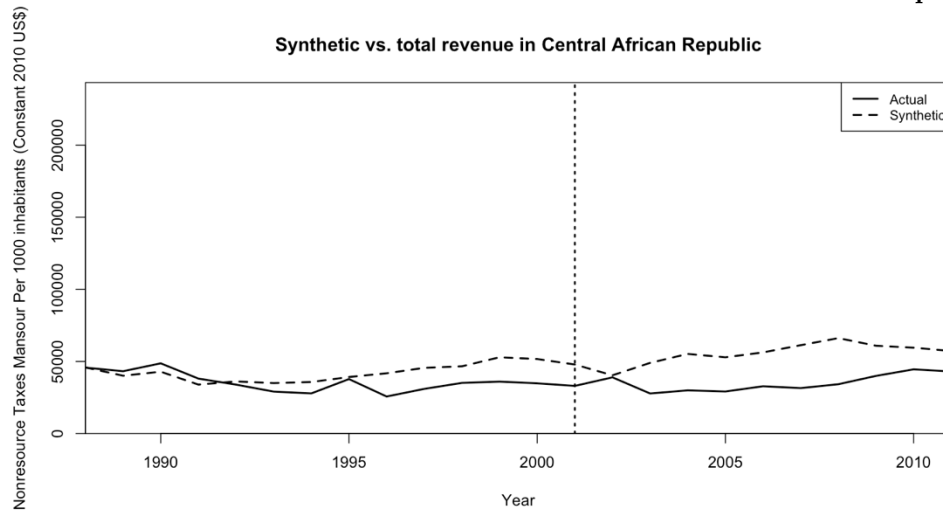
Appendix D: Results from the synthetic control estimation.

**Table D 1: Estimated synthetic control weights**

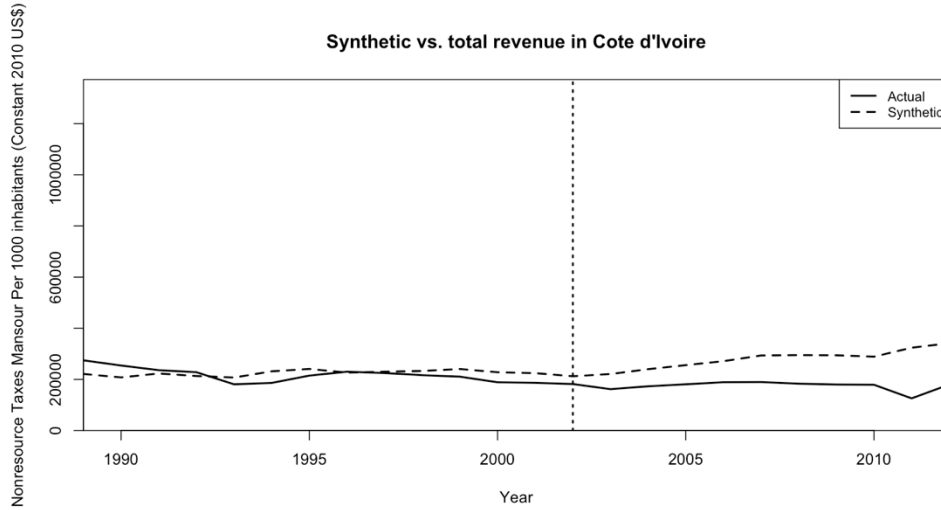
Country	Central Afr. Rep.	Cote d'Ivoire	Congo Rep.	Guinea	Guinea-Bissau
Benin	0	0.004	0	0	-
Burkina Faso	0.457	0.002	0	0.534	0.958
Botswana	-	0.003	0	-	-
Cabo Verde	-	0.002	0	-	-
Ghana	0	0.003	0	0	-
Kenya	0	0.789	0	0	-
Madagascar	0.543	0	0	0.466	0.042
Mauritius	-	0.005	0	-	-
Malawi	0	0.003	0	0	0
Namibia	-	0.096	-	-	-
Swaziland	-	0.002	0	-	-
Togo	0	0.004	0.655	0	-
Tanzania	0	0.003	-	-	-
South Africa	-	0.013	0.345	-	-
Zambia	0	0.068	-	0	-
Zimbabwe	-	0.002	0	-	-

**Figure D 1. Non-resource tax revenue treated and synthetic control**

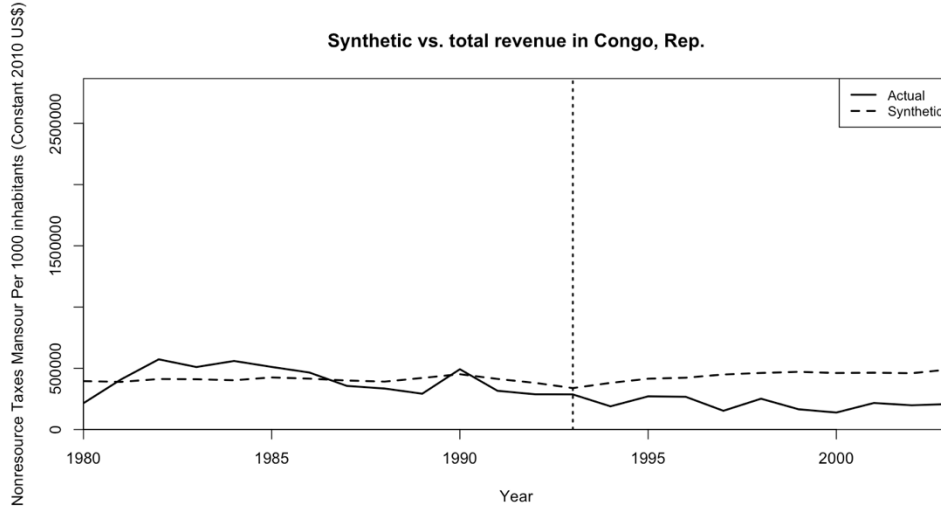
**Panel A. Trends in non-resource tax revenue in Central African Republic**



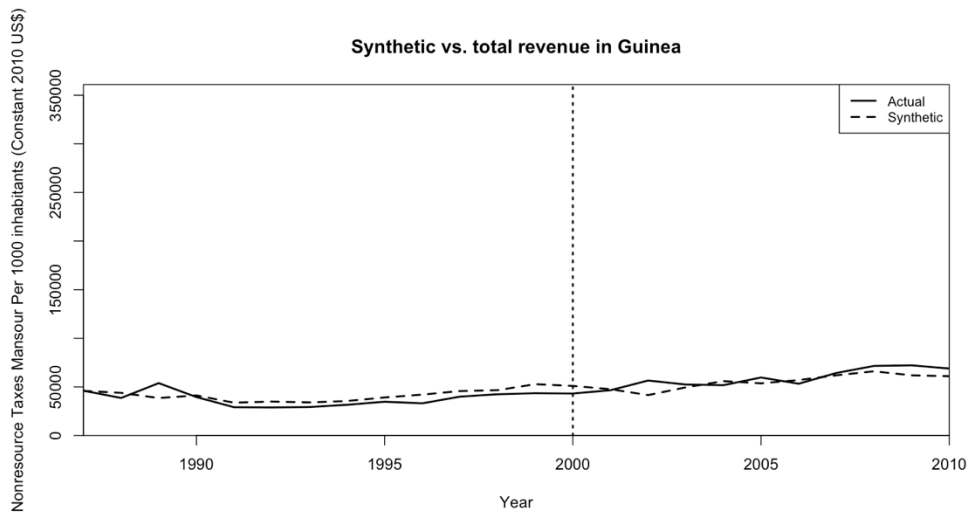
**Panel B. Trends in non-resource tax revenue in Cote d'Ivoire**



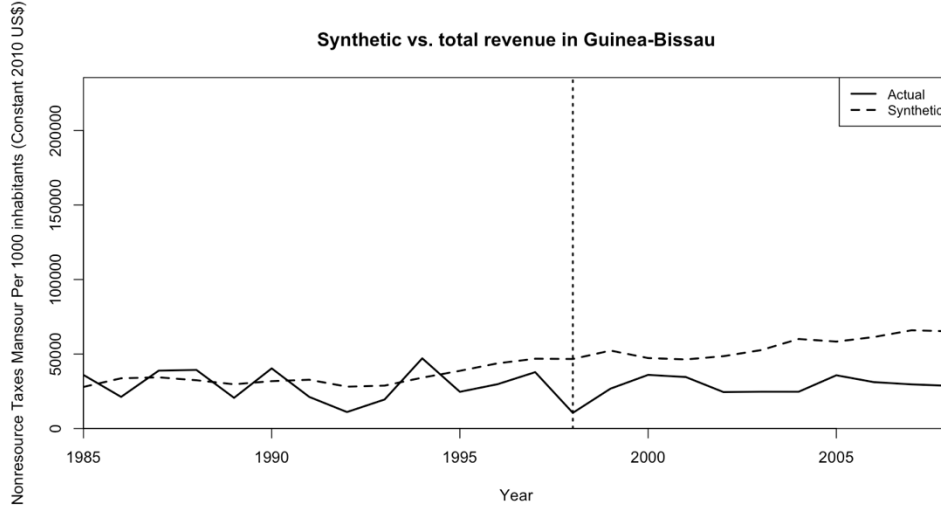
**Panel C. Trends in non-resource tax revenue in Republic of Congo**



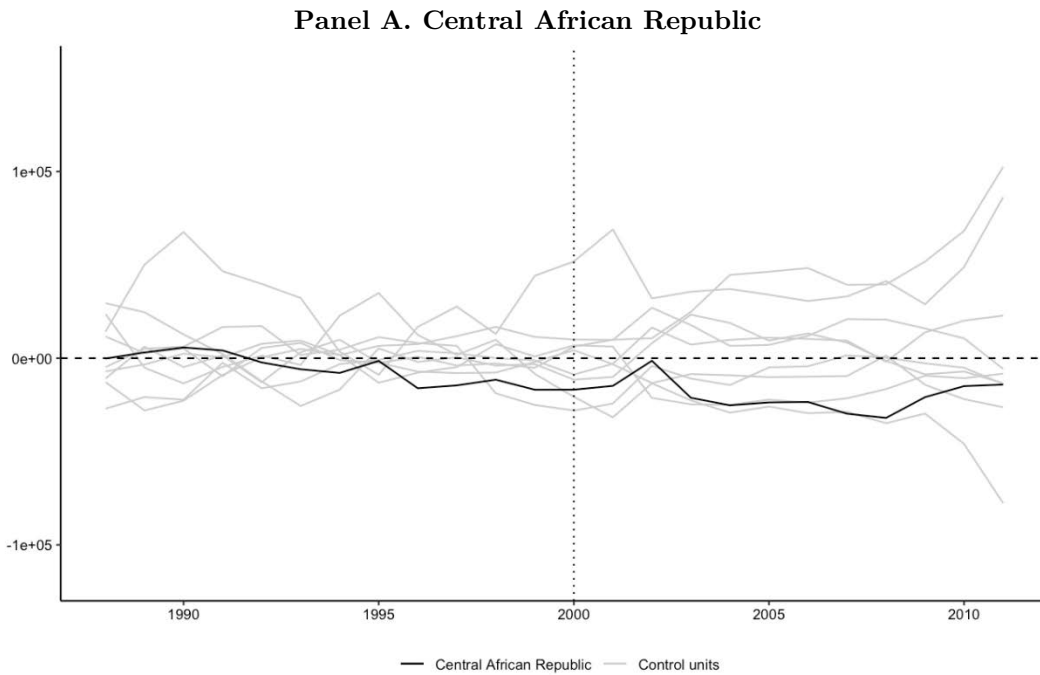
**Panel D. Trends in non-resource tax revenue in Guinea**



**Panel E. Trends in non-resource tax revenue in Guinea-Bissau**

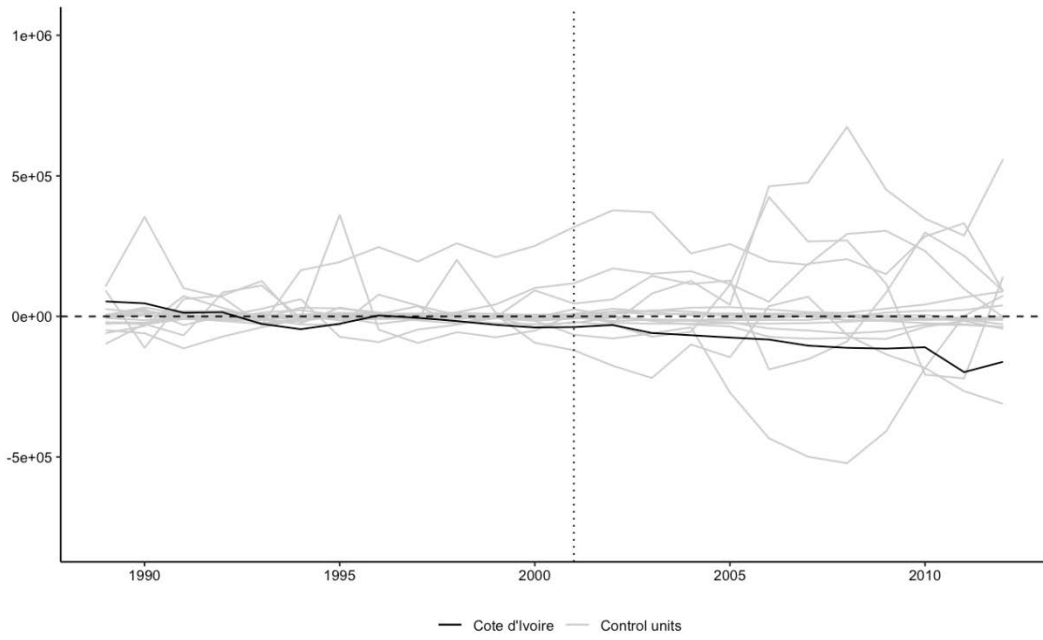


**Figure D 2. Non-resource tax revenue gaps in the treated countries and Placebo gaps in all their respective control countries**

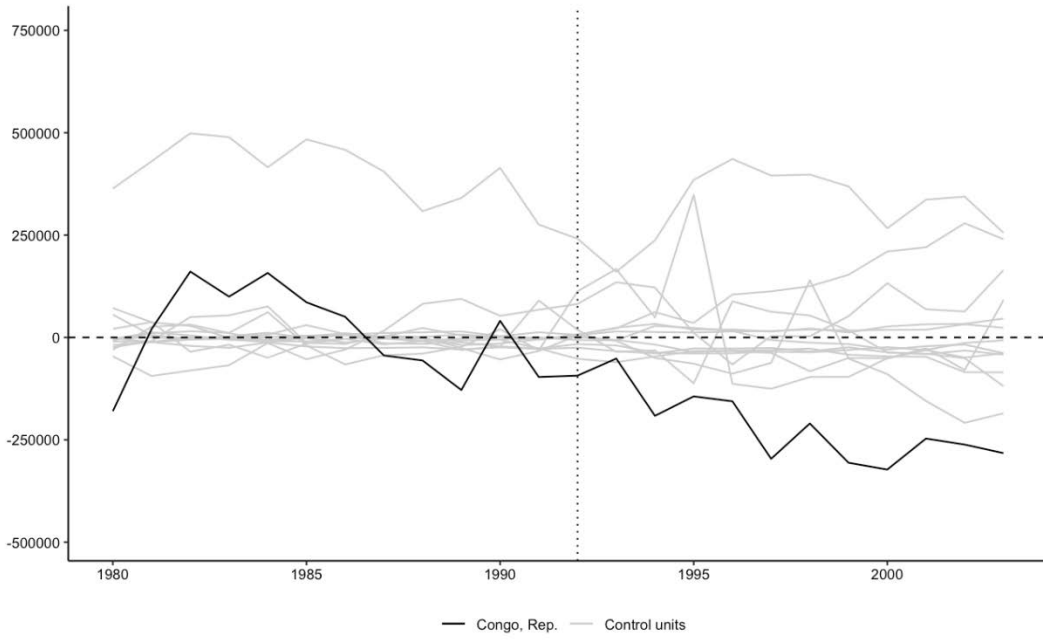




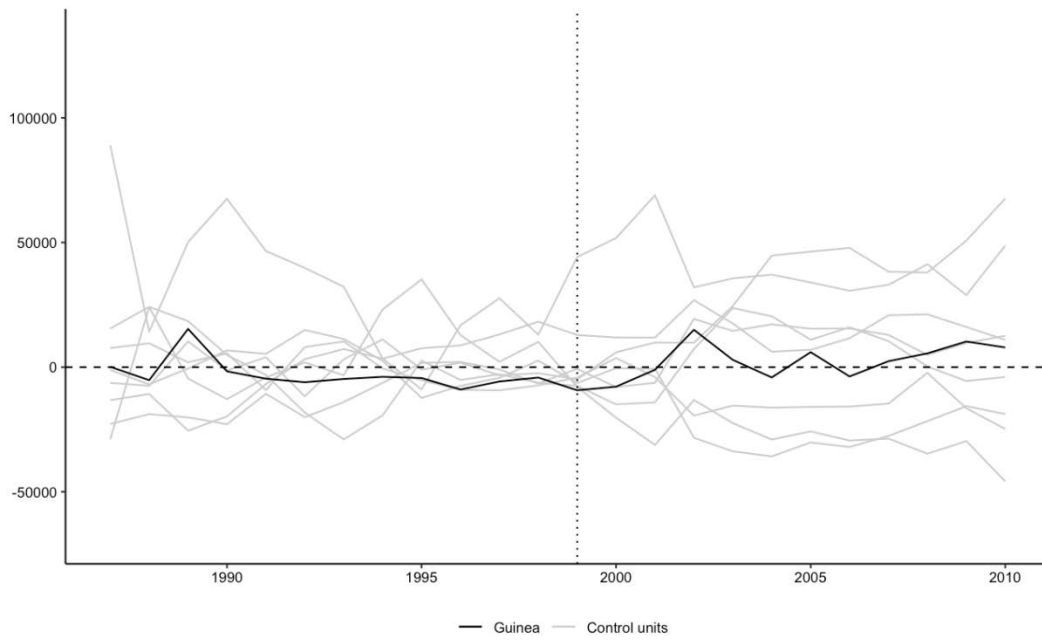
Panel B. Cote d'Ivoire



Panel C. Republic of Congo



Panel D. Guinea



Panel E. Guinea-Bissau

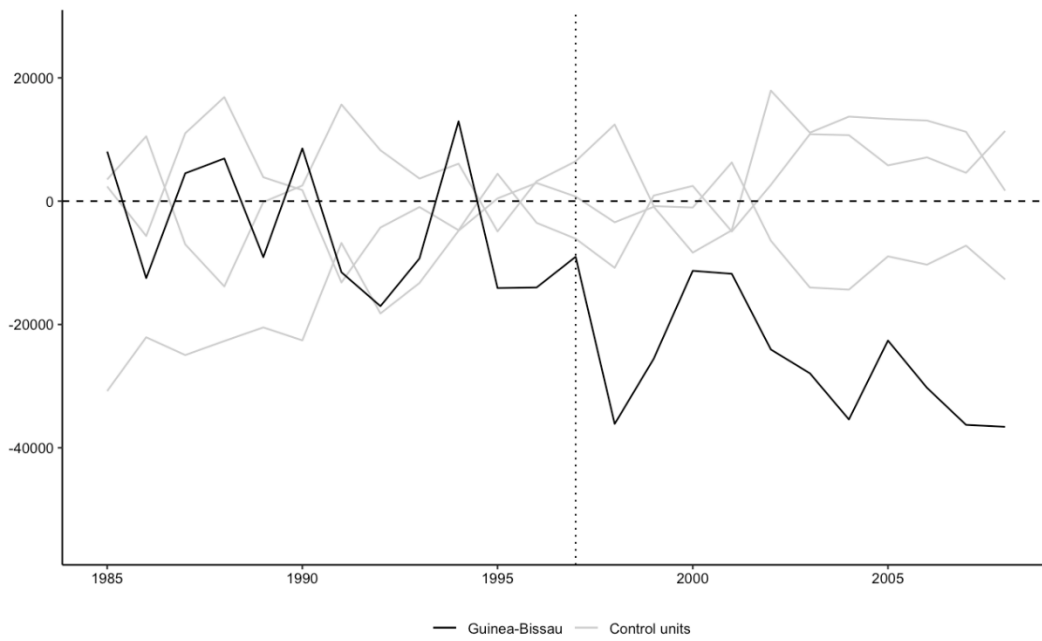
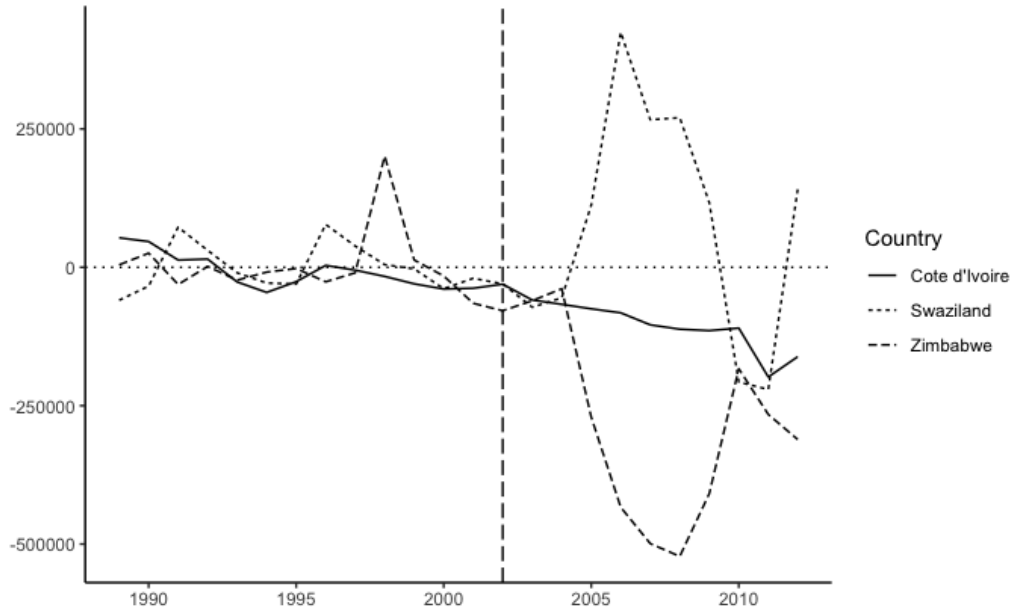


Table D 2: P values of the treated unit post/pre MSPE ratio.

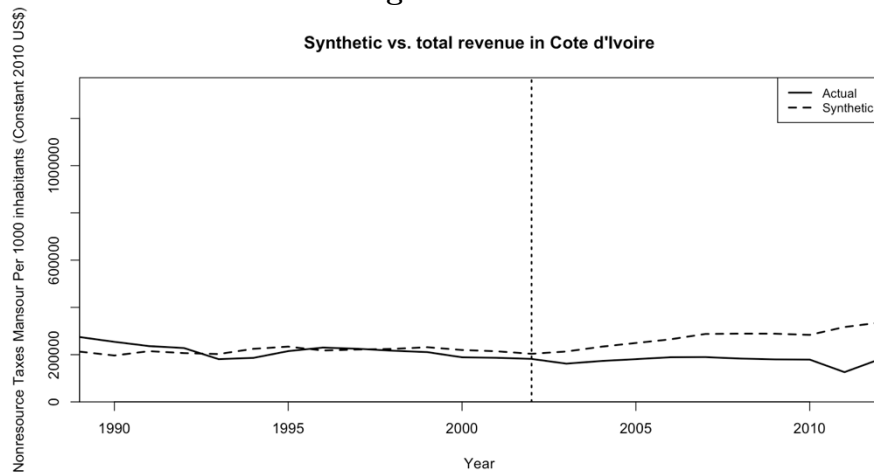
Country	Central Afr. Rep.	Cote d'Ivoire	Congo Rep.	Guinea	Guinea-Bissau
Mspe Test value	0.5	0.18	0.43	0.67	0.25

Appendix E: Additional robustness for Cote d'Ivoire.

**Figure E 1. Non-resource tax revenue gaps in Cote d'Ivoire and Placebo gaps in control countries with a post/pre MSPE ratio higher**



**Figure E 2. Non-resource tax revenue treated and synthetic control in Cote d'Ivoire excluding Swaziland and Zimbabwe**



**Figure E 3. Gap between tax revenue and the synthetic tax revenue in Cote d'Ivoire excluding Swaziland and Zimbabwe**

