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Conflict, Food Security and Crop Diversification Strategies: Evidence from Cote d'Ivoire

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Abstract

This study examines the household coping mechanisms during civil conflict in Cote d'Ivoire; the most powerful political economy factor dictating policy and performance in agriculture since the late nineties. The civil conflict that broke out in 2002 disrupted the socio-economic development caused by political instability and massive population displacement. It left the country divided into two halves - the tropical rain forest of the south, controlled by the government and the Savane of the north, controlled by the opposition forces. The north-south division demarcated by the enforcement of the UN peace-keeping line disrupted the food supply chain from the North to the rest of the country. Presumably, this had differential effects on agricultural strategies between the north and the South. This report provides theoretical discussion supported by empirical outcomes on the crop diversification as a coping mechanism for households facing the risk of conflict in the southern parts of Cote d'Ivoire. These households believed that if they can access land, they could make use of the available labor supply and thus feed their families. In other words, 'self-sufficiency' became the common principle. In the pre-war period cassava was the only food crop grown by more than 10% of the farmers in the South Forest; however, in the post conflict period, a sizable portion of the farmers were also involved in growing rice, maize, sorghum, vegetables, etc.

1.Introduction

'Civil War' is a dreaded reality. The consequences of this hard truth are not one but many, whether it has political, demographic, economic or even philosophical implications. The common strategies that poor households in rural areas undertake when threatened with an imminent risk or a crisis can be enumerated as the immediate diversification of land holdings into several spatially separately plots, prolonged stores of grains, atypical sales and purchases of assets such as land, financial borrowing from money lenders where deemed necessary and the utilization of transfers and non-money transactions relying on family or close support networks (Townsend, 1995).

Cote d'Ivoire is no exception to this. After two decades of successful economic development following independence in 1960, anchored by political stability and reasonable macro-economic management, Côte d'Ivoire descended into crisis that has lasted for twenty years. The consequences for the population's welfare have been tragic especially with the political instability posing a persistent threat of civil war and rising food prices in recent years. The GDP growth was negative in 2005 and 2006 and the GDP per capita stood at US$ 866 in 2007, with almost half of the population living below the poverty line of US$2 per person per day. The humanitarian situation has continued to deteriorate over the years (FAO, 2007). The human development index for Côte d'Ivoire was ranked 164th out of 177 countries in the Human Development Index scale in 2006 (UNDP, 2006). The nutritional status of vulnerable populations, especially children under five worsened since the civil war began.

This study provided evidence of crop diversification as a mechanism through which the risk of conflict can be mitigated. I build our hypothesis based on insights from the existing literature and empirically test if the most common occurrence was the utilization of crop diversification as a tool to smooth consumption and maintain standards of living. Specifically, in this proposed study we shall bridge the gap as mentioned by (Brück & Schindler, 2008) and investigate, to what extent crop diversification was used as a coping strategy by the households during the civil unrest in Cote d'Ivoire. The plan as follows. The next section provides a brief historical account

of the Ivoirian civil war, which is followed by a discussion on conflict and food security. Then I provide descrtive evidence on crop diversification, which is again followed by the multivariate regression outcomes on the determinants of crop diversification. At the end I briefly discuss the welfare consequences of crop diversification in Cote d'Ivoire.

2.The Ivoirian Civil War

A. The economic stagnation and political crisis preceeding the war

To gain a better understanding of the socio-political attributes that are deeply rooted in Ivoirian society and the rollercoaster performance of the Ivoirian economy, we go back to 1960, when Félix Houphouët-Boigny became the first president after Côte d'Ivoire gained independence. Under his rule, Côte d'Ivoire became one of the greatest success stories of sub-Saharan Africa with an annual average growth rate of over 7 percent throughout the 1960s and 1970s. Many factors were behind this miracle, such as sound economic management, close trade relationships with the Western world, effective development of the cocoa and coffee industries but more importantly the establishment of ethnic quotas in the political system which helped prevent exclusion of any sort. However, the worldwide recession and volatility in cocoa and coffee prices prompted Côte d'Ivoire to sign up for the structural adjustment programs offered by the World Bank and the International Monetary Fund. It only made the situation worse in leading the Ivorian economy to a prolonged economic crisis.

Economic stagnation along with the declining state-run welfare system and rising unemployment gradually created political opposition, which finally led to a multi-party election for the first time in 1990. The incumbent president, Félix Houphouët-Boigny, won the election by a significant margin defeating his closest opponent Laurent Gbagbo from the *Front Populaire Ivorien* (FPI) party. He died in 1993 and Henri Conan Bedie from the same political party *Parti Democratique de la Côte d'Ivoire* (PDCI) succeeded him, thus ending the power struggle against Alassane Ouattara. Following a split in the PDCI, Ouattara formed a new political party known as the *Reasemblement des*

Republicans (RDR). Bedie remained in power until 1999 when he was overthrown by a military coup led by General Guei (Figure 1).

Figure 1 A Brief History of the Ivorian Civil War

Timeline	President	Election	Challenger	Events
1960-1989	Félix Houphouët-Boigny	No		
1990		Yes	Laurent Gbagbo	Félix Houphouët-Boigny won with 81.68% of the vote
1991-1993		No		Félix Houphouët-Boigny nominated Henri Bedie as the next president
1994-1998	Aimé Henri Konan Bédié	Yes	none	Ouattara was barred from participation, birth of the "Ivoirite" concept—both his parents were from Ivory Coast
1999	Robert Guei	No		Robert Guei led a successful Coup, Bedie fled to Burkina Faso
2000-2001	Laurent Gbagbo	Yes	Robert Guei	PDCI-RCA (Bedie) and RDR (Ouattara) boycotted the election, Gbagbo won with 59.4% of the vote
2002		No		Around 800 mutineers took up arms against Gbagbo. Their demand included reintegration of deserters into the army, the release of military and paramilitary officers from the prison, along with better pay. The coup was successful only in the north; rebels retreated to the Muslim dominated North
2003				Civil war broke out; Government blamed immigrant population workers; French troops came and UN peace-keeping forces succeeded in creating a ceasefire line between the rebel controlled north and the government controlled south
2004-2009				From 2003 to 2005, there were many failed attempts to stop the war, with mass killings and leaving thousands displaced; Preparation for the much awaited election started at a slower pace; Took two years to achieve with the complete voters list, identification card for the voters, etc.
2010		Yes	Alassane Outtara	Following the disputed election, Ouattara was initially declared as the winner, but recounting favored Gbagbo; Two cabinets ran simultaneously
2011	Alassane Ouattara			Outarra became president following an election with international interference

Source: authors' compilation based on multiple sources

Throughout the 1990s, the concept of *Ivoirite* became the major political discourse. The ethnic and eventually the religious cards were frequently used by all the major political parties to gain greater political voice. Against the background of a prolonged economic

crisis, migrants and settlers from other countries were made the scapegoat for the decline in Ivoirian economic performance. The ongoing crisis was envisioned as an outcome of the liberal pro-migration policies and liberal landownership rights which had been practiced for decades. In 1994, the concept of Ivoirite was institutionalized, as the new Electoral Code restricted the right to vote to Ivorian nationals and all presidential candidates should have complete Ivoirian parenthood. Both Gbagbo and Bedie embraced this concept to gain political advantage but more importantly to prevent Ouatarra from contesting the election since his father was from Burkina Faso. As a result in 1995 Outarra was barred from running for president. Moreover, in 1998, Bedie introduced a new Land Code which allowed only Ivoirians to buy land. It also prevented non-Ivoirites or immigrants from settling in the southern part of the country. Consequently immigrant landowners in the south became more vulnerable to forceful land-grabbing. Meanwhile, Ouatarra and his RDR supporters attempted to create an ethnicized support base in the North.

In 2000, Laurent Gbagbo from the FPI party became the Ivoirian president after defeating General Guei by a considerable margin. He was from the Baoule ethnic group and the 'baoulisation' of the political system under Laurent Gbagbo's presidency marked a significant departure from Félix Houphouët-Boigny's thirty years-long policy of ethnic quotas. Northern ethnic groups, predominantly Mande and Krou among others, experienced growing political exclusion which only exacerbated the social strife that already existed since the early 1990s. In 2002, Gbagbo decided to demobilize the northern troops who had been recruited under the presidency of Robert Guei. Amidst growing social tensions and economic stagnation, this proved to be the catalyst in turning social strife into a full blown civil war.

The first round of armed conflict started in September, 2002 but lasted for only a few months. The national army (FANCI) was joined by the Young Patriots, a youth militia that supported President Gbagbo. On the other side, a few small rebel groups like the *Movement for Justice and Peace* (MJP), the *Movement of the Ivory Coast of the Great West* (MPIGO) and supporters of Outarra joined together under the banner *Forces Nouvelles* (FN) led by Guillame Soro. The first peace agreement between the two

opposing forces, The Linas-Marcoussis, was signed in January 2003. The *Forces Nouvelles* took charge of the Ministry of Defense and the Ministry for the Interior. Around the same time French troops and the UN peace-keeping force formed a narrow 'peace belt', which constituted a line of control near the religious fault line (see Figure 2). Since then a number of peace agreements had been signed between President Gbagbo and opposition forces, but the tension remained until 2007, when Guillame Soro became Prime Minister under Gbagbo. Both sides agreed to a free and fair general election to be held in 2008.

Figure 2 The 'UN Peace Belt' dividing Cote d'Ivoire into two parts

Source: http://en.wikipedia.org/wiki/First_Ivorian_Civil_War#mediaviewer/File:C%C3%B4te_d%27Ivoire_ZDC.png

The long-anticipated presidential election was held towards the end of 2010, after having been postponed six times. The presidential contest morphed into a political stalemate with the deadly power struggle between the renegade incumbent Laurent Gbagbo - who refused to relinquish power despite losing the election and Alassane Ouattara - who was finally given the chance to stand in the election in 2011 and was declared the winner by the Electoral Commission. Despite growing international pressure, Gbagbo refused to leave the office which again initiated fresh spells of violence and Côte d'Ivoire remained at the brink of another deadly civil war. When world leaders interfered, Gbagbo was finally forced to stand down in April 2011 and

since then Ouattara has been president of Côte d'Ivoire.

B. Incidences of conflict

The data on local incidences of civil war is taken from the Armed Conflict Location and Event Database (ACLED) for the period 1997 to 2008. To match with the conflict outcomes, the potential causal factors are constructed based on the Enquete sur le Niveau de Vie de Menage (ENV) survey data administered in Cote d'Ivoire. We use three rounds of nationally represented ENV data - 1998, 2002 and 2008.

Figure 3 Incidence of Conflict in Cote d'Ivoire: 1997 to 2010

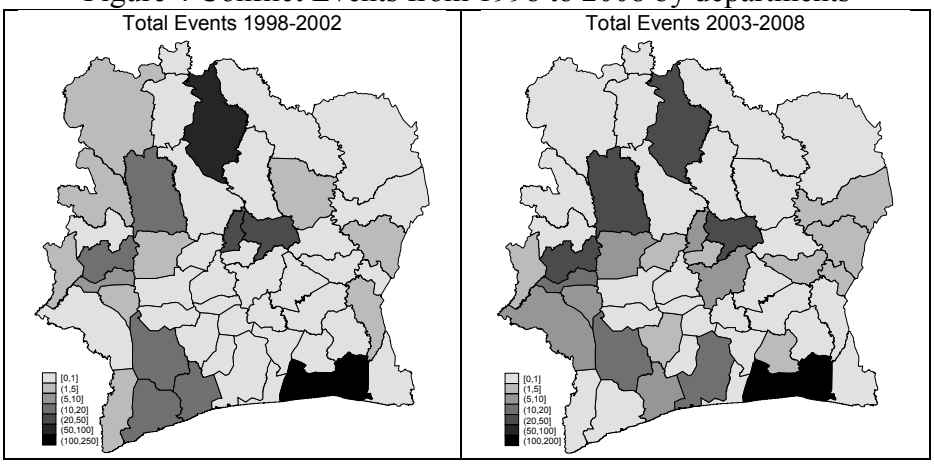
Source: Authors' calculation based on the ACLED database

The Armed Conflict Location and Event Database[1] (ACLED) (Raleigh, Hegre, and Carlson, 2009) compiles exact locations, dates, and additional characteristics of individual battle events in states affected by civil war. The conflict data for Cote d'Ivoire is available for the period from 1997 to 2010. It tracks rebel activity and distinguishes between territorial transfers of military control from governments to rebel groups and vice versa. The conflict events are disaggregated into six categories: (i) Battle - government regains territory, (ii) Battle - no change of territory, (iii) Battles - rebels overtake territory, (iv) Non-violent activity by a conflict actor, (v) riots/protests, and (vi) Violence against civilians. In Figure 3, we show the total number of reported conflicts according to year. In our study period, the frequency of conflict events follows

[1]For more information please look at the ACLED website located at http://www.prio.no/CSCW/Datasets/Armed-Conflict/Armed-Conflict-Location-and-Event-Data/

a twin-peaked distribution. The first peak is around 1999-2000 and the second peak is between 2002 and 2006, when the conflict was at its most violent. The ACLED database on Cote d'Ivoire reports a total number of 965 armed conflict events for the period 1998 to 2008.

Figure 4 Conflict Events from 1998 to 2008 by departments



Source: ACLED and author's own calculations

As per the 1998 Census, Cote d'Ivoire is divided into 50 departments. ACLED provides the exact locations of the civil war events. Based on the data on latitude and longitude, we map these conflict events into 50 departments using spatial coordinates taken from the DIVA-GIS [2] website. In Figure 4, we plot the total number of events at the department level for two periods: from 1998 to 2002 and from 2003 to 2008, respectively. In both figures, the regions marked with darker shading refer to a higher frequency of war events. A quick glance of these graphs indicates that the incidences of civil conflict have been more frequent in the western and southern parts of Core d'Ivoire and in the neighborhood Abidjan. In 2003, the number of armed conflict events escalated to more than 150. These events are recorded at a large number near the Line of Control administered by the UN and the French troops. In Table 1, I depict the descriptive statistics concerning conflict counts at the department level (N=50). The average conflict counts were higher in the period 1999-02 compared to 2003-06. The average number of conflict events per department stood at 9.16 and 8.58 in the periods

[2]DIVA-GIS website for Cote d'Ivoire http://www.diva-gis.org/datadown

1999-02 and 2003-06, respectively.

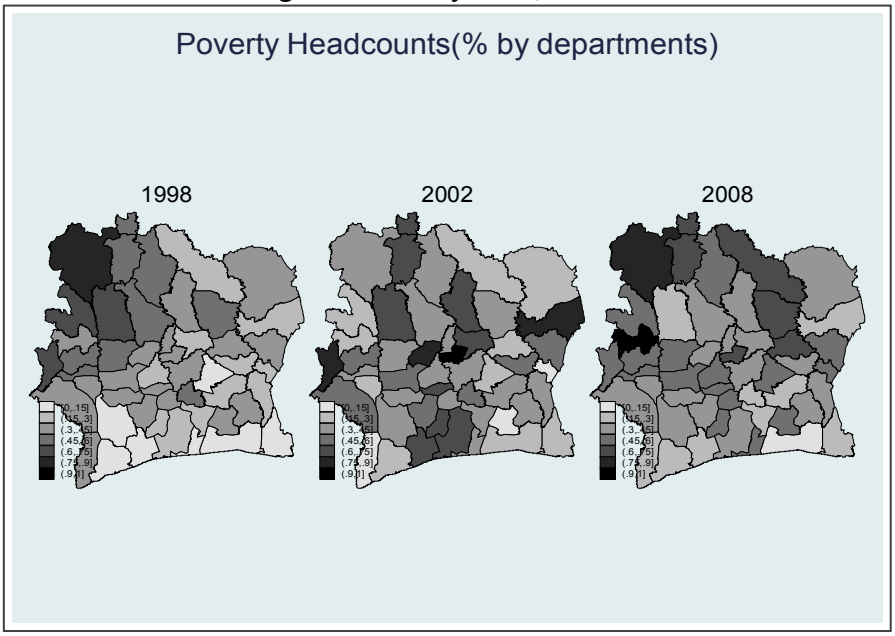
Table 1 Descriptive statistics of conflict counts at department/ sub-prefecture level

Level	Total events	Obs	Mean	Std. Dev.	Min	Max	Zeros (%)
Department	1999-2002	50	9.16	32.73	0	223	44%
	2003-2006	50	8.58	24.78	0	169	26%

Source: ACLED and authors' calculation

There were many factors associated with the Ivorian civil war. From the rivalry of political elites to the fragile land tenure system near the cocoa belt, politicization of ethnicity to the effect on food insecurity and heightened health hazards. Conceivably, poverty became widespread over time and this is evident from Figure 5. In 1998, poverty was more profound in the north west of the country. However, in recent years the poverty rate has increased in the war-torn region, particularly the mid-west of the country and the south has also experienced higher poverty rate in recent years compared to the late 1990s. Together, these problems point to a significant welfare loss for Ivoirians.

Figure 5 Poverty rates, 1998-2008



Source: authors' compilation based on ENV survey rounds 1998, 2002 and 2008

3.Conflict and food security in Cote d'Ivoire

Conflict and food security are linked in various ways. On one hand, the incidences of civil war exacerbate the conditions leading to malnutrition such as inadequate household food security and poor diet (FAO, 1998). On the other, the need to secure food and nutrition requirements of the population suffering from the conflict become a necessary condition for recovery (Flores, 2004). In 2003, a report by the *Food and Agriculture Organization (FAO)* documented that more than half of the countries where undernourishment was most prevalent experienced violent conflict and civil war in the 1990s (FAO-SOFI, 2003). Theoretical models by Taeb (2004) and Messer and Cohen (2004) argue that conflict has similar effects on food security. This has been supported by empirical studies. Using a sample of 38 countries that experienced conflict between 1961 and 2000, Teodosijevic (2003) finds that the incidence of conflict reduces daily energy supply (DES) calories on average by 7 percent. Jeanty and Hitzhusen (2007) find similar evidence on a larger panel of 80 less developed countries. These findings indicate a negative correlation between conflict and food security. However, Messer and Cohen (2004) point out the need for food insecurity has rarely been investigated by the

studies of the economic correlates of war directly, although they often provide evidence that conflict is strongly related to factors associated with food insecurity.

Turning to Cote d'Ivoire, recent studies report the problems caused by conflict on people's health outcomes and food insecurity in Cote d'Ivoire. The percentage of children under five suffered from stunting increased from 30.8% in 2004 to 32.9% in 2006 whereas 13.6% of children suffered from wasting in the North (UNICEF-MICS, 2006). Moreover, the under-5 mortality rate increased from 117 per 100,000 live births in 2004 to 125 per 100,000 live births in 2005 (FAO, 2007). Only one third of births were attended by skilled personnel, pushing maternal mortality to 690 deaths for 100,000 live births (FAO, 2007). The in-depth emergency food security assessment conducted in October 2006 by WFP concluded that about 9 percent of the population of the affected regions was food insecure, whereas an additional 20 percent was at risk (WFP, 2006).

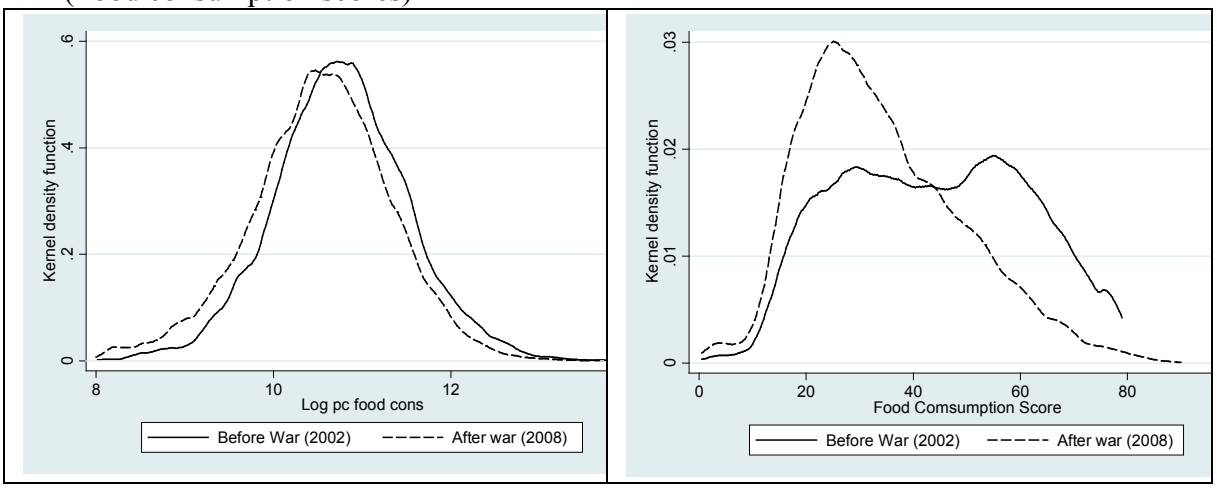
Table 2 Classification of households based on Food Consumption Scores

Food consumption Score	ENV-2002	ENV-2008
0-21 (Poor)	11 %	19 %
22.5 – 35 (Borderline)	24 %	38 %
>35 (Acceptable)	65 %	43 %

Source: Dabalen and Paul (2014)

Dabalen and Paul (2014) in a recent study find robust and statistically significant evidence of households in the worst-hit conflict areas and individuals who are the direct victims of the conflict having lower dietary energy supply. The FCS, which we use, is a frequency-weighted dietary diversity score. As a composite score, it has the strengths of dietary diversity measures validated in nutrition studies, but also takes into consideration the frequency of food intake, the relative nutritional importance of different food groups, and therefore availability of the nutrients and calories in the food groups consumed. As described in Table 2, the food insecurity in terms of food consumption score increased between 2002 and 2008.

Figure 6 Kernel density plots of Per capita Food Consumption and Dietary Diversity (Food consumption scores)



Source: Dabalen and Paul (2014)

Figure 6 compares the Kernel density estimates of log real per capita food expenditure[3] for households before war and households after war. The distribution of log per capita food expenditure for households who were interviewed after the war in 2008 shifts leftward. This indicates an overall fall in the food expenditure across all income levels. In the right hand panel we compare the distribution of FCS between 2002 and 2008. The kernel density function of FCS in 2002 shows a bimodal distribution, with its first peak around the score of 30 and the second around the score of 60. In 2008, we find a rightward skewed distribution of FCS, with a peak below 30. This indicates a significant shift of the population share with FCS below 20 between 2002 and 2008. Moreover, there is also a significant increase in the population share between 20 and 35.5, indicating increasing vulnerability based on dietary diversity and access to food.

On one hand, both anecdotal evidences and studies based on statistical rigor point to the fact that food security in Cote d'Ivoire worsened during the period from 2002 and 2008 along with other health related negative outcomes. On the other hand, the last years have seen an important development on investigations related to the questioned strategies that households utilize to cope with the risk presented by civil unrest. A number of coping strategies as adopted by households revolve around the sole word, 'agriculture' in Africa. This is not so surprising, as up to seventy percent of households

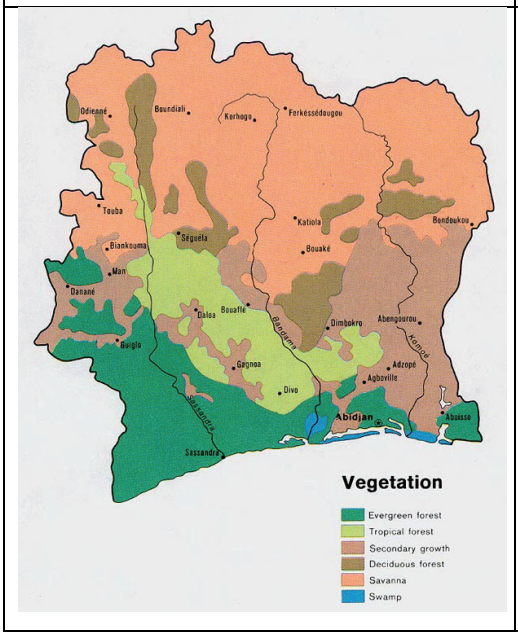
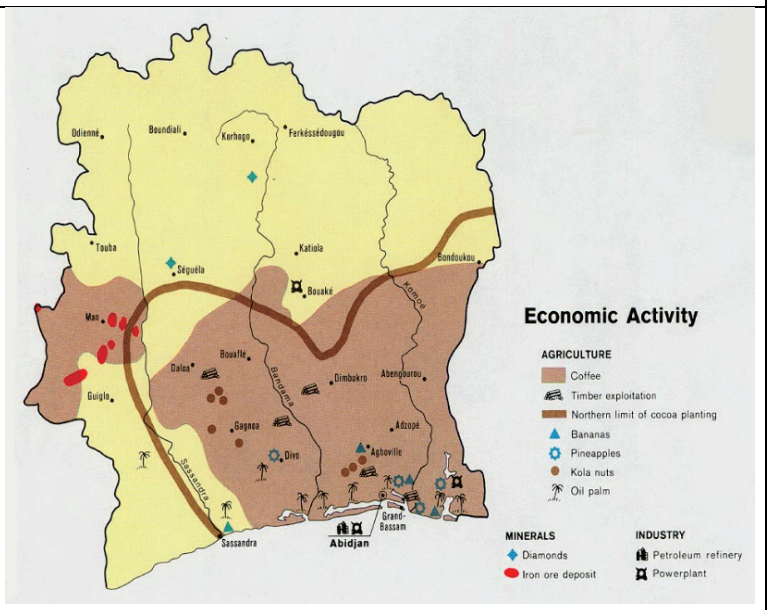
[3]The real figures are obtained after adjusted for regional deflators and Consumer price index (CPI)

in Africa depend on agriculture (Chenje et al, 2006). Justino (2010) observed that households residing in an area of conflict or in camps allocated for the refugees and internally displaced persons tend to rely on the cultivation of crops which are perceived as low risk and as such hand in hand of low return. These households believed that if they can access land, they could make use of the available labor supply and thus feed their families. In other words 'self-sufficiency' became the golden principle. As Collier (1999) put it, civil strife would lead to a change of economic activity towards autarky and subsistence activities, which were recognized as being less vulnerable to the calamities that civil unrest represented. In the next section we discuss the existence and extent of crop diversification as a coping strategy for Ivoirians facing conflict.

4.Crop diversification in Cote d'Ivoire: Descriptive evidence

In the backdrop of the recent global crisis preceded by a civil war, the Republic of Côte d'Ivoire portrays a unique experience of rising poverty and inequality (Dabalen, Essama-Nssah & Paul, 2010). The civil war that broke out in 2002 disrupted the socio-economic development caused by political instability and massive population displacement. It left the country divided into two distinct parts-the tropical rain forest of the south, controlled by the government and the Savane of the north, controlled by the opposition forces. During this period, the average real GDP grew at the rate of -.4 percent per year. The livelihood of rural households declined severely in the absence of a central administration (FAO, 2009). At the same time, the rural poverty rate increased from 46 percent in 2002 to 55 percent in 2008 (Dabalen and Paul, 2010). Since the late nineties, the most powerful political economy factor dictating policy and performance in Ivorian agriculture has been civil conflict (Abbott, 2007). According to Abbott (2007), the civil war has influenced the specifics of agricultural policy through the north-south division of the country and through impacts of immigrant labor from neighboring countries.

Figure 7 Vegetation and crops in Cote d'Ivoire

Vegetation	Location of crops
	

Source: http://www.fao.org/countryprofiles/index/en/?iso3=CIV

In Cote d'Ivoire almost 68% of labor force participates in agricultural activities. The institutional development behind agricultural policy in Cote d'Ivoire was heavily influenced by the French colonial legacy through the establishment of infrastructure and institutional structures. Cote d'Ivoire officially became a French colony in 1893 and an autonomous republic within the French community in 1958, followed by its full independence in August 1960 (US Dept. of State, 2003).

Traditionally, agricultural policy in Cote d'Ivoire has discouraged food crop production, against the wishes of farmers. In the 1920s cocoa and coffee plantations were established alongside smallholder farms. Cotton production was also developed from about the same time (FAO, 2003). This period also saw the establishment of the conditions for commodity production through the development of transportation networks, the activities of merchant houses and the imposition of export-oriented agricultural activities (Bassett, 1988). This shifted the focus of policy on export crops at the expense of food production. For decades, the Republic of Cote d'Ivoire has remained primarily an export oriented agricultural economy characterized by small

holder farming and cash crops[4] as the main source of revenues. From 1965 to 1980, the growth of agricultural GDP from cocoa and coffee alone averaged around 7 percent a year. However, the volatility in the world prices of cocoa and coffee since the late 1980s and the price uncertainty with the liberalization of cocoa and coffee marketing board in 1999 resulted in a large decline in the participation of cocoa and coffee farming (Dabalen, Essama-Nssah & Paul, 2010). Alongside, the cotton crisis since 2004 and the poor cashew harvest in 2006 led to an increase in the cultivation of food crops by replacing some of the existing cash crop activities (FAO, 2010).

The total agricultural production in Cote d'Ivoire's can be divided into two distinct parts - the tropical rain forests of the south and the savane of the north. Majority of the food crops (Rice, Maize, Sorghum, Millet, Cassava, Yam, etc) are grown in the Savane located at the north. The tropical rain forest of the south grows mainly cash crops, cocoa and coffee, as well as some vegetables, plantains and tropical fruits. Unlike cash crops, which have traditionally been then the main sources of export earnings, food crops are mostly non-tradable except that half of the rice consumption is met through import (nearly 3 percent of total import in 2004). Rice is mostly grown in the savane, along with cotton, maize and cassava. However, some rice is grown in the forest areas of the south west. The non-tradable food crops and rice accounts for more than one-third of the total value of agricultural production, but less is known on the welfare consequences of rising food prices on farmers growing them.

The north-south division affected agricultural sectors differently. Cocoa and coffee are produced mainly in the rain forests of the south, and exports for cocoa have remained steady in spite of the conflict. But cotton and much of cereals production concentrate in the Savane of the north, which were held by rebels during the civil war. In the case of cotton, much production was apparently sold and ginned in neighboring Mali and Burkina Faso (OT Africa Line 2006), so the Ivorian cotton companies have been facing difficult financial times. Credit has been more difficult to obtain during this period as well, in part due to the conflict and in part due to structural adjustment reforms. Recent

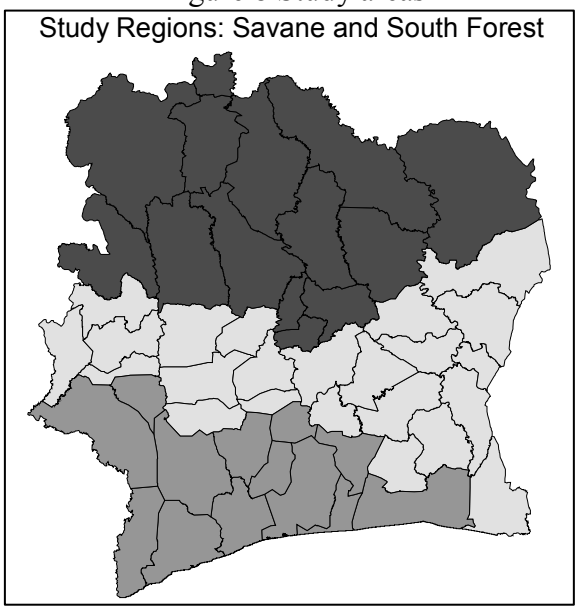
[4] Cocoa, coffee, cotton, rubber etc

years have seen growing importance of food crops and cash crops other than cocoa and coffee. While cocoa and coffee, including processed product exports, contributed on average over 70 percent of agricultural exports during the late 1990s, other agricultural exports matter as well. Cotton averaged nearly 7 percent of agricultural exports, and other important exports included pineapple (2.1 percent), bananas (3.0 percent), palm oil (2.7 percent), rubber (3.5 percent) and logs (0.6 percent) (FAOSTAT 2006). Canned fish also accounted for nearly 6 percent of exports. Shares of food imports in the late 1990s were 20 percent for rice, 29 percent for fish, 8.8 percent for dairy products, 9.5 percent for wheat, 3.7 percent for sugar and 3.8 percent for tobacco (FAO 2003).

Since cocoa and coffee are grown in the south, the effects of the civil war have been mostly seen in the resumption of export taxes and increased trader margins. Crops predominantly grown in the north, such as cotton and maize, have been more severely affected, and smuggling to neighboring countries has affected both management of the cotton sector, another successful agricultural export at one time, as well as collection of data on conditions in the Ivorian agricultural economy (Abbott, 2007). The need for rice and wheat imports must result in part because they are mostly produced in the north while there is a need for food in the urban areas of the south.

For analytical purpose, we consider two regions in Cote d'Ivoire: Savane and South Forest, as shown in Figure 8. Savane the northern part of Cote d'Ivoire is composed of six states: Savane, Denguele, Baffing, Wordougou, Valle Du Bandama and the northern part (Bouna department) of Zanzan. The south forest region in the south is composed of five states: Moyen Cavaly, Bas Sassandra, Sud Bandama, Lagunes and Fromager.

Figure 8 Study areas

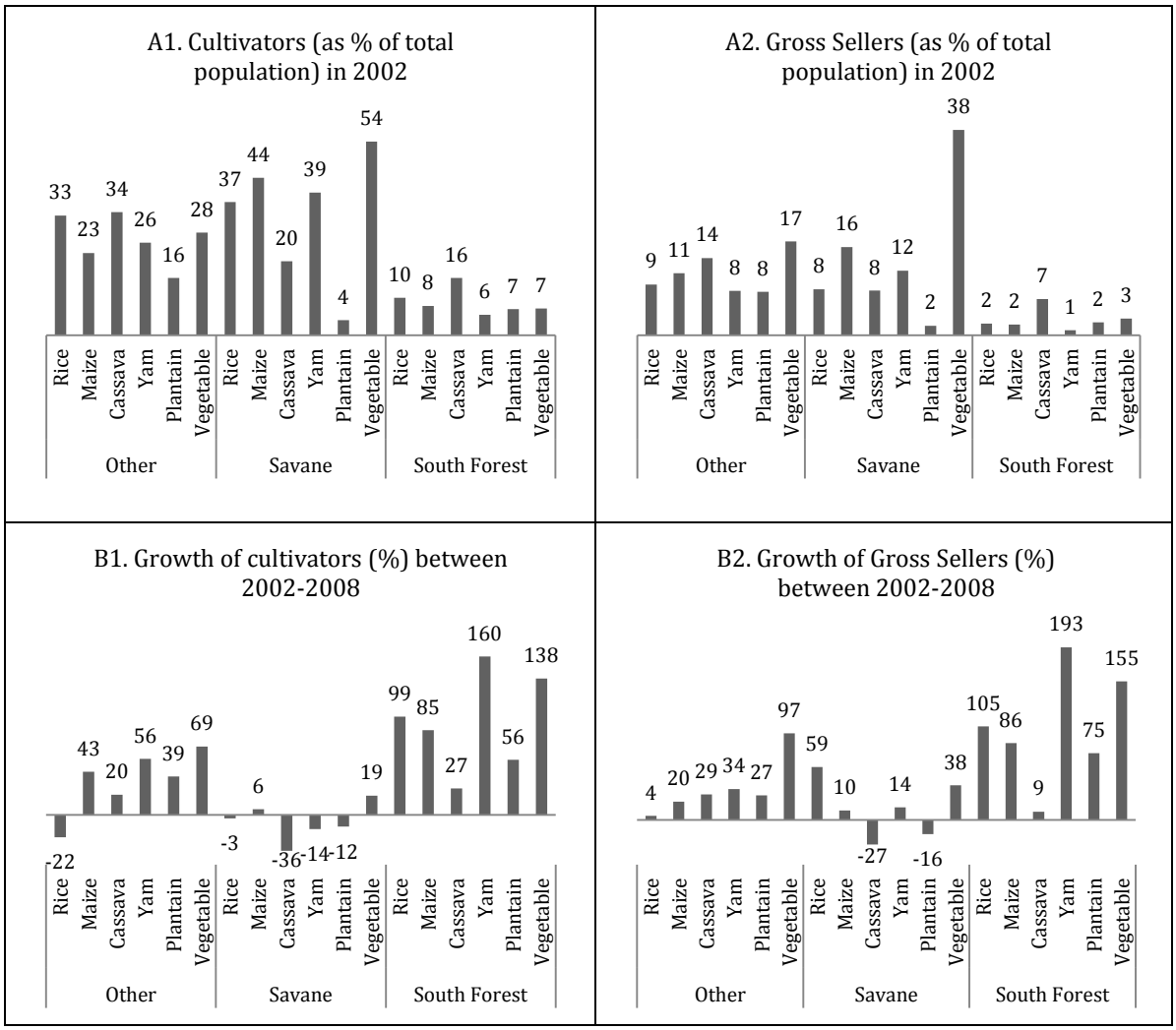


Note: Savane (darker shade), South Forest (dark shade)

Figure 9 below compares the shares of food crop cultivators and gross sellers between 2002 and 2008. As evident from panel A1 of Figure 9, food crop farmers are predominantly located in the Savane and other regions. In both regions, on average more than one third of the total population is devoted to food cropping whereas about one-tenth population of South Forest cultivate food crops. This difference holds for the gross sellers of food crops (panel A2). In 2002, on average only 2 percent of the population in the South Forest region recoded as gross sellers of food crops. It indicates that before conflict broke out, the northern and central parts of Cote d'Ivoire remained the main source of food supply chain. However, the growth of food croppers between 2002 and 2008, which is marked as the peak of civil conflict, saw significant increase in the South Forest region. Rice cultivators grew at about 99 percent whereas the growth of yam cultivators recorded at 160 percent. Other crops also show similar increase in the number of farmers, except for cassava. While the increase in food crop farming was moderate in other regions during the same period of time, the growth of food croppers in Savane region was negligible. A mirror of image of this phenomenon is portrayed for the growth of gross sellers in panel B2. Overall, the descriptive evidence on food crop farming suggests a significant increase in the cultivation and sell of food crops in the southern parts of Cote d'Ivoire. This strengthens the argument for crop diversification in

the southern regions, which was predominantly a cash crop growing region prior to conflict.

Figure 9 Gross sellers between 2002 and 2008

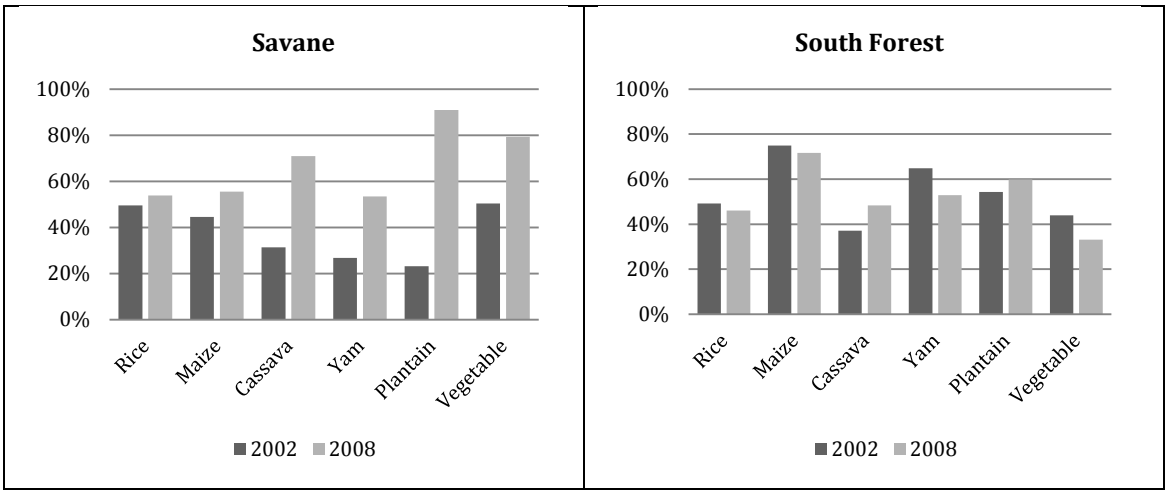


Source: authors' compilation based on ENV survey rounds 2002 and 2008

Figure 10 compares the distribution of net sellers between 2002 and 2008 across the regions of Savane and the South Forest. If a farm household sells a higher quantity than its own consumption of a particular crop then we define it as a net seller. In figure 10, net sellers for each food crop are calculated as a percentage of gross sellers. The percent of net sellers, on average, is higher in the Savane region compared to the South Forest. One possible explanation for this could be that farmers in the South Forest region used

their food crops mainly for consumption purpose due to the disruption of food supply from the North. A majority of farmers in the Savane region sold their food crops to meet other consumption requirements than food.

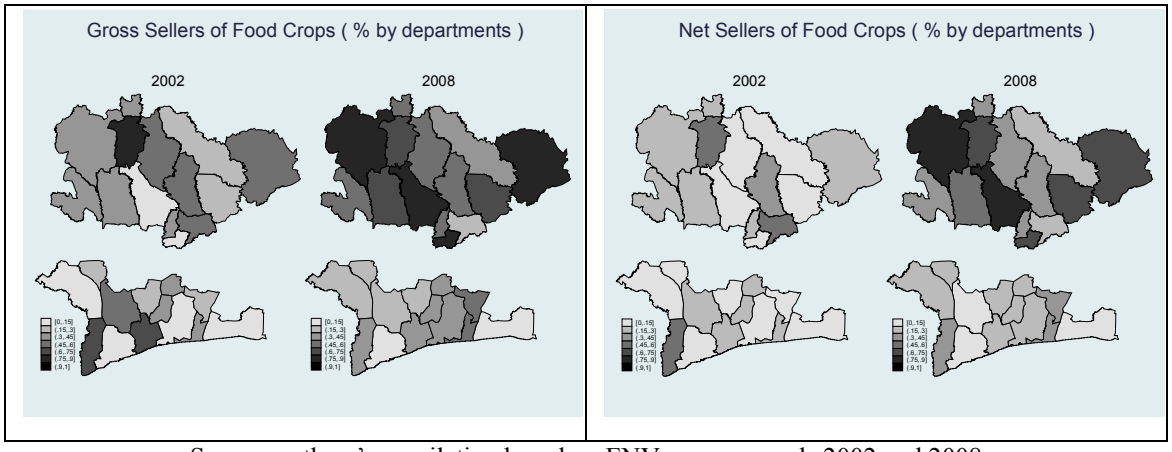
Figure 10 Net sellers as a percentage of gross sellers: 2002 and 2008



Source: authors' compilation based on ENV survey rounds 2002 and 2008

Figure 11 provides a spatial map of the growth of gross and net sellers of food crops (all the six key categories together). The left hand panel shows the distribution of gross sellers between 2002 and 2008. A darker shade indicates a higher concentration. The percentage of gross sellers in the Savane remained high in both periods, but the distribution is more spread out in 2008. In the South Forest region, spatial map indicates a growth of gross sellers in a number of departments; similar trend is noticed for net sellers in the South Forest region between 2002 and 2008. However, a significant growth of net sellers in the Savane region is depicted, and this growth is more or less homogenous across departments as shown in the right hand panel of Figure 11.

Figure 11 Gross and Net Sellers of Food Crops



Source: authors' compilation based on ENV survey rounds 2002 and 2008

To sum up, we find a changing pattern of crop choice during the conflict period. This indicates that crop diversification has been employed as a coping strategy in the face of the conflict aiming to achieve self-sufficiency. As summarized in Table 2, cassava was the only food crop grown by more than 10% of the inhabitants in the South Forest in 2002. However, in 2008, the level of crop diversification in this region matches that of the Savane, which shows a consistent trend between 2002 and 2008.

Table 3 Food crops (with more than 10% of population cultivating it) before and after the Conflict

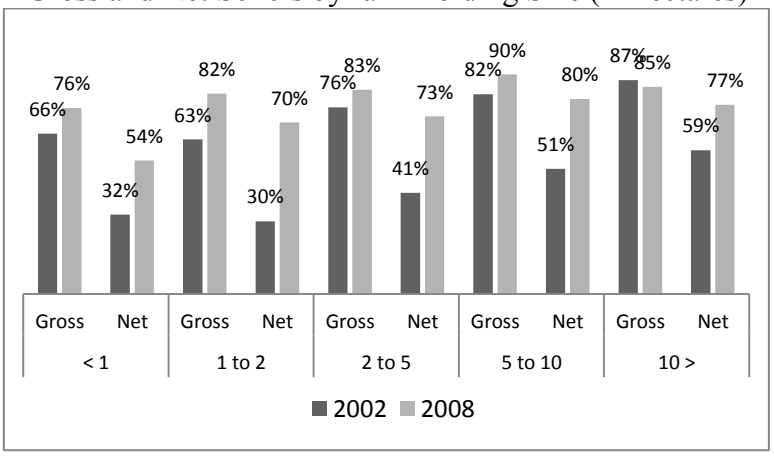
	Savane	South Forest
Pre-war crops (2002)	Rice Maize Cassava Yam Vegetables	Cassava
Post-war crops (2008)	Rice Maize Cassava Yam Vegetables	Rice Maize Cassava Yam Plantain Vegetables

Source: authors' compilation based on ENV survey rounds 2002 and 2008

Next we look at the relationship between farm holding size and types of sellers, gross and net. For the sake of analysis, we consider five categories of land holding sizes, less

than 1 hectare, 1 to 2 hectares, 2 to 5 hectares, 5 to 10 hectares and more than 10 hectares. The growth of gross and net sellers show upward trend across all farm holding sizes in the Savane.

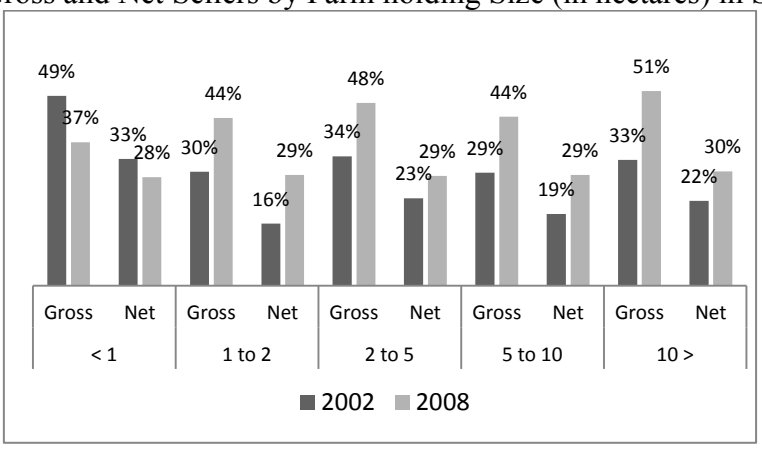
Figure 12 Gross and Net Sellers by farm holding Size (in hectares) in Savane



Source: authors' compilation based on ENV survey rounds 2002 and 2008

The small and marginal farmers (less than 1 hectare) in the South Forest region remained the only exception. Participation both as a gross and net farmer of food crop drops for farmers with less than 1 hectare of land holding size. For the large farmers, there was a positive growth of both types of food crop sellers in this region. Overall, farm holding size might not explain the extent of crop diversification.

Figure 13 Gross and Net Sellers by Farm holding Size (in hectares) in South Forest



Source: authors' compilation based on ENV survey rounds 2002 and 2008

5.Determinants of crop diversification: multivariate regression analysis

To empirically test the research hypothesis, we combine two nationally representative household surveys, one collected in 2002 (before the conflict started) and the other collected in 2008, bracketing the peak conflict period in Cote d'Ivoire from 2002 to 2006. We construct *Food Consumption Scores (FCS)* as a proxy measure of food security, originally developed by the World Food Programmme (WFP, 2007). This measures calorie availability from food consumption taking into consideration both food diversity and the frequency of food intake. Our empirical strategy identifies the indirect effects of war through the UN peace keeping line that divided the country into two halves, the north and the South. Using pre-war (ENV-2002) data to control for the baseline crop diversification level and the spatial variation across the northern region of Savane and the southern region of South Forest, we identify the indirect effect of conflict on crop diversification.

Table 4 displays descriptive evidence by regions: Savene, South Forest and other, for both periods 2002 and 2008. While the average welfare level remains higher in the South Forest region than the Savane, participation in agricultural has increased in both regions during the conflict period. Especially in the South Forest, participation in the cultivation of food crops increased signficantly as documented earlier. The share of multicropping farmers grew signfiicant in the South Forest region (from 22% to 35%), whereas in Savane it dropped from 64% to 54%. The household characteristics are, on average, comparable across the three broad regions identified in this study with some exception. The Savane is a muslim-majority area whereas the South Forest is dominated by the Christian population. Participation in non-farm activties is also higher in the South Forest region compared to the other two regions. However, the average are of land cultvated increased in the South Forest region during the conflict period.

Table 4 Descriptive evidence

	2002						2008					
	Other		Savane		South Forest		Other		Savane		South Forest	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Multi-cropper (as % of farmers)	0.41	0.49	0.64	0.48	0.22	0.42	0.51	0.50	0.54	0.50	0.35	0.48
Rice cropper	0.25	0.43	0.32	0.47	0.10	0.30	0.18	0.38	0.25	0.44	0.15	0.35
Maize cropper	0.20	0.40	0.40	0.49	0.07	0.25	0.24	0.42	0.33	0.47	0.11	0.31
Cassava cropper	0.30	0.46	0.18	0.38	0.13	0.34	0.30	0.46	0.11	0.31	0.14	0.35
Yam cropper	0.25	0.43	0.34	0.47	0.04	0.20	0.28	0.45	0.25	0.43	0.09	0.29
Plantain cropper	0.13	0.34	0.03	0.16	0.06	0.23	0.16	0.37	0.03	0.16	0.08	0.27
Palm cropper	0.03	0.16	0.00	0.04	0.03	0.17	0.03	0.16	0.00	0.06	0.02	0.15
Vegetables cropper	0.27	0.45	0.52	0.50	0.07	0.25	0.35	0.48	0.50	0.50	0.12	0.32
Fruits cropper	0.04	0.21	0.03	0.17	0.01	0.11	0.04	0.20	0.05	0.23	0.02	0.15
Cocoa farmer	0.29	0.45	0.01	0.08	0.20	0.40	0.28	0.45	0.01	0.12	0.23	0.42
Coffee farmer	0.26	0.44	0.01	0.10	0.11	0.31	0.17	0.38	0.01	0.11	0.09	0.28
Cotton farmer	0.02	0.13	0.20	0.40	0.00	0.00	0.00	0.04	0.05	0.22	0.00	0.00
Agricultural households	0.67	0.47	0.62	0.49	0.32	0.47	0.60	0.49	0.58	0.49	0.35	0.48
Participation in agriculture	0.63	0.48	0.60	0.49	0.30	0.46	0.70	0.46	0.66	0.47	0.48	0.50
Participation in livestock	0.18	0.39	0.28	0.45	0.11	0.31	0.23	0.42	0.32	0.47	0.13	0.33
Participation in wage	0.27	0.44	0.22	0.41	0.42	0.49	0.32	0.47	0.29	0.45	0.49	0.50
Participation in livelihood (other)	0.11	0.31	0.10	0.30	0.12	0.32	0.14	0.35	0.13	0.34	0.20	0.40
HH size	5.28	3.70	5.96	4.24	5.20	3.62	4.74	3.27	4.90	3.32	4.92	3.38
Children below 4 years	0.78	1.00	0.88	1.06	0.71	0.94	0.69	0.91	0.74	0.96	0.70	0.91
Children between 5 and 9 years	0.82	1.06	0.97	1.19	0.65	0.93	0.69	0.96	0.70	0.98	0.63	0.89
Education of HH head (years)	3.59	4.79	2.35	4.49	5.47	5.81	3.67	4.62	1.78	3.76	5.39	5.23
Average education of HH (years)	2.62	2.98	1.88	3.02	4.00	3.79	2.82	3.06	1.51	2.56	4.07	3.56
Age of HH head	43.59	15.07	44.37	14.61	41.73	13.21	42.81	14.54	44.13	14.58	41.46	12.95
Male HH head	0.81	0.39	0.86	0.35	0.83	0.38	0.78	0.41	0.79	0.41	0.82	0.38
Married HH head	0.73	0.44	0.78	0.41	0.70	0.46	0.71	0.45	0.74	0.44	0.72	0.45
Christian	0.38	0.49	0.15	0.35	0.51	0.50	0.42	0.49	0.13	0.33	0.47	0.50
Muslim	0.27	0.45	0.62	0.49	0.36	0.48	0.36	0.48	0.66	0.47	0.37	0.48
Land owned (hectares)	6.88	10.75	11.33	31.04	7.25	11.96	10.64	27.29	10.43	23.52	10.59	24.05
Land cultivated (hectares)	4.77	9.52	7.97	28.87	5.13	9.65	7.33	25.20	7.34	22.07	7.86	22.61
Land fallowed (hectares)	4.13	5.49	6.65	12.18	4.68	7.05	5.98	9.62	5.86	8.87	5.45	8.90
Food secured	0.56	0.50	0.79	0.41	0.61	0.49	0.32	0.47	0.34	0.47	0.51	0.50
Log of per capita HH expenditure	4.99	0.34	5.03	0.33	5.15	0.37	5.02	0.33	4.97	0.37	5.17	0.34

Source: authors' compilation based on ENV survey rounds 2002 and 2008

For the multivariate regression estimation we consider the following model:

$$Crop\ Div_{ijk} = \beta_0 + \beta_1(Year_j \times Region_k) + Year_j + Region_k + + (X_i)\emptyset + \varepsilon_{ijk}$$

where $Crop\ Div_{ijk}$ measures the extent of crop diversification for an individual i belongs to region k in year j. $Year_j$ is a dummy variable indicating year fixed effect, $Region_k$ is a dummy variable that measures region fixed effect. β_1 estimates the difference-in-difference estimator and X_i is a vector of household specific controls.

Table 5 reports the regression outcomes. Except the last column (where the dependent variable measure the number of crops a farmer cultivates), we show estimated coefificents of probit models. The marginal effects of the key vairable, the difference-in-difference indicator, is shows in the second row (shaded in gray). The first six columns present estimates of the likelihood that a household starts planting a particularly type of crop, such as rice, maize, cassava, yam, plantain and vegetables during the period between 2002 and 2008. Being a farmer in the South Forest, the likelihood of cropping rice increased on average by almost 14 percent during this period, as compared to a farmer in the Savane. Except plantain, for all other crops we find a growth of cultivators in the South Forest. For yam, the growth of yam farmers in thev South Forest region was recorded at about 20 percent.

The next three columns present probit outcomes, where the dependent variables are mono-croppers, bi-croppers and multi-croppers, respectively. Mono-croppers are defined as farmers growing a single food crop, bi-croppers growing two types of food crops and multicroppers growing more than two types of food crops. The difference-in-difference coefficient of probit runs indicate that both mono-cropping and bi-cropping is negatively related to the event of conflict (disruption of food supply chain) during the period of conflict in the South Forest region. However, multicropping gained prominence in the South Forest in the same period, which supports our hypothesis. On average, farmers in the South Forest are 20% more likely to become multicroppers compared to farmers in Savane, during the period from 2002 to 2008. The outcomes are

statistically significant. Next, we consider the number of crops cultivated as a dependent variable. The OLS outcomes in the last column shows similar outcomes supporting the prevalence of multicropping activities in the South Forest region. The OLS model explain more than 50% of the variation in the crop diversification level, where as the probit models also show a satisfactory level of the degree of fitness. Overall, the models privide robust evidence for multicropping as a coping mechasnim facing crisis and disruption of food supply chain in Cote d'Ivoire.

Table 5 Determinants of crop diversification: Probit and OLS outcomes

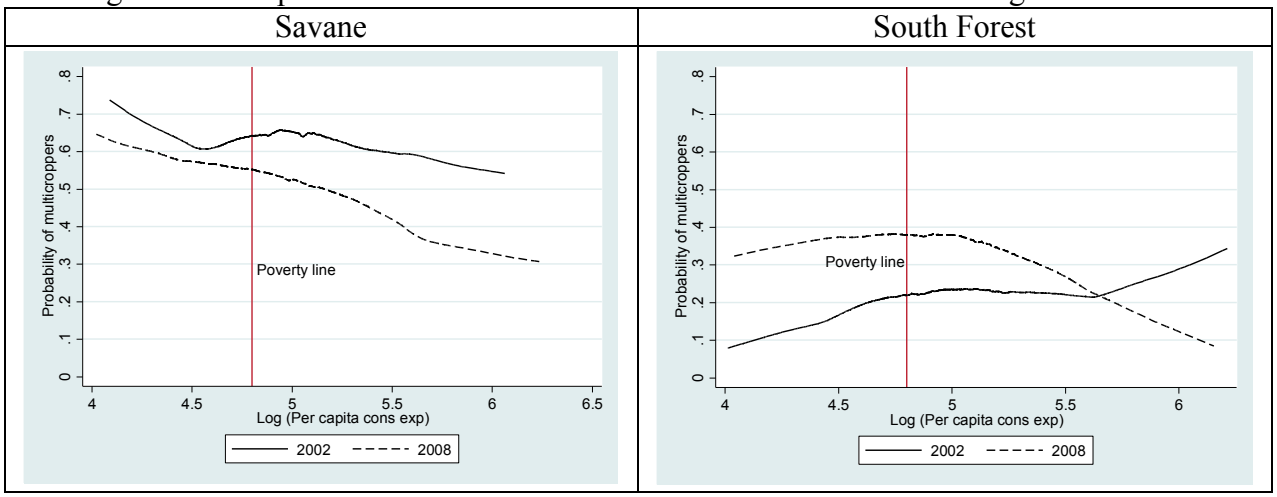
	Rice	Maize	Cassava	Yam	Plantain	Vegetables	Mono Cropper	Bi-cropper	Multi-cropper	Crop Diversification
South Forest * Year (2008)	0.590***	0.729***	0.465***	1.073***	-0.252	0.970***	-0.238	-0.239	0.797***	0.735***
dy/dx [South Forest * Year]	**.138**	**.167**	**.102**	**.208**	**-.033**	**.209**	**-.048**	**-.054**	**.195**	--
Year dummy (2008=1)	-0.150	-0.430***	-0.381***	-0.629***	0.254	-0.617***	0.051	0.035	-0.443***	-0.386***
South Forest dummy	0.012	-0.741***	0.238	-1.295***	0.979***	-1.759***	0.870***	0.330**	-1.006***	-0.915***
Cocoa farmer	-0.153**	-0.415***	-0.251***	0.100	0.432***	-0.207***	-0.484***	-0.449***	0.105	-0.179***
Coffee farmer	0.117*	0.097	0.001	-0.011	-0.017	-0.029	-0.110	-0.114*	0.139**	0.064
Cotton farmer	-0.491***	-0.198*	-0.545***	-0.198	-0.288**	-0.530***	-0.112	-0.215*	-0.307***	-0.476***
Farmer (any crop)	1.862***	2.461***	1.393***	2.296***	0.655***	2.659***	1.114***	1.585***	2.161***	1.858***
Livestock Production	0.319***	0.289***	0.147***	0.227***	0.151***	0.336***	-0.055	-0.010	0.329***	0.399***
Wage Employment	-0.007	0.021	-0.060	-0.053	-0.082	-0.134***	0.024	0.011	-0.118**	-0.087***
Other Income Sources	-0.053	0.243***	0.031	-0.005	0.052	0.143***	-0.014	-0.087	0.170***	0.084**
HH size	0.038***	0.031***	0.026***	0.026***	-0.010	0.021**	-0.016	-0.004	0.035***	0.032***
# children below 5 years	0.007	0.005	0.003	0.045*	0.004	-0.009	-0.037	-0.042*	0.028	0.027
# children from 5 to 9 years	-0.037	-0.034	-0.027	-0.006	0.028	-0.029	-0.047*	0.009	-0.022	-0.015
Years of education head of HH	0.006	-0.002	-0.004	-0.018**	-0.011	-0.010	0.010	0.012	-0.016**	-0.014**
Average years of education in HH	-0.055***	-0.036**	-0.054***	-0.042***	-0.009	-0.039***	0.008	-0.033**	-0.043***	-0.028***
Age of household head	-0.001	-0.001	0.004**	0.001	-0.001	0.001	-0.000	-0.001	0.002	0.001
Male household head	0.122*	0.275***	-0.227***	0.433***	-0.126	-0.062	-0.126*	-0.061	0.157**	0.099**
Married head of HH	0.118**	0.096	0.070	-0.022	0.252***	0.192***	-0.033	0.130**	0.085	0.147***
Christian	-0.188***	-0.117**	0.033	-0.109*	0.025	-0.211***	-0.019	-0.025	-0.061	-0.146***
Muslim	-0.104*	-0.011	-0.108	-0.327***	-0.409***	-0.222***	0.029	-0.009	-0.173***	-0.202***
Log per capita expenditure	-0.208***	-0.189***	0.098	0.096	0.078	-0.261***	-0.120*	-0.208***	-0.047	-0.064
Land cultivated (in hectares)	-0.011***	-0.002	0.000	-0.005	-0.011***	-0.005	-0.004	-0.002	-0.004	-0.009***
Land owned (in hectares)	0.013***	0.006**	0.002	0.008**	0.012***	0.006*	-0.002	0.002	0.010***	0.013***
Constant	-2.836***	-2.399***	-1.515***	-2.759***	-2.826***	0.020	-1.115***	-1.457***	-1.956***	0.934***
Observations	7411	7411	7397	7378	6016	7411	7334	7430	7411	7430
Pseudo-R^2 / R^2	0.327	0.352	0.297	0.393	0.317	0.435	0.176	0.131	0.315	0.501

Note: .01 - ***; .05 - **; .1 - *; Controls for ethnic groups and department fixed effects are included in all regressions.
Source: authors' compilation

6.Policy Analysis: Vulnerability and distributional effect of welfare

In the previous sections, the importance of crop diversification is highlighted with the heightened investigations of the distortions to agricultural incentives mostly through the rising prices of food commodities, which civil conflict caused in Cote d'Ivoire. To measure the direction and magnitude of the welfare consequences of a price change, we compare non-parametric probability regressions over time. A more direct way of estimating the changing risk of poverty among farmers is to plot the probability of being a multi-cropper along the welfare distribution (Benjamin and Deaton, 1993). This can be done with the probability regression method where the proportion of multi-cropping farmer is estimated as a function of per capita household expenditure.

Figure 14 Non-parametric estimation of the fraction of households selling food



Source: authors' compilation based on ENV survey rounds 2002 and 2008

The left hand panel of Figure 15 compares probability of being a multi-cropper estimated as a function of log per capita household consumption expenditures for the Savane region. In 2002, for farm households below the poverty line (estimated at log per capita household consumption expenditure equivalent to 4.8 from Dabalen and Paul (2013)), around 70 percent were engaged in multi-cropping which dropped by about 10 percentage points in 2008 in the Savane. For those above the poverty line shows a similar picture. On the other hand, in the South Forest region, between 2002 and 2008, the probability of a multi-cropper below the poverty line increased almost three-folds.

However, for rich farm households it shows an opposite picture. Overall, it suggests that in the South Forest region, the association between vulnerability and multi-cropping became stronger unlike in the Savane region.

Important development on investigations related to the questioned strategies that households utilize to cope with the risk presented by civil conflict – the contribution of this study fits squarely in. Anecdotal evidence supported by robust empirical outcomes indicates that crop diversification has been a coping strategy facing the north-South divide of Cote d'Ivoire resulting in the disruption of food supply chain. It is also found that the incidence of crop-diversification is correlated with poverty alleviation and food security.

It is natural when in war, the poilitical decisions are unpredictable and when viewed in history sometimes irrational as well. Thus, it comes as no surprise that the government imposed distortions created a gap between domestic prices and what they would be under free market conditions for commodities in Cote d'Ivoire (Abbott, 2007; Abbott, 2009). However, Chauveau & Richards (2008) reveal that the youth militia were motivated to be involved in the civil conflict in order to uphold a lineage based social order to maintain agrarian ownership. This suggests that unlike in other economies the coping strategies that a household could utilise was discriminated against, as with militia ownership of land, crop diversification would not be a luxury that everyone could implement. Thus the agrarian issues in Cote d'Ivoire are more complex than perceived, as other studies indicate (Auty, 2010). Nevertheless, I hope that the present study is a step towards unfolding this complex picture and a drafting a sound policy framework.

References

- Abbott, P. (2007). Distortions to agricultural incentives in Côte d'Ivoire. *World Bank Agricultural Distortions Working Paper No. 46*.
- Abbott, P. (2009). Cote d'Ivoire. In K. Anderson & W. A. Masters (Eds.), *Distortions to Agricultural Incentives in Africa* (pp. 385-412). Washington D.C.: World Bank Publications.
- Brück, T., & Schindler, K. (2008). The Impact of Conflict and Fragility on Households: A Conceptual Framework with Reference to Widows. *UNU-WIDER Working Paper Series - Research Paper No. 2008/83*.
- Chauveau, J. P., & Richards, P. (2008). West African insurgencies in agrarian perspective: Côte d'Ivoire and Sierra Leone compared. *Journal of Agrarian Change, 8*(4), 515-552.
- Colin, J. P., & Ayouz, M. (2006). The development of a land market? Insights from Côte d'Ivoire. *Land Economics, 82*(3), 404-423.
- Haggblade, S., Hazell, P., & Brown, J. (1989). Farm-nonfarm linkages in rural Sub-Saharan Africa. *World Development, 17*(8), 1173-1201.
- Heath, J. R. (1993). Land Rights in Cote d'Ivoire. *World Bank Technical Paper 238 - Africa Technical Department Series*.
- Hitzhusen, F. J., & Jeanty, P. W. (2006). Analyzing the effects of conflicts on food security in developing countries: An instrumental variable panel data approach. 2006 Annual meeting, July 23–26, Long Beach, CA 21483, American Agricultural Economics Association
- Justino, P. (2010). War and Poverty. *HiCN Working Paper No.81*.
- Justino, P., & Shemyakina, O. N. (2012). *Remittances and Labor Supply in Post-Conflict Tajikistan*. Institute of Development Studies Working paper No. 388.
- Raleigh, C., Linke, A., Hegre, H., & Karlsen, J. (2010). Introducing ACLED – Armed conflict location and event data. Journal of Peace Research, 47(5), 1–10,
- Minoiu, C., & Shemyakina, O. (2012). Child health and conflict in Cote d'Ivoire. American Economic Review: Papers & Proceedings, 102(3), 294–299.
- Taeb, M. (2004). Agriculture for peace: Promoting agricultural development in support of peace. Japan: United Nations University-Institute of Advanced Studies.
- Taylor, J., & Adelman, I. (2003). Agricultural household models: genesis, evolution, and extensions. *Review of Economics of the Household, 1*(1), 33-58.
- Townsend, R. M. (1995). Consumption insurance: An evaluation of risk-bearing systems in low-income economies. *The Journal of Economic Perspectives, 9*(3), 83-102
- World Food Programme (WFP). (2007). Food consumption analysis: Calculation and use of the food consumption score in food consumption and food security analysis. Technical Guidance Sheet (draft). Rome: World Food Programme.
- WFP (2008). Assistance to populations affected by the Coˆte d'Ivoire protracted crisis – Protracted relief and recovery operations (PRRO) 10672.0 report. Rome: World Food Programme.
- Wiesmann, D., Bassett, L., Benson, T., & Hoddinott, J. (2009). Validation of the world food programme's food consumption score and alternative indicators of household food security. IFPRI Discussion Paper 00870, Poverty, Health, and Nutrition Division.

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Selected Publications

"Estimating the Causal Effects of Conflict on Education in Côte d'Ivoire" (2014) ***Journal of Development Studies*** [In press] (with Andrew Dabalen)

"Disputed Land Rights and Displacement: A Double Whammy on the Poor" (2014) ***Conservation and Society*** 12(1): 65-76 (with Christie Lam)

"Effect of Conflict on Dietary Energy Supply: Evidence from Cote d'Ivoire" (2014) ***World Development,*** 58, 143-158 (with A. Dabalen)

"Recovering Comparable Poverty Estimates in Cote d'Ivoire" (2013) ***Journal of Development Studies*** 49 (10), 1412-1426 (with A. Dabalen)

"Accounting for Heterogeneity in Growth Incidence in Cameroon Using Re-centered Influence Function Regression" (2013) ***Journal of African Economies,*** 22(5), 757-795 (with B. Essama‐Nssah and L. Bassolé)

"Does Displacement Hurt Informal Risk Sharing? Evidence from Nepal" (2013) ***World Development*** 43(March), 42-55 (with Christie Lam)

"Communities where Poor People Prosper" (2009) *Moving out of Poverty: the Promise of Empowerment and Democracy in India"* ***Palgrave Macmillan and World Bank*** (with D. Narayan and P. Pettesh)

"Running the Numbers on Rogue States: A Comparative Perspective?"(2007) *The Worst of the Worst: Rogue and Repressive States in World Order,* ***Brookings Press*** (with Yi Feng)

"The Livelihood Effects of Industrialization on Displaced Households: Evidence from Falta Special Economic Zone, West Bengal" (2013) ***ZEW Discussion Paper*** *No. 13-083* (with Venga Sarma)

"Accounting for heterogeneity in growth incidence in Cameroon using re-centered influence function regression" (2013) ***ECINEQ Working Paper*** no. 289 (with Essama-Nssah and Leandre Bassole)

"The Effects of the Intensity, Timing and Persistence of Personal History of Mobility on Support for Redistribution" (2014) ***World Bank Policy Research Working Paper*** *6803* (with A. Dabalen and R. Parinduri)

"The Impact of Emigration on Source Country wages: Evidence from the Republic of Moldova" (2011) ***World Bank Policy Research Working Paper*** *5764, (*with L. Bouton & E. R. Tiongson)