

HOW TO EXPLAIN THE PARTICIPATION IN THE REBELLION IN IVORY COAST?

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Abstract:

Is the conflict in Côte d'Ivoire explained by greed or grievance? This study aimed to analyze the most important causes of the rebellion in Côte d'Ivoire. Specifically, it examines the effects of ethnicity on participation in a rebellion and checks the link between education, health and participation in a rebellion. To achieve this goal, a two-step approach is adopted. The first step was the establishment of the basics of an econometric model developed by Ballo and Rocco (2008) to analyze the causes of the civil war in Côte d'Ivoire. The second step was the description of data of 2.214 individuals used in the study, in order to test the hypotheses. By applying logit model, we obtained many significant results. We find that: educated people are less likely to join a rebellion; People from the North of Ivory Coast have more chance to join the rebellion.

Key words: grievances, greed, health, education, rebellion, logit.

JEL classification: H56, C35, D63, D74, I10, I20.

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1. INTRODUCTION

Collier and Hoeffler (1999) explain the causes of the civil wars by two reasons: the quest for justice (grievance) and the quest for looting (greed). On one hand, they recognize that most of the rebel groups displayed a desire to alleviate the grievances that population address to government: they want to reestablish the justice. On the other hand, the activities of rebel groups seem to be intrinsically linked to the looting of resources. For example, the exploitation of natural resources by rebel groups during the civil wars in Angola, Liberia and Sierra Leone had been underlined by many authors (Klare, 2001; Billon, 2001; Ross, 2003).

Grievance theory highlights the reasons why individuals or groups take up arms to claim an economic or social justice. The reasons of this kind of actions can be twofold. The first identifies social class as the important variable. According to Karl Marx ([1848] 1968), the industrial proletariat would be the main reason for the revolution against the capitalist system because the proletarians are commonly exploited by the capitalists. In this case, the actions was violent. According to Merton (1965), violent actions were due to deviance and the anomaly. More recently, describing conflicts in West Africa, Kaplan (1994) emphasized how the weakening of social organization can fuel violence in society. Richards (1996), in a critique of the theory of Kaplan, also underlined the role of personal frustration. He also insists on the rising of public dissatisfaction towards government actions in Africa. This argument showed that poor and less-educated people are more likely to participate in an armed rebellion (Humphreys and Weinstein, 2008).

The second reason relates to ethnic and political frustrations. In Africa, political parties represent ethnic groups and regions. For example, in Côte d'Ivoire, the democratic party of Côte d'Ivoire (PDCI) lead by Henri Konan Bédié includes the nationals of the Center of the country; the Ivorian Popular Front (FPI) is leaded by Laurent GBAGBO and includes the nationals of West-Central; the Republican Gathering (RDR) is leaded by Alassane OUATTARA and includes the nationals of North; and the Democartic Union for the peace in Côte d'Ivoire (UDPCI) leaded by Mabri TOIKEUSE includes nationals of West. Thus, the political actions consisting of denouncing the bad behavior of others politicians or of winning the elections can exacerbate ethnic tensions (Ballo, 2015). That's why, Humphreys and Weinstein (2008) uses the ethnicity as a proxy variable to measure the "grievance". In fact, the ethnicity is generally considered as the main cause of civil

war in the world. Fearon and Laitin (2011) classifies the civil wars since the Second World War II and found that 57% are ethnic wars. So, Fearon (2006) showed that 100 out of 709 of ethnic groups identified throughout the world are engaged in a rebellion against the government from 1945 to 1998. Also, relative deprivation (Gurr, 1970) help explain participation in ethnic violence.

The role of education on participation in the conflict is ambiguous. Indeed, education increases economic development (Thyne, 2006) and individual economic capacity, leading to higher opportunity costs of participating in violence. It also reduces militant attitudes (Shayo, 2007), increases tolerance (Lipset, 1959), strengthens out-of-group relationships (Inglehart & Welzel, 2005), reduces racism (Hagendoorn & Nekuee, 2018; Bobo and Licari, 1989) and to promote participation in political life (Hibbs 1973; Huntington, 1968; Welzel, 2013; Dahlum & Wig, 2019). Furthermore, Ives & Breslawski (2022) point out that education is not a direct cause of conflict but rather an enabling factor for members of a group suffering from political exclusion. Thus, they show that this effect exists when ethnic members are unable to advance their interests using conventional, nonviolent politics due to a lack of participation in politics or repression at the national level. However, authors have shown that education can increase violence through a number of mechanisms. Education can lead to an oversupply of educated people in the labor market (Urdal, 2006; Lia, 2007, Azam 2023), leading to frustration on the part of the unemployed. Education can also increase ethnic identity and play into relative deprivation and frustration-aggression mechanisms (Lange and Dawson, 2010).

The strong link between ethnicity and internal war can be explained by the fact that ethnicity is a channel of communication to plan rebellion at low cost. In addition, some ethnic groups have a specific characteristic that allow the exclusion of non-members. A specific characteristic can also be used as key information to distinguish between friends and enemies during the war. Finally, Esteban and Ray (2008) noted that the alliances between members of the same ethnic group are stronger than alliances between members of same social classes during the conflict. The main concept that includes ethnicity is "Horizontal inequalities". Horizontal inequality is defined as inequalities among groups of people (Stewart 2017, 1). Stewart (2010) point out horizontal inequality as the main source of internal conflicts. This analysis is reinforced by study cases in African countries like Ghana, Nigeria and Côte d'Ivoire (Langer, Mustapha, et Stewart 2007). Horizontal inequalities are dynamically depending on the nature of the groups and on the dimensions of inequality (Stewart 2016). Unfortunately, most of the arguments used to support the importance of horizontal inequality are not based on empirical evidences. To fill this, gap, Canelas and Guisellsquist (2018) set an introduction to horizontal inequality and its measurement. Huber and Mayoral (2018) also introduced a measure of horizontal inequality but find it less robust; therefore they focus on the capacity of group to fight rather than on grievance.

Although the literature underlined the importance of horizontal inequalities in the conflict of Côte d'Ivoire (Langer, Mustapha, et Stewart 2007; Langer et Stewart 2013), we note that the looting of economic resources could be a powerful factor that fuel it (World Bank, 2003). As example, in September 2003, the soldiers of the new force (FN) of Côte d'Ivoire have organized the looting of the Central Bank in Bouake and took about 20 billion CFA francs (30 million euro). In August 2004, the banks of Korhogo have been be attacked¹. In addition, Global Witness (2007) believes that the rebels gained about 15.1 billion CFA (US \$ 30 million) annually from the illicit trade in cocoa in Côte d'Ivoire. All these looting can question the real cause of the conflict in Côte d'Ivoire. Is the conflict caused by horizontal inequalities or by the search of profits? Could we affirm that the conflict in Côte d'Ivoire is mainly driven by greed or grievance? This study aimed to analyze the most important causes of the rebellion in Côte d'Ivoire.

In addition, we assume as Ballo and Lorenzo that political parties in Côte d'Ivoire are based on ethnic groups. Foregoing, we deduct the first two hypotheses that we will be tested:

¹ Read about this section of the Radio France Internationale: "Côte d'Ivoire: military Raiders of banks '
http://www1.rfi.fr/actufr/articles/057/article_30610.asp

H1: The individuals who belong to the ethnic groups in the North of Ivory Coast will be more inclined to participate in the rebellion;

H2: The level of education is important to participate to the rebellion in Ivory Coast

H3: individuals who have a good state of health will be more inclined to participate in violence;

H4: the rebellion can be regarded as an economic activity.

These four hypotheses will be tested using data from the survey conducted by the National Office of technical studies and development (BNETD) on behalf of the National Civic Service program (PSCN).

2. MATERIAL METHOD

2-1 The data from our study

The data collection took place from September 14 to October 9, 2011 and seven (07) departments were covered by the study. These departments were located in the Center, North and West (CNO) of Côte d'Ivoire. These three parts of the country were under the control of the rebels called "Forces nouvelles (FN)".

The population of rebels was about 1,066 people. We investigate up to 2,000 persons in order to take into account the seven departments investigated. This sample size was determined on the basis of a confidence level of 95% and a margin of permissible error of 3. The distribution of population among the department was made according to the method of quota and on the basis of the following characteristics:

- the weight of the population of each Department out to the total size of the population of the seven departments, according to the General Census of Population and Habitat (RGPH 98);
- the sex: according to statistics, on average 30% of the persons trained by the CSP are women;
- the type of youth: ex-combatants and idle civilians;
- the level of education: illiterate differ from people who have already been trained, whatever it is.
- the employment situation: a distinction is made between young people without activity and those who are doing an informal activity and;
- the age group: three (3) slices between 15 and 40 years have been defined. It's 15-25 years, 26-35 and 36-40 years.

Because, of the lack of previous data and of the enthusiasm of young people for the survey, most teams have gone beyond predefined quotas. Also, given the sensitivity of the target and the fact that the increase of the sample does not affect nor the level of confidence desired (95%) nor the margin of tolerated error (3%), the additional number of people surveyed was taken into account in the analysis. Thus, the sample size is increased from 2,000 to 2214 people, an increase slightly more than 10%, as shown in the following table:

Table 1: Distribution of the modified sample

Departments	Sample Size
Bouaké	540
Korhogo	400
Ferkessédougou	332
Séguéla	160
Man	323
Odienné	202

Bouna	257
TOTAL	2.214

Source: National Bureau of Technical Studies and Development

2-2 Model specification

The study analyse the probability to join the market of the conflict. In order to reach that aim, it mobilize individual and structural variables. The explained variable take two terms: the agent joined the rebellion or not. So, the dichotomous model (probit or logit) is adequate for the estimation of the parameters. The logistic and normal distributions are similar. However, the logistics makes estimations simpler and allows important simplifications in more advanced specifications. It explain the occurrence or not of the event “joining the market of the conflict”. The explained variable can be display as followed:

$$Y_i = \begin{cases} 1 & \text{the agent joined the rebellion} \\ 0 & \text{the agent do not joined the rebellion} \end{cases} \quad (1)$$

So, one can define the probability that an individual in the sample participate in the conflict as the expected value of the variable Y_i since:

$$E(Y_i) = \Pr(Y_i=1) \cdot 1 + \Pr(Y_i=0) \cdot 0 = \Pr(Y_i=1) = p_i \quad (2)$$

Y_i : Expectancy therefore gives the probability that the individual i is a fighter with the characteristic k observed (X_i^1, \dots, X_i^k) for an individual i to sample.

The probability of occurrence of the event is given by the relationship:

$$p(x) = \Pr(Y_i=1/X) = \Pr(Y_i=1/X_i^1, \dots, X_i^k) = F(X_i\beta) \quad (3)$$

Where $F(\cdot)$ refers to the distribution of the Act function logistics there:

$$F(X_i\beta) = \frac{1}{1 + e^{-(X_i\beta)}} = \frac{1}{1 + \frac{1}{e^{(X_i\beta)}}} = \frac{e^{-(X_i\beta)}}{1 + e^{-(X_i\beta)}} = \Lambda(X_i\beta)$$

The logit model defines the probability associated with the event $Y_i=1$ as the value of the distribution function of the logistic law considered at the point $(X_i\beta)$:

$$p_i = \Lambda(X_i\beta) = \frac{1}{1 + e^{-(X_i\beta)}} \quad \forall i = 1, \dots, N$$

The model used to estimate the equation is given by:

$$Y_i = \beta X_i + \mu_i$$

Where Y_i is the explained variable

X_i a vector of observable characteristics, β the vector of parameters to be estimated, μ_i vector of disturbances following a standard logistic distribution. When the value of the parameters is known, the most commonly used estimation is the maximum likelihood. The likelihood function is defined as below:

$$L(Y_i, \beta) = \prod_{i=1}^N \left(\Lambda(X_i\beta) \right)^{y_i} \left(1 - \Lambda(X_i\beta) \right)^{1-y_i}$$

The equation is then deducting the log-likelihood:

$$\log L(Y_i, \beta) = \sum_{i=1}^N Y_i \log(\Lambda(X_i\beta)) + (1 - Y_i) \log(1 - \Lambda(X_i\beta))$$

Maximum likelihood of the β parameters estimator is obtained by maximizing the likelihood function $L(Y_i, \beta)$ either the log-likelihood function $\log L(Y_i, \beta)$. Therefore, the log-likelihood against the elements of the vector β is obtained:

$$\frac{\partial \log L(Y_i, \beta)}{\partial \beta} = 0$$

In the context of this research, explanatory factors of the participation in the rebellion in Ivory Coast have been identified on the basis of the literature. However, all explanatory variables have not been introduced because some variable had unobservable characteristics. The different variables that have been used are listed in the following table:

Table 2: Variables used

variables	Definitions
Grievance	
Education	It is a qualitative variable that captures the level of education of the respondent: 0 = illiterate; 1= Primary; 2= Secondary; 3= Superior.
health	It is a qualitative dichotomous variable representing the state of health of the respondent: it has the ways: 1 = if the respondent indicates a health problem; = 0 otherwise
ethnic group	It is a qualitative variable that measures the ethnicity of the respondent. 1 = Dioula ; 0 otherwise
Greed	
Number of children	It is a quantitative variable that measures the number of children interviewed
Number of dependents	It is a quantitative variable that measures the number of dependents Of the interviewee
Other individual characteristics	
Marital status	It is a qualitative variable that allows enjoying the marital status of the respondent. Its terms are: 1 = married; 0 = single
Age	This is a quantitative variable that measures the age of the respondent
Age2/100	It is a quantitative variable. The number 100 represents a weighting factor to reduce the scale effect. This technic is preferred to the logarithmic transformation because it keeps the quadratic dependence sought through the square of age.
gender	This is the qualitative variable capturing the sex of the respondent. It has 2 modes: female = 1, male = 2
Migration	It is a qualitative dichotomous variable that captures whether the respondent change residence. It takes the values: 1 = if the previous residence was in the department; = 0 otherwise
department	This is the qualitative variable capturing the city of residence of the respondent. It has 7 modes: Bouake=1, Bouna=2 Ferke=3, Korhogo=4, Man=5, Odienne=6, Seguela=7.

Source: Authors

3. RESULTS

The logit model have been applied using variables listed in Table 3. The results are used to compare the impact of educational level in the participation to the rebellion. The variables used: primary, secondary or higher education. These variables are less significant to explain the participation of individuals to the rebellion. This result is consistent with that obtained by some authors (Humphreys and Weinstein, 2008). Indeed, more an individual increases his knowledge capital, more he hope to get a good job and is less interested by a conflict. In addition, another explanation could be that the moral cost of participation in criminal activity as a rebellion increases with the level of study.

Table 3: Identification of factors of involvement in the rebellion in Côte d'Ivoire (insérer les ecarts-types entre parentheses)

		logit model (a)			logit model (b)		
Variable		Coef.	Z	P>z	Coef.	z	P>z
H1	ethnic group (ref= Dioula)	-.5616521	-2.24	0.025**	-.5695046	-2.18	0.029**

	Education (ref = Illiterate)						
H2	Primary education	-.9194579	-3.09	0.002*	-.8772906	-2.94	0.003*
	Secondary education	-.7831776	-2.93	0.003*	-.8614618	-3.01	0.003*
	Higher Education	-2.528649	-2.44	0.015**	-2.438294	-2.34	0.019**
H3	Health (ref = not be healthy)	-.8028451	-2.40	0.016**	-.6952391	-1.94	0.052***
H4	Number of dependents	.0612119	2.75	0.006*			
	Number of children				.1123164	1.95	0.051***
	Age	.1592492	0.71	0.479	.1300929	0.57	0.566
	Age2/100	-.0022114	-0.68	0.499	-.0020025	-0.61	0.544
	gender (ref = female)	2.515881	5.31	0.000*	2.862928	5.44	0.000*
	Marital status (ref= single)	.193334	0.76	0.45	.2816778	1.01	0.312
	Migration (ref= yes)	.4188809	1.78	0.076***	.4226349	1.72	0.086***
	department (ref= Bouake)						
	Bouna	-1.258083	-1.65	0.099***	-1.276796	-1.66	0.097***
	Ferke	.8793167	2.62	0.009*	.9176587	2.62	0.009*
	Korhogo	-1.154926	-2.39	0.017**	-1.333834	-2.54	0.011**
	Man	.9958645	3.03	0.002*	.9729933	2.83	0.005*
	Odienné	.4511586	1.08	0.281	.6267922	1.48	0.138
	Séguéla	1.055078	2.50	0.012**	.9059917	2.03	0.043**
	_cons	-6.819165	-1.81	0.07***	-6.445972	-1.70	0.09***
	Number of obs	1566			1437		
	LR/Wald chi2	172.49			167.69		
	Prob> chi2	0.0000			0.0000		
	Pseudo R2	0.2099			0.2187		

Source: Authors; estimates from the software Stata 12. (*, **, ***) indicate the significance at 1%, 5% and 10%, respectively.

Consider the conditional probability, $p(x)=Pr(Y_i=1/ X)$ derive the marginal effects which expressions are a function of the nature of the explanatory variable x.

$$\frac{\partial p(x)}{\partial x_1} = \frac{\partial Pr(Y_i=1/ X)}{\partial x_1}$$

In the case of a continuous explanatory variable, there is a slight modification of the variation in the probability of the occurrence:

$$\Delta Pr(Y_i=1/ X) = \frac{\partial p(x)}{\partial x_1} \Delta x_1$$

When the k^{th} explanatory variable is a binary, the marginal effect is expressed as follows:

$$\frac{\partial Pr(Y_i=1/ X)}{\partial x^k} = p(x^1, x^2, \dots, x^{k-1}, 1) - p(x^1, x^2, \dots, x^{k-1}, 0)$$

Since the marginal effect of each variable varies from one individual to another, it is necessary to calculate an average marginal effect that is a fictional individual who has the average characteristics of the sample. The following table provides the marginal effects.

Marginal effects measure the sensitivity of the probability of the event with respect to changes in the explanatory variables X_i . In other words, they allow capturing mechanisms but also the extent of the influence of different variables on the probability of participating in the rebellion.

The interpretation of marginal effects varies according to the nature of the variable. Indeed for discrete variables, a change of one modality to another changes the probability that the explanatory variable takes the value 1 of x %. When the explanatory variable is continuous, an infinitesimal modification in the explanatory variable induced variability of x % of the employability of the individual. With regard to our variables of interest (educational attainment, health status and ethnicity), the results show that they are important in the decision to participate in the rebellion.

Having a level of education makes people reluctant to join the rebellion; differentials of probability of access to employment in the rebellion between people who have primary, secondary and higher, and those that are without level are assessed respectively at close to 5.5%, 5.4% and 9.5% for the model (a).

Table 4: Evaluation of marginal effects

Variable	Average marginal effects	
	logit model (a)	logit model (b)
Age	.0078369	.0094061
Age2/100	-.0001206	-.0001306
Education (ref = Illiterate)		
Primary education	-.0551546	-.0559078
Secondary education	-.0544269	-.0497023
Higher Education	-.0953183	-.0943323
ethnic group (ref= Dioula)	-.0357524	-.0347108
gender (ref = female)	.1021604	.0915579
Health (ref = not be healthy)	-.0501085	-.0585577
Marital status (ref= célibataire)	.0163324	.0111826
Migration (ref= yes)	.0270199	.0261782
Number of children	.006766	
Number of dependents		.0036155
ville (ref= Bouake)		
Bouna	-.0399001	-.03868
Ferke	.0650823	.0605075
Korhogo	-.0408421	-.0368562
Man	.0703359	.0714179
Odienné	.0400821	.0265109
Séguéla	.0639952	.0772434

Source: Authors: estimates from the regression results on stata 12

4. DISCUSSIONS

Healthy people are more likely to be in the rebellion that those who have health problems. Several facts and arguments underlined this point of view. Physical disabilities may limit the capability of the rebel during the war. Moreover, even in the absence of specific disability, several common or chronic diseases decreased energy, concentration and performance required by the rebel leaders and therefore can decrease chances of access to the market of the rebellion or even, the ability to maintain its position within the group.

In reference to individuals belonging to the ethnic group 'Dioula', it appears that the people from other ethnic groups are less likely to join the rebellion. This result confirms the importance of ethnicity in the conflict. Indeed, one of the main grievance of the rebellion was the exclusion of populations from the North of Côte d'Ivoire. In addition, this result is consistent with the literature that shows that the largest share of civil wars have ethnic origins (Fearon and Laitin, 2010).

The social pressure that represents family dependency (the number of dependent children or the number of dependent persons) increases the probability to participate in a rebellion. This variable capture the greed of people who have joined the rebellion. Indeed, the individual decision of involvement in the rebellion occurs after a calculation of costs and benefits. It is expected that if the activity of rebellion represents the most advantageous option for an individual, then it will

engage. Since there is a positive correlation between participation in the labour market in one hand and the fertility of people in the other hand (Zaidi-Adams, 2007), the participation in the Ivorian rebellion could be regarded as an alternative activity to labour market.

The 'marital status' and 'age' are not significant regardless of the model used. The non-significance of age is consistent with the study of Humphreys and Weinstein (2008) on participation in the rebellion of the RUF2. So, the probability of participating in a rebellion increases when the individual is a man. This result seems statistically significant at the 1% level and in line with that achieved in Sierra Leone by Humphreys and Weinstein (2008). This positive correlation between male and the participation to the rebellion may be justified by the fact that in sub-Africa, the man is the head of the family; therefore, it must ensure the access of members of his family in the health, education, housing, security, etc. The desire of protection is also a cause of participation in an armed band (Humphreys and Weinstein, 2008). Joining the rebellion allows people to take care of his family. In addition, being a soldier in a rebel troop requires great physical abilities as we mentioned. These abilities are not always available with women. So, be ordered by a woman is still psychologically not well received by soldiers.

Be installed during a long period in one of the departments of the CNO area, is a good criteria to recruit. This result suggests that the leaders of the rebellion were recruited primarily among persons with strong link in the region in order to reduce the asymmetry of information. Compared with individuals of the Department of Bouaké, the headquarter of the rebellion, those of other departments are significantly more likely to participate in the rebel activity except the Department of Odienné. Indeed, the Department of Odienné is insignificant for both models. In addition, individuals from the departments of Bouna and Korhogo are less likely to be in the rebellion than people of Bouaké so than those of Ferkessedougou, Séguéla and Man have more chance to participate in the rebellion than in Bouaké. The probability of participating in the rebellion increases in these three departments compared to the largest city of the CNO zone because Ferkessedougou and Séguéla are respectively the birth city of Ibrahim Coulibaly and Guillaume SORO, the both leaders of the rebellion. In addition, the town of Man is located in the West of the country where conflicts have been the most violent.

5. CONCLUSIONS

The analysis of the behavior of individuals facing an armed insurrection is important both for theory and for the evaluation of economic policies. Understand the motivations of the fighters can shed light on the origins of the conflict. It can also help in the resolution of conflicts and in rebuilding post-conflict (Humphreys and Weinstein, 2008). If individuals have taken weapons because on the promised money, land or other assets, so the restoration of the peace will depend on the ability of authorities and donors to financially assist veterans. If the rebels were motivated by the disagreement with government policies, the post-conflict solutions must focus on the establishment of institutional solutions that deal with discrimination, oppression and inequality. This study analyzed the interactions between grievances and participation in a rebellion. Specifically, it firstly analyzed the effects of ethnicity, education and health on involvement in a rebellion, and on the other hand checked the link between greed and participation in a rebellion. To achieve this goal, the approach adopted is made in two steps.

In the first step, we remember the basis of the theory of the grievance with a specific emphasis on the theoretical model developed by Bahram and Lorenzo (2008) which analyses the causes of the civil war in Côte.

In the second stage, inspired by the theoretical underpinnings and empirical work of Humphreys and Weinstein (2008), a formal framework, allowing to model the impact of injustice

² Revolutionary United Front

on participation in the rebellion has been developed. The estimation of logit models introduced many results. Among these, we can remember:

Individuals with higher education are less likely to join a rebellion; they are more likely to get out of the financial formal system due to the amount of expenses incurred. People belonging to the "Northern Mande" are more likely to join the rebellion mainly because they are the main victims of the policy of 'ivoirite'. The probability of participating in the rebellion is highest for individuals in a good health; war requires a good physical fitness. The number dependent children and the number dependent people increase the probability of participating in a rebellion. Which suggests that the rebellion is a lucrative activity?

In sum, while it is true that the participation in the rebellion in Côte d'Ivoire was based on the desire to respond to grievances between including native populations in the North of Ivory Coast and the Government of Laurent Gbagbo, so, the rebels were motivated by the search for profit.

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ANNEX

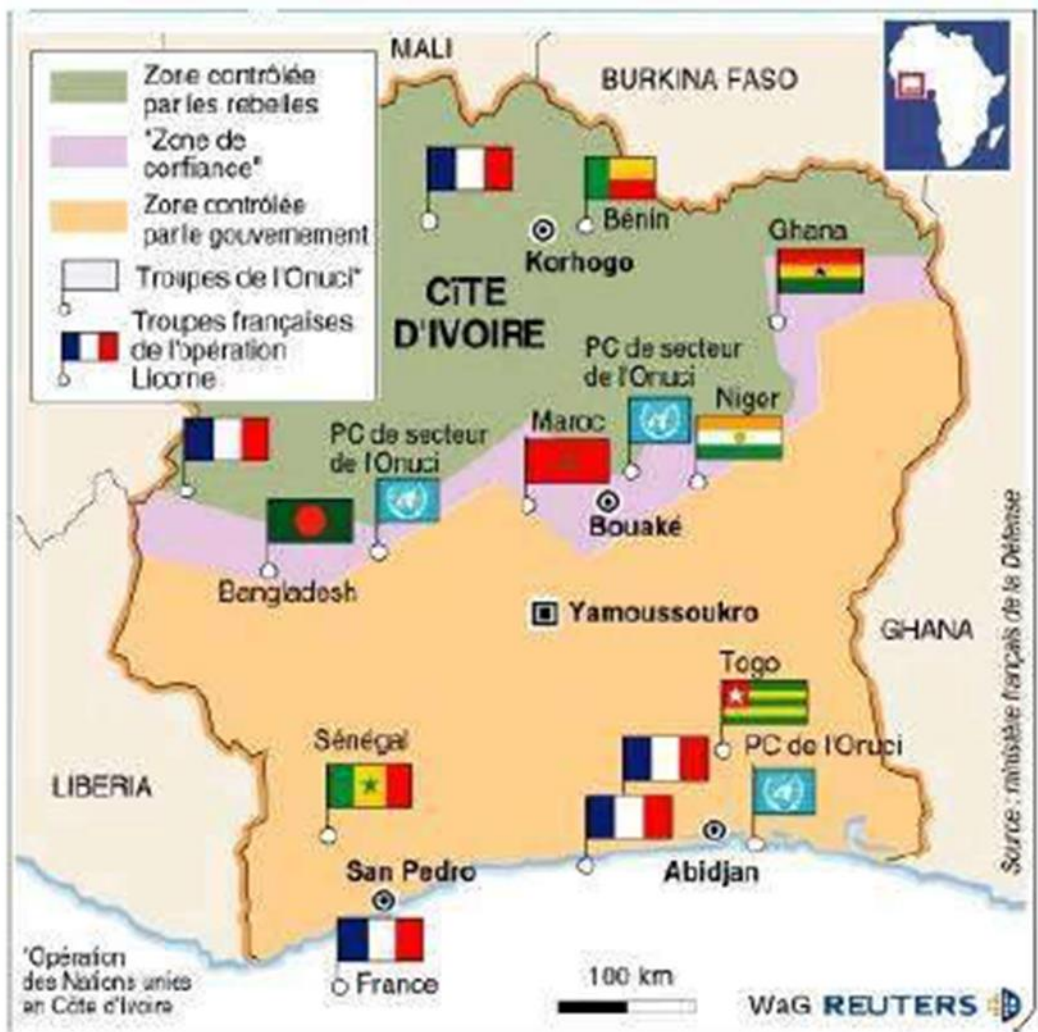
Annex 1: the 'virtual' division of Côte d'Ivoire in December 2000 and The sharing of Côte d'Ivoire and the international control by the 'impartial forces '.

Map 1: the 'virtual' division of Côte d'Ivoire in December 2000



Source: Patriot number 4267 of December 2000

Map 2: The sharing of Côte d'Ivoire and the international control by the 'impartial forces '.



Source: french Ministry of defence

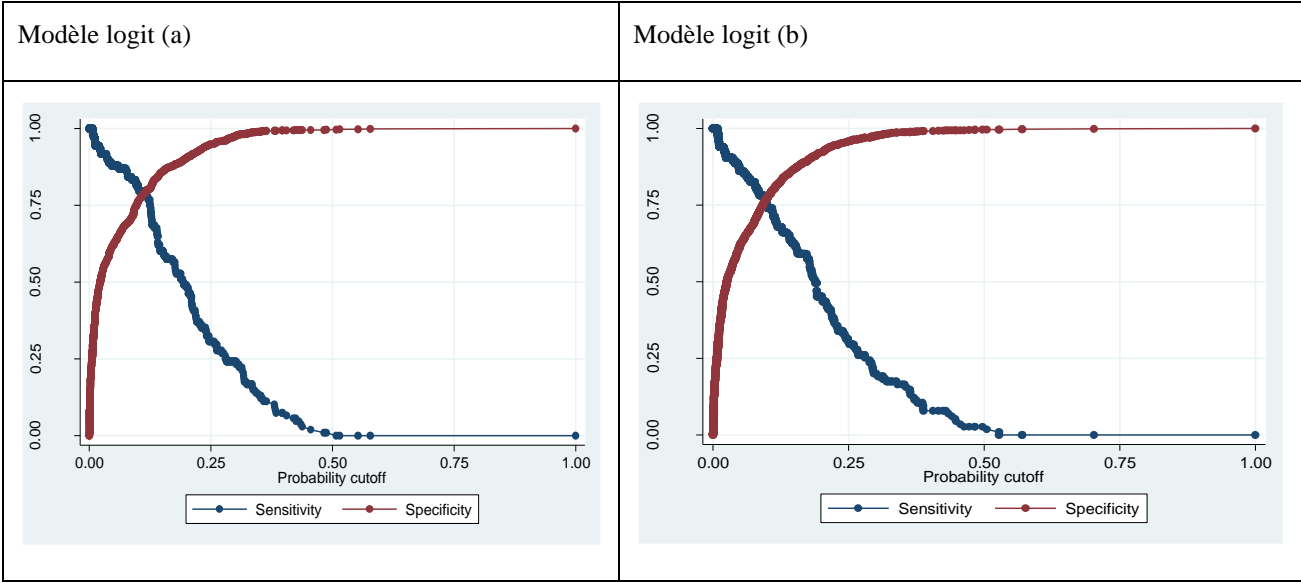
Annex 2: Econometric model validity

Table 5: Hosmer-Lemeshow Test

	Modèle logit (a)	Modèle logit (c)
Number of observations	1437	1566
Number of groups	10	10
Hosmer-Lemeshow chi2(10)	12.19	8.84
Prob> chi2	0.2725	0.5478

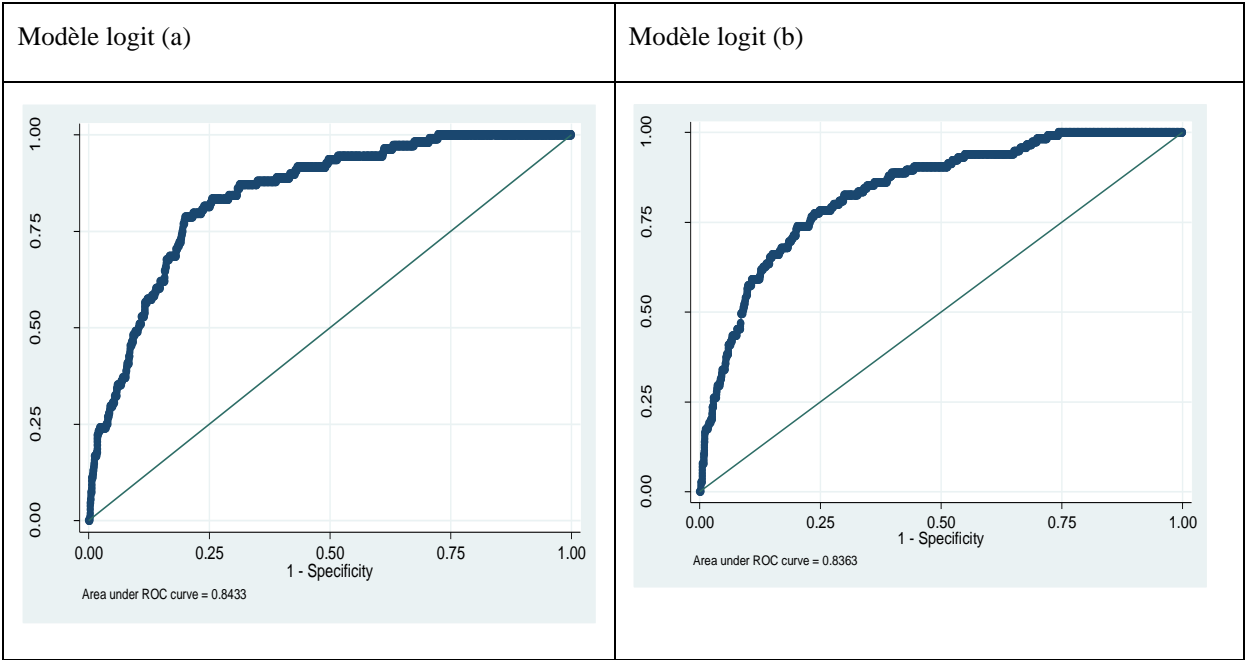
Source: Authors: estimates from the regression results on stata 12

Table 6: Test of specificity and sensitivity



Source: Authors: estimates from the regression on Stata 12 results

Table 7: Diagnostic Test



Source: Authors: estimates from the regression on Stata 12 results