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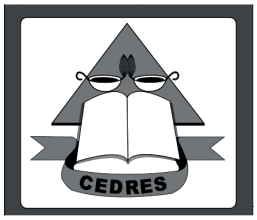

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Household resilience strategies in face of armed conflict : the case of Côte d'Ivoire

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Abstract

This article analyzes the determinants of households' decisions to adopt resilience strategies after 2010 post-election crisis in Côte d'Ivoire. Data used come from the Harmonized Survey of Household Living Conditions (EHCVM, 2018), Armed Conflict Location and Event Data Project (ACLED, 2010/2011). Multinomial probit model estimates show that the variables “conflict exposure, education level of household chief, marital status of household chief, household size, region, decrease income, in production, in food expenditure and living standard” significantly influence the adoption of a resilience strategy. The strategies identified: asset sales, recourse to aid or loan, use of savings and migration. However, “gender, age and area of residence” variables were not significant. In view of results, the following recommendations are made: Ivorian government should strengthen the establishment of diversified, efficient and inclusive financial systems; use comprehensive policies to facilitate refugees return and subsidize essential sectors such as electricity and water supply. In this way, economic policies based on people's needs will make a significant contribution to increasing household resilience.

Keywords: Resilience strategy, Armed conflict, Multinomial probit, Household socio-economic characteristics.

1. Introduction

Nowadays, armed conflict is one of greatest tragedies. In 2023, 59 armed conflicts were recorded worldwide, and almost half of (28) took place in Africa. The number of conflicts in this territory has « almost doubled » in ten years, resulting in more than 330000 combat deaths over the past three decades (Rustad, 2024). While some conflicts, such as Russia's invasion of Ukraine, are between states, most conflicts in Africa are intra-state (Amnesty international, 2023). « Intra-state conflicts generally defined as opposition between the government and internal opposition groups, manifest themselves in form of wars, civil disorder, coups d'état and terrorism (Yabré and Semedo, 2021).

In countries affected by armed conflict, particularly in Sub-Saharan Africa, conflict has harmful consequences at both macro and micro levels. World Bank statistics reveal that the majority of conflict-affected countries in Sub-Saharan Africa are recording low growth rates. Over the period 2010-2019, the average annual growth rate of real GDP per capita was -2.62% in Congo (a country destabilized by armed gangs), and -1.12% in Central African Republic (a country in perpetual conflict) (World Bank, 2020).

Over the past decade, West Africa has been beset by numerous security challenges. Okafor et al (2023) report that Sahel countries in this case Burkina Faso and Mali are grappling with multiple security threats. They point out that since 2014, Burkina Faso has faced security threats from violent terrorist groups and serious cases of military coups (A recent military coup in Burkina Faso in 2022). Then, divergent attacks by violent extremists in Mali led to military coup in 2012 and 2020.

At microeconomic level, armed conflict accentuates the vulnerability of populations living in high-risk areas. In Burkina Faso, for example, the deteriorating security situation has led to substantial increase in internal displacement (1810000 Internally Displaced Persons in February 2022). It has reduced the already very limited access to basic social services in a context of extreme poverty (OCHA, 2023). This situation is putting

pressure on the resources of said localities, with growing needs in terms of meeting minimum survival requirements (BRACED, 2017).

Like West African countries, Côte d'Ivoire, which borders Burkina Faso and Mali, has also experienced security crises. It has been the scene of chronic instability, starting with the coup d'état of 1999, the military-political crisis of 2002 and the post-electoral crisis of 2010. These conflicts have had profound repercussions on factors relevant to development, namely physical, human and social capital. Following the post-electoral crisis, Côte d'Ivoire recorded pronounced drop in real GDP of -5.9% in 2011. On the humanitarian front, the crisis resulted over 3000 deaths and massive displacement of civilians (700000 displaced), mainly to Liberia and Ghana. Social sectors such as health and education have been severely impacted. In national education system in 2011, nearly 800000 children were unable to access their schools, leading the increasing of school dropouts (UNDP, 2012).

Given the vulnerability of Ivorian economy, measures have been taken by the government to strengthen resilience through programs such as the Presidential Emergency Program (PPU), the National Development Plan and the Post-Conflict Assistance Project (PAPC). Thanks to the efforts of government and its technical and financial partners, GDP growth has risen from

-4.7% in 2011 to 7% in 2021, with a slight downturn to 6.7% in 2022, due to negative impact of war in Ukraine. Today, following the spectrum of fragility defined by the African Development Bank in its strategy to address fragility and build resilience 2022-2026, Côte d'Ivoire would be in « risk reduction and new pathways to resilience phase » (African Development Bank, 2023). Beyond the efforts made by the Ivorian government, individual households have also developed strategies to reduce their vulnerability to conflict. Indeed, households faced with conflict situations often live in a state of persistent and complex uncertainty, which compromises their efforts to ensure sustainable livelihoods (DFID, 1999). Community and household response are particularly important in protracted crises, during and after violent conflict, and wherever public institutions and systems that normally

support livelihoods (e.g. markets) are weak or ineffective. Literature reveals that the strategies adopted by households include common strategies such as liquidating assets (e.g. selling livestock); reallocating labor; changing household spending and consumption using formal, informal savings, loans and drawing on family and community support networks (kinship) and external organizations (Adimassu, Z., & Kessler, A. 2016).

These strategies fall into two categories: ex-ante strategies and ex-post strategies. The former, described as anticipatory strategies, are referred to risk management strategies, while the latter, described as more reactive are referred to resilience strategies. The long-term effects of armed conflict can affect household consumption and production choices. Even after the war is over, the allocation of household labor will only slowly return to its optimal peacetime value (Raigosa Londoño, 2024). As armed conflicts do not affect households in a homogeneous way, it is important to take their specific characteristics into account. Strengthening household resilience to armed conflict requires clear government decisions based on careful analysis of household specificities. However, few studies have focused on analyzing these specificities in aftermath of armed conflict. Moreover, the majority of current studies focus on periods of active conflict while very few attempt to analyze resilience strategies during post-conflict periods.

If we take Côte d'Ivoire as our framework for study, most authors interested in study of armed conflict have focused on the impact of conflict on education, health, employment and the accentuation of poverty (Yabile 2013; Yaro, 2024). Studies have also focused on resilience in post-conflict context without identifying household resilience strategies in face of conflicts. Instead, these studies have focused on balancing social cohesion as well as studying resilience in health, education and employment sectors (Brahima, 2015). The factors influencing households' choice of which resilience strategy to adopt have also not been the subject of empirical study. This study attempts to fill this gap by contributing to better understanding of strategies. To this end, it sets itself the general objective of analyzing the determinants of decisions to adopt household resilience strategies in context of armed conflict. Specifically, the aim is to identify

the different resilience strategy options available to households, and to identify the factors that promote or hinder these choices.

We will test the hypothesis that exposure to conflict; socio-demographic factors (gender, age, education, marital status of household chief, household size, region and area of residence of household chief) significantly influence the choice of resilience strategies. We will also test the hypothesis that economic factors such as declining income, food production and expenditure, membership of a mutual insurance company and living standard significantly influence the choice of strategies. The rest of article is organized as follows: section 2 is devoted to literature review. Sections 3 and 4 are devoted to methodology and results of analysis, respectively. Section 5 contains the conclusion and implications of results.

2. Brief review of literature

This section is divided into two parts: a theoretical review and an empirical review.

2.1. Theoretical review

Economists did not traditionally study war economies or the behavior of people living in war zones, for reasons of security and ethics. This field was the domain of political science and sociology. The emergence of innovative data collection methods has lifted this constraint. On the other hand, traditional economists viewed acts of violence as irrational behavior, leading them to dismiss violence as irrelevant to economic theory (Verwimp, 2019). Modern economists, on the other hand, believe that there are actors who have a comparative advantage in use of violence and that it may be rational or optimal to violent (North et al., 2009). The prevailing idea is that once the war is over, the economy must be "rebuilt" (Addison, T., & Brück, T.) (2009).

Early studies of armed conflict focused on the macroeconomic causes and consequences of civil wars. In second half of 1990s and early 2000s, economists began to focus on how individuals, households and communities behave, adapt, make decisions and live in contexts affected by armed conflict. This led to emergence of a new field in development economics, the microeconomics of conflict (Justino et al., 2013). The arrival of resilience thinking in peacebuilding theory and practice is therefore a recent phenomenon. This is why certain aspects that were not taken into account need to be further theorized, and among these aspects we can cite the relationship between resilience, conflict and socio-demographic characteristics such as gender (Juncos and Bourbeau, 2022). Resilience analysis is increasingly taking into account the specific characteristics of households, as they are not homogeneously affected by conflict.

For DFID (2012) « Disaster resilience is the ability of countries, communities and households to adapt to change, maintaining or transforming their living standards in face of shocks or stresses - such as an earthquake, drought or armed conflict - without compromising their long-term prospects ». Resilience strategy therefore determines the ability of a community or household to mobilize action in response to threatening situation when it arises (Comfort et al., 2001).

Fjelde (2015) in context of predominantly agricultural African economies, distinguishes two main families of resilience strategies: capital endowment and diversification of activities. Capital endowment is made up of physical capital (household assets and stocks held by the individual); financial or monetary capital (savings or borrowing), human capital (skills and health) and social capital (interaction with other individuals). In his view, the development of human capital, through training, literacy and apprenticeships, aids to increase the adaptability of households. Social capital, for its part, is a social resource capable of generating lasting externalities that affect the economic situation of individuals (Coleman, 1998).

Diversification of activities is a coping strategy for poor households. According to Diepart et al (2003), farm households turn to non-agricultural activities for three main reasons: a social motivation (non-agricultural activity is more rewarding), an economic motivation (the land base is too narrow to occupy the entire family workforce) and a survival motivation (meeting basic needs). The diversification of activities can lead to counter-intuitive behaviors such as contracting consumption and reducing spending on health and education. If the effects of crisis persist, households are forced to adopt strategies to decapitalize their physical capital. This involves selling part of their physical capital.

From the above, we can highlight the importance of taking into account the socio-demographic and economic specificities of households in development of peace-building policies and the fight against poverty.
Some authors have empirically established the triangular relationship between armed conflict - socio-demographic and economic characteristics - and resilience.

2.2. Empirical review

Literature on household resilience strategies to armed conflict is sparse compared to literature on resilience strategies in context of climate change, food security or the Covid19 pandemic (Nana and Thiombiano, Zheng et al., 2021, Gnedeka and Wonyra, 2023; etc.). Nevertheless, a few empirical studies have been identified. These studies focus on the socio-demographic and economic characteristics of households as factors influencing their choices.

Verwimp et al.(2019) identified as common resilience strategies, the use of savings, diversification of land holdings and crops, asset sales such as livestock and land, borrowing, change in consumption patterns, support networks (family, friends, government etc.).

Béné (2024) argues that these resilience strategies may differ from one household to another, depending on their socio-demographic and economic characteristics. They may differ between rural and urban

households, between households with educated and uneducated heads, between men and women, according to migratory status, career path, etc.

In same vein, Lwanga-Ntale and Owino (2020) identify three key strategies that strengthened household resilience following Somalia's two socio-political crises (2011 and 2016), namely social networks, safety nets and remittances from the Somali diaspora. They highlight the determinants of choice of "social networks" resilience strategy. According to the authors, age, gender, religion and geography are the characteristics of membership of networks. Depending on these characteristics, households may have converged on the following social networks.

Dago (2020), in a study carried out in Côte d'Ivoire using a bivariate probit model, concludes that households in departments that have experienced at least one conflict event use the withdrawal of children from school as a resilience strategy. The occurrence of conflict has a positive influence on children's withdrawal from school.

Brück (2008) reports that widows are more likely to lose assets and be removed from support networks following the loss of their husbands. He concludes that widows are less resilient to conflict. Similarly, a study conducted in Mali by D'Errico et al. (2021) using the GLM and probit models suggests that female-headed households have a lower probability of adopting new coping strategies.

Research by Bird and Higgins (2009) has shown that education is an asset that supports resilience. Through a study in northern Uganda, the authors argue that individuals with a high level of education choose to change their consumption behavior as a strategy.

3. Methodological approach to study

3.1 Analytical framework

This article focuses on discrete choice modeling of household behavior. Discrete choice models are used to analyze situations in which an individual must choose from a finite and exhaustive set of mutually exclusive modalities. These models calculate the probability that an individual will select a particular modality from this set, given the observations (Bolduc and Kaci,1993). In terms of analyzing the determinants of households' choice or decision to make adjustments or modifications, two models (Logit and Probit) are commonly used (Yegbemey et al., 2014). The most widely used model, which best explains the diffusion process, is the logistic function. However, estimating the latter poses the problem of independence of irrelevant alternatives. Ignoring or miss specifying the interdependence structure between modalities leads to problem of non-convergent parameter estimation. This constraint can be overcome by multinomial probit (Ahouandjinou M., & al. (19-23 septembre 2010).

According to Bolduc and Kaci (1993), the limitation of multinomial probit model is that when the number of alternatives exceeds five, it creates serious problems when estimating parameters using conventional estimation methods. Within class of multinomial probit models, we distinguish between ordered multinomial probit models and unordered multinomial probit models. The latter is a model in which the dependent variable is categorical and the modalities are unordered (Tazeze et al., 2012). Households' choice of different resilience strategies in face of armed conflict is unordered in sense that it is difficult to rank the different strategies in order of preference. The model to be used in this study is therefore the unordered multinomial probit model proposed by Bunch (1991).

3.2. Presentation of multinomial probit model

The multinomial probit model is based on the maximization of a random utility function. The dependent variable is a multinomial variable with unordered modalities.

either j = 0, 1, …, n the different possible alternatives; X = 1, 2, …, t representing the explanatory variables and i the head of household. For each choice j, the head of household i receives a utility.

The utility function is :

$$U_{ij} = \beta_j X_{ij} + \varepsilon_{ij} \qquad (1)$$

Wheras $\beta_j X_{ij}$ represents the deterministic part of utility function and ε_{ij} represents the random portion.. β_j given the parameters associated with the explanatory variable X_i for a given alternative j; the explanatory variable being a determining factor in adoption of resilience strategies.

Either Y_{ij} a variable that takes the value 1 if head of household i chooses alternative j and zero if not. Thus, the probability of head of household's choice j being realized is:

$$P(Y_{ij} = 1) = P(U_{ij} \geq U_{in}), \text{ avec } j \neq n \qquad (2)$$

The probability of household chief i choosing alternative j is expressed in multinomial probit model as:

$$P(Y_i = j) = \frac{\exp(\beta_j X_{ij})}{\sum_{j=0}^{n} \exp(\beta_j X_{ij})} = \frac{\exp(\beta_j X_{ij})}{1 + \sum_{j=1}^{n} \exp(\beta_j X_{ij})} \qquad (3)$$

By normalizing β_0 to zero ; $\beta_0 = 0$, the probability associated with 0 modality is :

$$P(Y_i = 0) = \frac{1}{\sum_{j=0}^{n} \exp(\beta_j X_{ij})} = \frac{1}{1 + \sum_{j=1}^{n} \exp(\beta_j X_{ij})} \qquad (4)$$

Model parameters will be interpreted as deviations from zero modality parameters.

3.3 Data sources

Data used in this study from the Harmonized Household Living Conditions Survey (EHCVM) conducted by INS in 2018-2019 in Côte d'Ivoire. Data are collected from 12992 households and their members throughout the national territory. Information on shocks, resilience strategies and other household characteristics was used. Missing data having been eliminated in view of geographical area selected ex CNO (center-north and west) and south & Abidjan and center-east, the final size of database covers 1437 households.

3.4. Variables description

3.4.1. Explanatory variables[1]

- The gender of head of household (gender) is qualitative variable that takes the value 1
  if the head of household is female and 0 if not. It has a mixed effect. It can influence the household's ownership of assets and factors of production.
- The age of head of household (age) is a quantitative variable measured in number of years. It has a mixed effect. The younger the head of household, the more likely he or she is to adopt resilience strategies.
- The level of education of head of household (educ) is a quantitative variable that positively influence the probability of being more resilient. It takes the value 1, when the head of household is uneducated. Value 2, for a head of household with primary education, and value 3 for a head of household with secondary education or higher. It would increase the likelihood of adopting resilience strategies, as a better-educated head of

[1] Analysis based on Yaya's analysis (2023)

household has easier access to job market and easily improves his or her income.

- Marital status[2] of head of household (marit_sit). It takes the value 1 for a monogamous married or polygamous married head of household; value 2 for a single or common-law head of household and value 3 for a widowed, divorced or separated head of household.
- Household size (tail_men) measures the number of people in household. The effect of size is mixed. It represents a potential workforce for the family.
- The region[3](region) indicates whether households live in a stable area or not. It takes
  the value 1 for the central-eastern region, which was unaffected by the conflicts of 2002 and 2010. According to ACLED data, there were no battle deaths in this area. It assumes a value of 2 for the center-north and west regions (ex CNO), areas besieged by rebels in 2002, and a value of 3 for the south & Abidjan zone.
- The environment (env) distinguishes households living in rural areas from those living in urban one. It takes the value 1 for urban areas and 0 for rural area.
- Drop in income (inc_choc) is an economic variable used to measure the living standard of chief of household. The more income falls, the more likely the chief of household is adopt resilience strategies. It has a positive relationship with the adoption of resilience strategies. The same as decreasing for lower food expenditure (achAlim_choc) and production (product_choc).
- Membership of a mutual(mutual) is positively linked to adoption of resilience strategies

The living standard (level of live) is approximated by quintiles which are used to measure inequality. The quantile option in study of poverty profiles makes it possible in monetary terms to break down population on the living standard of scale into 5 fractions of 20 % each known as 5th-order

[2] Marital status concerns both: male and female
[3]See regions in the appendix.

percentiles. The first quintile represents 20 % of population living in extreme poverty, the second quintile represents 20 % population living in moderate poverty, the third quintile is made up of 20 % population with an average living standard and the last two quintiles represent 40 % population living in confortable conditions, that's to say non-poor (Ouedraogo, 2009). Then the breakdown of expenditure into quintiles allows us to measure inequalities within population (Godard et Olvera, 2000).

- Exposure to conflict is a variable that distinguishes households that have been exposed to conflict from those who have not. It is constructed from ACLED data, which identifies the number of combat deaths. Households living in areas where there was at least one fatality during the 2002 and 2010 conflicts are considered as conflict-exposed households. Those living in areas where there were no combat deaths are considered non-conflict-exposed. This variable takes the value 1 if the head of household is exposed to armed conflict and 0 if not.

3.4.2. Explained variable

The dependent variable has four (4) modalities and concerns the types of resilience strategies adopted. It concerns the:

- Modality 0: this modality indicates no resilience strategy adopted (that's no strategy adopted).
- Modality 1(noted strategy_1). Means that the head of household has chosen to sell his or her productive and non-productive assets.
- Modality 2 (noted strategy_2). Means that the head of household has chosen tosk for aid from relatives or friends, from the government or from religious organizations or NGOs. Either, he has opted to use his savings or he has asked for a loan.
- Modality 3 (noted strategy_3). Means that the head of household has decided to migrate.

3.3 Model specification

The empirical model is the multinomial probit model. Concerning the theoretical model, we refer to Zurich's (2009) resilience theory, which states that there is a well-defined mathematical relationship between the factors influencing resilience strategies and resilience.

The theoretical model is as follows:

Strategy = β_0 + $\beta_1$gender + $\beta_2$age + $\beta_3$educ +β_4 matri _sit + $\beta_5$tail_men + $\beta_6$region+ $\beta_7$env +$\beta_8$inc_choc + $\beta_9$achat_Alim + β_{10}product_choc + ε_{it} (5)

$i's$ are the parameters of model, with i ranging from 0 to 10. "Strategy" is the dependent variable, with 4 modalities. To estimate the multinomial probit model, we use the maximum likelihood method. The advantage of this method is that it presents a particularly interesting statistical inference due to fact that its estimator is endowed with properties of efficiency and asymptotic normality and that the observations are independent and identically distributed (Thiombiano and Nana, 2018).

The Log-likelihood function is:

$\log L(Y, \beta_1, \beta_2, \ldots \beta_k) = \sum_{i=0}^{n} \sum_{j=0}^{k} Y_{ij} \log[P(Y_i=j)]$ (6)

avec

Y_{ij}= 1 si Y_{ij}=j

Y_{ij}= 0 if not

Parameters of multinomial probit model are then estimated by maximizing the above log-likelihood function. β_j constitute the parameters to be estimated, with j ranging from 0 to 4 modalities (the number of resilience strategies adopted). i ranges from 1 to 1437 households. Estimation is

performed using STATA software. The estimated coefficients are not directly interpretable, but rather serve to give an indication of nature of relationship between the dependent variable and the explanatory variables. Only the marginal effects need to be interpreted. Marginal effects must therefore be calculated. They are obtained by deriving the probabilities with respect to explanatory variables. Note that the signs of marginal effects are not necessarily the same as those of estimated coefficients (Croissant, 2009).

4. Results and discussion

4.1. Descriptive analysis of variables

Statistical analysis of dependent variable "resilience strategy" shows that 45.16% of households have adopted no resilience strategy at all; 19.83% of them have adopted the strategy of selling their agricultural assets and durable goods; 16.08% of them have resorted to assistance from relatives and friends, the government or NGOs; they have also resorted to savings and loan. Finally, the statistics reveal that 18.93% of households migrated as a result of armed conflict. These statistics show that almost half of households have not adopted resilience strategies, and a very small proportion have used savings, loan or aid to cope with the security crisis**.**

Table 1: Modalities of dependent variable according to percentage of resilience strategies

Number of adopted strategies	Pourcentage participant %
No strategy	45,16
Asset sales	19,83
support/Savings/Loan	16,08
Migration	18,93

Source: author's construction from data EHCVM, 2018

Considering the conflict variable, we note that of 1,437 households selected, only 25.89% were not affected by armed conflict, compared with 74.11%. This shows that the majority of households have suffered the effects of armed conflict.

Table 2: Variable of armed conflit

Conflcit exposure	Pourcentage of household %
Non affected household by conflicts	25,89
Affected household by conflicts	74,11

Source: author's construction from data EHCVM, 2018

In terms of socio-demographic variables, 83.30% of respondents were male. This figure shows that the majority of heads of household in Côte d'Ivoire, and particularly in our context, are male. Few female heads of household are unmarried (16.70%). For the sample as a whole, the average age is 42, the maximum is 102 and the minimum is 12. In terms of level of education, 58.80% of heads of household surveyed were not educated, and a minority had a higher level (2.78%). This shows that efforts need to be made in field of literacy and formal education. Concerning marital status, statistics show that 60.26% of heads of household are monogamous or polygamous spouses, 32.78% are single or in a common-law relationship, and 6.96% are in a broken home situation (widowed, divorced or separated). In terms of household size, the majority of households are medium-sized (48.30%), i.e. between 4 and 7 members. In terms of regions, households living in centre-east region, which was not affected by the 2002 and 2010 conflicts according to ACLED data, represent only 5.29%. Households living in impacted regions of Centre-Nord and West (ex CNO) represent respectively 19.00% and 28.04% of population studied. The South & Abidjan zone has the largest number of households (47.67%), as Abidjan is a large city with the highest concentration.

Finally, in terms of place of residence, the figures show that 37.02% of Ivorian population lives in urban areas and 62.98% in rural areas. These figures show that the development strategy of Ivorian economy is based on agriculture.

Concerning economic variables, the statistics reveal that 90.40% of households recorded a drop in income as a result of armed conflicts, compared with 9.60% who declared that they had not experienced a drop in income. These statistics show that the conflicts have not impacted the income of a minority of Ivorian population. Furthermore, 79.47% of households stated that they had experienced a reduction in assets, compared with 20.53% who had not. Also, 66.81% of households said they had experienced a drop in agricultural production, compared with 33.19% who had not. In addition, 69.80% of households said they had reduced their consumption expenditure as a result of armed conflict, while 30.20% said they had not. In addition, a minority of households (3.41%) said they belonged to mutual insurance company, compared with 96.59% of households who said they did not belong tony mutual insurance company. These figures show that the mutualization rate in Côte d'Ivoire remains low. Finally, in order to appreciate the effects of living standard in our model and to highlight inequalities, we have used the quintile as an economic variable. It establishes a scale ranging from 1 (poorest quintile) to 5 (richest quintile). Statistics show a certain inequality in consumer spending. Theoretically, a quintile represents 20% of population, but there are slight variations in frequency. Households are concentrated in first three quintiles, which represent the category of households living in extreme poverty, those living in moderate poverty and the third group with an average living standard (55.81%).

4.2. Presentation, interpretation and discussion of multinomial probit estimation results

4.2.1 Results presentation

Table 3: Results of multinomial probit estimation

VARIABLES	Asset sales		Support/savings/loan		Migration	
Armed Conflict						
Non exposed	Ref					
Exposed	0,2480***	0,042	0,5654***	0,000	1,0306***	0,000
	(0,1219)		(0,1339)		(0, 1443)	
Gender						
Male	Ref					
Female	0,1141	0,533	0,0654	0,711	0,2031	0,239
	(0,1669)		(0,1767)		(0,1726)	
Age	-0,0075*	0,087	0,0007	0,868	-0,0086**	0,056
	(0,0439)		(0,0044)		(0, 0045)	
Education						
No instruction	Ref					
Elementary	0,9441	0,518	0,2124	0,166	-0, 0179	0,907
	(0,1461)		(0,1531)		(0,1534)	

Secondary	0,5410	0,718	0,2215	0,154	0,1281	0,404
	(0,1497)		(0,1552)		(0,1536)	
Higher	-1,1271**	0,015	-0,444	0.898	-0,4105	0,248
	(0,4637)		(0,3479)		(0, 3556)	
Marital situation						
Married	Ref					
Single	0,1597	0,899	0,0044	0,973	-0,2584**	0, 046
	(0,1258)		(0,1320)		(0,1295)	
Divorced	0,4070	0,104	0,3171	0,230	0, 2478	0,345
	(0,2504)		(0,2643)		(0, 2624)	
Household size	0,0023	0,924	-0,1312	0,608	0,0578***	0,017
	(0,0247)		(0,0256)		(0, 0242)	
Region						
Central-East	Ref					
Central-North	0,9457***	0,003	0,1701	0,575	0,144	0,615
	(0,3187)		(0,3036)		(0,2863)	
West	0,3674	0,242	-0,5318	0,857	-0,1793	0,948
	(0,3141)		(0,2959)		(0,2773)	
South & Abidjan	0,5958 ***	0.048	0,2929	0,288	-0,0158	0,951
	(0,3010)		(0,2759)		(0,2609)	
Meduim	0,1499	0,228	0,0575	0,657	-0,1327	0,918
	(0,1243)		(0,1296)		(0,1287)	
Lower income	0,0510	0,798	0,2984	0,120	-0,3285	0,143
	(0,1991)		(0,1920)		(0,2240)	

Lower production	0,0788	0,523	0,3045***	0,017	0,3672***	0,003
	(0,1233)		(0,1270)		(0,1244)	
Lower food expenditure	0,0827	0,503	0,4169***	0.001	-0,3311**	0,011
	(0,1234)		(0,1248)		(0,1305)	
Mutual	-0,2798	0,364	-0,3140	0.329	0,6087**	0,036
	(0,3084)		(0,3216)		(0,2898)	
Living standard						
Quintile1	Ref					
Quintile2	-0,1352	0,465	-0,2004	0,305	-0,1512	0,412
	(0,1850)		(0,1954)		(0,1842)	
Quintile3	-0,2191	0,236	-0,1381	0,472	-0,4814**	0,012
	(0,1851)		(0,1918)		(0,1905)	
Quintile4	-0,1036	0,594	-0,2142	0,294	-0,1367	0,483
	(0,1945)		(0,2040)		(0,1948)	
Quintile5	0,2260	0,275	-0,1008	0,647	0,0515	0,806
	(0,2072)		(0,2202)		(0,2102)	

Source: estimates by the author based on survey data EHCVM, 2018

Table 4 : Marginal effects table

Variables	Pr(Y=1)= 0,2004	Pr(Y=2)= 0,1578	Pr(Y=3)= 0,1754
	Conflicting Factor		
Conflcit	-0,2079	0,0524**	0, 1487***
	(0,0248)	(0,0206)	(0,0190)
	Socio-demographic factors		
Gender			
Female	0,0130	-0,0025	0,0345
	(0,0229)	(0, 0303)	(0,3422)
Age	-0,0012	0,0133	-0,0014
	(0, 0008)	(0,0233)	(0,0008)
Education			
Elementary	0,0107	0, 0356	-0,0189
	(0,0296)	(0, 0291)	(0, 0271)
Secondary	-0,0069	0,0356	0,0129
	(0,0294)	(0,0291)	(0,0271)
Higher	-0,1565***	0, 0529	-0,3824
	(0,038)	(0, 0716)	(0, 0572)
Marital Situation			
Single	0,0101	0,0133	-0,0512 ***

	(0,0254)	(0,0233)	(0, 0224)
Divorced	0,0640	0,0280	0,0112
	(0,0559)	(0,0494)	(0,0493)
Household seize	-0,0020	-0,0053	0,0124***
	(0,0049)	(0,0044)	(0,004)
Region			
Central-north	0, 2257***	-0,0311	-0,0399
	(0,0830)	(0,0494)	(0,0487)
West	0,0886	-0, 0303	-0,0156
	(0, 0712)	(0, 0496)	(0,0507)
South & Abidjan	0,1201**	0,0264	-0, 0499
	(0,0625)	(0,0489)	(0,0481)
Medium	0,0311	0,0041	-0,0137
	(0,0242)	(0,0224)	(0,0241)
	Economic Factors		
Lower income	0,0096	0,0760*	-0, 0756***
	(0, 0403)	(0, 0398)	(0,0315)
Lower production	-0,0193	0,0382*	0,0590 ***
	(0,0240)	(0,0231)	(0,0244)
Lower food expenditure	0,0121	0,0972 ***	-0,0876***
	(0,0249)	(0, 0244)	(0,0209)
Mutual	-0,0057	-0,0130	-0,1088
	(0,0614)	(0,0574)	(0,0667)

Living standard			
Quintile2	-0,0120	-0,0243	-0,0147
	(0,0358)	(0, 0315)	(0,0325)
Quintile3	-0,0174	0, 0046	-0, 0745 ***
	(0,0357)	(0,0335)	(0,0292)
Quintile4	-0,0051	-0, 0289	-0,0128
	(0,0384)	(0,0327)	(0,0348)
Quintile5	0,0548	0,0329	0,0018
	(0,0441)	(0, 0355)	(0,0387)

Number of comments = 1 437

Wald chi2(72) = 184,10

Prob > chi2 = 0,0000

Log likelihood = -1751.0887

*** Indicates significance at 1%, ** a significance at 5% et * a significance at 10%.

Figures in brackets denote standard deviations.

Source: author's estimate based on survey data EHCVM, 2018

4.3.2 Estimated parameters statistical interpretation

Wald statistic given by STATA is 184.10 with 72 degrees of freedom, which can be approximated to reduced-centered normal distribution. The probability associated with the Wald statistic is 0.000, significant at 1%. We can therefore conclude that the model is adequate. The variables taken as a whole are significant.

Looking at the coefficients of estimated parameters, we see that the choice of asset sale strategy is significantly influenced by exposure to armed conflict, the age of head of household, his or her level of education and the region in which he or she lives. The aid/savings/loan strategy is significantly influenced by armed conflict, lower agricultural production and lower food expenditure. Finally, the choice of migration strategy is significantly influenced by armed conflict, age of head of household, marital status, household size, decrease in food expenditure, membership of a mutual insurance company and living standard. The following paragraph will show how these variables influence the probability of adopting a specific resilience strategy.

4.3.3. Economic interpretation of parameters and discussion

This is an interpretation of marginal effects of different variables introduced into model, in order to better identify their influences on the probability of choosing either to sell assets; to demand aid from relatives, friends, the government, religious organizations or NGOs, to use savings or to apply for loan; or to migrate to more stable areas.

There is a positive and significant relationship of 1% between "exposure to armed conflict" and "asset sales". This means that increased exposure to armed conflict increases the probability of asking for financial aid, using savings or applying for loan by 0.0524. Financial aid, while essential, can create dependency and make households more vulnerable to onset of new crises.

Increased exposure to armed conflict" increases the probability of 'migrating' by 0.1487. Indeed, some households may seek to maintain or improve their well-being through migration (Justino, 2007). However,

migration can pose reconstruction problems. The return of refugees can pose challenges in terms of reintegration. On the other hand, the marginal effect of "conflict exposure" is negative and insignificant for the "asset sales" strategy.

Concerning socio-demographic variables, "gender and age" appears to have no significant influence on the adoption of three resilience strategies. These results are in contradiction with those of N'Da (2014) conducted in Côte d'Ivoire in context of socio-political crises (2002-2011), which reveal that probability of choice of household coping strategies depends significantly on gender and age.

There is a negative and significant relationship at 5%, between "education" and only the choice of "asset sale" strategy; moreover, its marginal effect is also negative and significant. These results indicate that the more educated the head of household, the less inclined he is to sell his assets. This result could be explained by the fact that education would enable households to have a better knowledge of strategies enabling them to maximize their utility through better access to information (Gnedeka, 2023).

"Marital status" shows a negative and significant relationship for only the migration modality at 5%. Its marginal effects are also significant at 1%. The study shows that single people adopt the "migration" strategy very little. They are less inclined to migrate. This could be explained by the fact that, as they have no parental obligations, they do not opt for migration, which is a kind of protection for the family (wife, children). These results contradict those of Bamba

(2022), who indicates that young single Ivorians are inclined to migrate during armed conflict.

The marginal effect of "household size" is significant (1%) only for the choice of a single resilience strategy: migration. When "household size" increases by one unit, it increases the number of migrants by 0.0124. Indeed, economic pressure may lead larger households to increase.

The coefficients of "region" variable indicate the existence of a positive and significant relationship for the "asset sales" modality at the 1%

threshold. These results indicate that households living in center-north region and those living in south & Abidjan region preferred to sell their assets (sale of land, sale of durable goods, etc.) to cope with the crisis. Indeed, these two regions have been heavily impacted by the two armed conflicts in Côte d'Ivoire. Centre-Nord is part of ex-CNO zone, which was heavily impacted by the longer socio-political crisis of 2002. A certain lull was observed in 2008 with the signing of Ouagadougou political agreement. The South & Abidjan region, on the other hand, was heavily impacted by the post-electoral crisis, which lasted only a short time (2010-2011). Deteriorating living conditions, shortages of basic necessities and rampant inflation therefore drove households to sell their possessions to buy food and medicine. Barbelet and Goita (2015) obtained the same results in northern region of Mali.

For the third analysis, the results show that economic variables significantly influence the adoption of resilience strategies. The marginal effects of lower income, lower production and quintile 3 are significant.

For "income decrease", the marginal effects are positive for the "aid/savings/loan strategy" and negative for the "migration strategy". This means that the lower the household income, the more they ask for aid, use their savings and apply for loan, and the less inclined they are to migrate. The analysis shows that Ivorian households who have seen their income fall, have not gone to other countries to seek other sources of financing, but have preferred to stay at home and resort to internal financing to cover their essential needs.

Faced with a drop in production, some households still migrated, despite having received financial aid or loan, or having used their savings. This counter-intuitive behavior could be explained by the fact that, on the one hand, this aid was considered insufficient to meet basic needs and/or, on the other hand, that the feeling of insecurity outweighed everything else.

Households that saw their "production" drop were more inclined to migrate, certainly in search of additional sources of income to increase their production or diversify their activities, or even to find free or available land for the continuation of their activities.

The drop in "food expenditure" has a mixed effect on the adoption of resilience strategies. It is positive for the use of aid/savings/loan and negative for migration. As a result, to make up for the consumption deficit, the head of household calls on social networks to obtain financing. He also uses his savings or has recourse to borrowing. Given all these constraints, they are less inclined to migrate.

For "quintile 3", the marginal effects are positive and significant at the 5% level for the "migration" strategy. Households in this quintile, situated in intermediate category (between poor and rich), tend to migrate during periods of armed conflict. They are certainly looking for other opportunities to substantially increase their income.

5. Conclusion and recommendations

The aim of this study was to analyze the determinants of resilience strategies in face of armed conflict. The starting hypothesis is that: level of education, decrease in food expenditure, decrease in income, decrease in production, region and place of residence significantly influence the decision to sell assets, ask for aid, use savings, apply for loan or migrate. Estimation was based on a 4-method multinomial probit. The results show that the model used is appropriate, and that resilience strategy-seeking increases with conflict exposure and household size. Strategy search also increased significantly in Centre-Nord region and in South & Abidjan region. Strategy-seeking also increased significantly with declining production.

However, households are less likely to sell their assets, ask for aid/savings/loans or migrate when they have a higher level of education or are single. When their income and food expenditure fall, households are more likely to demand for aid, use their savings or take out loans, and are less inclined to migrate. Households with an average living standard also do not seek strategies such as migration. On the other hand, variables such

as gender and age have no significant influence on the choice of a resilience strategy.

Considering the results, a number of recommendations are made.

- The Ivorian government should strengthen the development of diversified, efficient and inclusive financial systems. This will involve increasing the granting of loan to people who are still vulnerable, in order to finance projects.

-The CMU health insurance scheme should also be made more operational, to enable vulnerable populations to protect themselves against all health risks.

- Government should put in place comprehensive policies to facilitate the return of refugees and their reintegration for the sustainable reconstruction of country.

- Government should continue to implement sectoral policies to support the populations of central-northern and southern zones & Abidjan, who have had to sell their assets to cope with the conflicts and therefore subsidize essential sectors such as electricity and water supply.

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