COPING DECISION, STRATEGIES AND RURAL HOUSEHOLDS WELFARE IN COTE D'IVOIRE

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Abstract
Shocks are ubiquitous in the daily life of rural people in Côte d'Ivoire, like many other developing countries. These shocked households have to choose between coping or not. With data from the Household Standard of Living Survey in Côte d'Ivoire (ENV2015), we use a probit model to analyze the factors influencing the decision of rural households to cope or not and then we identify the dominant strategies of these households facing shocks. A logit model allows us to understand the impact of the strategic choices made by these households on their well-being. We find that only health shocks have a positive influence on household's coping decision. Also, for these various shocks (health shocks, natural shocks, economic shocks and shocks related to conflicts / crimes), the dominant strategies are the reduction of consumption, then the receipt of donations and borrowing. However, it is the reduction of food consumption, borrowing and the sale of assets that have a positive impact on these households welfare approximated by their poverty status.

Keywords
Rural households; Coping decision; Welfare; Strategies; Côte d'Ivoire

JEL Classification
D10; D60; I30

Introduction and literature review
In most developing countries, agriculture remains as one of the main sources of income for the majority of rural people. But rural agricultural producers also take part in other activities such as salaried employment in agriculture, trade, and other services as well as self-employment in small industries and commercial activities (micro-enterprises). Unfortunately, the income generation opportunities of rural households are usually highly correlated hence, these households are particularly vulnerable to systemic shocks (Carlos Andres Alpizar, 2007). Since the majority of rural households are engaged in agricultural production, they are particularly prone to ecological shocks which cause damage on agricultural output and income (Tongruksawattana *et al.,* 2008). The adverse effect of shocks is generally more severe for the poor who are less insured *ex-ante* against shocks and therefore are more likely to reduce consumption than wealthier households (Jalan and Ravallion, 1999).
Everyday life in Sub-Saharan Africa carries considerable risk, which often is linked to extreme weather, such as drought. *World Development Report 2014 : Risk and Opportunity* documented that more people have died in Sub-Saharan Africa from drought than any other natural hazard (World Bank 2014). But households also face price shocks—increases in food prices or input prices, or falls in output prices. Illness or death in the household is also frequently reported by rich and poor households alike. In a study of rural Kenya and Madagascar, Barrett et al. (2006) found for instance that every poor household that was interviewed could ultimately trace its poverty to ill health or an unexpected loss of assets. As rural are facing many shocks that can

influence their welfare, understanding shocks and their consequences is essential for developing effective poverty alleviation strategies in developing country like Côte d'Ivoire. Unfortunately a better understanding of this linkage is lacking because comprehensive empirical data are rare (Tongruksawattana *et al.,*2010).

Differents strategies are used by households to face shocks. The literature on shocks and coping actions has identified these strategies among which we can cite self-insurance strategies, income diversification, risk-sharing mecanism, etc.

Risk-coping strategies include self-insurance through precautionary savings and informal group-based risk-sharing. They may also attempt to earn extra income when hardship occurs. Kochar (1995) reported increased labor supply as key response in south India ICRISAT villages. Park (2006) using Chinese data showed that grain's consumption role makes it an attractive form of precautionary saving even when households have access to credit. Empirical work using data from India and Africa found that grain buffer stocks are the most important form of saving used to smooth income shocks *ex post* (Lim and Townsend, 1998).

Income smoothing often involves diversifying income sources. Across the developing world, farm households receive a substantial share of income from nonfarm activities. Reardon et al. (1994) reported an average share of 39 percent of income from nonfarm activities in eight countries in rural West Africa. Diversification does not always result in income smoothing, for several reasons. First, combining different income sources is not always intended to manage risk. Different activities may be conducted at different times of the year, providing income throughout the year by smoothing labor over time. Second, during crises farm and off-farm activities move together. In a severe downturn, this would severely limit the usefulness of diversification (Czukas et al. 1998).

There are also important constraints to entering into profitable and risk-reducing diversification (see Reardon 1997). Capital and other entry constraints exclude the poor from diversification into activities with a higher return. Also, income-based strategies are directly linked to asset-based strategies. As Eswaran and Kotwal (1989) showed that credit can serve as an insurance substitute, but credit market imperfections usually imply collateralized lending. The consequence is that asset-poor households cannot enter into high-risk activities because downside risks are too high while households with access to (liquid) assets can borrow in times of crisis or sell assets as part of a buffer stock strategy. Thus, Dercon (2002) found that the poor and asset-poor select a low-risk, low-return portfolio, whereas the rich take on a riskier set of activities. The consequence is further impoverishment, or at least increased inequality. The policy implication is that just promoting diversification is not necessarily a solution. Finding ways of reducing entry constraints into profitable low-risk activities is crucial.

Kochar (1995) argued that labor supply adjustments, rather than asset or other strategies, are the main strategy used by households in India to cope with negative idiosyncratic shocks. Moser (1998) reported increased female labor market participation and child labor in Ecuador and Zambia. During a severe crisis, such as a famine, households undertake additional action such as temporarily migrating to obtain work, working longer hours, and collecting and selling wild foods and forest products all this to prevent destitution (Davies 1996).

Empirical studies have sought to determine whether there is evidence of complete risk sharing in developing countries and other settings, including the United States, and to understand how (partial or complete) risk-sharing is achieved. Results from the United States, communities in India, and nuclear households in Ethiopia suggest that complete risk sharing is not taking place (Dercon and Krishnan 2000a; Hayashi and others 1996; Townsend 1994) but that partial risk sharing may be occurring. Theoretical work also reveals the limits of risk-sharing arrangements. Hoff (1996) highlights the possible negative consequences of informal risk sharing on poverty. Fafchamps (2002) discusses the persistence of inequality and patronage linked to risk- sharing arrangements. Even

if imperfect, these risk-sharing networks are crucial in helping many poor households in developing countries cope with misfortune. Such groups can insure only idiosyncratic shocks, however, not common shocks. Savings or public safety nets could be developed to cope with common risks and to protect against idiosyncratic shocks not covered by communities. Informal risk-sharing arrangements can complement public safety schemes (Ligon 2002). Groups have incentives to self-insure, especially if there are economies of scale in asset holdings (lower transactions costs, for example). Some works have attempted to analyze the impact of shocks on household welfare or to study factors that influence the choice of one strategy to another one to cope with idiosyncratic or covariate shocks. Here, determining the nature of shocks may help identifying the possibilities to deal with its consequences. Dercon et al. (2005) considered a shock as idiosyncratic if it is reported to have affected only that household and covariate if it affects at least some other households. Most of the informal risk-coping arrangements and strategies of the poor might work well on idiosyncratic risks (e.g. self-insurance or informal community risk-sharing) but are limited in their effectiveness against covariate risks that create contemporaneous community-wide loses (Agenor, 2004 as cited by Olalekan *et al.,* 2011).

For households facing shocks, Rashid et al. (2006) identified factors that influence the choice of coping actions and found that this choice depend on household characteristics, most importantly the diversity and stability of household income sources, household assets and education of the household head. Nikoloski *et al.,* (2017) attempted to answer the questions 'is drought indeed still the dominant risk faced by households, and how do households cope with shocks today ?'. They concluded that risk is higher in rural areas, particularly risks to income. They also found that female-headed households are less susceptible to agricultural price risk, but more susceptible to food price risk. For this particular households, informal assistance is the most prevalent coping mechanism. Concerning coping strategies, they found that savings are the most widely used coping mechanism, but have a more limited role for poor and rural households, which as a result rely more on their assets. Increasing labor supply (sometimes involving migration) is a common coping strategy in rural areas.

Olalekan et al., (2011) used a probit model to determine the relationship between personal socio-economic characteristics of the respondents, shocks and choice of coping actions and found that educational status, household size, per capita income, shocks type, coping strategies, among others significantly affect the choice of coping actions and are likely to have implications for households' future welfare status.

Christiansen and Subbarao (2001) submitted that the need for addressing the issue of shocks becomes paramount because they lead to a wide variability in households incomes. In the absence of sufficient assets or insurance to smoothing consumption, such shocks may lead to irreversible losses such as distress sale of productive assets, reduced nutrient intake or interruption of education that permanently reduces human capital, thereby locking their victims in perpetual poverty.

Obtaining a deeper understanding of household ability to respond to and to insure against different types of shocks calls for a sound understanding of the factors influencing the decision to cope or not and an analysis of the consequences of strategic choices on household welfare.

In Côte d'Ivoire, shocks are ubiquitous in the daily lives of rural households whose main activity is agriculture. Ouoya (2019) reported that nearly three quarters of rural households in Côte d'Ivoire have agriculture as their main activity. Also, in the presence of a given shock, households must make the choice between developing at least one active strategy allowing them to maintain their standard of living or simply remain passive. It is therefore a matter of choosing between two decisions : coping or not coping. In addition to this, one might ask whether the choice of a given strategy by a given household has a positive and significant influence on that household's welfare. It

is according to these lines of research that this study intends to answer the following research questions: What are the shocks that influence household coping decisions? What are the dominant strategies for each type of shock? What is the impact of each of these strategies on the welfare of rural households?

This study is conducted according to the following plan: Section II presents the methodology of work with, on the one hand, data, on the other hand, the selected analysis models. Section III discusses the results and the ensuing discussions. The last section is devoted to the conclusion and the limits of this study.

Methodologie

Models of analysis

We use regressions and descriptive analysis to analyze the links between shocks, coping strategies and the well-being of rural households. We categorize information on the 26 different events (sub-types) into four major shock types, namely, health shocks, natural shocks, economic shocks and crime/conflict related shocks. A household is defined as having experienced a particular shock type if it reports experiencing at least one of the components within a particular shock type. Coping is defined as actions undertaken by a household to accommodate the effect of a shock. As Debebe et *al.* (2013) we divided coping actions into six categories plus the option that the household did not adopt any active coping response. These six categories include the use of savings, reducing food consumption, selling assets (including food stocks), borrowing, receiving gifts (in cash or in kind from informal groups, neighbours or the government) and labour supply based strategies. Two of these categories, that is, borrowing and receiving gifts may be considered as external coping strategies while the remainder may be considered as internal (to the household) coping approaches. We construct a categorical variable that takes six values from 0 to 5 and each category corresponds to one of the strategies mentioned above (level 0 corresponds to the absence of strategy and savings are excluded because none rural household do use it as a strategy). We use this to tabulate coping strategies employed for the various types of shocks. We then construct a bar graph that will allow us to visualize the dominant strategy employed by households for each type of chock.

Furthermore, household characteristics such as economic status, human capital, social capital and demographic features may affect the occurrence of a shock and may also be correlated with the coping decision. Accordingly, as in (1), we treat the probability of coping as a function of the four shock types and a range of household characteristics.

$$prob(CS_i) = \beta_0 + \sum_{j=1}^{4} \delta_j Shock_{ij} + \sum_{q=1}^{r} \varphi_q X_{iq} + \varepsilon_i \qquad (1)$$

The dependent variable of this probit model (coping strategy – CS_i) is a dummy variable that takes the value 1 if household *i* decide to cope with shocks and zero otherwise. We regress this on a vector of four shock variables *j* that household *i* may have faced in the past one year. The specification controls for a vector of *r* household and community characteristics *(X)*. This includes measures of i) education level of household head, ii) age category of head iii) sex of head iv) own dweling v) number of men. The last terms ε_i is an error term.

The use of probit regression is becoming widely accepted in similar literature which explores the correlation between shocks and coping activities (e.g. Rashid et al. 2006, Tongruksawattana *et al.,*2010).

We use a logit model to analyze the impact of different strategies on rural household's well-being (poverty). The probit and logit models both assume an average of error terms equal to 0. In the probit model, the error term is normally distributed with a variance

$Var(\varepsilon) = 1$. Alternatively, ε is assumed to be distributed logistically with $Var(\varepsilon) = \pi^2/3$, leading to the binary logit model with the equation

$$\Pr(Y_i = 1|X_i) = \frac{\exp(X_i\beta)}{1+\exp(X_i\beta)} \quad (2)$$

Y_i is a latent variable related to household's poverty status. It takes the value 1 if the household is poor (individual consumption below the poverty line of 737 FCFA per day or 269075 FCFA per year) and 0 if not. X_i are six variables including HSt which is a categorical variable related to the strategies. This variable takes six values namely 0-none strategy, 1-selling assets, 2- borrowing, 3- receiving donations, 4- increasing labor supply and 5- reducing of food. The other variables CA, EL, HHS, OD and MN respectively represent the age category of the head, his education level and his gender (male or female), the ownership of dweling and the number of male persons in the household.

Database

The data used in this research are those from the 2015 Household Living Standards Survey produced by the National Institute of Statistics (Côte d'Ivoire). The research unit is the household and the people who live there. The universe of the survey is made up of all African households residing in Côte d'Ivoire. It is a multi-topic national survey, with modules covering many aspects of the standard of living. The General Census of Population and Housing (RGPH2014) served as a sampling frame. The sampling follows a two-stage draw with first-stage proportional allocation of Census Districts or Enumeration Area in the strata of the study; In the second degree there is a systematic drawing of 12 households by enumeration area. The sample is stratified into three sets and provides significant results for the region and the place of residence, the city of Abidjan and all of Côte d'Ivoire, urban and rural. The size of the sample per stratum varied between 276 and 1188 households, to take account of the demographic weight of certain regions, ie a total sample of 12 900 households for the 33 strata (31 regions plus the city of Abidjan and the Autonomous District of Yamoussoukro). The household survey has 16 sections (household composition, household governance, health and education, employment, income-generating activity, livestock characteristics, agriculture, , ...). As part of our analysis, only rural households (55% of observations) were selected. We use a database of around 35,000 individuals living in rural areas. These individuals reported experiencing a shock in the last 12 months preceding the ENV2015 survey. Following the presentation of our database, it is convenient for us to proceed to the presentation of our results and the resulting discussions.

Results and Discussions

Table 1 presents the descriptive statistics of the household coping decision analysis model.

Table 1 Descriptive statistics of coping decision probit model

Estimation sample probit			Number of obs =	35389
Variable	Mean	Std. Dev.	Min	Max
CSt	.6535929	.4758315	0	1
1.HeS	.5497471	.4975261	0	1
1.NaS	.1486903	.3557879	0	1
1.EcS	.1162791	.3205638	0	1
1.CcS	.1026025	.3034433	0	1
CA				

55	.4393456	.4963144	0	1
105	.2210856	.4149839	0	1
EL				
1	.2579898	.4375345	0	1
2	.0994942	.2993286	0	1
3	.0114725	.106495	0	1
1.OD	.3380994	.4730693	0	1
1.HHS	.5582243	.4966054	0	1
MN	1.989206	1.472861	0	10

Source Our Calculs with ENV2015 data

Among these 35389 households who have suffered the effects of a shock during the last 12 months preceding ENV2015, nearly two-thirds, or 65%, coped to deal with the effects of the shock. The most common shock in rural Côte d'Ivoire is the health shock with 55 percent of the total number of shocks. After the health shocks, it is the natural shocks that follow with 15 percent of the workforce followed by economic shocks and shocks related to conflicts / crimes. The distribution of households according to the age category of the head of the household shows that the largest workforce is at the 35-55 level with 44%.

When it comes to the education level of the household head, the fact is that the heads of households living in rural Côte d'Ivoire have a low level of education. Table 1 tells us that 63% of them have no level of education when 26% only have the primary level. Those who have reached high school level represent 10% and only 1% has been able to pursue university studies. 55% of heads of households are men, 34% live in a dwelling of their own and on average there are 2 men per household.

These households having experienced one of these four categories of shocks have the choice between developing an active strategy to adapt (coping) or being passive (not coping). What are the factors that influence this coping decision? Does the category of shock experienced influence this decision?

We use the results of coping decision model presented in Table 2 to answer these questions.

Table 2 Probit Model Unstandadized and Standardized estimates

	b	z	P>z	bStdX	bStdY	bStdXY	SDofX
1.Heakth Shocks	0.091	3.535	0.000	0.045	0.090	0.045	0.498
1.Natural Shocks	-0.080	-2.679	0.007	-0.028	-0.079	-0.028	0.356
1.Economic Sh	-0.205	-6.548	0.000	-0.066	-0.202	-0.065	0.321
1.Crime/conflit Sh	-0.141	-4.379	0.000	-0.043	-0.139	-0.042	0.303
Age Categories (CA)							
55-55	0.194	11.893	0.000	0.096	0.192	0.095	0.496
55-105	0.196	10.224	0.000	0.082	0.194	0.081	0.415
Education Level							
1 – Primary	-0.006	-0.338	0.735	-0.002	-0.006	-0.002	0.438
2 – High School	0.070	2.860	0.004	0.021	0.070	0.021	0.299
3 – University	-0.226	-3.512	0.000	-0.024	-0.224	-0.024	0.106
1.Own	0.070	4.265	0.000	0.033	0.069	0.032	0.473

Dweling							
1.Household Sex older	-0.054	-3.400	0.001	-0.027	-0.053	-0.026	0.497
Number of Men	-0.019	-3.732	0.000	-0.028	-0.019	-0.028	1.473
constant	0.312	11.340	0.000	.	.	.	.

b = raw coefficient
z = z-score for test of b=0

Mean dependent var	0.654	SD dependent var	0.476
Pseudo r-squared	0.012	Number of obs	35389.000
Chi-square	532.099	Prob > chi2	0.000
Akaike crit. (AIC)	45159.447	Bayesian crit. (BIC)	45269.611

P> z = p-value for z-test

bStdX = x-standardized coefficient
bStdY = y-standardized coefficient
bStdXY = fully standardized coefficient
SDofX = standard deviation of X

Source Our Calculs with ENV2015 data

It can be seen that rural households in Côte d'Ivoire adopt active coping strategies only in the case of health shocks. For a household facing health shock, it propensity to cope is expected to increase by 0.09 standard deviations, holding all other variables constant. For a household facing natural shock /economic shock /shock related to a conflict or crime, it propensity to cope is expected to decrease by 0.028/0.202/0.043 standard deviations, holding all other variables constant ($p < 0.01$). Health shocks endanger the vital process of the individual and take into account the death of a family member. In the face of such a shock, coping becomes an absolute necessity and not an option. Rural households in Côte d'Ivoire have thus perceived this state of affairs and this explains the positive relationship between having suffered a health shock and the propensity to cope. When other shocks, these households prefer to let things happen on their own by not making the decision to cope.

For a head of household, being between 35-55 years old compared to a leader under 35 increases the propensity to cope by 0.096 standard deviation, all things being equal. Similarly, when mooving from a head under 35 to a head over 55 the propensity to cope increases by 0.082 standard deviation, all things being equal ($p < 0.01$). We know that from this age range 35-55, health problems and shocks become more and more common. This is all the more true as life expectancy in Cote d'Ivoire is in this bracket. Above, we have seen that there is a positive relationship between being confronted with a health shock and coping decision and this would probably explain this last result.

Regarding the level of education, there is a decrease in the propensity to cope when moving from a household whose head has no level to a household whose head has the primary level (or University level) all other variables being held constant ($p<0.01$). On the other hand, there is an increase in the propensity to cope when moving from a household whose head has no level to a household whose head has a high school education level, all other things being equal (an increase of 0.024 standard deviations $p<0.01$). For our part, we believe that it is the level of integration of these leaders within their community and their analytical skills that explain the influence of the modalities of this EL variable on this coping decision likelihood. A leader with the primary level has a high level of integration given the fact that he has spent virtually all his childhood in the village unfortunately, his analytical skill level is low. The head with a university level has a relatively high analytical skill however his level of integration into the community should be relatively weak. On the other hand, a leader with a secondary level has an appreciable capacity of analysis and he spent part of his childhood in the

village hence a good level of community integration. Such a leader can expect to optimistically consider the decision to cope and rely on his social capital to accompany him in this initiative.

Possession of one's own home increases the propensity to cope by 0.033 standard deviations all other things being equal. This is certainly an advantage offering possibilities for defining at least one coping strategy. On the other hand, when moving from a female-headed household to a male-headed household, there is a reduction in the propensity to cope by 0.027 standard deviations, all things being equal ($p < 0.01$). For our part, it would probably be the compassion that individuals have for female-headed households and the fact that they have to consider the male head of household as a sufficiently combative person to find solutions to his own problems which would explain this result. However, for each additional male in the household, there is an increase in the likelihood of coping, the other variables being held constant ($p <0.01$).

At the end of this first analysis, it is concluded that rural households in Côte d'Ivoire make the decision to cope only if they are confronted with a health shock, given the impact this shock could have on the vital prognosis of family members. They do not cope when facing other types of shock. Following this initial analysis which enabled us to determine the influence of the types of shocks on the household's decision to cope, we would like to answer the question of what is the dominant strategy used by these rural households for each type of shock? Table 3 and Figure 1 in the Appendix allow us to answer this question.

Table 3 Distribution of Coping Strategies by Shocks

Shock	Households coping strategy						
	0	1	2	3	4	5	Total
10- Health Shock	6880	672	1888	5355	586	6158	21539
	31.94	3.12	8.77	24.86	2.72	28.59	100.00
	54.25	65.18	65.60	65.75	64.82	59.80	59.94
11- Natural Shock	2122	135	405	1167	0	1798	5627
	37.71	2.40	7.20	20.74	0.00	31.95	100.00
	16.73	13.09	14.07	14.33	0.00	17.46	15.66
12- Economic Shock	2067	46	360	812	138	1351	4774
	43.30	0.96	7.54	17.01	2.89	28.30	100.00
	16.30	4.46	12.51	9.97	15.27	13.12	13.29
13- Conflit/crime	1612	178	225	810	180	990	3995
	40.35	4.46	5.63	20.28	4.51	24.78	100.00
	12.71	17.26	7.82	9.95	19.91	9.61	11.12
Total	12681	1031	2878	8144	904	10297	35935
	35.29	2.87	8.01	22.66	2.52	28.65	100.00
	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source Our Calculs with ENV2015 data

First row has *frequencies*; second row has *row percentages* and third row has *column percentages*

- *0-* None Strategy
- *1-* Selling Assets
- *2-* Borrowing
- *3-* Receiving Gifts
- *4-* Labor Supply
- *5-* Reducing Food

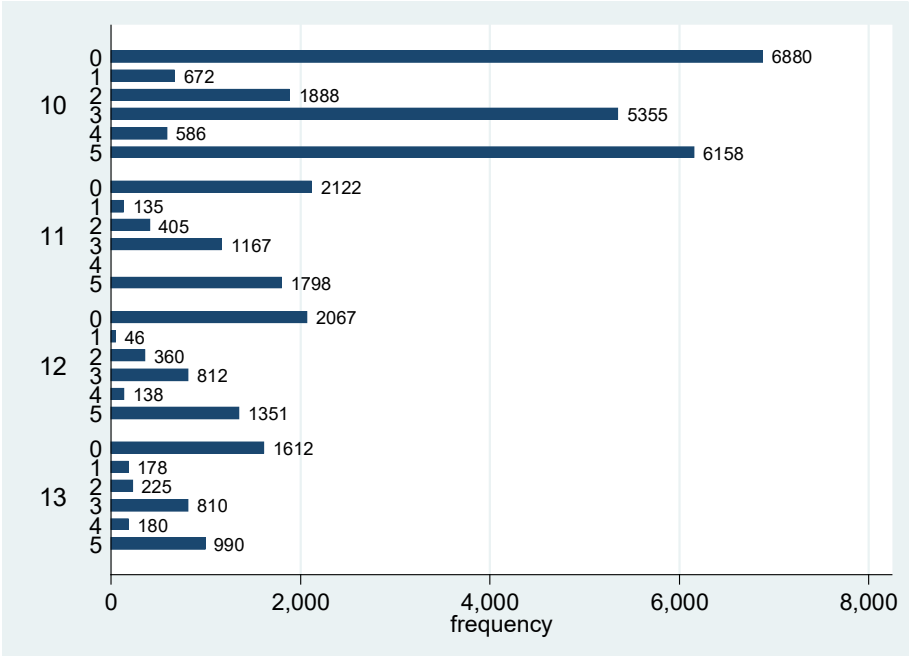

Figure 1 Distribution of strategies by shocks
Source Our Calculs with ENV2015 data

Table 3 gives us the distribution of the strategies according to the type of shocks and Figure 1 is the graph which results from it. By dominant strategy, we designate the strategy that has the largest workforce. Figure 1 reveals that for each of the four types of shocks listed, the most effective choice is recorded at the level of the absence of strategy ie that the households that remain passive and don't cope are the most numerous if one makes a ranking of strategies by size and that the lack of strategy is considered a strategy. Excluding the lack of a strategy (modality 0 on the graph), among the five types of strategies employed in rural Côte d'Ivoire, the reduction of food consumption is the dominant strategy for each type of shock. The finding is that the order of the first three strategies is the same for each of the four types of shocks. The reduction of food consumption comes first, followed by the receipt of donations and then the loan. The sale of assets comes before the labor supply increase at the level of health shocks and natural shocks. This order of the last two strategies is reversed for economic shocks and shocks related to conflicts / crimes.
The most common type of shock in rural areas is the health shock followed by economic shocks. Thus, we can conclude that health shocks are most dominant in rural Côte d'Ivoire. The most commonly used strategy is the reduction of food consumption followed by the receipt of donations. Table 4 and Figure 2 show the dominant strategies according to the type of shock (covariant or idiosyncratic). As Yilma et al. (2013), we classify economic and natural shocks as covariate and health shocks and crime/conflit shocks as idiosyncratic.

Table 4 Distribution of Strategies by Types of Shock

Shock is covariate	Households coping strategy						
	0	1	2	3	4	5	Total

0- Idiosyncratic	8492	850	2113	6165	766	7148	25534
	33.26	3.33	8.28	24.14	3.00	27.99	100.00
	66.97	82.44	73.42	75.70	84.73	69.42	71.06
1- Covariate	4189	181	765	1979	138	3149	10401
	40.27	1.74	7.36	19.03	1.33	30.28	100.00
	33.03	17.56	26.58	24.30	15.27	30.58	28.94
Total	12681	1031	2878	8144	904	10297	35935
	35.29	2.87	8.01	22.66	2.52	28.65	100.00
	100.0	100.0	100.0	100.0	100.0	100.0	100.00

First row has *frequencies*; second row has *row percentages* and third row has *column percentages*

Source: Our Calculs with ENV2015 data

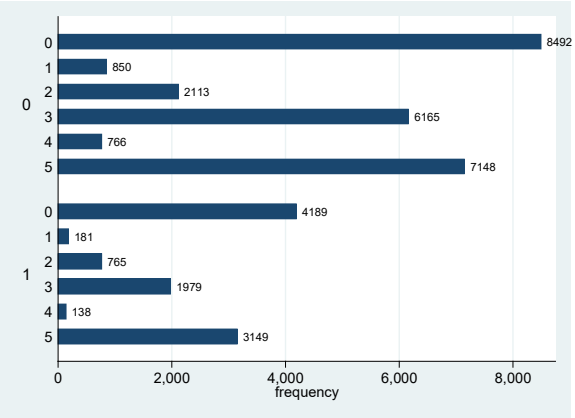

Figure 2 Distribution of strategies between covariate and idiosyncratic shocks

Source: Our Calculs with ENV2015 data

We find that idiosyncratic shocks represent 71% of the shocks. Also, Whether the shock is idiosyncratic or covariant, active-strategy households first choose to reduce food consumption and then receive donations. The strategic choices made by these rural households are not in line with the work of Morduch (2002) who found that formal or informal transfers (credit and insurance) from outside the community or intertemporal transfers are necessary for the management of covariate shocks. However, our findings are in part concordant with those of Debebe et al. (2013) who found that to cope with covariate shocks, Ethiopian households dissave and reduce their food consumption. For idiosyncratic shocks, such as health shocks, these households dissave, sell assets and borrow. Bonfrer and Gustafsson-Wright (2015) found that in Kenya, households facing health shocks first opt for the use of savings, then the sale of assets finally the receipt of donations and loans.

After making these choice, we would like to know the contribution of these different strategies to the welfare of households. Table 6 allows us to answer this question. But Table 5 gives the descriptive statistics of the variables in the household's welfare analysis model. We use poverty status as a proxy for welfare.

Table 5 Descriptive Statistics of Poverty Logit Regression Model

Estimation sample logit			Number of obs = 35389	
Variable	Mean	Std. Dev.	Min	Max
P0	.4011133	.4901308	0	1
HSt				
1	.0269293	.161879	0	1
2	.0837266	.2769812	0	1
3	.231004	.4214809	0	1
4	.0256577	.1581141	0	1
5	.2862754	.4520261	0	1
CA				
55	.4393456	.4963144	0	1
105	.2210856	.4149839	0	1
EL				
1	.2579898	.4375345	0	1
2	.0994942	.2993286	0	1
3	.0114725	.106495	0	1
1.OD	.3380994	.4730693	0	1
1.HHS	.5582243	.4966054	0	1
MN	1.989206	1.472861	0	10

Source: Our Calcul with ENV2015 data

Table 5 shows that the sample consists of 35389 observations and 40% of the households in this sample are poor. The descriptive statistics of the other variables in this model are substantially the same as those presented in Table 1. The absence of strategy (modality 0 of the variable HSt) constitutes the basis of our analysis and interpretations. For the interpretations, we use the results of table 6.

Table 6 Percent Change in the Odds of Welfare Analysis Model

logit (N=35389): Percentage change in odds
Odds of: 1 vs 0

	b	Z	P>z	%	%StdX	SDofX
HSt						
1- Selling Assets	-0.183	-2.276	0.023	-16.800	-2.900	0.162
2- Borrowing	-0.217	-4.450	0.000	-19.500	-5.800	0.277
3- Receiving Gifts	0.160	4.730	0.000	17.300	7	0.421
4- Labor Supply	0.675	9.040	0.000	96.400	11.300	0.158
5- Reducing Food	-0.186	-5.789	0.000	-17.000	-8.100	0.452
Age Categories						
35 - 55	-0.147	-4.917	0.000	-13.600	-7.000	0.496
55 - 105	-0.041	-1.199	0.230	-4.100	-1.700	0.415
Education Level						
1 – Primary	-0.164	-5.512	0.000	-15.100	-6.900	0.438
2 – High School	-0.873	-17.003	0.000	-58.200	-23.000	0.299
3 – University	-1.476	-8.416	0.000	-77.100	-14.500	0.106
1.Own Dweling	0.241	8.027	0.000	27.300	12.100	0.473
1.Householder Sex	-0.718	-24.868	0.000	-51.200	-30.000	0.497
Number of Men	0.893	74.154	0.000	144.300	272.800	1.473
constant	-1.647	-45.171	0.000	.	.	.

b = raw coefficient
z = z-score for test of b=0

Mean dependent var	0.401	SD dependent var	0.490
Pseudo r-squared	0.203	Number of obs	35389.000
Chi-square	9683.315	Prob > chi2	0.000
Akaike crit. (AIC)	38010.872	Bayesian crit. (BIC)	38129.511

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

P>	z	=	p-value	for	z-test

% = percent change in odds for unit increase in X
Source: Our Calcul with ENV2015 data

There is a 16% reduction in the odds of being poor when moving from a household that does not cope to a household that sells assets, all things being equal ($p < 0.05$). There are also reductions of 19.5% and 17% in this odds when moving respectively from a household with no strategy to a household which borrows and from a household without any strategy to a household reducing its consumption, all things being equal ($p<0.01$). On the other hand, there are increases of 17.3% and 96.3% of this odds of being poor when moving from a household adopting no strategy to a household opting for the receiving donations and from a household with no strategy to a household increasing his labor supply, all things being equal ($p < 0.01$).

In the short term, these strategies (asset sales, borrowing and reducing food consumption) improve the household's welfare level by enabling these households to obtain resources to meet short-term needs or to accommodate their needs with available resources. Our analysis does not take into account the long-term effects of these choices on the welfare of these households. However, we can conclude as Debebe et al. (2013) that reducing food consumption can not be a viable strategy in the event of a health shock because it does not provide resources to meet the costs of care.

With respect to the age category (CA variable) of the head of household, when moving from a household under 35 to a household with an older head, there is a decrease in the odds of being poor, the other variables being kept constant. However, this decline is more pronounced when we move from a head of less than 35 years to a leader between 35-55 years (decrease in the odds by 13.6% and $p<0.01$) all other variables held constant. Heads of household in the 35-55 age range are active and have greater potential for improving their well-being than a chef under 35 or a chef over 55 years of age.

The level of education has a significant impact on the odds of being poor in rural Côte d'Ivoire ($p < 0.01$). The odds of being poor decreases with the increase in the education level of the head of household, all things being equal. These results are consistent with the results of many other findings on the effect of educational attainment on poverty. Also, male-headed households are less poor than those headed by women, but the increase in the number of males in the household increases the odds of being poor, all other things being equal ($p < 0.01$).

Conclusion

At the end of our analysis we conclude that idiosyncratic shocks and particularly health shocks are very present in the daily lives of rural households in Côte d'Ivoire. In a shock situation, households can choose between coping and not coping. Several factors influence this decision. Of the five types of shocks listed, only shocks involving the vital prognosis of family members ie health shocks have a positive influence on coping decision.

For each of the categories of shocks, the most used strategy is the reduction of food followed by the receipt of donations and loans. The order is the same whether the shock

is idiosyncratic or covariate. However, the viability of reducing food consumption in the event of a health shock is unsustainable as the household can not obtain the financial resources needed to support the care of the sick person.
Lastly, compared to households that do not cope, it is households that opt for either reducing food consumption, selling assets and borrowing that improve their welfare. On the other hand, those who choose to receive donations or to increase their labor force have a worse welfare situation than those who do not cope with shocks. Despite these strategies for managing and coping with risk, vulnerability to consumption shortfalls remains high in developing countries and particularly in rural area. Further development of safety nets is therefore necessary. Nikoloski et al. (2017) stated that strengthening financial markets to provide financial products as buffers in periods of distress should be part of the development strategy, especially for rural areas. Improving and strengthening national social protection systems as well as formalizing social transfers would also help the most vulnerable in smoothing the impact of risk.

Limitations of the study

This study give the implication of the different strategies on the welfare of the households studied. But it does not determine the factors influencing the choice of one strategy over another, and a work that can help us understanding this aspect will be useful.

References

Bonfrer, I., and Gustafsson-Wright, E. (2015), 'Health shocks, coping strategies and foregone healthcare among agricultural households in Kenya.'*An International Journal for Research, Policy and Practice,* ISSN: 1744-1692 (Print) 1744-1706 (Online) Journal homepage: http://www.tandfonline.com/loi/rgph20

Barrett, C., Marenya, P., McPeak, J.,Minten, B., Murithi, F., Oluoch-Kosura, W., Place, F., Randrianarisoa, J. C., Rasambainarivo, J., and Wangila. J. (2006), 'Welfare Dynamics in Rural Kenya and Madagascar.' *Journal of Development Studies* 42 (2), 248–77.

Carlos Andres Alpizar, M.A. (2007), '*Risk coping strategies and rural household production efficiency: Quasi-experimental evidence from El-salvador*.' A Ph.D dissertation presented to the Graduate School of the Ohio State University.

Czukas, K., Fafchamps, M. and C. Udry. (1998), 'Drought and Saving in West Africa: Are Livestock a Buffer Stock?' *Journal of Development Economics* 55(2), 273

Christiaensen, L. and Subbarao, K. (2001), 'Towards and Understanding of Vulnerability in Rural Kenya.' Mimeo.

Davies, S. (1996), *Adaptable Livelihoods*, London, Macmillan.

Debebe, Z.Y., Mebratie, A., Sparrow, R., Abebaw, D., Dekker, Alemu, G. and Bedi, A.S. (2013), 'Coping With Shocks in Rural Ethiopia.' *ASC Working Paper 110*

Dercon, S., and P. Krishnan. (2000), 'In Sickness and in Health: Risk-Sharing within Households in Ethiopia.' *Journal of Political Economy* 108(4), 688-727.

Dercon, S., Hoddinott, J. and Woldehanna, T. (2005), 'Shocks and Consumption in 15 Ethiopian Villages, 1999-2004.' *Journal of African Economies* 14(4), 559-585

Dercon, S. (2002), 'Income Risk, Coping Strategies, and Safety Nets.' *The World Bank Research Observer* 17(2), 141-166

Eswaran, M. and Kotwal, A. (1989), 'Credit as insurance in agrarian economies', *Journal of Development Economics*, vol. 31, 37-53.

Fafchamps, M. (2002), 'Rural Poverty, Risk, and Development' *FAO Economic and Social Development Paper* No.144. Food and Agricultural Organization, Rome.

Hayashi, F.,Altonji, J. and Kotlikoff, I. (1996), 'Risk-Sharing between and within Families.' *Econometrica* 64(2), 261-94.

Hoff, K. (1996), 'Informal Insurance Schemes: An Equilibrium Analysis.' World Bank, Development Research Group, Washington, D.C.

Institut national de la statistique (INS) (2015), Enquête sur les Niveaux de Vie des Ménages en Côte d'Ivoire, ENV2015.

Institut national de la statistique (INS) (2014), Recensement Général de la Population et de l'Habitat, Ministère de la Planification et de la programmation du Développement.

Jalan, J. and Ravallion, M. (1999), 'Are the poor less well insured? Evidence on vulnerability to income risk in rural China.' J*ournal of Development Economics*, 1999, vol. 58, issue 1, 61-81

Kochar, A. (1995), 'Explaining Household Vulnerability to Idiosyncratic Income Shocks' *The American Economic Review* 85(2), 159-164

Ligon, E. (2002). 'Targeting and Informal Insurance.' WIDER Discussion Paper DP2002/8. World Institute for Development Economics Research, Insurance against Poverty Programme, Helsinki.

Lim, Y. and Townsend, R. (1998), 'General equilibrium models of financial systems: theory and measurement in village economies', *Review of Economic Dynamics*, vol. 1(1), 59-118.

Morduch, J. (2002), 'Consumption Smoothing across Space: Tests for Village-Level Responses to Risk.' WIDER Discussion Paper DP2002/55. World Institute for Development Economics Research, Insurance against Poverty Programme, Helsinki.

Nikoloski, Z., Christiaensen, L., and Hill, R. (2017), 'Household shocks and coping mechanism: evidence from Sub-Saharan Africa.' available at: http://eprints.lse.ac.uk/85313/

Olawuyi, O.S., Fola, O-O. and Oyedapo, R.M., (2011), 'Shocks and Coping Strategies of Rural Households:

Evidence from Ogo-Oluwa Local Government, Oyo State, Nigeria' *International Journal of Agricultural Management & Development, Available online on: www.ijamad.com ISSN:2159-5860*

Ouoya, Z.M. (2019), Gender Impact, Typical Profiles of Access to Credit and Savings Markets: A Case of Rural Households in Cote D'ivoire, *Studies and Scientific Researches. Economics Edition,* Vol 29, 17-41, available at http://sceco.ub.ro/index.php/SCECO, DOI : 10.29358/sceco.v0i29.438

Park, A. (2006), 'Risk and Household Grain Management in Developing Countries.' *The Economic Journal*, Vol. 116, No. 514 (Oct., 2006), 1088-1115

Rashid, D.A., Langworthy, M. and Aradhyula S.A. (2006), 'Livelihood Shocks and Coping Strategies' An empirical study of Bangladesh Household. A paper presented at the Agricultural and Applied Economics Association annual meeting, Long Beach, CA, July 23-26, (2006).

Reardon, T., Fall, A. A., Kelly, V., Delgado, C., Matlon, P., Hopkins, J. and Badian. 0.(1994), "Is Income Diversification Agriculture-Led in the West African Semi-Arid Tropics?" In A. Atsain, S. Wangwe, and A. G. Drabek, eds., *Economic Policy Experience in Africa: What Have We Learned. Nairob*i, African Economic Research Consortium.

Reardon, T. (1997), 'Using Evidence of Household Income Diversification to Inform Study of the Rural Nonfarm Labor Market in Africa.' *World Development* 25(5), 735-47.

Tongruksawattana, S., Waibel, H. and Schmidt, E. (2010), 'Shocks and Coping Actions of Rural Households: Empirical Evidence from Northeast Thailand.' A paper presented at the CPRC International Conference, Brooks World Poverty Institute at the University of Manchester, September 8-10, (2010).

Tongruksawattana, T., Schmidt, E.,and Waibel, H. (2008), 'Understanding Vulnerability to Poverty of Rural Agricultural Households in *Northeastern Thailand' Tropentag*, Hohenheim, October 7-9, (2008).

Townsend, R. (1994), "Risk and Insurance in Village India", *Econometrica*, 62, 539–592.

World Bank, (2014) *World Development Report 2014: Risk and Opportunity*. Washington, DC: World Bank.