

Social Protection in Niger

What Have Shocks and Time Got to Say

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Abstract

Social protection programs, common in developing countries, can be wide ranging. Expenditures on social schemes are large, but their effectiveness and ability to act as safety nets against shocks can be limited. This paper devises a tractable empirical framework to explore several hypotheses in social protection schemes in Niger. The analyses document two important results. First, non-poverty status and household consumption expenditures decline remarkably when exposed to extreme shocks, that is, declines between 31 and 48 percentage points and 24,278 and 47,549 CFA, respectively. In response, affected households employ a vector of strategies to deal with realized shocks, ranging from the use of livestock holdings to doing nothing. There is evidence of substitution across the shock-strategy set over time. Engaging in migration as a coping mechanism leads to

worse household outcomes. This result can be explained by theories of asymmetric information between migrants and their families, and unfavorable labor market conditions at migrants' destination. Second, social transfers are crucial only in the second quarter of the calendar year. Social assistance provided within the second quarter appear to be effective on average and significantly dampens the impact of shocks on households' consumption and vulnerability. The paper interprets this finding as evidence against the long-standing incentive-hypothesis that providing social assistance is a disincentive for households to engage in possible coping strategies, and makes them more sensitive to external shocks for behavioral reasons. The results have important implications for the design and delivery of social assistance programs.

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Social Protection in Niger:

What Have Shocks and Time Got to Say?

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1 INTRODUCTION

Poor and low-income societies are exposed to a variety of daily shocks and risks. These often strain household budgets and can lead to poverty traps through extreme fluctuations in household incomes and consumption, especially when financial and/or insurance markets are incomplete (Townsend 1994; Morduch 1995; Dercon & Christiaensen 2011; references therein).

Social protection programs—which serve as safety nets—have sparked much interest among development agencies and practitioners (e.g., including governments) as a prominent way to help these societies manage their risk and vulnerabilities (Ravallion 1999). Social protection programs are common (Grosh et al. 2008) and can be wide ranging. Notable examples include India’s National Rural Employment Guarantee Act (NREGA) (Dutta et al. 2014), Ethiopia’s Productive Safety Net Project (PNSP) (Hoddinott et al. 2012), and Malawi’s Social Action Fund (SAF) (Kathleen, Galasso and Goldberg 2015). These are broadly in the form of either cash transfers or in-kind transfers to eligible households.

Estimates and conversations with relevant practitioners suggest social protection expenditures of over US\$170 million to \$US190 million per annum (translating to about 2.5-3.0% of GDP).² This expenditure estimate excludes other societal transfers among informal households. In contrast to the usual objective of escaping poverty, Niger is extremely poor with recent evidence suggesting that some households and regions have become poorer. For instance, the fraction of food-poor households in the Dosso region increased from 30% in 2011 to 50% in 2014; while the median household food and non-food consumption expenditure in the Maradi region decreased from 1,126,152 CFA in 2011 to 1,101,629 CFA in 2014 (approximately 2.2% decline rate).

In this paper, we devise tractable empirical frameworks to explore several aspects and hypotheses within social protection schemes using newly available rich panel data sets. We begin by examining the distribution of both economic and non-economic shocks faced by Nigerien societies. The distribution of the frequency and severity of household shocks is globally characterized. Next, we discuss potential leakages and reachability of the current social protection schemes in Niger. Effective design and targeting of social assistance occurs at

² For Niger, data on spending or expenditure on social assistance programs are largely unavailable. From the World Bank’s ASPIRE database: the share of Nigerien population participating in social assistance is about 2.7%, in 2011. See <http://datatopics.worldbank.org/aspire/country/niger>.

different scales. Important emphasis is placed on the often-overlooked *time* dimension of receiving transfers by eligible households, along with highlights about *geographical* and *gender* dimensions of the management of social transfers. Our analysis innovates on existing social protection targeting strategies to document that the quarter or month of disbursing transfers to households is crucial for the Nigerien society. In particular, we illustrate that households are better able to dampen the impacts of shocks on consumption levels if social assistance is received within the second quarter of the calendar year; not so for the other quarters. This result is concurrently evidence against the long-standing *incentive-hypothesis* which implies that providing social assistance to households can create incentive effects and thereby cause households to become more sensitive to external shocks for private behavioral reasons.

While traditional cash transfer schemes to beneficiary households are delivered on a monthly basis, the time *viz* month and quarter for receiving other social schemes can vary, e.g., short-term food aid; cash for work. In addition, the regular monthly cash transfers may be unavailable to some regions in the country.³ Estimation of effects exploits the variations in dates of the year of receiving social transfers and the distribution of realized shocks. The use of panel data sets on social support systems (e.g., unemployment insurance; food stamps, etc.) is common for research in developed countries, but in developing countries such data have historically been unavailable for research. The combination of rich household level data and novel empirical frameworks

³ **An Implementation Review:** It is useful to review briefly the implementation and *targeting mechanisms* of other cash transfers (CTs) in Niger. This is an anthropological commentary which is due Olivier de Sardan et al. 2014; who conducted qualitative surveys across beneficiary villages in Niger to understand how other CTs offered by NGOs are practically implemented/targeted. The mechanism involves 3 steps. First: there exist established agencies that provide early warning information on municipalities and villages e.g., risks of droughts, floods, malnutrition to the support agencies. Second: the support agencies or NGOs will then select some villages as beneficiary villages based on vulnerability indicators provided in the first stage. Third: once the beneficiary villages are determined, enumerators conduct door-to-door visits within the villages to pin down the more vulnerable households to become beneficiaries of the CTs. Household's wealth and asset holdings are non-systematically used to determine eligibility thresholds for CTs. For example, households that have fewer than 3 cows or goats may be considered vulnerable and thus eligible for CTs. The third and last stage is the most contentious part of the CT system. Conflicts are common between potential beneficiary and non-beneficiary households due to the non-systematic nature of selecting households and perceived unfairness of the eligibility thresholds by households. In response, in some villages—to avoid village level and inter-household conflicts—the village head re-collects all disbursed funds and then either re-distributes funds uniformly to the whole community or puts the funds into public coffers to become community-wide public good. There exists also a bribery component where the households who receive the CTs provide a share to the village leader to avoid the re-collection process. In some cases, the enumerators rely on village heads to decide on households' vulnerability and eligibility for the CTs. The village head's influence in this further exacerbates the bribery. This is especially the case given that once a household is denoted eligible, the household may receive the assistance for a long period of time.

enables us to explore multiple hypotheses within social protection schemes from the Nigerien setting. We discuss the results in light of social protection schemes for Niger. The overall findings have implications for social policy and broader issues of poverty in Niger, with potential extensions to other developing countries.⁴

The paper is related to the broader literature on public work programs, which examines their effects on a vector of outcomes such as consumption stabilization (Ravi & Engler 2015,); food security (Gilligan, Hoddinott & Taffesse 2009; Kathleen, Galasso and Goldberg 2015); investments in both agriculture and assets (respectively, Hoddinott et al. 2012; and Stoeffler, Premand & Mills 2014); employment and wages (Imbert & Papp 2015; Deiniger & Liu 2013); and more recently, resilience and adaptability to shocks (McCord, Beazley, Solorzano & Artur 2016; Handa & Otchere 2017). First, the evidence on effects is mixed; for example Kathleen, Galasso and Goldberg (2015) document that Malawi’s SAF failed to improve food security (a primary aim of the program), while Gilligan, Hoddinott & Taesse (2009) and Berhane et al. (2014) respectively find modest and significant improvements in food security for Ethiopia's PSNP. Second, most of this literature has focused on investigating specific social programs; for example India’s NREGA, Ethiopia’s PNSP, Malawi’s SAF, and Mozambique’s PASP programs.⁵ We extend this literature by (1) attempting to examine the combined cash and non-cash social programs in Niger captured in national surveys—possibly, accounting for general equilibrium effects (Muralidharan, Niehaus & Sukhtankar 2016)—and then (2) formulating a tractable framework that provides an alternative for assessing the concept of household resilience.

Finally, this paper is also connected to the literature on design of social programs, exploring the role of gender and spatial dimensions for targeting (Abril and Ofosu-Amaah 2009; Hasan 2010).

⁴ **Data Sets:** Our analyses rely on panel data collected in Niger between 2010/11–2014/15. Occasionally, we draw on secondary evidence and case studies from other contexts where necessary. The panel data come from joint data collection efforts between the World Bank Group WBG and the National Statistical Office NSO of Niger. The data are rich in content, where in each year two waves of data collections are carried out. Information about several variables are contained in these data sets –broadly spanning individual households, agriculture and livestock holdings, and community level records. **Econometric Models:** Throughout, all discussions about our empirical model and identification strategy are relegated to the Appendix. Supplementary results are also provided in the supplemental figures section of the Appendix.

⁵ PASP denotes Productive Social Action Programme.

Our work adds to this literature by documenting the important role of the *time* dimension; yielding insights that are useful for disbursing social assistance.

The remainder of this paper is organized as follows. Section 1 uses Factor Analysis to characterize the global distribution of household shocks in Niger. Section 2 uses the estimated shocks to examine their linkages with relevant household outcomes: *per capita* consumption expenditure and poverty. We document the substitution patterns and effectiveness of shock-coping mechanisms employed by households. Section 4 delves into the ecosystem of social protection schemes, highlights challenges in the current schemes and explores the crucial role of *time* in providing social assistance. The role of gender is illustrated to re-affirm old social targeting strategies. Section 5 concludes with implications. Details about identification strategy are in the Appendix.

2 CHARACTERIZATION OF SHOCKS

Economic and Non-Economic Shocks

In general, households are exposed to a wide range of shocks such as weather, health, revenue loss and many others. While the vector of shocks may be related to each other or not, the extent of impacts from the individual shocks on households can vary tremendously. For our purposes, we shall treat these shocks as exogenous, throughout the document.

This section models the distribution of the vector of shocks globally or in totality, instead of studying an individual shock. This is important for several reasons. First, the dimension of the shocks vector is large. Without limiting attention to a subset of these shocks, it is difficult to study all the shocks in isolation. We adopt an approach —Factor Analysis (see e.g., Rencher & Christensen 2012, Chap. 13) — which overcomes this challenge and models all the universe of reported household shocks. This does not assume independence of the various shocks. While the space of shocks are discretely reported (as in: *yes/no*), the Factor Analysis delivers a continuous distribution of shocks faced by the Nigerien population. This can be appealing and eases the empirical analysis to come e.g., model estimations and interpretation of estimates.⁶ Third and

⁶ Data limitations do not allow us to look at the magnitude of shocks per se. Even so, not looking at the magnitudes (but just occurrence: *yes/no*) allows us to circumvent the problem that shocks do not have a common metric.

perhaps more important, our treatment of social protection encompasses all assistance programs as the data do not allow for distinctions. These assistance programs provide different protections against different shocks or vulnerabilities, making our global characterization of shocks natural. In doing so, we are able to provide an overall evaluation of the assistance programs and shocks. The implementation of an assistance program to address the problem from a particular shock can have extended effects on other shocks. Our approach allows us to assess all these effects together.

Distribution of Shocks

The households indicated their experiences over 18 different negative shocks which are considered to be crucial for the livelihoods of poor and vulnerable populations. These range from droughts to conflicts.⁷ Figures 1a-2b display the distribution of estimated household shocks based on the Factor Analysis. Since the data are a panel, we conduct the Factor Analysis in two different ways. The first involves pooling all observations across both years in the data set, while the second recognizes the panel structure. Both distributions are superimposed in figure 1a. The difference between estimated shocks from the two methods is negligible. Moving forward, we restrict attention to the version of shocks estimated under the flexible non-pooling approach. In figure 1b, we overlay the distribution of shocks separately for 2011 and 2014. The figure suggests similar distributional patterns of shock experience over time. But this does not preclude any other differences that may exist, e.g., across space; across households.

⁷ The complete list of reported shocks span exposure to: drought; flood; elevated rate of crop disease; elevated rate of animal disease; large decrease in agricultural output prices; high price of agricultural inputs; high price of food products; loss of regular transfers other households; large loss of non-agricultural revenue; bankruptcy of a household's non-agricultural enterprise; large loss of wage revenues; loss of a wage earning household member; accident of household member; death of earning member of the household; death of another member of the household; divorce or separation; theft of money or harvest goods; and occurrence of conflict or violence. Even beyond the merits associated with our global characterization of shocks, in the future — we aim to apply similar characterizations for subsets of idiosyncratic versus covariate shocks; and economic versus non-economic shocks.

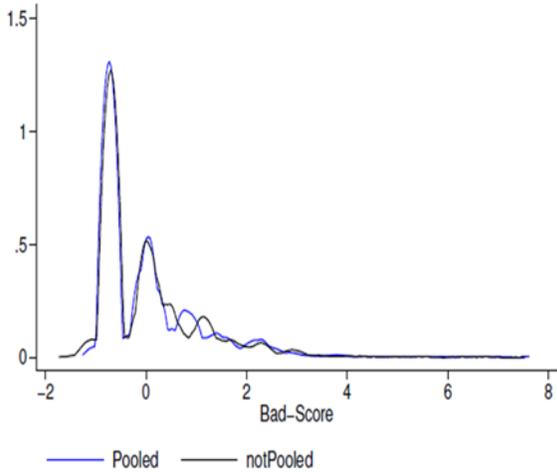


Figure 1a: Density of bad shocks exposure score or index

Notes: Source: Niger LSMS. The scores capture the relative exposure of households to negative shocks. The derivation is based on Factor Analysis of households experience over 18 different bad shocks.

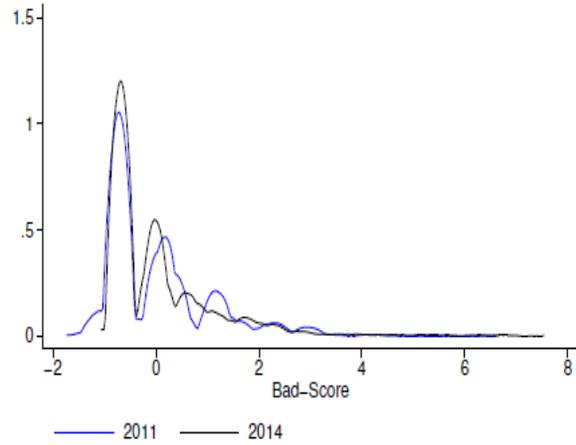


Figure 1b: Density of shocks exposure score or index across time

Notes: Source: Niger LSMS. The scores capture the relative exposure of households to negative shocks. The derivation is based on Factor Analysis of households experience over 18 different bad shocks.

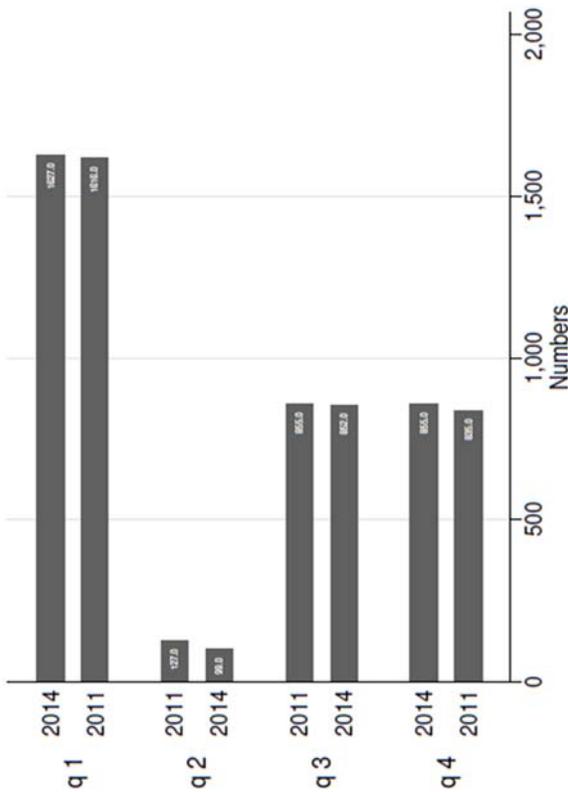


Figure 2a: understanding bad-shock quartiles

Notes: The *Missing Middle* phenomenon.

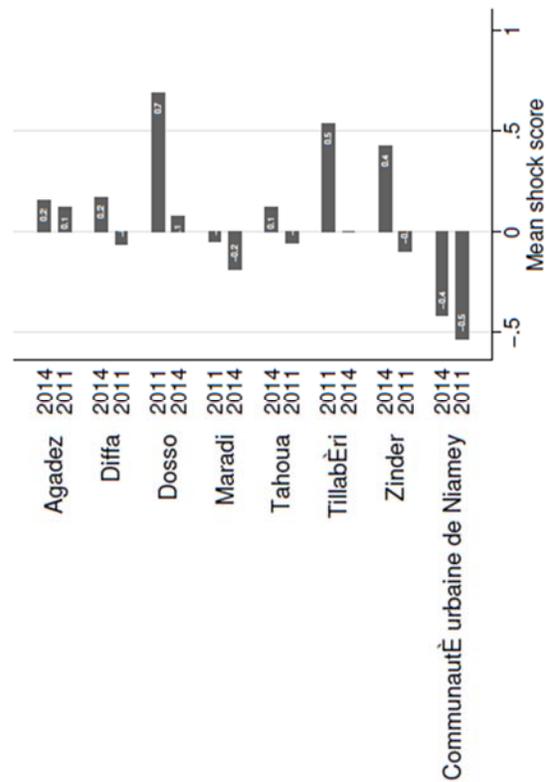


Figure 2b: understanding bad-shock quartiles

A brief description of figures 1a and 1b is detailed in what follows —to gain some intuition. The horizontal axes denoted by “Bad-Score” capture the relative exposure of households to negative shocks. Extremely low values correspond to households who experience less amount of exogenous shocks. Equivalently, high values correspond to households who tend to experience extreme degree of negative shocks. The overall estimated distribution of scores range between -1.12 and 7.83 with a standard deviation of about 1.01. To illustrate further: the distribution of household shocks is explored across different shock quartiles and regions in Niger. Figure 2a count the number households in each quartile of the estimated shocks, while figure 2b displays the distribution of average scores of the estimated household shocks across different regions. The former appears to suggest a *missing middle* phenomenon where relatively a few number of households are exposed to negative shocks in the middle quartiles compared to the first and last shock quartiles.

In examining the average score of estimated shocks, Dosso, Agadez, and TillabEri regions experienced more bad shocks (above zero) over the two periods. This is not the case for Niamey. The regional-level discrepancy in the distribution of shocks speaks to the observed differences in poverty outcomes. Together: the figures suggest a tremendous amount of spatio-temporal variation in the exposure of households to negative shocks. The level of variation in our household level data is even larger than what is shown in these quartile or regional level aggregates. The next section exploits this variation to examine the immediate implications of the estimated shocks on household consumption expenditures and poverty standing.

3 SHOCKS: EFFECTS & HOUSEHOLD RESPONSES

Exploring Linkages with Poverty and Consumption

There is a large literature that tests for consumption smoothing of households using rainfall shocks as exogenous shocks to income (Paxson 1992; Wolpin 1982; Seshan & Zubrickas. 2015; Joseph, Nyarko & Wang 2015). We have a direct measure of households’ poverty status and consumption outcomes. The former is a classification of whether a household is *poor* or *not* based on national poverty lines, while the latter captures *per capita* expenditure of household's consumption. This section examines whether both non-poverty status and household

consumption expenditures decline when exposed to extreme shocks.⁸ A large fraction of Nigerian households are engaged in agricultural business which is inherently risky; extreme shocks are therefore likely to affect their output and corresponding consumption patterns and poverty status.

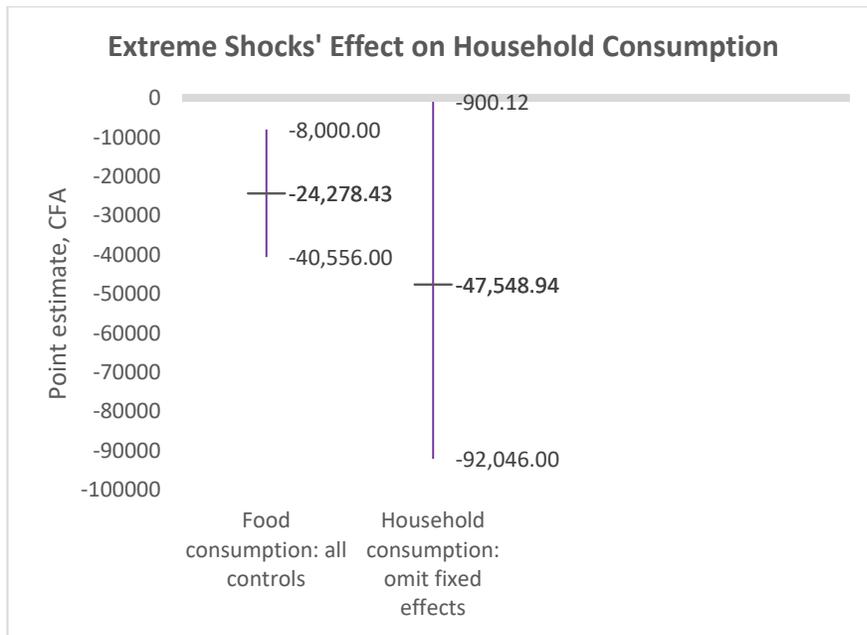


Figure 3a: Effect of extreme shocks on consumption (N=3,059)

Notes: Question: does households' exposure to extreme shocks matters for consumption? The main outcome of interest: households' consumption expenditure, defined as either per capita food or per capita household consumption. Only results from models that include all the various control variables are reported; other estimates are similar. Confidence intervals are indicated by the blue vertical lines.

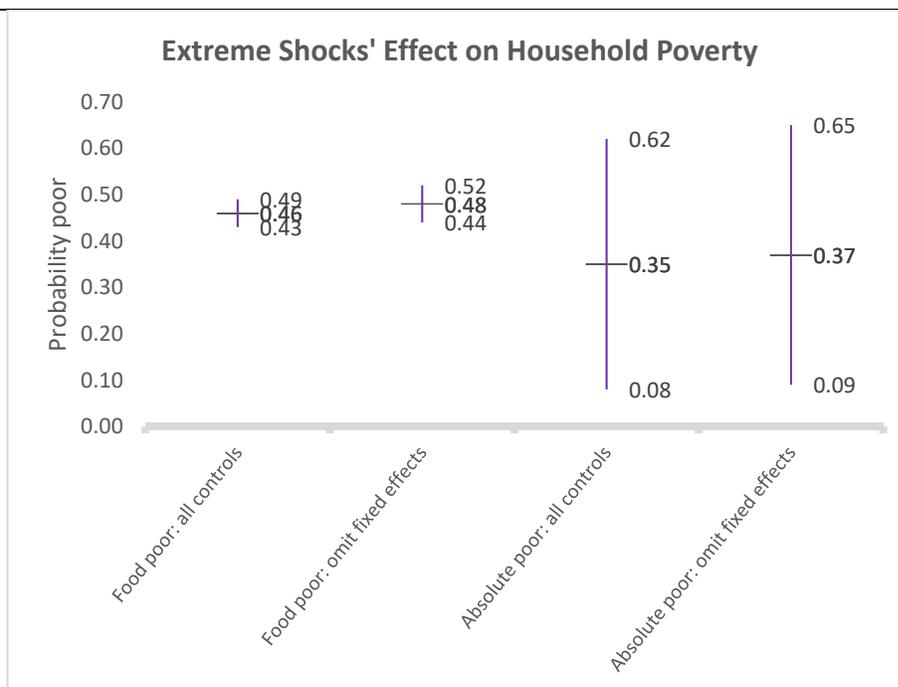


Figure 3b: Effect of extreme shocks on poverty (N=3,059)

Notes: Question: does households' exposure to extreme shocks matters for poverty status? The main outcome of interest: households' poverty status, defined as either food or absolute poor. Results from models that either exclude household fixed effects or include all the various control variables are reported. Confidence intervals are indicated by the blue vertical lines. See discussions in the "Empirical Approach" section.

⁸ Extreme shocks: these by definition correspond to realizations above 80 percentile of the shocks distribution. We explore other rules of defining extreme shocks in the sequel, but the results are qualitatively similar.

Results and Discussion

The two key outcome variables explored include: poverty status, and household consumption. Figure 3 summarizes the relevant results from several model estimations. Figure 3a asks whether households' exposure to extreme shocks matters for expenditure on consumption: per capita food consumption, and per capita household consumption. The figure illustrates the consumption–extreme shocks relationship. The horizontal axis captures the fall in average household consumption expenditures in the event of extreme shocks. We see that households' exposure to an extreme shock would imply a 24,278.43 CFA decline in average food consumption expenditure, while the realization of an extreme shock decreases the households' per capita expenditure by 47,548.94 CFA.

Turning to figure 3b, this figure asks whether households' exposure to extreme shocks matters for poverty status: food–poor and absolute–poor, respectively. Equivalently, the figure depicts the poverty–extreme shocks relationship, where the horizontal axis denotes the probability of switching from a non-poor household to poor following an exposure to extreme shock. The differences in estimates displayed are due to differences in estimation methods, and poverty classes. The results re-affirm our working conjecture that shocks may lead to poverty traps, especially when a household is exposed to extreme shocks repeatedly. For example, an exposure of households to extreme shock during the year would imply as high as 34–48% points chance of becoming either food and/or absolute–poor.

In our analysis, we control for household and time fixed effects which soak up any potential confounding variations fixed across households and years. The results indicate that households' consumption significantly falls in response to extreme shocks. This creates extreme fluctuations in households' income levels and thereby limits their ability to smooth consumption. Next, across the wide range of model specifications, households are more likely to become both food and absolute poor. Conditional on the fixed effects, we interpret this potential for poverty trap as a direct consequence of extreme changes in households' consumption due to extreme shocks.

Asymmetric Effects of Shocks

The effect of extreme shocks on households' *per capita* consumption and poverty outcomes are examined across each Nigerien agro-ecological zone to account for the possibility of

heterogeneous or asymmetric effects.⁹ This allows us to illustrate the role of heterogeneity in the estimated linkages between consumption and extreme shocks as well as observed discrepancies in poverty outcomes. There are 5 ecological zones in total. These include urban, irrigated agriculture, rain-fed agriculture, agro-pastoral and pastoral zones. Since we estimate the implied effects simultaneously, we excluded the urban zone as our omitted category for subsequent comparison with the other zones. The effects under the pastoral group are not estimable due to data limitations. Estimation results are presented in table 1.

Table 1: Asymmetric effects of extreme shocks across eco-zones

DV	Expenditure, CFA (a)	Food–Poor (b)	Absolute–Poor (c)
Extreme Shocks X Irrig. Agr.	-39696.2(71513.5)	0.38***(0.01)	0.42***(0.02)
Extreme Shocks X Rainf. Agr.	32901.3(72318.3)	0.61***(0.02)	0.56***(0.02)
Extreme Shocks X Agropastoral	-113310.1***(14860.8)	1.50***(0.04)	1.60***(0.04)
joint Wald-Test, P–val	<0.00	<0.00	<0.00
R-/Pseudo -squared (%)	0.02	-	-
Observations	3,059	3,059	3,059
Fixed Effects	Households	Households	Households
Logit (Marginals)	-	Yes	Yes

Notes: Table reports estimates from regressions of households per capita consumption expenditure and households poverty e.g., food versus absolute poor status on shock variables across different agro ecological zones. The baseline omitted category is the urban zone. Irrig. Agr. denotes irrigated agriculture zone, while Rainf. Agr. denotes rainfed agriculture. Extreme shocks—“Shocks”: correspond to realizations above the 80% percentile of estimated shock distribution. The columns are differentiated by outcome variables and implied regression models. All columns include household level fixed/random effects. All standard errors are clustered at the region level and shown in parentheses. Significance levels are indicated by *** 1%, ** 5%, * 10%.

In table 1, column (a) reports the results for *per capita* consumption expenditure; while columns (b) and (c) display results for two household poverty outcomes. We conducted joint hypothesis tests under the null that extreme shock effects are symmetric across all eco-zones. The corresponding probability–values are reported in the middle row of each specification. In all cases, we strongly reject symmetric or homogenous effects in the joint tests. Consider the results for households’ expenditure: extreme shock effects are indistinguishable between urban and

⁹ We classify Nigerien households into 5 agro-ecological zones. The definitions of zones are adapted from FEWS NET—the Famine Early Warning Systems Network’s classifications. FEWS NET was incorporated in 1985 by the US Agency for International Development USAID, and the US Department of State following drastic famines in major parts of Sub Saharan Africa.

irrigated agriculture zones. Similarly, the effects cannot be distinguished statistically between urban and rain-fed agriculture zones. This is not the case for agro-pastoral, where the negative effects of extreme shocks are larger by about 113,310.1 CFA in households located in the urban zone. This difference is statistically significant at all conventional levels.

Next, consider the results for poverty. Across food-poor and absolute poor, the results are identical. Specifically, households in irrigated agriculture zones are about 40% points more likely to become poor than households in the urban zone. The poverty effects on households are even larger in rain-fed agriculture and agro-pastoral zones compared to the baseline urban zone. This is expected given that urban households are more likely to engage in other micro enterprises that are more resilient to extreme shocks. The extreme shocks are more driven by weather fluctuations and other local conditions as discussed earlier. The urban households may also adjust to realized shocks along multiple margins than the agricultural and pastoral counterparts.

Exploring the Coping Strategies

The consequences from shocks are enormous and can lead to extreme fluctuations in overall consumption and different poverty inclinations, as we detailed above. In response, affected households employ a variety of strategies –both behavioral and non-behavioral– to deal with impending and realized shocks. These are well known, but here we document the coping mechanisms and discuss how these can be useful in thinking about the effective design and implementation of social protection schemes for the case of Niger.

Observed Strategy Mix

Multiple shock-coping mechanisms are explored. In figure 4 below, we summarize the distribution of various strategies used by households to cope with shocks and the implied risks. Effectively, 23 principal strategies are identified, among others in the Nigerien households. The strategies range from relying on prior savings, to government support schemes, social networks e.g., assistance from relatives and friends, and then to doing nothing. Specifically, figure 4a shows the frequency of adopting each of these strategies, while figure 4b examines the changes in adoption frequencies across time. The popularity of each coping strategy can be discerned from both figures by looking at the horizontal length that correspond to the strategy. In addition,

changes in coping strategies between the 2011 and 2014 productive years are easily identified from figure 4b. The figures reveal two important features that are worth pointing out.

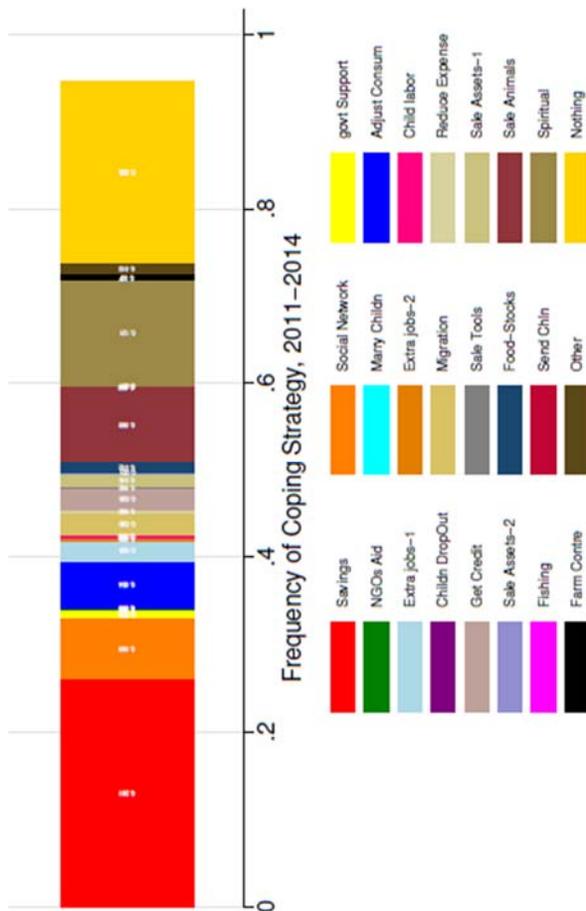


Figure 4a: Understanding the mix of existing shock-coping strategies

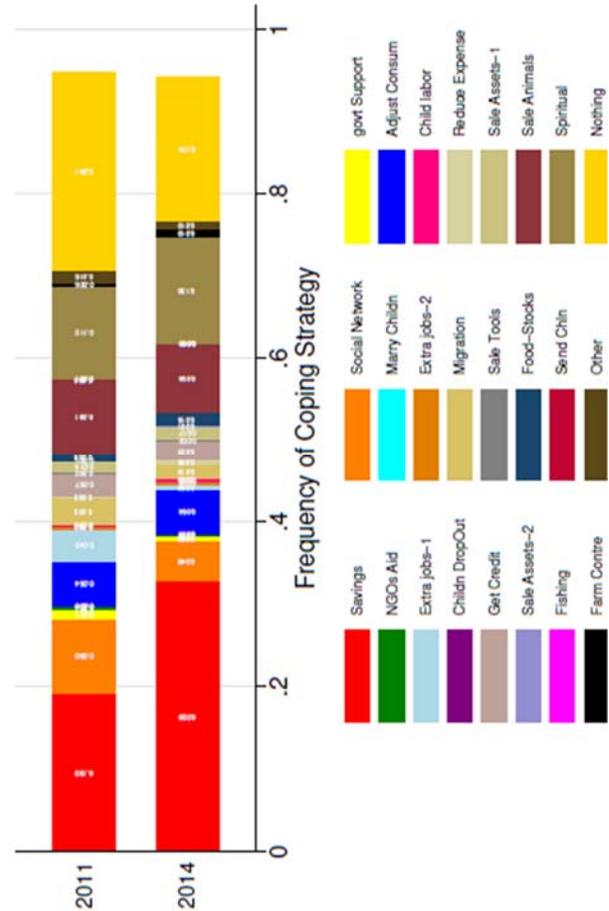


Figure 4b: Understanding the mix of existing shock-coping strategies, across time

First, households do *not* equally adopt the various coping mechanisms when faced with shocks. In particular, using either prior savings and doing nothing dominate. Based on figure 4a, the overall frequency of using previous savings is 26.1%, while that of the doing nothing strategy is 20.8%. These two dominant strategies are followed by other major strategies such as engaging in spiritual activities (e.g., prayers, rituals, etc.), selling of available livestock, relying on social network (e.g., relatives and friends, etc.) and adjusting household consumption patterns (e.g., eating less, etc.) in decreasing order of frequency.¹⁰ Support from the government ranks 13 of 24

¹⁰ For illustration: the top 6 dominant observed strategies include Savings (26.1%); Do Nothing (20.8%); Spiritual (12.1%); Sale Animals/Livestock (8.8%); Social Networks (6.9%); Adjust Consumption patterns (6.9%). Frequencies of use are shown in parentheses.

identified strategies with a frequency of about 1.0%. The surprisingly frequent use of spiritual activities (about 12.1%) reflects the important role that religion and culture play in this region. The result that households frequently do nothing indicates an extremely limited scope for coping with shocks as well as highlights how sensitive or vulnerable these societies are. The frequent sale of animals is expected because most Nigerien households commonly own livestock either through transfers made during marriage arrangements, mixed or pastoral farming especially in the northern belt.

Second, households switch or *substitute across* various coping mechanisms overtime. This is illustrated in figure 4b. Between 2011 and 2014, the use of previous savings as a coping strategy increased from 19.3% to 32.9%, while doing nothing decreased from 24.1% to 17.4% but the use of other major strategies like spiritual activities, selling of available livestock, and adjusting household consumption patterns remained roughly stable, except for the decrease in social network channels. These substitution patterns are important as they may reflect additional channels upon which households can cope with realized shocks. For instance, the observed substitution between prior savings and the doing nothing strategy is relevant in making households less sensitive to shocks. Expanding the shock-coping strategy sets of households can be an important strategy itself. Notice that households have to either save or keep a stock of food in each productive year as shock-coping mechanisms. The estimates above will therefore suggest an overall savings rate of about 26.1% and food storage rate of approximately 1.2% among the poor Nigerien households.

Estimated Effects: Robustness Analysis

This section has two objectives. First, we show that our earlier estimates of poverty and consumption responses to extreme shocks are robust to controls for households' coping adjustments. Based on the preceding discussion, households adopt a number of mechanisms or strategies to deal with realized shocks. We directly control for these strategies in our baseline model to ensure that we are possibly not over-estimating the damaging effects of extreme shocks. Second, whether the coping mechanisms are effective or not is an open question.

Therefore, we take a step to explore the effectiveness of the individual strategies. In some cases, we restrict attention to the top 6 dominating coping mechanisms.¹¹

Table 2 illustrates the consumption–extreme shocks relationships conditional on the vector of coping strategies. The first panel of this table reports estimates for *per capita* food consumption and the second panel displays the results for overall *per capita* household consumption. The first column of each panel repeats the baseline estimates of consumption–extreme shock linkage, while the second (i.e., 1b and 2b) and third (i.e., 1c and 2c) columns introduce either all the 23 strategies or only the top 6 dominant strategies used by households to face shocks. As expected, extreme shocks have negative effects on both household consumption outcomes. Specifically, households’ exposure to an extreme shock during the year would imply between 27,516 – 37,100 decline in food consumption expenditure and about 58,201 – 69,858 decline in aggregate per capita household consumption expenditures. Next, the estimated quantities on extreme shocks are similar in magnitude to our baseline results since the confidence intervals intersect (see figure 3). Statistically, the estimates from the models that control for households’ coping mechanisms are indistinguishable from the baseline unconditional versions at 5% level of significance. Notice that both household and time fixed effects are controlled for in all cases. The majority of the coping strategies have limited direct effects on consumption expenditures.

¹¹ Results are invariant to inclusion of all the 23 principal coping strategies. Restricting attention to the top 6 strategies is for mere convenience and ease of presentation.

Table 2: Extreme Shocks Effects on Consumption –Robustness

DV	Food Consumption			Household Consumption		
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)
Extreme Shocks	-24278.43 (13535.18)	-27516.18 (16264.08)	-37100.35* (18650.48)	-47548.94* (22554.52)	-58201.20* (28638.90)	-69858.20** (27692.16)
All 23 Strategies Savings (26.1%)	-	Yes	- -4308.88 (5197.246)	-	Yes	- -7531.36(5689.09)
Do Nothing (20.8%)			4327.13(3080.73)			8013.45*(3873.04)
Spiritual (12.1%)			1522.13(7615.587)			175.92(14049.06)
Sale Animals (8.8%)			-2206.21(4773.69)			-441.01(6952.14)
Social Networks (6.9%)			-6683.79(4722.68)			-4723.99(7013.27)
Adjust Consumption (5.4%)			7288.43(5876.81)			10530.61(8187.44)
R-/Pseudo -squared (%)	4.88	6.15	5.31	0.87	3.95	2.01
Observations	3,059	3,059	3,059			
Fixed Effects Model	Households+ Year Linear	Households+Year Linear	Households+Year Linear	Households+ Year Linear	Households+Year Linear	Households+Year Linear

Notes: Table reports estimates from regressions of two per capita consumption expenditure on extreme shock variables, and vectors of shock-coping strategies. Frequencies of strategy-use are shown in parentheses. Shock realizations are based on estimated shock quantities in section 2 which range between -1.12 and 7.83. Extreme shocks correspond to realizations above 80th percentile of shock estimated shocks. The columns are differentiated by outcome variables and implied regression models. All columns include both household level and year fixed effects. All standard errors are clustered at the region level and shown in parentheses. Significance levels are indicated by *** 1%, ** 5%, * 10%.

Table 3: Extreme Shocks Effects on Poverty –Robustness

DV	Food-Poor			Absolute-Poor		
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)
Extreme Shocks	0.311***(0.088)	0.291**(0.111)	0.370**(0.119)	0.327***(0.088)	0.313*(0.135)	0.365**(0.131)
All 23 Strategies	-	Yes	-	-	Yes	-
Savings (26.1%)			0.007(0.035)			0.017(0.024)
Do Nothing (20.8%)			-0.039**(0.012)			-0.045**(0.013)
Spiritual (12.1%)			0.021(0.011)			0.065(0.027)
Sale Animals (8.8%)			0.032(0.039)			-0.003(0.053)
Social Networks (6.9%)			0.027(0.032)			-0.011(0.026)
Adjust Consumption (5.4%)			0.050(0.087)			0.037(0.046)
R-/Pseudo -squared (%)	0.35	2.72	0.91	0.87	3.95	2.01
Observations	3,059	3,059	3,059			
Fixed Effects	Households + Year	Households+Year	Households+Year	Households+ Year	Households+Year	Households+Year
Model	Linear Prob.	Linear Prob.	Linear Prob.	Linear Prob.	Linear Prob.	Linear Prob.

Notes: Table reports estimates from regressions of households poverty e.g., food versus absolute poor status on extreme shock variables, and vectors of shock-coping strategies. Frequencies of strategy-use are shown in parentheses. Shock realizations are based on estimated shock quantities in section 2 which range between -1.12 and 7.83. Extreme shocks correspond to realizations above 80th percentile of shock estimated shocks. The columns are differentiated by outcome variables and implied regression models. All columns include both household level and year fixed effects. All standard errors are clustered at the region level and shown in parentheses. Significance levels are indicated by *** 1%, ** 5%, * 10%.

We turn to poverty–extreme shocks relationships. Table 3 reports estimates from regressions of households’ poverty (food versus absolute poor status) on extreme shock variables, and vectors of shock-coping strategies. The columns are differentiated by outcome variables and the control vectors. Analogous to the presentation in table 2, we repeat our baseline estimates of poverty–extreme shock linkage in the first column of each panel. The second columns (i.e., 1b and 2b) introduce all the 23 strategies as controls, while the third (i.e., 1c and 2c) introduce only the top 6 dominant strategies used by households to face realized shocks. Households exposed to an extreme shock over the period are more likely to become food poor by 29–37 percentage points, relative to no exposure to extreme shock. In the case of absolute poverty, this is about 31–37 percentage points. Conditioning on the relevant vector of coping strategies does little to alter the baseline estimates (compare table 3 to figure 2 /columns 1a and 2a).

Strategy Set Effectiveness

Table 4 explores the effectiveness of all the 23 reported shock–coping mechanisms. To keep a brief presentation, we chose to report results for only the mechanisms that are significant. Estimates come from regressions of the relevant household outcomes on estimated score of shocks variable, all the shock-coping strategies as well as their interactions. We assess the effectiveness of individual strategies based on the sign and significance of the interaction terms. The left panel of table 4 corresponds to the results for poverty; the second presents the results for household consumption expenditures. For poverty, a negative estimate for the interaction would imply a negative effect of the strategy on shocks; and thus a dampening of the negative effect of shock realizations. For *per capita* consumption expenditures, positive interaction estimates would imply a dampening of the negative effect of shock realizations on households. Although not significant at conventional levels, shocks have damaging effects on both absolute poverty and food consumption outcomes. Across the wide range of models, 9 strategies were significant. These includes aid from NGOs, marrying off children, adjusting consumption habits/patterns, migration, reduction in other expenditures, sale of agricultural tools/inputs, use of previous food stocks, increase in fishing activities and engaging in spiritual activities (e.g., prayers, sacrifices, consultation with witches, etc.).

Based on both economic magnitudes and statistical significance: marrying off children appears to be the most effective strategy employed by households. This strategy soaks-up or dampens the negative impact of shocks in more folds than the other candidate significant strategies. This holds across both poverty and consumption expenditure outcomes. Engaging in migration and spiritual activities suggest opposite results in some cases. For instance, the effect of engaging in spiritual activities on the damaging effects of shocks on households' absolute poverty status—a non-economic strategy—is significantly positive at the 10% level. This would imply more sensitivity of households to shock realizations following their dependence on spiritual activities. Cultural arrangements and social norms can potentially skew households to rather more ineffective strategies—as illustrated here via the channel of spiritual activities.

The results for migration are similar. Engaging in migration as a coping mechanism implies more sensitivity of households' consumption and poverty to shock realizations. The result that migration of one or more members of the household as a strategy leads to worse household outcomes can be explained by theories of asymmetric information/behavior between migrants and their families, including others.¹² In a recent study, Joseph, Nyarko & Wang (2015) provided evidence that increase in migrant earnings is associated with decrease in remittances over time. This discrepancy between earnings and remittance becomes narrow in situations where the migrants have more co-workers from the same location who are likely to inform their families' members. This is suggestive of asymmetric information driving remittances. Our knowledge about whether or not asymmetric information between migrants and their families leads to inefficient outcomes is crucial and remains an open research question (see e.g., Joseph, Nyarko & Wang 2015; Seshan & Zubrickas 2015 for related discussions). While we do not fully provide rigorous analyses about this, our results are suggestive: engaging in migration as a shock-coping strategy makes households' consumption and poverty inclinations worse.

¹² Such results may also reflect the nature of the labor market conditions (i.e., in terms of unfavorable wages and working conditions) at the destination of migrants who are mostly unskilled (see e.g., United Nations 2003 for related discussions).

Table 4: Examining Effectiveness of Shock Strategy Set

DV	Poverty		Per Capita Consumption Expenditures	
	Food-poor, (1a)	Absolute-poor, (1b)	Food, (2a)	Household, (2b)
Estimated Shocks	-0.006 (0.025)	0.015 (0.036)	-328.65 (4074.42)	1133.69 (5943.33)
X NGOs Aid	-0.022* (0.011)	-0.029*** (0.008)	-3632.10 (4033.18)	-3211.61 (6723.18)
X Marry Children	-0.385*** (0.023)	-0.367*** (0.018)	68879.73*** (3750.42)	121120.30*** (5531.93)
X Adjust Consum.	0.0166 (0.048)	0.004 (0.026)	10080.34** (3392.08)	12387.05** (4394.04)
X Migration	0.071*** (0.009)	0.064*** (0.015)	-7891.66* (4022.50)	-10447.9* (5004.01)
X Reduce Expenses	-.098 (0.069)	-0.120 (0.069)	29161.54*** (6846.64)	16841.84 (29743.90)
X Sale Ag-Tools	0.168*** (0.039)	0.109** (0.037)	-6915.02 (7471.88)	-9717.32 (9720.09)
X Food Stocks	-0.039 (0.049)	-0.035 (0.047)	-13089.62** (4325.68)	-18139.03** (6881.76)
X Fishing	-0.016 (0.016)	-0.053 (0.032)	36306.64 *** (4979.07)	54339.25*** (7845.57)
X Spiritual	0.023 (0.015)	0.026* (0.023)	-2629.982 (1867.32)	-9872.602 (6557.43)
R-/Pseudo -squared (%)	2.59	2.99	6.06	8.20
Observations	3,059	3,059		
Fixed Effects Model	Households+Year Linear Prob.	Households+Year Linear Prob.	Households+Year Linear	Households+Year Linear

Notes: Table reports estimates from regressions of poverty and per capita consumption expenditure on estimated score of shock variables, shock-coping strategies or mechanisms and their interactions —to assess effectiveness. Shock realizations are based on estimated shock quantities in section 2 which range between -1.12 and 7.83. The columns are differentiated by outcome variables and implied regression models. All columns include both household level and year fixed effects. All standard errors are clustered at the region level and shown in parentheses. Significance levels are indicated by *** 1%, ** 5%, * 10%.

Implications for Transfer Designs

The results in this section can provide guidance for the design and delivery of social assistance programs in Niger. On one hand — the majority of these poor households frequently rely on previous savings and sale of livestock holdings in the wake of extreme shocks. This would directly imply designing social programs that are complimentary to them. The overall savings rate among this rural population is fairly low (less than 27.0%); the use of livestock or animal holdings rate is about 8.8%. In addition, the credit channel can be important in overcoming credit

market frictions: either formal or informal. We observe that about 2.5% of the households seek formal credit after the shocks are realized to face the situation. Analogous arguments *mutatis mutandis* can be made for case of support from the social networks channel which ranks 5th among the 23 candidate strategies. In the world of informal risk sharing arrangements, e.g., through arrangements with friends, households' ability to honor informal contracts hinges more crucially on their ending wealth including assets and savings. On the opposite hand — the majority of these frequently used strategies are limited in their effectiveness. A relatively less frequent strategy –i.e., marrying off children appears to be the most effective in dampening the impacts of shocks on households. We note that, while marrying off children may work, it can damage the girls' long term opportunities and development that a forgone education can provide, more especially for the girls with higher abilities. Both strands of results should be carefully analyzed in the design of social assistance.¹³

4 SOCIAL PROTECTION: SCHEMES, DIMENSIONS & ROLES

Exploring the Schemes

This section describes the current ecosystem of social protection schemes in Niger. The linkages with poverty along regional boundaries are made. Our discussions lead to important hypotheses which highlight potential challenges in the current schemes.

Results and Discussion

In Niger, social protection programs have been in long existence. We begin with an illustration of how long the beneficiary households have been receiving social assistance. The distribution is displayed in figure 5a. The figure counts the number of months between the first and last time that households received social assistance. In principle, this figure does not say anything about whether households receive the assistance continuously; it only captures the span between the

¹³ An important question to ask moving forward is: whether observed coping mechanisms and loop holes in current transfer schemes could be used to design effective interventions and transfers that increase the resilience of households to shocks among poor populations in Niger. In our view, the animal or livestock holdings channel appears to be an aspect that requires a serious consideration for the case of Niger especially given the popularity in ownership and how most livelihoods depend on livestock. More research is needed to fully understand the complex interplay between the coping mechanisms and loop holes in current transfer schemes, and how these could be used to design effective interventions that will increase resilience of households.

first and last date of receiving the social support. In 2014: about 59% of households were first time beneficiaries. The remaining 41% of households have received some form of social assistance in the past, where the maximum length is 313 months (i.e., about 26 years). A large fraction of the beneficiary households are skewed towards a year or less assistance durations, suggesting that social protection programs are becoming popular and expansive recently in Niger. To further understand these social interventions, Figure 5b illustrates the maximum span that households have been receiving social assistance across the eight Nigerien regions. Spatial differences exist. The Dosso region records the highest followed by Niamey, Diffa, Zinder and TillabÉri.

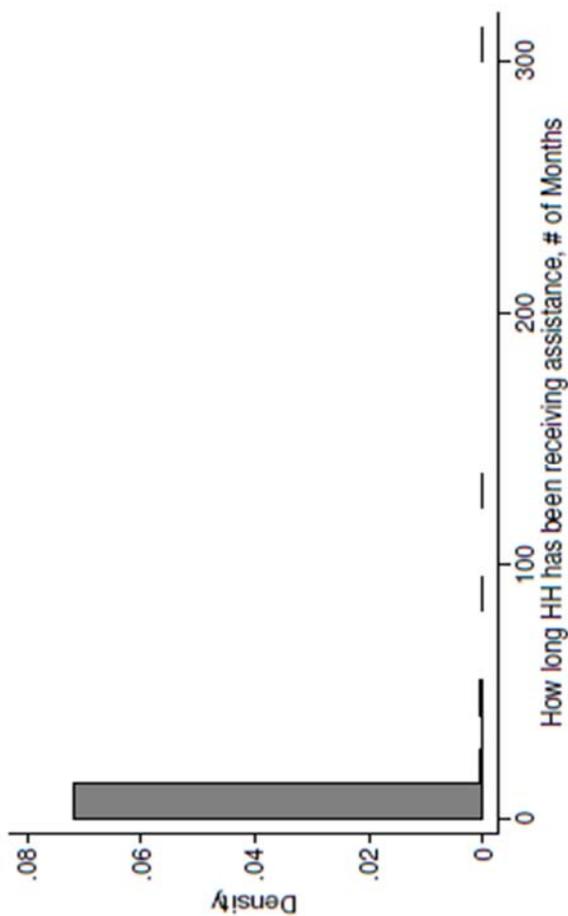


Figure 5a: Distribution: length of receiving social assistance

Notes: Source: World Bank Household Panel, 2014 Niger. The figure counts the number of months between the first and last time HH received assistance. In principle, the figure does not say anything about whether HH receives assistance continuously; it only captures the span.

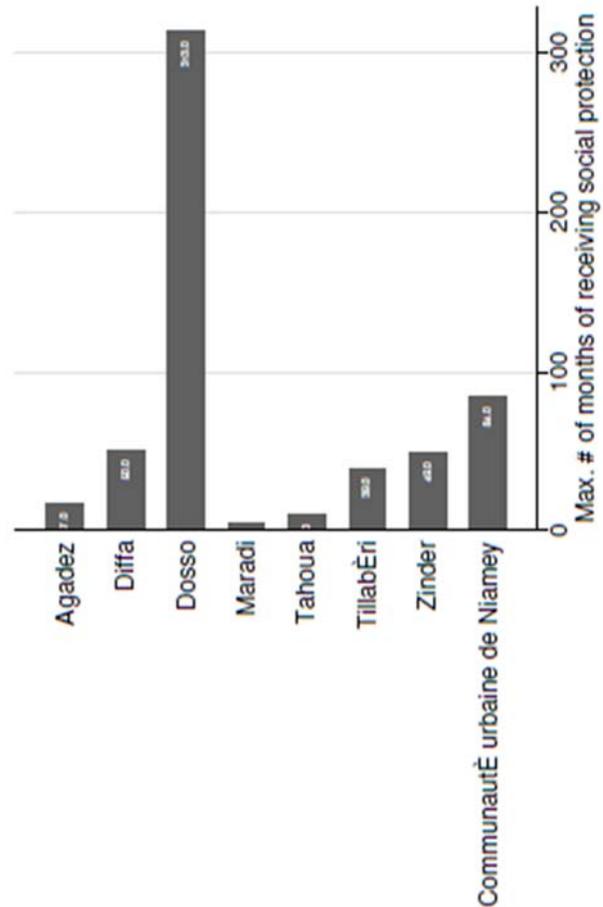


Figure 5b: Understanding social protection across regions

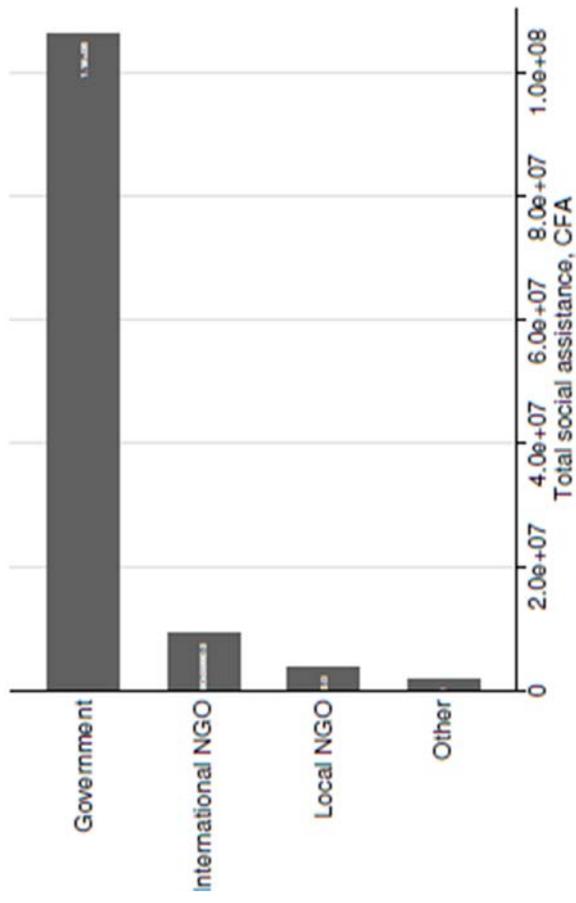


Figure 5c: Sources: Total social assistance, CFA

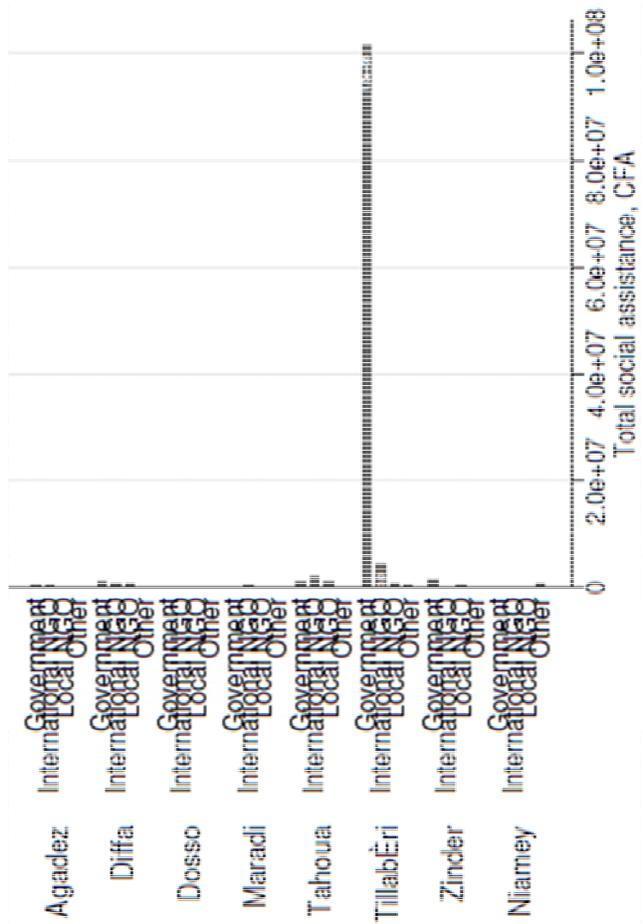


Figure 5d: Disbursements: Total social assistance, CFA

DISTRIBUTION OF SOCIAL PROTECTION INTERVENTIONS

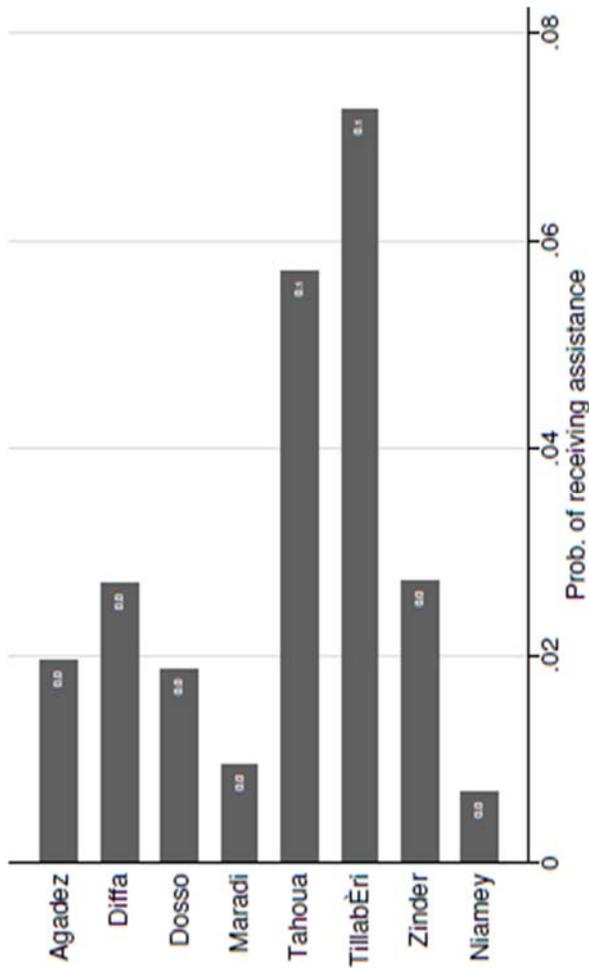


Figure 6a: Understanding social protection across regions

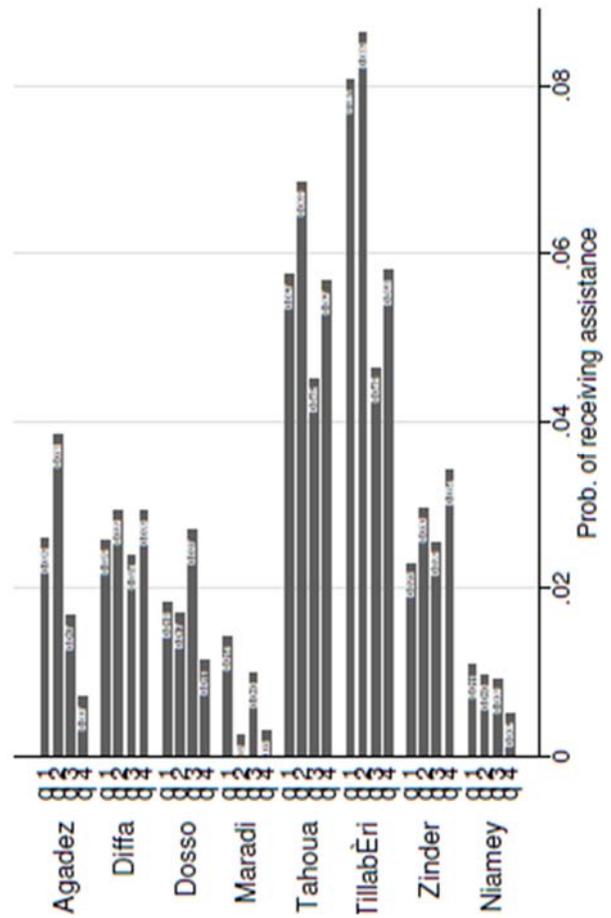


Figure 6b: Understanding social protection by region and expenditure quintiles

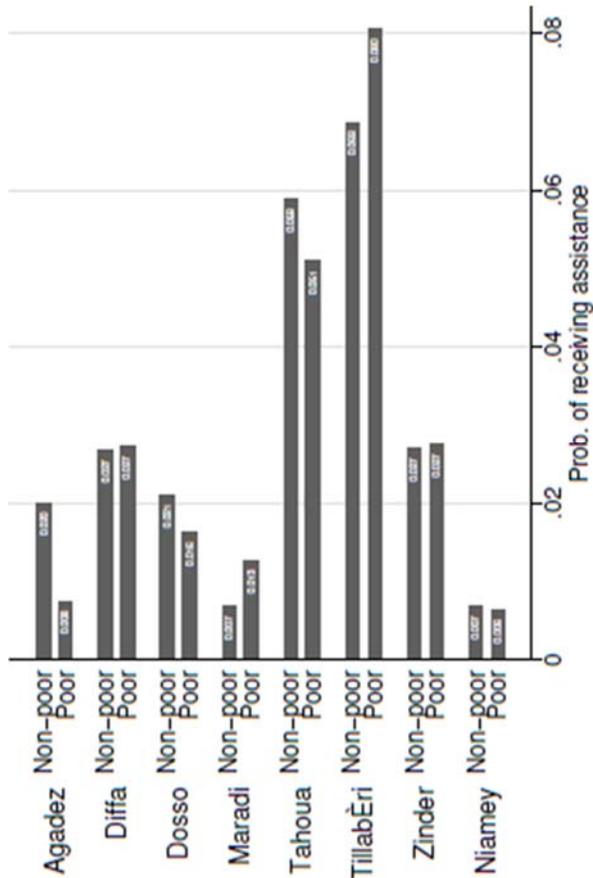


Figure 6c: Understanding social protection by region and food poverty

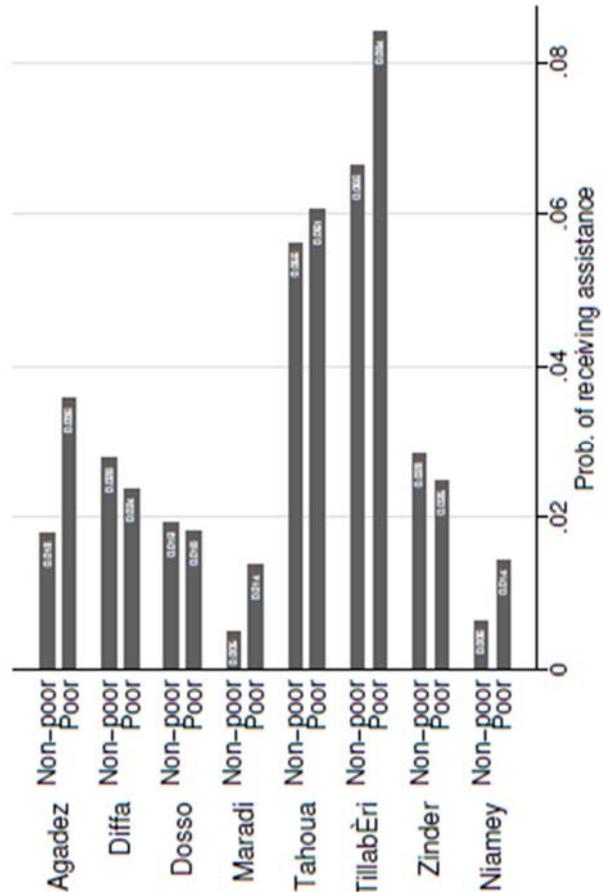


Figure 6d: Understanding social protection by region and absolute poverty

Sources and variation in assistance provision

Social assistance to the poor and eligible households comes from multiple sources. These include support from the government, international NGOs and local NGOs, among other negligible sources. Figure 5a indicates the various sources and the corresponding size of total assistance received by sample households over the period: 2011 and 2014. Figure 5b replicates the representation in 5a but allow the total assistance to vary across the eight-regions of Niger. First, social assistance from the national government is by far the largest support program. This accounts for more than 80% of all disbursed social assistance; followed by international NGOs which accounts for about 8% of the total assistance. Second, there exist considerable differences in total assistance received by households along regional lines. In particular, the share of support

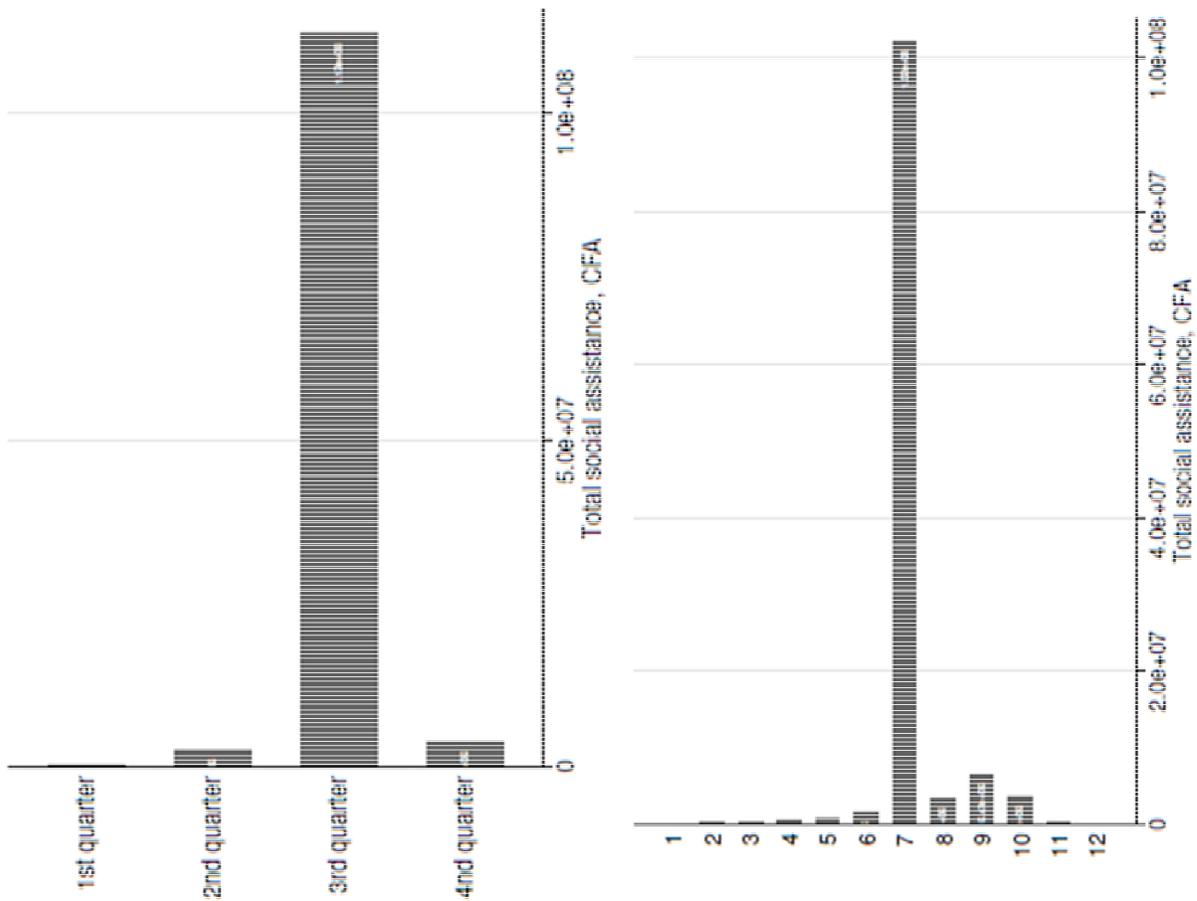
from government and international NGOs is significantly largest (i.e., >85%) in the TillabEri region; not so for the other regions.¹⁴

Next, figure 6 explores the distribution of social assistance across different mix of wealth brackets, regions, and poverty classes. All illustrations in this figure are entirely correlational; but a few hypothetical features are evident. In particular, figure 6a shows the probability of receiving social assistance across different regions; 6b does the same but allows this probability to vary further across quartiles of *per capita* consumption's distribution. The figures show significant inequalities of receiving assistance. TillabEri households are significantly more likely to receive social support; and households within the second quartile of the distribution of consumption expenditures are by far more probable to receive social assistance. In addition, households in the upper quartiles of income or expenditure distribution are more likely to receive social support in the regions of Diffa, Dosso and Zinder. This is surprising and inconsistent with the usual targeting standards of formal social programs. To investigate this further, we present in 6c and 6d estimates for the probability of receiving social assistance conditional on the poverty class of households. To draw linkages of these with observed poverty trends, the results are presented for different regions. Two working definitions of poverty are employed, throughout the document: either food-poor or absolute-poor. Guided by the Nigerien National Poverty lines in 2011, a household is classified food-poor if the *per capita* food consumption expenditure is strictly less than 123,410 CFA. The household is however classified absolute-poor if the *per capita* food consumption expenditure is less than 189,233 CFA. In some case, poor households are less probable to receive social transfers. The results in 6c and 6d corroborate the earlier findings.

Examining trends in poverty, we find that the Dosso, Maradi, and TillabEri regions have identical share of absolute-poor households using the 2011 National Absolute Poverty Line of 189,233 CFA. The share of food-poor households is similar, but on average households in Dosso

¹⁴ To ensure that the results in 5b are not driven by differences in the number of representative households, we rather examined *per capita* total assistance across the regions. The latter re-affirms the previous evidence: the TillabEri region accounts for over 85% of total assistance; this is followed by the Tahoua region which accounts for less than 5% —not shown. Additional diagnostics on the reported transfers reveal limited evidence of outliers —this helps to rule out potential issues of outliers and data mis-reporting.

have experienced increased poverty rates between 2011 and 2014. An illustration of trends in poverty rates are all detailed in the Appendix. Together, we find the discrepancy in social assistance across Dosso, Maradi, and Tillabéri surprising since these regions have similar poverty rates. Several previous studies and policy reports have documented the relevance of both *geographical*, and *gender* specific aspects; not so for the *time* dimension. In the next parts of the sequel, we provide detail analysis for the *time* dimension, and briefly discuss the case of *gender*.¹⁵



¹⁵ **Figures 7a-7c** in also show the distribution of total assistance by either quarter or month of the year and across the various regions. Interestingly, we find that households received a large fraction of the 2014 total social assistance in the third quarter, accounting for over 95%. This is followed by disbursements in the fourth quarter. Zooming further, figure 7c illustrates that this result is driven by receipts in July, 7th month. The evidence is consistent across all regions, as shown in figure 7c. While the second quarter is crucial for household shocks and consumption expenditures as will be shown in later sections to come, disbursements of social assistance rarely happen within this quarter. This suggests a missing consideration or missing temporal-targets in the distribution of social interventions in Niger.

Figure 7a: Disbursements: Total assistance across quarters, CFA

Figure 7b: Disbursements: Total assistance across months, CFA

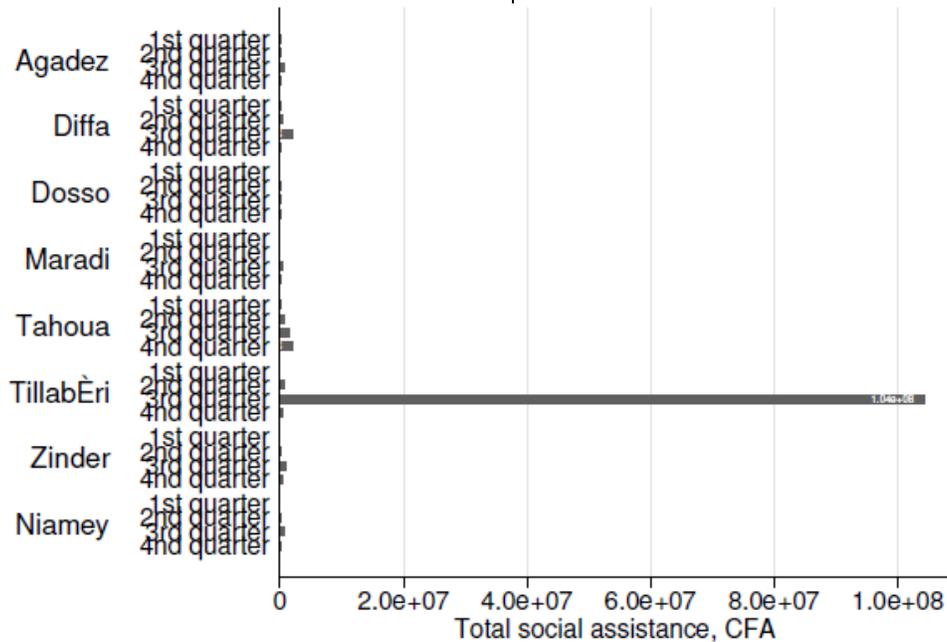


Figure 7c: Disbursements: Total assistance by Regions and quarters, CFA
TOTAL ASSISTANCE ACROSS TIME AND REGION

Exploring the Time Dimensions

In general, social protection act as shock absorbers to the poor and vulnerable households. But exposure to shocks and the extent of vulnerabilities can vary widely across the calendar year. Here, we examine the time differentiated impacts of shocks by asking whether the *timing* (e.g., month or quarter) of disbursing transfers shape the extent to which the assistance help households to absorb shocks. This is important for providing assistance systems that are effective to beneficiaries and can help overcome potential issues with scarce resource allocation, noting that —the financial capacities of poor and low-income countries (e.g., Niger, among others) can be much lower than the needs.

Question – *does the month of receiving social assistance matter and why?*

Results

Figures 8a and 8b display parameter estimates from the regression of *per capita* household consumption on households’ exposure to negative shocks and interactions with social protection and the receiving month or quarter. The triple interactions are meant to capture potential

“incentive” or shock absorber effects of receiving social assistance across different time periods in a given calendar year. The results for monthly interactions are reported in figure 8a, which in turn provide two important evidence. First, the impact of shocks on household consumption is negative and statistically significant at 5% level. This was what we expected, ex-ante. Next, the interaction terms are all statistically indistinguishable from zero at 5% significance level except the months of April, May, June AMJ and December. In these months, we find that social assistance serves as significant shock absorbers by reversing the negative impacts of shocks. This means that households are able to smooth consumption within this period, AMJ.

Figure 8b replicates 8a but with interactions at the quarterly level. We find an overwhelming evidence suggesting the crucial importance of receiving social assistance in the second-quarter; not so for the other quarters. The interaction term corresponding to the second-quarter is positive and statistically significant. The estimated shock-absorption effect for this second quarter is about 69,000 CFA. This quantity is economically meaningful and translates to about 36% of the Nigerien 2011 National Absolute Poverty Line (of 189,233 CFA). This implies that the provision of social support to the poor and vulnerable Nigerien population in the second quarter of the calendar year —on average— has about 36% chance of making households non absolute-poor.¹⁶ Finally, notice that the individual effects are estimated *conditional* on transfers from other the months or quarters.

¹⁶ These results are stable across several variations of the baseline model that interacts extreme shocks with social assistance and timing of the assistance, with and without controls. We estimate another regression model of *per capita* household consumption on only households’ exposure to negative shocks and the interaction with social protection; but ignored the time dimension. While not reported here, the estimated shock-absorption effect overall is 48,610.1 CFA. Even though the estimate is positive and suggests that social protection schemes are useful, it is *not* statistically different from zero at conventional significance levels. This overall estimate corresponds to 25.6% of the Nigerien 2011 National Absolute Poverty Line (of 189,233 CFA).

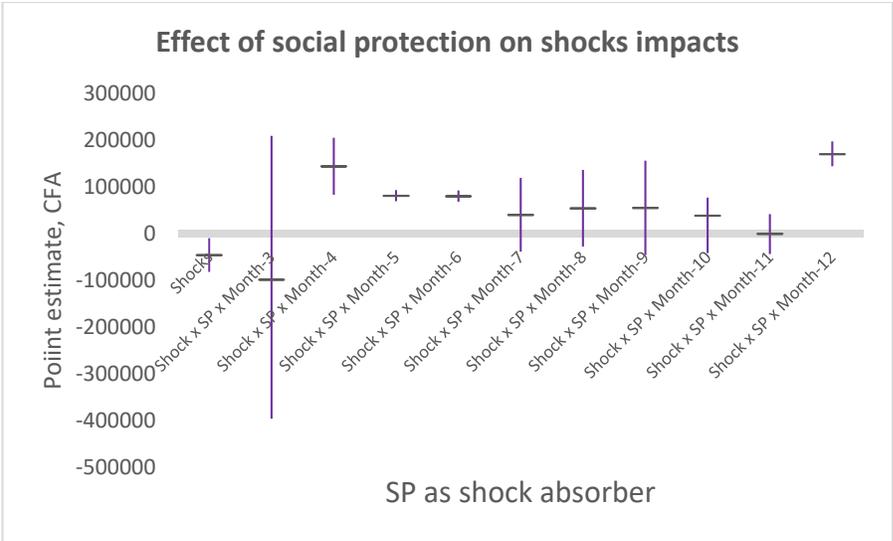


Figure 8a: Linkages between social protection, timing and consumption sensitivity to shocks, N=3,059

Notes: Question: Does month of year that household receives social protection matters? The main outcome of interest: households' consumption expenditure, defined as either per capita food or per capita household consumption. Confidence intervals are indicated by the blue vertical lines.

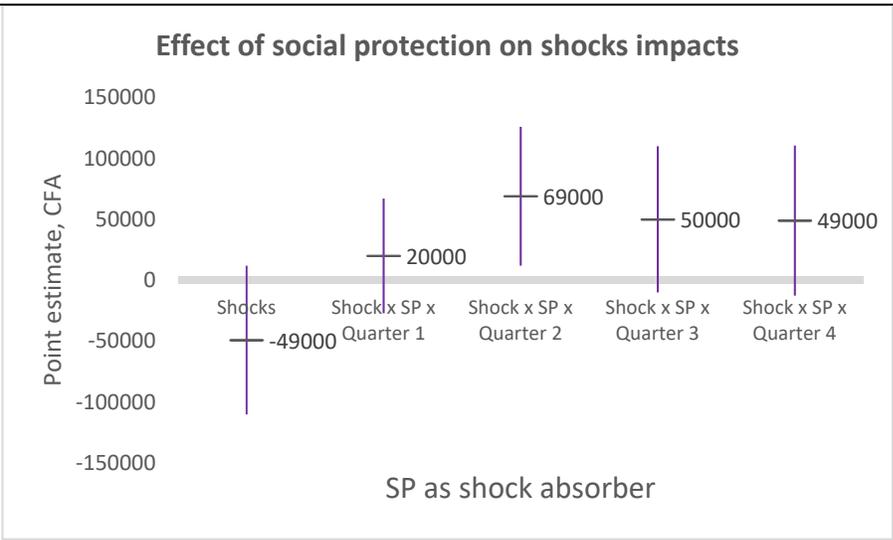


Figure 8b: Linkages between social protection, timing and consumption sensitivity to shocks, N=3,059

Notes: Question: Does quarter of year that household receives social protection matters? The main outcome of interest: households' consumption expenditure, defined as either per capita food or per capita household consumption. Confidence intervals are indicated by the blue vertical lines.

Incentive Effects

One long-standing incentive-hypothesis is that providing social assistance to households can create incentives and cause the households to become more sensitive to external shocks for behavioral reasons, e.g., through Moral Hazard Effects.¹⁷ This can limit the soundness of providing social assistance because the ability of households to cope with shocks such as droughts and diseases is limited in such cases. In general, social transfers can either aid or potentially disincentive households coping to realized shocks. The “benefits” of social transfers

¹⁷ Or more broadly Asymmetric Information.

are straightforward to imagine or discern; not so for the associated hidden economic “costs”. Said differently: government and/or NGO transfers to households can skew behavior of beneficiaries and attenuate the social incentive to self-protect against extreme local shocks. Examples of the direct benefits of societal transfers include increases in households’ consumption, encouragement in investment of more profitable technologies, minimization of exposure to risks from the shocks, among others. But —as hypothesized earlier— transfers can cause societies to rather take on more risk and become more shock-sensitive through consumption outcomes and implied poverty inclinations.

Our framework and results in the section allow us to analyze the incentive-hypothesis. In particular, our estimates on the interaction terms reflect the “average effect” of social transfers on consumption responses to local economic and non-economic shocks. This captures the net effect of all effects (i.e., both positive and negative) of the social transfers —which is ex-ante ambiguous. Consider the results presented in figures 8a and 8b. Notice that negative parameter estimates on the interaction terms will imply that social assistance makes households more sensitive to the shock realizations. In contrast, the results provide evidence against the incentive-hypothesis. In particular, in the case of Niger, we find that social assistance provided within the second quarter appears to be effective on average and significantly dampen the impacts of shocks on households’ consumption. This evidence is consistent across the wide range of model specifications that we consider.

Discussion and Mechanisms

There exist potential binding physical and socio-cultural constraints in the second quarter of the year that are unique in Niger. These likely explain the time differentiated effects of transfers on realized household shocks. First –Agricultural business is the main enterprise upon which livelihoods depend in Niger. But in April-May-June / second quarter –sowing and planting– are the main production activities, not harvest. Without much storage and savings from past production, both food and non-food consumption can be limited for these predominantly agrarian households within this period of the year. We do not have direct information on households’ savings and storage behavior, but both are very minimal in Niger. This is because most Nigerien households tend to produce overwhelmingly at the subsistence level. In section 3, we found

fairly suggestive low savings rates (less than 27.0%) and food-stocking rates (less than 1.5 %) among this rural population.

Second, in Niger, April-May-June (i.e., second-quarter of the calendar year) is marked by extreme and unfavorable weather conditions. For example, during this period precipitation is very low precipitation with less than 40% chance of rain in a day. This is the period of the year when temperatures become extremely hot — above 90F. In this region, weather shocks are covariate or global in nature in that they tend to affect entire groups of households. Therefore, there is limited scope for even informal transfers across households to occur (which typically could serve as risk sharing arrangements among poor and vulnerable populations to smooth consumption). The second conjecture has a link with the rich economic literature suggesting that risk-sharing is incomplete among rural populations in poor countries (De Weerd & Dercon 2006; Mazzocco & Saini 2012; Munshi & Rosenzweig 2016).

Implications for Transfer Designs

Combining both results above, it seems natural that the value of social safety nets will be maximized within the second-quarter of the calendar year in Niger. The result that social interventions does very little to shape vulnerabilities of beneficiary households to shocks aside the second quarter is also consistent with the theory that households spend the transfers received within this period on non-productive activities. In such a theory, recipients undertake expenditures that does not contribute to increasing household welfare, consumption or overall adaptation to shocks. We hope that these findings will influence the way transfers (e.g., by the government, international NGOs; humanitarian aid agencies) are delivered to Nigeriens. The design of transfers should account for time-specific components of recipients. While the results here are intuitive, our work provides first-hand empirical evidence supporting the hypothesis that the households are better able to dampen the negative impacts of shocks and thereby effectively smooth consumption in Niger when transfers are received in the second-quarter, in particular in the month of May. The results extend to other developing countries where social protection schemes are common. In general, it is useful bear in mind the physical and socio-cultural constraints that are unique over the calendar year in the design and disbursement of social assistance programs.

Exploring the Gender Dimensions

There is a large literature that document the gender differentiated impacts of shocks on households across a vector of outcomes including food intake, migration, educational attainment, early and polygamous marriage, among many others (DeVreyer et al. 2014; Fenske 2011/15; Mobrak et al. 2013; MercyCorps Report 2014). As is well known, the extent of vulnerabilities to shocks and risk is different across men and women because of differences in domestic and economic roles, as well as inequalities in access to resources such as land and other asset holdings. This makes gender important in the design and implementation of social protection schemes. This section provides evidence and a brief discussion about the gender aspects of social assistance from the Nigerien context. In particular, we ask whether the *gender* of the person who manages household social assistance shapes the extent to which the assistance help households to absorb shocks.

Question – *does the gender of the household's decision maker [who manages assistance] matter?*

Results

We examine both households' *per capita* consumption and poverty outcomes to characterize gender roles in the effectiveness of social protection schemes. The sensitivity of households to realized shocks among households that rely on females to manage received social assistance are compared to those where assistance is not managed by females. The results from different model specifications are presented in Table 5. The first panel of Table 5 corresponds to estimates for consumption expenditure, while the second and third panels display the results for household food-poverty and absolute poverty status, respectively. In all panels, column–a is an unrestricted version of column–b where the direct effect of gender is included in the model. Next, Female Manager is a logical indicator that equals 1 whenever a female is involved in the management of households' social support. The parameter estimate of the interaction term is our main parameter of interest in each model. In addition, columns (1a), (2a) and (3a) are the preferred specifications given their flexibility.

All variables and terms have their expected signs for *per capita* consumption expenditure. The interaction term is positive suggesting that households where females manage received social assistance are relatively less sensitive to extreme shocks on average and thus better off. While the estimated magnitude of about 32901 CFA is economically meaningful, it is not statistically significant. To illustrate the implied economic relevance, consider the following back-of-envelop calculations. The relative shock-insensitivity estimate of 32901 CFA translates to 17.4% of Nigerien 2011 National Absolute Poverty Line (of 189233 CFA). This is a nontrivial fraction and suggests that allowing females to manage household social transfers has about 17% chance of making households non absolute-poor. Employing the same calculation, the estimates suggest that females' management of social transfers has about 25% chance of making households non-food-poor.

Turning to poverty in the right two panels, the variables have their expected signs. The interaction term is negative across all poverty outcomes implying a less chance of poverty among households where females manage assistance. The results are significant at 5% level in the restricted specification of absolute poverty. The chance of not tripling to absolute poverty is about 19%. This value is coincidentally close to what we obtained under *per capita* expenditure using on our back-of-envelop calculations. Together, while the evidence for *per capita* consumption expenditure is limited by statistical insignificance, the overall results in Table 5 are consistent with previous evidence and expectations. Our results highlight how effective social transfers can be in Niger if household transfers are managed by females. This re-affirms arguments that favor the targeting of social protection schemes along gender dimensions.

Table 5: Gender and Sensitivity to Shocks

	Per Capita Expenditure, CFA		Food–Poor		Absolute–Poor	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Estimated Shocks	-46128.2 (27948.1)	-45872.5 (27857.2)	0.034** (0.016)	0.034** (0.016)	0.035* (0.021)	0.035* (0.021)
X SP X Female Manger	32901.3 (24888.1)	30179.18 (34819.7)	-0.075 (0.127)	-0.124 (0.079)	-0.124 (0.128)	-0.195** (0.081)
Female Manager	-72217.02 (50086.1)	-	-0.004 (0.027)	-	-0.041 (0.043)	-
R-/Pseudo -squared (%)	2.70	2.61	0.54	0.54	0.60	0.60
Observations	3,059	3,059	3,059	3,059	3,059	3,059
Fixed Effects	Eco-zones	Eco-zones	Eco-zones	Eco-zones	Eco-zones	Eco-zones
Logit (Marginal)	-	-	Yes	Yes	Yes	Yes

Notes: Table reports estimates from regressions of per capita consumption expenditure and poverty on the shock variable, whether female household member manage social assistance conditional on receiving the assistance as well as their interactions. SP denotes social protection. Shock realizations are based on estimated shock quantities in section 2 which range between -1.12 and 7.83. The columns are differentiated by outcome variables and implied regression models. All columns include ecological zone level fixed effects. All standard errors are clustered at the region level and shown in parentheses. Significance levels are indicated by *** 1%, ** 5%, * 10%.

5 CONCLUSION

Using new rich data sets on shocks, social protection/transfers and consumption expenditure records, we explore several hypotheses within the framework of social protection in Niger. To do this, we devise novel empirical frameworks. We estimate both consumption and poverty responses to global realization of household shocks. Our results indicate that there is a tremendous spatio-temporal variation in households' exposure to negative shock realizations which highlights potential vulnerability of households to local shocks. To first order, non-poverty status and household consumption expenditures decline remarkably when exposed to extreme shocks, an indication of the population's sensitivity and vulnerability to adverse shocks. In response, households employ several strategies to deal with realized shocks ranging from the use of previous savings and livestock holdings to doing nothing. There is strong evidence of substitution across the shock-strategy set over time. Engaging in migration as a coping mechanism leads to worse household outcomes. In particular, our results suggest that migration of one or more members of the household as a coping strategy implies more sensitivity of households' consumption and poverty to shock realizations. These results are consistent with theories of vulnerability, avoidance behavior and adaptation.

Next, we examined the time differentiated impacts of household shocks by asking whether the *timing* (i.e., month or quarter) of disbursing transfers shape the extent to which social assistance help households to absorb shocks. Our analyses document that social transfers or schemes are crucial *only* in second quarter of the calendar year, *conditional* on transfers in other quarters. In particular, the transfers do very little to shape vulnerabilities of beneficiary households to shocks aside the second quarter. On average, social protection schemes provided within the second quarter appear to be useful and significantly dampen the impacts of shocks on households' consumption. This result is an evidence against the long standing incentive-hypothesis that providing social assistance to households can create incentives effects /asymmetric information and cause households to become more sensitive to external shocks for behavioral reasons. Our results also re-affirm old arguments that favor targeting of social protection schemes along gender dimensions. These indicate that social transfers can be effective if household transfers are managed by females.

These results have several policy implications. Social protection programs serve as safety nets among poor and vulnerable (sub/) populations. Effective implementation and targeting of these programs is important for providing assistance systems that are effective to beneficiaries and can help overcome potential issues with scarce resource allocation, noting that —the financial capacities of poor and low-income countries (e.g., Niger, among others) can be much lower than the needs. The findings from this paper can be relevant in thinking about the *time* scale of targeting, the design of social schemes and the overall relevance of social protection.

Non-governmental organizations (NGOs), central governments, households and other humanitarian agencies are investing in social protection programs in developing countries. The programs have become popular and even expansive recently in many poor and low-income countries. At the same time, households are exposed to numerous shocks with varying impacts and can benefit from social assistance. Exploring existing schemes can aid our understanding of social programs. Important questions to ask include whether social programs are useful in general or the negative incentive-effects leads to inefficient outcomes that stifle their overall usefulness; whether the *timing* (e.g., month or quarter) of disbursing social transfers can make them more effective. These have important welfare consequences. Our results provide suggestive answers to these questions—for the case of Niger. Specifically, social transfers may play much role in consumption stabilization if received in March/April (i.e., around the first quarter’s end to the second quarter’s beginning)—before households “possibly” sell off their assets or borrow to face the aftermath of major shocks. Secondly, there is previous suggesting that longer terms transfers can help to smooth incomes in Niger. This combined with our evidence, suggest that small transfers for twelve (12) months that start in March/April could yield much impact. Finally, we note that the current model of emergency (larger) transfers used by the government and NGOs might be arriving too late.

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7 APPENDIX: EMPIRICAL APPROACH

I. Specifications and Estimation

Our analyses and empirical results therein rely on multiple model specifications and estimations. These are discussed sequentially, in what follows. The broader aim is to devise tractable empirical frameworks that allow us to explore several aspects of the social protection schemes. Depending on the section and availability of our data sets, either panel or cross-sectional regressions are estimated. In section 3, we estimate panel regressions linking either poverty status or consumption expenditure y_{it} in household i in year t to extreme shock variables \mathbf{S}_{it} conditional on time and household level fixed effects:

$$y_{it} = \alpha_i + \beta\mathbf{S}_{it} + \delta_t + g_i(t) + \epsilon_{it}$$

Our key parameter of interest is β . This provides an estimate of the damaging effect of extreme shocks on a vector of relevant outcomes including household consumption expenditures; and poverty standing. The specifications include household α_i and year δ_t fixed effects to soak up potential heterogeneity that is fixed across time and macro changes that are fixed across households, respectively.¹⁸ We control for potential trends in households consumption expenditures and poverty levels using a linear time trend $g_i(t)$ in two possible ways: (i) common to all households (ii) or allowed to vary by agro ecological zones. The latter is informed by one of our findings suggesting asymmetric shock effects on household outcomes along the dimension of eco-zones. The baseline model is estimated simultaneously across the 5 Nigerien ecological zones.

We modify the panel specification above. Denote by z an ecological zone, containing households. Social protection and support data sets are only available for 2014/2015. So, in section 4, we combine both social protection and household shocks records to estimate the following regression model:

$$y_{iz} = \alpha_z + \beta_{s1}\mathbf{S}_{iz} + \beta_{s2}[\mathbf{S}_{iz} \times \text{SPTIME}_{iz}] + \gamma\text{SPTIME}_{iz} + \epsilon_{iz}$$

¹⁸ Households are different based on their vulnerabilities. Our inclusion of household level fixed effects allows us to control for such heterogeneity.

Our key parameter of interest here is β_{s2} .¹⁹ Estimates of this parameter capture the shock absorber effects of receiving social assistance across different time periods (either month or quarter) in a given calendar year. Equivalently, the parameter provides an estimate of how the social protection program gives households a disincentive from either engaging or not in possible coping strategies to limit the damaging effects of household shock realizations. Next, using insights from earlier specifications we examine the gender aspects of social assistance using:

$$y_{iz} = \alpha_z + \beta_{s1}\mathbf{S}_{iz} + \beta_{s2}[\mathbf{S}_{it} \times \text{SPFemale}_{iz}] + \gamma\text{SPFemale}_{iz} + \epsilon_{iz}$$

where SPFemale_{iz} is a logical indicator that equals to 1 whenever a household i receives social assistance and a female person in the household manages the assistance; zero otherwise. β_{s2} , the coefficient on the interaction term, is the main parameter of interest. For poverty equations, this measures the likelihood of tripping into poverty induced by females managing household assistance. For consumption expenditure, this captures the average difference in sensitivity of consumption to shocks across households where females manage social assistance compared to those where assistance is not managed by females.

II. Model Identification: Threats and Validity

Our empirical approach relies on certain identifying assumptions, which in turn are important for ascertaining the validity and interpretation of our main estimates of interest. This section discusses the main identifying assumptions. The key variables are constructed by interacting exogenous terms \mathbf{S}_{iz} with the potentially endogenous variables: SPTime_{iz} and SPFemale_{iz} . Such interaction terms can be interpreted as exogenous once we control for the main effect of the endogenous variables (Angrist and Krueger 1999, Sec. 2.3.4; Annan and Schlenker 2015).²⁰ To illustrate, consider the required identifying assumption for a variable x : $\mathbb{E}(x \times \epsilon | \text{controls}) = 0$. In words, this implies that consistent and credible estimation of the relevant parameters of interest can be achieved if changes in the interaction terms are conditionally uncorrelated with the unknown determinants of poverty and consumption expenditure outcomes. Next, without loss of generality assume that $\mathbb{E}(\mathbf{S}) = 0$ and $\mathbb{E}(\text{SPTime}) = 0$. Then we have the following:

¹⁹ Similar versions of this model –but in a panel representation– were estimated under the “Estimated Effects: Robustness Analysis” subsection. The interaction terms in such models were between extreme shock variables and the various coping strategies.

²⁰ The underlying assumption is that the endogenous variable and the outcome variable(s) are jointly independent of the exogenous variable \mathbf{S}_{iz} . Bun and Harrison (2013) provide a related discussion about this subject.

$$\begin{aligned}\mathbb{E}(\mathbf{S} \times \text{SPTime} \times \epsilon) &= \text{cov}(\mathbf{S} \times \text{SPTime}, \epsilon) \\ &\equiv \mathbb{E}[\mathbf{S} \times \{\mathbb{E}(\text{SPTime} \times \epsilon | \mathbf{S}) = 0\}]\end{aligned}$$

The condition $\{\mathbb{E}(\text{SPTime} \times \epsilon | \mathbf{S}) = 0\}$ plausibly holds since most major household shocks usually precede the disbursements of social assistance (see the implementation review in footnote 3). Further, the fixed effects help to control for potential channels through which a correlation might exist between household or zonal shocks and the potentially endogenous variables. Estimation and interpretation of our results thus hinge on the plausibility of the above conditions and controls. Similar arguments can be made for the other interaction terms.

Other source of endogeneity

Section II above discusses the identification of effects, primarily for the social transfers; showing that the effects on social transfers are identified as most major household shocks usually precede the disbursements of social assistance.

We turn next to potential endogeneity of “self-reported” shocks. Particularly, it is possible that the probability of reporting a shock as significant in the surveys could increase with economic distress, and thereby introduce measurement errors via mis-reporting. We follow the tradition that, by definition, the occurrence of shocks is exogenous (not the magnitude of shocks, which could likely be over/under-estimated). With our focus on the occurrence of shocks, any potential measurement error from mis-reporting is likely non-classical and therefore captured in the error terms, conditional on our controls for unobserved heterogeneity.²¹ First, it is useful to note that the problem of mis-reporting shocks is not unique to our “grouping” approach. Second, as a sanity check for potential mis-reporting and its importance for our analysis: we correlate the households’ reported shocks (i.e., yes/no for drought, flood) with publicly non-manipulable weather data (i.e., rainfall, drought) from MERRA-.v2 (a global reanalysis database that assimilates space-based observations of aerosols and represent their interactions with other physical processes in the climate system).²² Reassuringly, the share of households reporting

²¹ In addition, the fact that we estimate models that directly control for households’ coping strategies help to overcome additional concerns that shock reporting may be endogenous to coping strategies.

²² See <https://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/>.

drought and flood at the regional level positively correlates with drought and flood reconstructions based on MERRA-v2. This makes it unlikely that households “systematically” mis-reported the occurrence of these shocks, thus as well as the others.

III. Factor Analysis

A nice detailed discussion of Factor Analysis is provided in Rencher and Christensen (2012) Chap. 13. A brief review and implementation is provided in STATA 13 Manuals and references therein.²³ Interested readers may consult STATA’s documentation. All technical presentations are omitted here for brevity.

²³ See <http://www.stata.com/manuals13/mvfactor.pdf>.

8 APPENDIX: TRENDS IN POVERTY

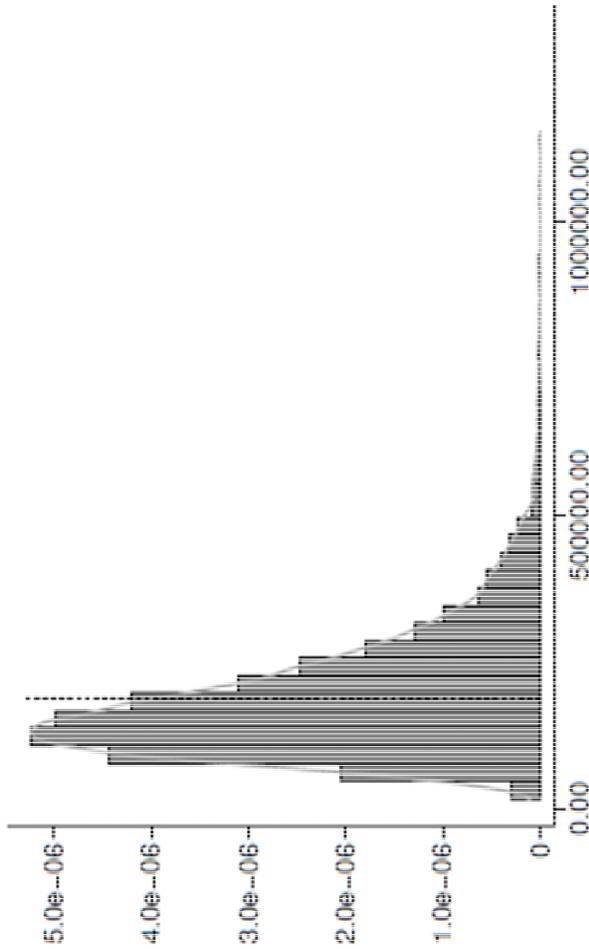


Figure A.1a: Distribution: per capita food consumption expenditure; deflated (annual)

Notes: Source: World Bank Household Panel, Niger. The dashed vertical line denotes the National Absolute Poverty Line NAPL of $\cong 189233$ CFA.

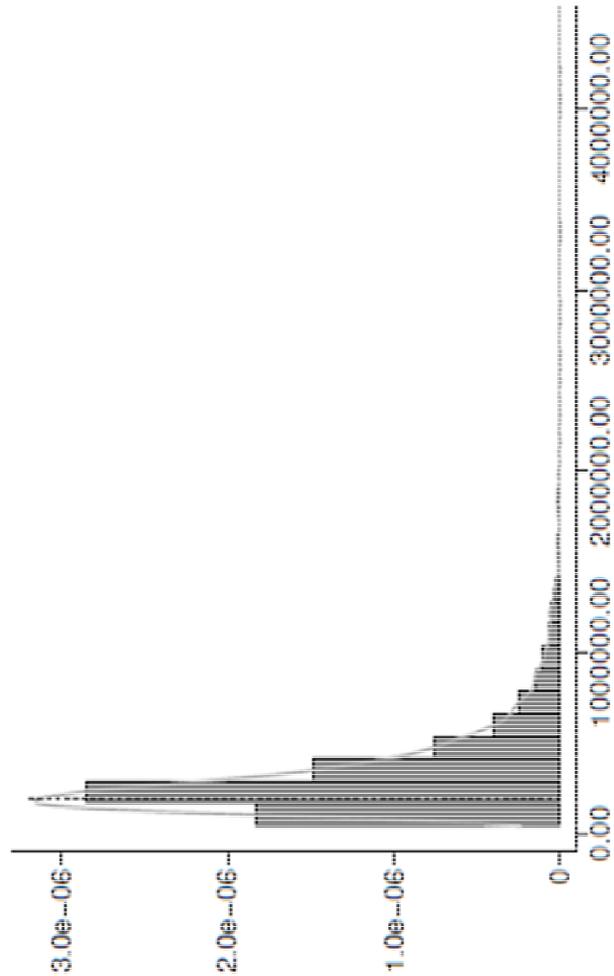


Figure A.1b: Distribution: per capita food and non-food consumption expenditure; deflated (annual)

Notes: Source: World Bank Household Panel, Niger. The dashed vertical line denotes the National Absolute Poverty Line NAPL of $\cong 189233$ CFA.

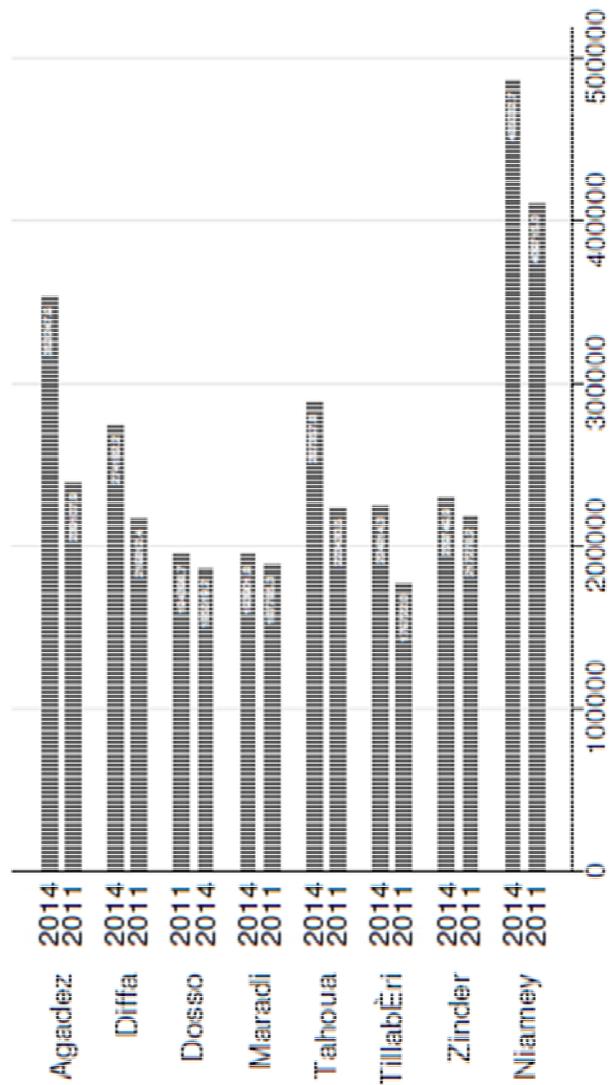


Figure A.2a: Regional trends in poverty, median per capita food consumption expenditure, CFA

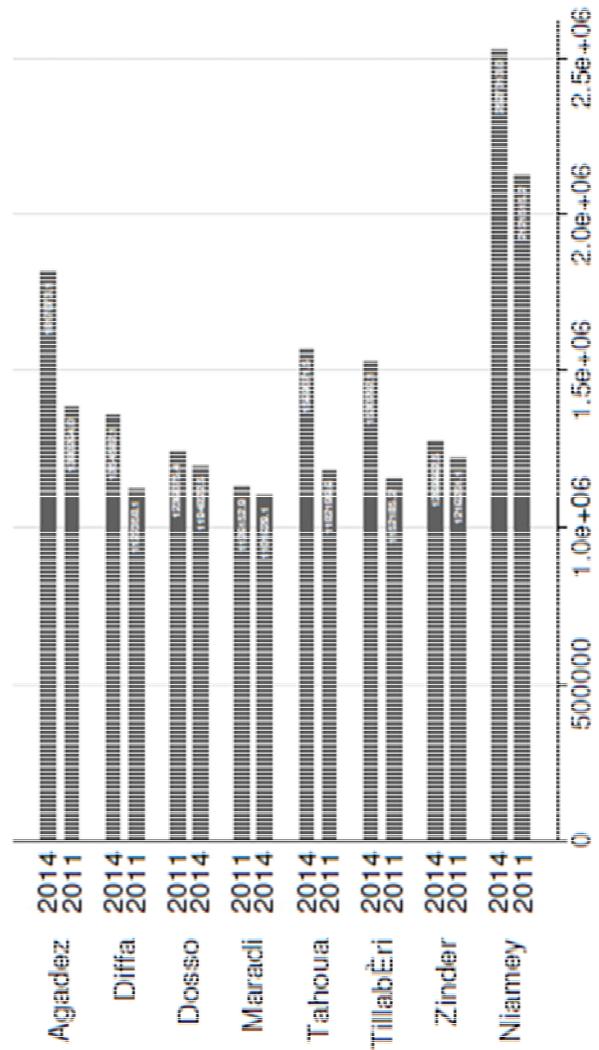


Figure A.2b: Regional trends in poverty, median per capita food and non-food consumption expenditure, CFA

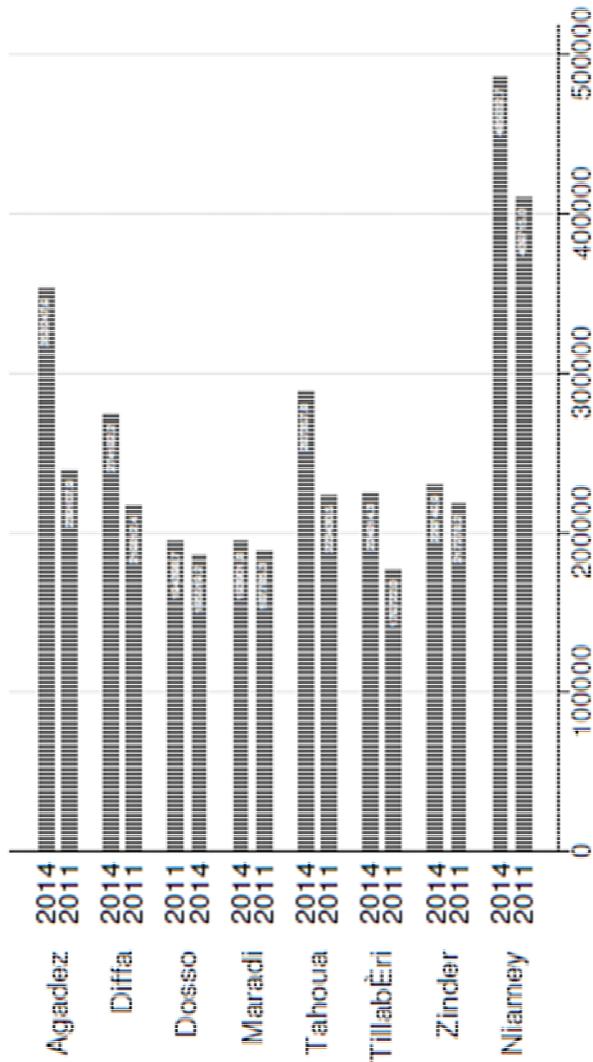


Figure A.3a: Regional trends in poverty, share of *food-poor* households based on the NFPL

Notes: The National Food Poverty Line NFPL (equivalently, the hardcore poverty line) in Niger is ≈ 123410 CFA

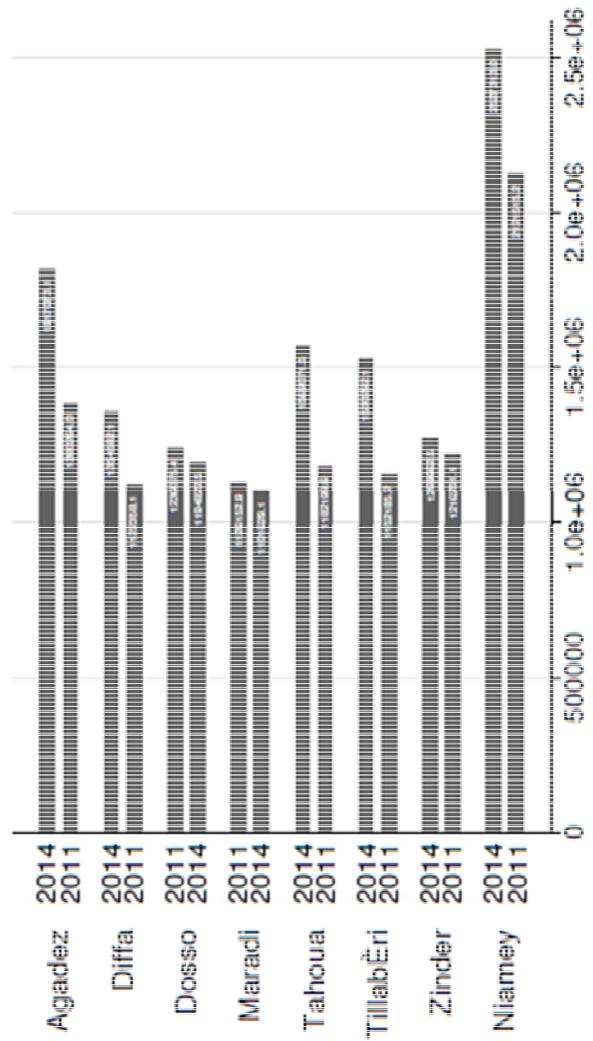


Figure A.3b: Regional trends in poverty, share of *absolute-poor* households based on the NAPL

Notes: The National Absolute Poverty Line NAPL in Niger is ≈ 189233 CFA.