

# Individual and collective shocks in farmer and herder interactions in Senegal: Evidence from a lab-in-the field experiment

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## Extended abstract:

Climate change has a rising impact on rural livelihoods, particularly for those that are dependent on stable rainfall patterns, for example in rain-fed agriculture. In regions such as the Sahel, access to water and land is under stress due to climate variability, including extreme heat, shortening of the rainy season and more frequently occurring, extreme hydrometeorological events. Since decades, disputes between sedentary farmers and semi-nomadic herders over crop damage, water and grazing opportunities have been ongoing (Brottem, 2016). These clashes are becoming more frequent and more violent also in relatively peaceful areas, as droughts, heatwaves, and lack of rainfall lead populations from the Sahelian drylands into more fertile areas. Tensions between farmers and herders may create sparks for conflicts as they interact with ongoing instability, ethnic polarizations, religious insurgencies, and violent uprising in the region (Benjaminsen and Ba 2021; Moritz, 2010). Current climate-conflict literature shows that climate shocks and ethnic fragmentation are some of the underlying causes that can bring existing fragile contexts, in which farmer-herder conflicts emerge, out of balance (Eberle et al., 2020). The particularity of climatic events and other livelihood threatening events such as sudden increases in food and animal feed prices bring collective risk that could potentially affect whole communities and undermine their collective adaptive and coping capacities. As a result, group identities between farmers and herders associated to their different occupations and ethnic identities may be reinforced and act as a driving force affecting cooperation and increasing the likelihood for conflict. As farmers and herders have mostly symbiotic relations and conflicts are relatively rare events, this study will examine the effects of shocks on cooperation.

This study answers the central question: Do individual versus collective shocks affect cooperation, and if so, does this effect differ between farmer and herder groups? We conducted a survey and a lab-in-the field experiment based on a public good game in farming and pastoral areas in Senegal. For individual shocks we hypothesized that cooperation increases as people are incentivized to share risks. Adversely, the covariance of risk was hypothesized to reduce cooperation as the shock is carried as a collective burden and no risk hedging is possible. Additionally, we expected cooperation to be affected differently for farmers compared to herders, and that this effect was stronger for farmers relying on intensive agriculture with high pressure on land, which has drastically increased their vulnerability to adverse climatic conditions (McClintock and Diop, 2005; Gueye, 1994). Pastoral areas, home to agro-pastoral and extensive livestock systems, are characterized by short wet seasons and limited grazing opportunities. Pastoralists rely on seasonal herd migration as their natural livelihood strategy to cope with the harsh climatic conditions of the drylands (Moritz, 2010).

Firstly, we find that cooperation increases under individual shocks and reduces under collective shocks. Collective shocks reduce cooperation, independent of whether the experiment was conducted in a

farming or pastoral area. Our results are supported by a field experiment conducted in four countries showing that collective risks are associated with lower cooperation (Cárdenas et al., 2017). We show that collective shocks experienced in real life have a decreasing effect on cooperation. Moreover, risk aversion has a negative effect on contributions to the public fund under both types of shocks.

Secondly, herders showed higher average cooperation levels than farmers. Populations inhabiting pastoral areas are faced with more homogeneous landscapes, higher exposure to collective risks, and are characterized by remoteness to markets. Such conditions create lower cooperation among family members in terms of herd re-distribution, leading to weaker responses to idiosyncratic shocks. Simultaneously, herders depend on strategic cooperation with their social surroundings, such as trade during herd migrations (van Dijk, 1994). This implies that participants in pastoral areas are less responsive to both individual and collective shocks, which is supported in our findings where cooperation levels in pastoral areas are more resilient to shocks compared to farming areas.

Thirdly, we show that being part of a minority group, in our case being a farmer in pastoral areas or a pastoralist in farming areas, reduces cooperation. Being part of a minority group puts the participant in particularly difficult positions, shown as reduced willingness to cooperate in our experiment, irrespective whether you are a minority in either of the groups. Such findings are typically explained by in-group-out-group bias and highlights the role of group identity in explaining cooperation (Hewstone et al., 2002).

**Keywords:** farmer-herder, individual shocks, collective shocks, lab-in-the field experiment, cooperation, public good game, group identity

**JEL codes:** D91, Q34, D81, H41, C71, C93

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