

Principles and Metrics for Cooperative Agribusiness in Africa

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Abstract

Organizations designed according to basic cooperative principles, such as member ownership and control, are widespread throughout rural Africa. Despite their proliferation, these cooperatives have not been able to bring about rural entrepreneurship and agribusiness. One reason for this is that agricultural cooperatives in Africa struggle to mobilize and sustain collective marketing during their life cycle, due to disruptive side-selling by member-farmers. When unresolved side-selling can result in low cooperative health and even in organizational dormancy or collapse. Francesconi and Cook (2015) have suggested how governance in agricultural cooperatives could be improved by defining specific cooperative principles for tackling the side-selling problem. Here, we use new data collected at “Cooperative Leadership Events” held in Uganda, Malawi and Madagascar to test the validity of these principles. In particular, we assess the extent to which these principles were internalized by leaders and managers of about 300 cooperatives and the factors that contributed to learning efficiency. Organizational and individual metrics or indicators are used to proxy for the health of a cooperative in terms of its engagement in collective commercialization and its ability to keep members’ side-selling at bay. Our econometric results reveal that leaders and managers from healthier organizations are more likely to internalize the modified principles proving their validity and that learning efficiency could be improved through a better selection of the cooperatives that are invited to participate in the events, and of their representatives.

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Introduction

Organizations designed according to basic cooperative principles, such as member ownership and control, are widespread throughout rural Africa (Wanyama *et al.* 2008; World Bank 2007). Every other rural village in Africa is estimated to house a cooperative, which is typically used by rural smallholders to gain access to inputs and extension advice to improve the productivity, sustainability and resilience of farm-households (Abate *et al.* 2014a-b; Balineau 2013; Francesconi and Ruben 2012; ISSER 2012; Larsen *et al.* 2009; Salifu *et al.* 2010; Bernard *et al.* 2008a-b; Hill *et al.* 2008). Despite their proliferation, cooperatives merely function as passive channels for the distribution of inputs, extension and credit due to their inability to sustain service provision in the absence of external support (Borzaga *et al.* 2014; Wanyama *et al.* 2014). Most cooperatives in Africa rise and wither with development projects and programs (Francesconi and Wouterse 2015b). It appears that although agricultural cooperatives may contribute to productivity, sustainability and resilience of marginalized and vulnerable farm-households they have not been able to bring about rural entrepreneurship and agribusiness.

Recent studies have found for Ethiopia that membership in cooperatives had no significant impact on farmers' commercialization (Francesconi and Heerink 2010; and Bernard *et al.* 2008a). In fact, commercialization was found to increase significantly only when farmers could market their surplus collectively through their organizations instead of selling their produce to middlemen. However, few cooperatives in African countries south of the Sahara engage in collective marketing. This is in sharp contrast with evidence from the European Union where 40 percent of agricultural produce is sold through cooperatives (Bijman *et al.* 2012). Bijman *et al.* (2012) emphasize that cooperatives add value to member production in most EU countries, but less so in those member states with a socialist past. Centralized governance driven by socialist and nationalist ideologies has also delayed the rise of cooperative agribusiness in China (Deng *et al.* 2010). As in China and Eastern Europe, countries in Africa are struggling to decentralize and enhance governance of agricultural cooperatives. The policy and legal framework defining the governance of cooperatives at the national level tends to be based on general cooperative principles as agreed upon by the members of the International Cooperative Alliance (ICA). However, African countries often lack specific policies and legislations for guiding the development of cooperative agribusiness into an increasingly liberalized and globalized market.

In a recent policy brief, Francesconi and Cook (2015) have set out how the ICA principles could be tailored to be more applicable to the reality faced by agricultural cooperatives in Africa. In this study, we use data collected during three Cooperative Leadership Events (CLEs) held in Uganda, Malawi and Madagascar, between May 2016 and February 2017, to test the validity of these customized principles. In particular, we assess the extent to which the proposed principles taught

during the CLEs were internalized by the leaders and managers of 300 agricultural cooperatives, and how efficiency of transmission could be enhanced through a better selection of participating organizations and their representatives. Results show that the average leader or manager who participated in an event assimilated 39 percent of what he/she was expected to learn with regard to the proposed principles. Results also reveal that learning efficiency could be further improved through a more selective targeting of cooperatives that: i) have been increasing the value of their collective sales per competitor (middleman) and per member-farmer; ii) are simultaneously offering spot-payment and price incentives to procure members' produce; and/or iii) hire a professional manager, have reached organizational maturity and whose membership is homogeneous with regard to landholding.

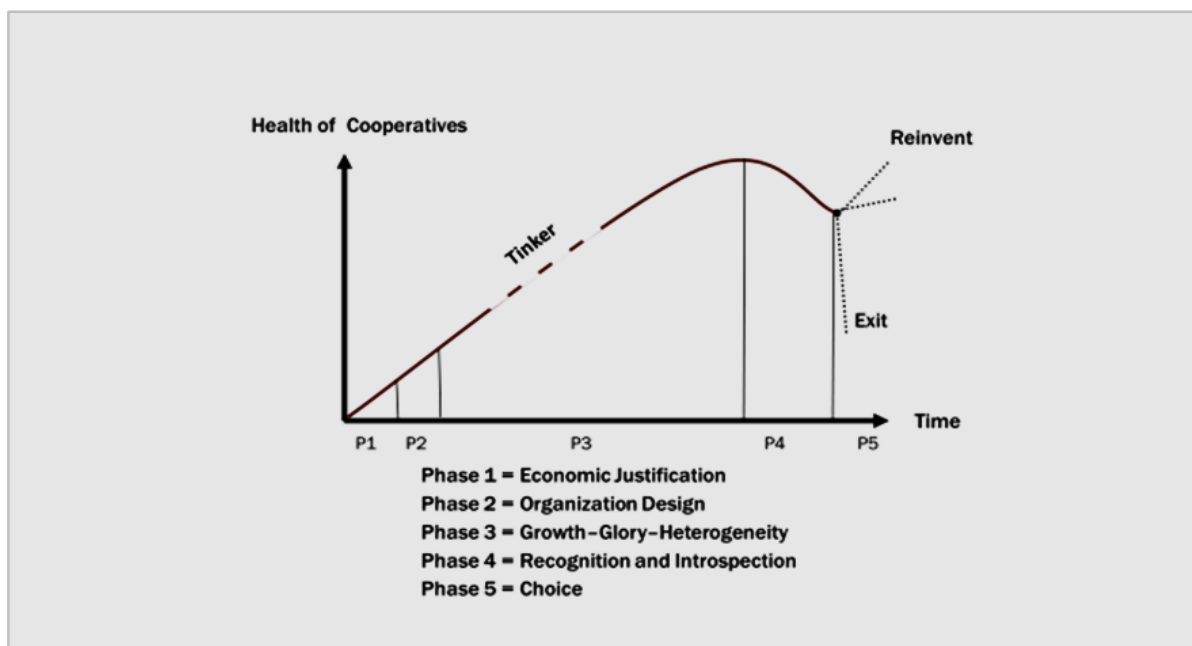
Principles

The cooperative principles drawn up by the ICA are open and voluntary membership, democratic member control, member economic participation, autonomy and independence, education-training-information, cooperation with other cooperatives and concern for community. Table A1 provides a description of the ICA principles, which were conceived for all cooperatives worldwide, from multinational cooperative banks operating in the EU and U.S., to community-based organizations made of smallholders in rural Africa. Although we recognize the validity of the ICA principles, this study aims to promote and facilitate their application in the context of rural Africa, so as to specifically address the side-selling problem faced by local agricultural cooperatives and farmer organizations. To do so, this section discusses a recent policy brief published by Francesconi and Cook (2015), which describes the "Cooperative Life Cycle Framework", by Cook and Burrell (2009), and fill it up with evidence and stories from rural Africa.

The life cycle of a cooperative as depicted in Figure 1 progresses through 5 phases. Farmers usually decide to establish a cooperative for defensive purposes, because they need to improve their bargaining power to receive a better price for their produce. If farmers succeed in establishing the cooperative, they usually succeed also in achieving their initial objective. Consequently, member-farmers shift their interest to more offensive objectives, aiming to add value to production and benefit from economies of scale, for example through collective marketing. However, cooperatives struggle and often fail to shift from defensive to offensive collective action. Due to their large membership and democratic principles, cooperatives face higher decision-making costs compared to Investor Owned Firms (IOFs). Further, preferences of members tend to naturally diverge over time making it difficult for cooperatives to maintain the initial group-cohesion and generate the necessary consensus to

embark on collective marketing. When a cooperative struggles or fails to make such a shift, member-farmers face an incentive to side-sell their output. Side-selling affects the health of cooperatives and can culminate in the dismantling of an organization, a state of dormancy or its reinvention. The life cycle framework thus implies that potential economic benefits, for example generated through taking advantage of economies of scale, are a necessary precondition for the establishment of a cooperative but that the sustainability of an organization over the mid and long term depends on its governance structure. In particular, the constitution and by-laws, the mandate and the values of a cooperative, which are all defined immediately upon its establishment and difficult to modify afterwards, need to envision and anticipate organizational changes from the start, so as to evade side-selling problems and extend the business cycle.

Figure 1: The Cooperative Life Cycle Framework



Source: Cook and Burress (2009)

According to Francesconi and Ruben (2014), thousands of coffee producers in Tanzania embraced collective marketing when the cooperative of which they were a member received Fair Trade certification and the related price premium. Unfortunately, this collective success did not last long (less than three years) because the Fair Trade premium became diluted by rapid expansion in membership and increasing competition from middlemen. The price premium attracted many more farmers into the cooperative after its certification but the demand for Fair Trade coffee was more or less unchanged. As the coffee supply began to exceed the Fair Trade demand, the per-capita price

premium began to fall. As a result, members accused their managers of embezzlement and redirected part of their coffee supplies to a growing group of middlemen. Although middlemen offered the same or even a lower price than the cooperative, they provided faster (on the spot or upon delivery) payment. Side-selling increased until the cooperative had to declare bankruptcy due to its inability to repay bank loans, which were used to pre-finance services to members, including the provision of extension and auditing services to obtain certification in the first place. This story explains how price incentives can end up being counterproductive if provided to cooperatives with open and unregulated membership and lengthy payment procedures.

Bernard *et al.* (2008a) further explain the importance of regulating membership. According to these authors, Ethiopian grain cooperatives were failing to mobilize collective marketing even though member-farmers were receiving a significantly higher price for their output compared to otherwise similar non-member farmers. Price incentives did not help because the cooperatives that benefitted from them had larger and more heterogeneous memberships. While growing membership tends to dilute price incentives (see also De Janvry *et al.* 2010), heterogeneous membership means that price incentives tend to be equally and therefore inefficiently allocated to members with high and low productive potential. When farmers who are less productive join a cooperative, they tend to benefit as much from price incentives as other members but their contribution to collective marketing is inevitably smaller. The inclusion of significantly less productive farmers into a cooperative leads to an increase in membership heterogeneity, which in turn induces more productive members to side-sell most of their output to avoid free-riding by the new members.

The importance of combining price incentives with payment upon delivery for member produce is widely emphasized in the literature (Latinskiy and Berger 2016; Milford 2014; Sitko *et al.* 2014; Mujawamariya *et al.* 2013; Jagwe and Machethe 2011; Pokhrel and Thapa 2007). When agriculture is rain-fed and often with a single growing season, even minor delays may significantly discount future payments, thus discouraging farmers from using the cooperative as a marketing channel (Holden *et al.* 1998). Farmers need to be paid upon delivery in order to repay the debts accumulated before and during the harvest. However, selling through a cooperative always implies a certain delay in payment - due to the time needed to procure and bulk individual produce and related financial operations - while farmers are usually paid on the spot when selling on an individual basis through middlemen. Access to credit for shortening the time that farmers have to wait to receive payments from a cooperative may therefore increase willingness to market agricultural produce through the cooperative (Latinskiy and Berger 2016). However, most cooperatives face important access barriers to credit.

Francesconi and Wouterse (2015b) report that while a donor provided the collateral needed by banks to disburse cheap loans to more than 2000 agricultural cooperatives in Ghana, only 260 organizations had received credit by the end of the program. The vast majority of organizations failed to demonstrate a track record or a credible financial and organizational history and failed to produce a feasible business plan to justify the disbursement of a loan by the bank. It transpired, that many cooperatives were established in anticipation of donor support, which also included a considerable amount of subsidized inputs to member-farmers (improved seeds in particular). These authors thus conclude that the maturity of cooperatives also plays an important role in mobilizing collective marketing. A certain amount of time elapses from the establishment of a cooperative to the moment in which the organization succeeds in mobilizing members into collective marketing. This is because a cooperative needs to take its time before embarking collective marketing, in such a way to design a constitution and by-laws that allow to offset members' propensity to side-sell.

A case in point is Senegal where a donor financed the establishment of a maize cooperative (Wouterse and Francesconi 2016). The cooperative was swiftly established by doubling the membership of a pre-existing groundnut cooperative. This was possible because most of the members of this cooperative were also producing maize. In less than a year the cooperative collected and stored an impressive amount of maize and sold it for a very good price to a multinational trading corporation. The commercial success of the new cooperative was widely acclaimed. But as cash started to flow in, leaders and service providers realized that they had not agreed upon and defined the distribution of revenues among members. The board members claimed a bonus for the effort exerted in leading such a successful collective marketing campaign. However regular members asked for revenues to be distributed in proportion to the amount and quality of grains supplied to the cooperative. Tensions and conflicts arose between board and regular members and the latter threatened to side-sell most of their next harvest. This example stresses that a cooperative needs to take its time to define its constitutions and by-laws in such a way as to anticipate and prevent the rise of side-selling problems.

Another way to address side-selling is through conflict management (or tinkering in Figure 1). When the largest dairy cooperative of Ethiopia realized that some of its members were side-selling most of their milk, the manager of the cooperative (who held an MBA), promptly confronted side-sellers and ceased provision of artificial insemination, feed and veterinary services (Francesconi and Ruben 2012). This resolute action stamped out side-selling attempts for several years to come. Professional management can thus discourage side-selling by members. In line with this story, Bruhn *et al.* (2010) argue that managerial capital is important for agribusiness development. However, managerial capital is scarce in rural Africa. Only a few and particularly successful agricultural cooperatives can afford to hire a professional manager. Most cooperatives are managed by farmers

elected by their colleagues to form executive boards. Board members (or leaders) are usually part of traditional rural elites largely composed of male household heads with little academic education and professional skills (Meier zu Selhausen 2015; Ampaire et al. 2013; Francesconi and Ruben 2012; Quisumbing and Pandolfelli 2010; Rubin et al. 2009; Kaaria et al. 2008).

Base on all the above theory and evidence, Francesconi and Cook (2015) have suggested how to tailor and apply the ICA principles for preventing members' side-selling in agricultural cooperatives in Africa. These suggestions are presented in details in Table A1. First, the open membership principle has to be qualified, as members' entry and exit needs to be better managed to avoid side-selling. Second, members' ownership and control needs to be accompanied by a well-defined structure (constitution and by-laws), so as to allow cooperatives to make swift decisions on how to confront changes in the marketplace and stay competitive. Third, member economic participation should be extended to include voluntary and tradable investments in the assets of a cooperative. Fourth, autonomy and independence remain important but the importance of professional management for handling external capital and resisting external interference needs to be emphasized. Finally, to ensure sustainability the focus of core functions of cooperatives need to include collective marketing. The next section describes the outreach activities we carried out to teach, discuss and produce the necessary data to test the validity of these principles.

Outreach

Three Cooperative Leadership Events (CLEs) were organized by the first author of this paper between May 2016 and February 2017, in Uganda, Malawi and Madagascar. Each event lasted five days and gathered approximately 100 leaders and managers from cooperatives in a country and their various (inter)national stakeholders. The agricultural cooperatives represented at the CLEs included only organizations that were owned and controlled by farmers. During the first day of each event the leaders and managers were asked to take an entry-test, designed as a vignette, confronting participants with six hypothetical scenarios or dilemmas for assessing their understanding of the tailored cooperative principles described in Table A1, as well as a structured questionnaire specifically designed to collect organizational level data on collective marketing and side-selling.

During the first day of each CLE, the first author of this paper and 10 assistants – selected among MSc students or recent graduates in each country – interviewed all leaders and managers. The latter were divided over 10 round-tables. Each table was supervised by an assistant while the first author moved across tables and supervised the entire process. In particular, respondents were asked to first fill out an entry-test and subsequently the structured questionnaire. Questions were explained in

bilateral conversations. All the leaders and managers had been prepared by the assistants to answer these questions through phone conversations that took place before each event. This survey methodology was used to improve data quality in comparison to large-scale and impersonal surveys carried that are commonly carried out by surveyors in the field. In particular, we aimed to minimize imperfect information between respondents and the main researcher. When data is collected through large field surveys, the researcher is completely reliant on the integrity and capacity of the enumerators for data collection. Of course, the respondents also benefitted from the training, coaching and networking sessions during the events.

The following two days of each CLE were dedicated to train and coach leaders and managers on the basis of the life cycle theory and field evidence discussed in the previous section. These sessions aimed to promote the internalization of the proposed cooperative principles by participants, which was further incentivized by opportunities to interact and network with donors, policymakers, investors and service providers, during the last two days of the CLEs. At the end of each CLE, leaders and managers filled out an exit-test (identical to the entry test). The comparison of entry and exit test provides the indicator we use in the rest of the analysis for capturing motivation and ability of leaders and managers to internalize the applied cooperative principles (in next section).

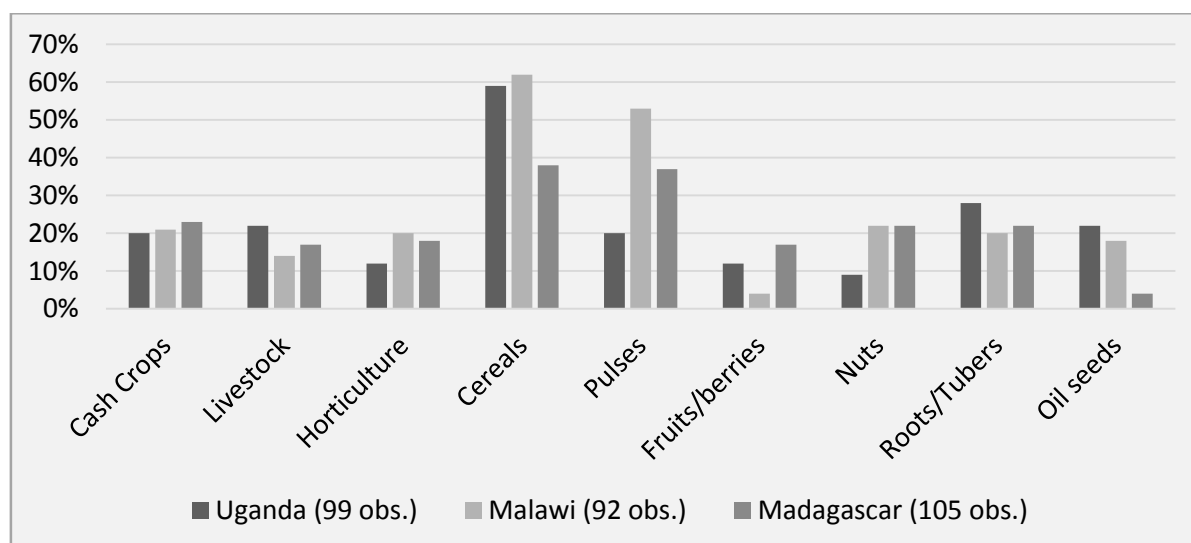
The first CLE took place in Uganda in May 2016, the second event in Malawi in September 2016 and the third event in Madagascar in February 2017. The selection of these three countries was demand-driven. In other words, events were organized in countries where national governments, international organizations, NGOs and private investors welcomed the idea of the event and offered support for its organization. In particular, in-country partners funded the participation of the cooperative leaders and managers in the event. The sample of surveyed organizations is therefore not random but based on the selection made by in-county partners, which comprised the majority of companies, NGOs, government agencies, farmer unions, donors and international organizations that were actively involved in cooperative development in target countries at the time of the event.

Table 2 shows that the sample used in this study includes a total of 296 agricultural cooperatives from three countries, 12 regions and 260 districts. Importantly, our sample covers all regions and almost half of the total number of districts in the three countries. Figure 2 shows that sampled cooperatives deal with the main categories of agro-commodities in each country. The two commodities most frequently produced by members of sampled cooperatives are cereals (rice, wheat, millet, maize, sorghum, etc.), pulses (beans and all nitrogen fixing plants) and roots and tubers (cassava, potatoes, etc.), which are also the most widely produced and consumed commodities in sub-Saharan Africa, especially among smallholders.

Table 2: Sample size and distribution

Uganda						
Regions	Central	Western	Northern	Eastern	All	
No. of Districts	23	27	30	32	112	
No. (%) of Sampled Districts ²	11 (48%)	14 (52%)	15 (50%)	16 (53%)	56 (50%)	
No. of Sampled Coops	19	32	30	18	99	
Malawi						
Regions	Southern	Central	Northern		All	
No. of Districts	13	9	6		28	
No. (%) of Sampled Districts ³	10 (77%)	9 (100%)	5 (83%)		24 (86%)	
No. of Sampled Coops	37	35	20		92	
Madagascar						
Regions	South	Central	North	East	West	All
No. of Districts	32	29	9	29	21	120
No. (%) of Sampled Districts ⁴	10 (31%)	12 (41%)	3 (33%)	11 (38%)	6 (29%)	42 (35%)
No. of Sampled Coops	40	19	3	34	9	105

Figure 2: Commodities handled by cooperatives in the three countries



² Districts sampled in Uganda: Alebtong, Amotatar, Amudat, Apac, Bududa, Bugiri, Bukomansimbi, Bundibugyo, Busenyi, Busia, Butaleja, Dokolo, Gulu, Hoima, Iganga, Isingiro, Jinja, Kabale, Kabarole, Kaberamaido, Kalangala, Kampala, Kamwenge, Kamuli, Kasese, Kayunga, Kibuku, Kiryandongo, Kitgum, Koboko, Kole, Kumi, Kyenjojo, Kyankwanzi, Lira, Lwengo, Lumero, Masaka, Masindi, Mbarara, Mitooma, Mityana, Moyo, Mukono, Nakapiripirit, Napak, Nebbi, Ngora, Ntungamo, Pallisa, Rakai, Rukungiri, Rubirizi, Sheema, Soroti, Zombo.

³ Districts sampled in Malawi: Balaka, Blantyre, Chikwawa, Machinga, Mangochi, Mulanje, Neno, Nsanje, Thyolo, Zomba, Dedza, Dowa, Kasungu, Lilongwe, Mchinji, Nkhotakota, Ntchisi, Ntcheu, Salima, Karonga, Mzimba, Mzuzu, Nkhatabay, Rumphi.

⁴ Districts sampled in Madagascar: Ambohidratrimo, Ankanzobe, Antsirabe I, Antsirabe II, Manjakandriana, Soavinandriana, Tsiroanomandy, Ambanja, Ambilobe, Andapa, Ambalavao, Ambatofinandrahana, Ambohimahasoa, Ambositra, Fianarantsoa I, Ifanadiana, Lalangina, Manakara, Mananjary, Vangaindrano, Vohibato, Ambato-Boeni, Antsohihy, Mahajangall, Maintirano, Brickaville, Mahanoro, Toamasina II, Vavatenina, Ambovombe, Ampanihy, Ankanzoabo, Betioky, Mahabo, Manja, Morombe, Taolanaro, Toliara II.

The 296 agricultural cooperatives in our sample were represented by either one leader (board member) or by one manager (a hired (non-member) professional). Only one representative per organization was allowed to participate in the event. This was justified by the need to maximize sample size but also by the fear that leaders and managers would not talk freely and openly discuss their organizations in the presence of colleagues or members. However, errors attributable to imperfect information and subjectivity bias are expected to be present in the sample since one person cannot provide accurate data on behalf of a complex and member based organization. These errors and biases are expected to be evenly distributed across the sample affecting the absolute values of our descriptive statistics. It is thus recommended to interpret the metrics described below as approximations. That said, measurement errors and biases are not expected to affect comparative and regression analyses.

Metrics

In this section we present a set of indicators that describe the health status in sampled agricultural cooperatives in particular focused on the extent that these organizations are involved in collective marketing and able to minimize side-selling by members. Direct measurement of side-selling is difficult and costly as it requires data to be collected from both individual members and their cooperative. We have therefore opted to describe this problem on the basis of six proxies: age and size of the organization, homogeneity in landholdings of members, revenues from collective sales, whether the cooperative offers on-the-spot payments and price incentives, and the number of middlemen competing to procure a member's output. The selection of these proxies was based on the theory and evidence previously discussed. Table 3 shows that the average cooperative in our sample is seven years old. Ugandan cooperatives are somewhat older (11 years of age on average) compared to cooperatives in Malawi (8 years old) and in Madagascar (3 year of age). Older cooperatives are more likely to have the required organizational maturity to mobilize collective marketing. The membership size of the average cooperative in our sample is 990 members. This indicator also shows significant variability across countries. Ugandan cooperatives have 1820 members on average, Malawian coops have 1166 and Malagasy coops only 61. As previously explained, rapid growth in membership exacerbates organizational complexity and the ability of a cooperative to sustain collective marketing.

Our data further shows that the average cooperative in our sample sold the equivalent of 50,276 USD of agricultural commodities during the 12 months preceding the events. Again there is significant variability between countries. If we divide the amount sold by the number of members, we obtain 66 USD per member in Uganda, 21 USD in Malawi and 115 in Madagascar. We can thus

conclude that the share of output sold by farmers through cooperatives is rather small. The Herfindahl index used to measure the degree of homogeneity in members' landholdings is 80 percent, which is above the median value of 75 percent suggesting that membership is relatively homogeneous. Homogeneity in members' landholdings is expected to reduce the risk of a cooperative to witness free-riding among members.

Although it is clear that a combination of on-the-spot payment and price incentives offered by the cooperative for members' produce is conducive if not essential for collective marketing to take place, only 35 percent of cooperatives offer these benefits. Price incentives and on-the-spot payments partly define the competitive advantage of cooperatives over middlemen. Table 3 also shows that the average cooperative in our sample has nine competitors - defined as middlemen or other individuals and organizations competing to procure agro-commodities from member-farmers. It thus seems that the cooperatives in our sample are indeed facing significant competitive pressure. This is especially true for Uganda and Madagascar where on-the-spot payments and price incentives are less prevalent and the number of competitors is higher.

Table 3 further describes the characteristics of leaders and managers who participated in the three CLEs. It shows that 75 percent of leaders and managers were male and this gender disparity was more or less observed in all three countries. The average leader or manager was 45 years old and little variability was observed across the three countries. These figures suggest that women and youngsters are strongly underrepresented in leadership roles in these cooperatives. It is also important to note that on average only nine percent of cooperatives in our sample was represented by a manager at the event. The prevalence of managers was significantly higher in Uganda (17 percent) for which representatives were also more educated and had better ICT skills.

Table 3: Proxies for cooperative health

Coop age (years since establishment)	Mean	Std. Dev.	Min.	Max.
Entire sample (294 obs.)	7.19	9.40	1	64
Uganda (97 obs.)	11.16	13.73	1	64
Malawi (92 obs.)	7.66	5.92	1	30
Madagascar (105 obs.)	3.10	3.45	1	18
Membership size (no. of members)				
Entire sample (296 obs.)	989.7	2445.6	7	13350
Uganda (99 obs.)	1819.7	3081.2	7	13000
Malawi (92 obs.)	1165.6	2722.9	12	13350
Madagascar (105 obs.)	60.8	135.8	7	1220
Homogeneity in members' landholding (Herfindahl index: 0.5=heterogeneous; 1=homogeneous)				
Entire sample (275 obs.)	0.80	0.19	0.5	1
Uganda (80 obs.)	0.79	0.19	0.5	1
Malawi (90 obs.)	0.80	0.18	0.5	1
Madagascar (105 obs.)	0.81	0.19	0.5	1

Revenues from collective sales over the last 12 months (USD)⁵				
Entire sample (296 obs.)	50,276	303,492	0	3,916,900
Uganda (99 obs.)	119,605	511,837	0	3,916,900
Malawi (92 obs.)	24,618	84,537	0	546,289
Madagascar (105 obs.)	7,389	33,681	0	318,211
Spot payment and price incentives (0= no; 1= yes)				
Entire sample (296 obs.)	0.35	0.48	0	1
Uganda (99 obs.)	0.34	0.48	0	1
Malawi (92 obs.)	0.38	0.48	0	1
Madagascar (105 obs.)	0.34	0.48	0	1
No. of middlemen competing to procure members' output				
Entire sample (296 obs.)	8.57	26.19	0	230
Uganda (99 obs.)	10.65	26.14	0	230
Malawi (92 obs.)	4.26	9.34	0	75
Madagascar (105 obs.)	10.40	34.66	0	70
Leader (0) or manager (1)?				
Entire sample (296 obs.)	0.09	0.28	0	1
Uganda (99 obs.)	0.17	0.38	0	1
Malawi (92 obs.)	0.09	0.28	0	1
Madagascar (105 obs.)	0.01	0.10	0	1
Leader/manager gender (0=female; 1=male)				
Entire sample (296 obs.)	0.75	0.43	0	1
Uganda (99 obs.)	0.72	0.45	0	1
Malawi (92 obs.)	0.77	0.42	0	1
Madagascar (105 obs.)	0.76	0.43	0	1
Leader/manager age (years)				
Entire sample (296 obs.)	44.64	11.30	16	83
Uganda (99 obs.)	42.87	12.55	16	83
Malawi (92 obs.)	44.70	11.69	18	72
Madagascar (105 obs.)	46.26	9.4	22	70
Leader/manager education (0 - 6)⁶				
Entire sample (295 obs.)	2.60	1.60	0	6
Uganda (98 obs.)	3.80	1.46	0	6
Malawi (92 obs.)	2.26	1.45	0	6
Madagascar (105 obs.)	1.77	1.13	0	6
ICT skills (0 - 5)⁷				
Entire sample (296 obs.)	2.11	1.19	0	5
Uganda (99 obs.)	2.99	1.26	0	5
Malawi (92 obs.)	2.07	0.96	0	5
Madagascar (105 obs.)	1.31	0.61	0	3

⁵ Conversion rates:

Uganda, May 2016= 0.0003; Malawi, September 2016= 0.0013; Madagascar, February 2017= 0.0003

⁶ This variable takes a value of 0 when a respondent has no school diploma; a value of 1 for primary school diploma; a value of 2 for secondary school diploma; a value of 3 for high school diploma; a value of 4 for vocational/college diploma; a value of 5 for undergraduate University diploma; and a value of 6 for postgraduate University diploma.

⁷ This variable takes a value of five for respondents who declared to have access to: 1) a landline or corporate phone 2) a personal mobile phone 3) an email address 4) a social media (Skype, Twitter, Facebook, etc.) 5) a website. ICT skills is equal to zero for respondents who have no access to any of the above.

Analysis

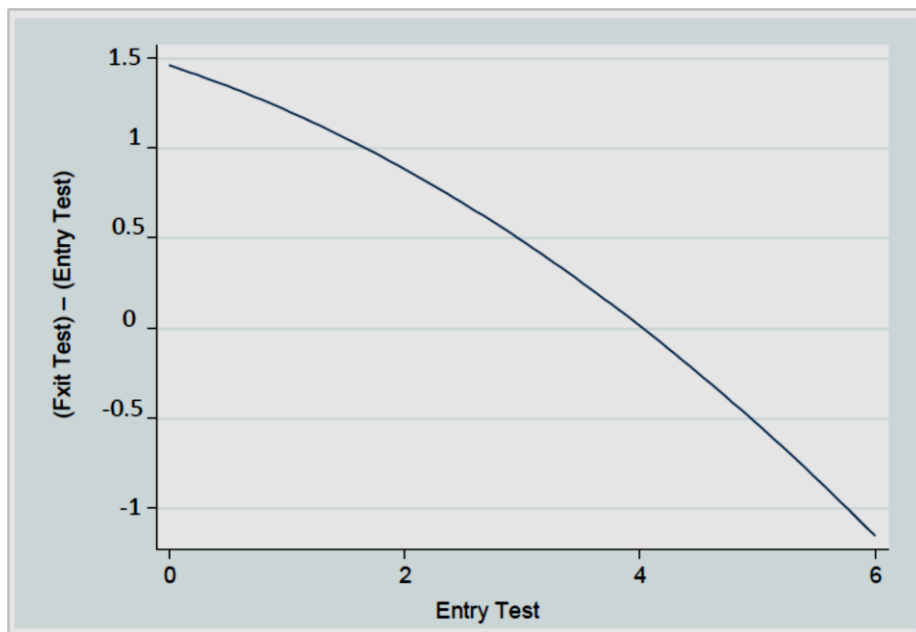
We now estimate to what extent cooperative leaders and managers internalized the cooperative principles that were taught by the first author during the CLEs. We subsequently ascertain the validity of the principles against the health indicators described in the section above. The cognitive assimilation of the principles by leaders and managers is measured as an efficiency term ranging from 0 to 100 percent. This learning efficiency was predicted on the basis of a stochastic frontier model where the learning frontier defines the maximum improvement scored by respondents in the understanding of the principles, given their initial knowledge. In other words, we estimate the maximum possible difference in the scores of exit and entry tests given the initial score in the entry-test.

As discussed in the data section, entry and exit tests were identical and administered, respectively, at the beginning and end of the event. The test was designed as a vignette confronting leaders and managers with six hypothetical scenarios defined on the basis of the theory and evidence presented in section two. Each scenario was designed to test the understanding of one of the six cooperative principles described in Table A1. Test scores range from zero (no principles understood) to a maximum of six (all principles understood). Learning efficiency was thus calculated as the improvement made by the respondent as a percentage of the maximum possible (or frontier) improvement that could have been made given the entry score. Figure 3 and Table 4 thus describe the learning efficiency of leaders and managers of sampled cooperatives. In particular, Figure 3 depicts average learning efficiency per entry score. While Table 4 reports the average learning efficiency for the entire sample (39 percent), for Malawi (46 percent), for Uganda (43 percent) and Madagascar (30 percent). A mean value of 39 percent suggests that the efficiency of the teaching sessions on the proposed cooperative principles can still be significantly improved (by 61 percent on average).

Table 4: Scores in entry and exit tests, and learning efficiency

Learning Efficiency	Mean	Std. Dev.	Min.	Max.
Entire sample (296 obs.)	0.39	0.22	0	1
Uganda (99 obs.)	0.43	0.20	0	1
Malawi (92 obs.)	0.46	0.22	0	1
Madagascar (105 obs.)	0.30	0.20	0	1

Figure 3: Learning efficiency of leaders and managers



Learning efficiency can also be interpreted as the ability and motivation of leaders and managers to internalize the customized cooperative principles that were taught during the events. The next analytical step thus identifies the determinants or the factors that explain the variation in motivation and ability to learn. In particular, we test whether cooperatives that are more likely to engage in collective marketing also have leaders and managers that are more likely to internalize and thus adopt the principles. The proxies of cooperative health described in the previous section are considered as exogenous determinants of learning efficiency. Omitted variable bias and reversed causality bias are unlikely to affect the regression analysis because characteristics of cooperatives are used to explain dynamics that occurred ex-post and in a different context (i.e. the CLEs). To minimize problems of multi-collinearity in the personal characteristics of leaders and managers we aggregated the three variables describing the individual's position in the organization, educational attainment and ICT skills, into one variable.⁸

Table 5 presents results from the OLS regression of learning efficiency on characteristics of sampled cooperatives and their leaders/managers. We can interpret the results as suggestion that learning efficiency, or the motivation and ability to absorb the principles is higher in cooperatives that simultaneously offers price incentives and on-the-spot-payments to its members, and whose value of collective sales is greater. Increased membership and reduced market power (or number of competitors) are associated with lower efficiency. A greater degree of homogeneity in members' landholdings and the maturity of the organization are also associated with greater learning efficiency.

Finally, learning efficiency is greater for hired managers and this effect increases further when these managers are well educated and ICT skilled. It is important to note that the gender and age of leaders and managers are not significant in explaining learning efficiency. These results are consistent with the hypothesis that the proposed cooperative principles are more likely to be internalized in organizations that are healthier and less likely to be affected by side-selling. We can thus deduce that these results underline the relevance and validity of the modified cooperative principles for governing cooperative agribusiness in Africa. Further, our results suggest that the efficiency of the CLEs in transmitting the proposed principles could be significantly improved through a more selective screening of participating organizations and their representatives. Transmission would be more effective if participation was to be restricted to well-educated (university level) and ICT skilled managers from organizations that are already engaged in counteracting members' side-selling to some extent.

Table 5: Determinants of learning efficiency

Explanatory variables	Coeff. (Std.Err.)
<i>Trainees</i>	
Age (years old)	0.001 (0.001) ^a
Gender (0= female; 1= male)	0.002 (0.026)
(Manager position)*(ICT skills)*(School Education) ⁸	0.09 (0.02)***
<i>Cooperatives</i>	
Homogeneity in members' landholding (Herfindahl index: 1 max - 0.5 min)	0.13 (0.06)*
Spot-payment*price-premium (0= none; 1= both)	0.06 (0.03)**
Age (years since establishment)	0.004 (0.001)***
No. of competitors (middlemen procuring from members)	-0.001 (0.0003)***
Membership size (no. of members)	-0.00001 (5.43e-06)**
Value of collective sales for the past 12 months (USD/year)	3.15e-08 (1.75e-08)*
<i>Country fixed effects</i>	
Uganda	0.06 (0.03)*
Malawi	0.12 (0.03)***
R-squared	0.23
N. of observations	272

Notes: ^aRobust standard errors in parentheses

*significance at the 10% level; **significance at the 5% level; ***significance at the 1% level

⁸ ICT skills and school education were respectively divided by five and six to ensure that all three variables aggregated into this index have comparable values, ranging from zero to one.

Conclusions

Although cooperative organizations are widespread in rural Africa and contribute to improve productivity, environmental sustainability and social resilience of marginalized and vulnerable farm-households, they have not yet been able to bring about rural entrepreneurship and agribusiness. One reason for this is that policy and legal frameworks are often drawn up at the international level and are not well applied to the realities of farmer cooperatives in Africa. This study suggests how governance could be improved by adopting and enforcing cooperative principles that are specifically tailored to prevent and address members' side-selling and to boost collective marketing.

Here, we have used new data collected at "Cooperative Leadership Events" organized in Uganda, Malawi and Madagascar to test the validity of these principles. In particular, we assess the extent to which these were transmitted to leaders and managers of about 300 cooperatives and the factors that contribute to the internalization of these principles. At the organizational level, we have defined metrics that can be used to proxy health of a cooperative in terms of its engagement in collective commercialization and its ability to keep member side-selling at bay. Our econometric results reveal that leaders and managers from healthier organizations are more likely to internalize the proposed principles, suggesting that the latter are appropriate guidelines for the governance of producer-owned agricultural cooperatives in Africa. Learning efficiency could be improved through a better selection of the cooperatives that are invited to participate in the events, and of their representatives. In particular, inviting representatives of more commercially oriented and mature cooperatives with a certain degree of market power would enhance learning efficiency. As would the targeting of professional managers compared to leaders elected from among the membership.

It thus seems that improved governance of agricultural cooperatives through the use of the cooperative principles proposed in this study could contribute to the development of cooperative entrepreneurship and business. The principles and health proxies developed in this study could thus serve as a tool to evaluate one-size-fits-all and/or outdated cooperative policy and legal frameworks for producer cooperatives in rural Africa.

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Table A1

ICA Cooperative Principles	Principles for Cooperative Agribusiness in Africa
<p>Open and voluntary membership: coops are voluntary organizations, open to all persons able to use their services and willing to accept the responsibilities of membership, without gender, social, racial, political or religious discrimination.</p>	<p>1) Regulate entry: coops need to be pragmatic in applying the traditional principle of open membership, in order to avoid the inclusion of opportunistic members (or free-riders), and the risk to end up with a production that exceeds market demand, thus driving down price. Coops need to regulate entry so as to manage excessive growth in production, maintain members’ cohesion, and thus minimize the risk of side-selling.</p> <p>2) Incentivize exit: members are usually discouraged from quitting a coop, by either exit sanctions or fees, or by the prospect of receiving unfair pay-offs for the investments made in the common good (to build warehouses, offices, etc.). In this way coops tend to hold on to members that have no longer the interest or the capacity to engage in collective marketing. To evade side-selling problems by members who want but cannot quit, a coop should instead incentivize their exit, offering them exit bonuses.</p>
<p>Democratic member control: coops are democratic organizations controlled by their members, who actively participate in setting their policies and making decisions. Men and women serving as elected representatives are accountable to the membership. In primary coops members have equal voting rights (one member, one vote) and coops at other levels are also organized in a democratic manner.</p>	<p>3) Democracy needs structure: coop leaders and managers must take their time, seek internal consensus and external advice in order to define the mandate, values, constitution and bylaws of their organizations. Once the governance structure of a coop is defined it is difficult to change it, as members’ interests tend to diverge over time and democratic decision making is time consuming and costly. In particular, a coop needs to be designed from the start in such a way to prevent and confront members’ side-selling.</p>
<p>Member economic participation: is another one of the defining features of co-operative societies. Members contributions are expected to: setting up common reserves, part of which at least would be indivisible; service provision in proportion to the value of members’ transactions with the coop; and support other activities approved by the membership.</p>	<p>4) Voluntary and tradable investments: the indivisible part of the asset or endowment of a coop needs to be kept as small as possible. This is not usually the case as the amount and type of investments made by most African coops are decided by their leaders/managers and uniformly charged and imposed onto members. Further, when a member decides to quit a coop, his/her share of the collective asset tends to be redeemed by the coop (see also principle 2). Members need to be able to choose what investments to make, through the voluntary purchase of shares, and then they need to be able to trade the shares among themselves (albeit upon the approval of coop leaders/managers). Tradable and voluntary shares have the potential to promote investments for adding value to collective marketing.</p>
<p>Autonomy and independence: coops are autonomous, self-help organizations controlled by their members. If they enter into agreements with other organizations, including governments, or raise capital from external sources, they do so on terms that ensure democratic control by their members and maintain their co-operative autonomy.</p>	<p>5) Professional management: external incentives, in the form of grants, subsidies or investments, induce members’ disenfranchisement, dependency and thus side-selling. Coops need to manage external incentives, recognizing and systematically addressing the frictions that these may induce among members, before they consolidate into factions. Professional management means anticipating external incentives through the communication of a clear and convincing strategy to keep justifying, motivating and enforcing collective marketing.</p>
<p>Core functions of coops: Education, training and information Cooperation with other cooperatives Concern for community</p>	<p>6) Anticipate socio-economic changes: community development, mutual support and extension services are the core social and short-term needs of coops. But a coop must also try to anticipate changes in members’ needs over the mid/long term. Once a coop satisfies the initial and defensive (or self-help) needs of members it has to be able to start pursuing more offensive objectives, such as collective marketing and value addition. However, coops that are solely established and designed to pursue social and short-term needs struggle to then mobilize collective marketing, when this need arise.</p>

