



Review

Productive inefficiency in extended agricultural households: Evidence from Mali



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ABSTRACT

In Sub-Saharan African farm households, two types of plot management often coexist: collective fields are farmed jointly by household members under the authority of the head while individual plots are autonomously managed by members. In this paper we explore the productivity differentials between collective and individual plots in the context of extended family farms. We find that land yields are significantly larger on male private plots than on common plots after all appropriate controls have been included. Yet, the disadvantage of common plots exists only for care intensive crops and for cash crops. We provide evidence that the yield differentials stem from labor incentive problems. They may arise from the prevailing reward function and/or from preference heterogeneity over the use of the proceeds from the collective field.

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1. Introduction

There has been a recent surge of interest in African family farms where collective plots that are collectively managed and worked coexist with private plots held and cultivated by individual members. On the one hand, economists have tried to understand the rationale behind the existence of various forms of farm-cum-family structures. Their theories aim at explaining either the shift from a pure collective farm to a mixed structure in which private and collective plots coexist, or the split of the collective farm into individual units (see Fafchamps, 2001, for an explanation of the former, Foster and Rosenzweig, 2002, for an explanation of the latter, and Guirkinger and Platteau, 2014, for an explanation of both). On the other hand, many studies have compared the productivity of plots (with similar characteristics) controlled by different types of farmers across households or more frequently within the same household. A large number of these studies have identified systematic gender productivity differentials and conclude to a non optimal land allocation: *ceteris paribus*, men tend to be more productive than women (Udry et al., 1995; Udry, 1996; Bindlish, Evenson, Gbetibouou, 1992, all dealing with Burkina Faso; Goldstein and Udry, 2008, for Ghana; Sirdhar, 2008 for Nepal; Holden et al., 2001, for Ethiopia; Jacoby, 1992, for Peru).¹

To our knowledge, and with the exception of Kanzianga and Wahhaj (2013), hardly any study dealing with sub-Saharan Africa has assessed land yields based on a distinction between collective and individual

fields, despite their oft-observed coexistence. By collective fields, we mean plots that are jointly cultivated by the family workforce under the responsibility of the head who makes decisions regarding both production and output allocation. Conversely, individual plots are independently managed, for their own use, by members of the household.² Kanzianga and Wahhaj compare productivity of senior male plots (assumed to be collectively farmed) with junior male private plots and female private plots in Burkina Faso. We follow up on their effort by investigating the same issue in the context of neighboring Mali, and come up with a completely different conclusion. While Kanzianga and Wahhaj find that collective plots are farmed more intensively and achieve higher yields than plots with similar characteristics farmed by individual members, we reach the opposite conclusion. In our investigation, we focus on the situation of private plots farmed by male members. This is because female plots obey a different logic compared to male plots with the result that, on their private plots, women are much more constrained than men in terms of both crop choice and use of the proceeds (Guirkinger and Platteau 2015). Because of their numerous duties inside the household, they are also more constrained in terms of sheer labor availability. Of course, in studying the differences between male private plots and collective field, we need to systematically control for female private plots. The smaller yields obtained on the female plots will be shortly commented within the general framework of our interpretative discussion.

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¹ Note that in these studies, male plots include both collective and private holdings since the authors are usually not able to distinguish between them. In contrast, female plots are private, except for the rare cases of female-headed households.

² Our questionnaire was specifically designed to track all collective and individual plots. First, for each household member, the household head was asked whether she/he has been granted a plot for personal cultivation. All the members thus identified were then selected to participate in the individual holders' survey. In the next step, a complete list of all collective and individual fields was drawn. The consistency between the head's reporting of individual plots and the information obtained from the members was dutifully checked.

Our investigation of productivity differentials across plot types proceeds in three steps. First, we perform a descriptive analysis of the differences in yields between collective and male individual plots. It shows that male individual plots are significantly more productive than collective plots. Second, we use econometric analysis to determine whether the difference remains when we control for household and crop fixed effects along with individual farmer and plot characteristics. We still find important productivity differentials between individual and collective plots. Third, we explore whether the productivity differential holds for all crops or mainly characterizes certain categories of crops, namely care-intensive versus care-saving crops, and cash versus subsistence crops. What comes out is that care-intensive and cash crops largely account for the yield differential.

We hypothesize that yield differences between collective and male private plots can be ascribed to variations in labor effort that can themselves be explained in terms of incentives. Such a claim is strongly supported by qualitative evidence gathered in the course of the fieldwork. We then proceed by discussing the exact nature of the incentive problems at stake. A distinction is thus made between incentive problems caused by the prevailing remuneration system and those arising from heterogeneous preferences. These two explanations, which are not mutually exclusive, are compatible with our results.

The two aforementioned lines of explanation have been advanced by several authors to account for the individualization of farm units. Incentive problems caused by remuneration rules are at the heart of the theory of agricultural cooperatives proposed by Putterman and DiGiorgio (1985) and Carter (1987). When output is shared equally among members, a moral-hazard-in-team problem arises that leads to efficiency losses increasing in the number of co-workers. This disadvantage of collective production is to be set against its insurance advantage, giving rise to a trade-off between efficiency and risk-pooling considerations. A similar analysis has been recently extended to large family farms (Delpierre, Guirkinger, Platteau, 2012). A different trade-off underlies the analysis proposed by Guirkinger and Platteau (2014) in which it is rent-seeking instead of risk considerations that must be balanced against efficiency considerations. Their setup is that of a patriarchal farm-cum-family structure where the patriarch maximizes the surplus he extracts from the collective field by allocating family land between private plots and the collective field under the participation constraint of the individual members.

Note that the argument stressing the superiority of privately managed plots in terms of productivity has been formulated slightly differently by economists inspired by the work of Boserup (1965). More precisely, if farmers adopt relatively land-saving and labor-using techniques for which quality of labor matters, significant management diseconomies exist: since labor is costly to monitor, the advantage of private farming on individual plots increases as agriculture becomes more intensive (see, for example, Binswanger and Rosenzweig, 1986).

Incentive problems caused by heterogeneous preferences are central to the argument put forward by Foster and Rosenzweig (2002) to explain farm household splits in rural India. According to them, preferences of members work against efficiency in collective production: when preferences regarding the use of output diverge among members, their incentive to work on a collective field is undermined.

The explanation advanced by Kanzianga and Wahhaj (2013) differs from the above two strands of the literature. Indeed, they emphasize the public character of the good produced on the family field: social norms exist that require the head to use all the proceeds of this field for the collective good so that every member benefits from it. Moreover, junior partners are assumed to have a particularly strong preference for the public good thus generated. As a consequence, they are more willing to work on the collective field than on their private plots. It bears emphasis that the households surveyed in their study are relatively small and largely nuclear.

The remainder of the paper is organized as follows. Section 2 presents the setting of the study and some key background information regarding the organization of family farms in Mali. Sections 3 and 4 are devoted to the empirical analysis of yield differentials between collective and private plots. Section 5 provides a detailed discussion of the mechanisms that may drive the comparative advantage of private plots. Section 6 concludes.

2. The setting

2.1. The survey

The data used in this paper is first hand data collected in the south-eastern region of Mali in 2008. An interesting feature of this region is that various types of farm organization coexist. Traditional collective farms headed by a patriarch are still widespread although there is an increasing tendency toward more individualized forms of cultivation. We randomly sampled 17 villages in the three districts of Koutiala, Sikasso and San, which belong to the old cotton growing region. Within each village, we randomly selected 12 households from a complete listing of the local household population. A questionnaire was administered to each household head. In addition to detailed information on the composition of the household, we collected information on the size and structure of the associated farm, including the listing of all fields jointly cultivated by the family or individually held and worked by members, whether male or female. Another questionnaire was then addressed to a random sample of private plot holders.³ The selection of the sampled individual farmers was made randomly.⁴ We obtained very detailed information on agricultural production, plot characteristics and access to agricultural equipment. Furthermore, in order to have a more complete view of the household's *modus operandi*, precise qualitative questions were asked about the different rights and duties of the household members, and about the pros and cons of collective versus mixed farm structures.

2.2. Farm and family structures

As defined in Matlon (1988), cited in Udry (1996: 1016), a household is a group of individuals who “work jointly on at least one collective field under the management of a single decision-maker and draw an important share of their staple foodstuffs from one or more granaries which are under the control of that same decision-maker.” In West Africa, many rural households extend both vertically (in the sense that married sons continue to live with their father) and horizontally (brothers of the head, their wives and children are part of the household). In our sample about 40% of household heads live with their brothers while, at the other extreme, only around 20% have neither brothers nor married sons around (strictly speaking, they are nuclear households). Moreover, more than half of the household heads are polygamous. On average, the sample households count 11 individuals above 12 years old with a maximum family size of 30.

In these large households, the incidence of mixed farm structures has increased over the last decades especially because of the growing number of male individual plots. On collective plots, members continue to work as a team and output is shared among all the co-workers after

³ We initially intended to cover all the individual farmers listed by the head, yet due to time and budget constraints only two-thirds of them (68%) could be interviewed. On an average, the interview of a household comprising only collective family fields lasted half a day while the interview of a household with a mixed farm structure lasted a whole day, the second half being devoted to the interviews of private plot holders.

⁴ The field supervisors got a complete list of the private plot holders in the sample households from the survey of the household heads, and they randomly drew the sample of holders to be interviewed. We believe that we do not have any biased sample of private plot holders since we do not find any systematic differences between interviewed individual farmers and those who have not been selected (as assessed from the questionnaire addressed to the household head).

⁵ Only 6% of individual plot holders made transfers to the head in cash or in-kind during the 12 months preceding the survey and, when they took place, these transfers were small.

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