Food Policy 67 (2017) 93–105

Contents lists available at ScienceDirect

Food Policy

journal homepage: www.elsevier.com/locate/foodpol

Agricultural input credit in Sub-Saharan Africa: Telling myth from facts

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ARTICLE INFO

Article history:
Available online 24 October 2016

Keywords:
Africa
Farm inputs
Credit
Rural nonfarm employment

ABSTRACT

Recent evidence shows that many Sub-Saharan African farmers use modern inputs, but there is limited information on how these inputs are financed. We use recent nationally representative data from four countries to explore input financing and the role of credit therein. A number of our results contradict "conventional wisdom" found in the literature. Our results consistently show that traditional credit use, formal or informal, is extremely low (across credit type, country, crop and farm size categories). Instead, farmers primarily finance modern input purchases with cash from nonfarm activities and crop sales. Tied output-labor arrangements (which have received little empirical treatment in the literature) appear to be the only form of credit relatively widely used for farming.

1. Introduction

It is generally accepted that Sub-Saharan Africa (SSA) farmers often have low yields which could be increased, all else equal if they bought more "external inputs" (chemical fertilizer, pesticides, and seeds). Moreover, it is often asserted after liberalization and privatization dismantled many government farm credit programs in the 1990s (Kherallah et al., 2002), that small farmers face severe credit constraints and that this is a cause of low use of external inputs (Kelly et al., 2003; Morris et al., 2007; Poulton et al., 1998, 2006).

Yet Sheahan and Barrett (2014) find that SSA farmers now purchase more external inputs than in the 1990s, and much more than is generally asserted in the debate. Farmers are thus financing inputs somehow. Is it by credit? If so what kind? Is it by own cash sources from crop sales and labor sales? These issues lead us to the three research questions we address here: (1) how do farmers finance input purchases? (2) Is there a correlation between finance source and farm size and thus "inclusiveness" of the financial arrangement used? (3) Is there a relation with crop type and thus relation to cash crop versus food crops?

To derive hypotheses for these questions, we briefly review the literature concerning the potential finance sources for inputs.

First, government credit was common before the 1990s for both farmers producing cereals as well as export cash crops. The schemes generated fiscal deficits and suffered frequent non-recovery, considered "strategic default" used by farmers as de facto insurance after bad harvests (Poulton et al., 1998). These schemes were generally dismantled in the 1990s and 2000s during Structural Adjustment. We hypothesize that few farmers use government credit now.

Second, government subsidies to farmers to buy fertilizer were common before Structural Adjustment. The subsidy was administered as a reduction of fertilizer price, or as a coupon to farmers (as a direct transfer). Many input subsidy programs were eliminated by Structural Adjustment. However, in several SSA countries they were partially revived in the mid-2000s on the heels of concerns that fertilizer use had dropped since Structural Adjustment. Malawi and Tanzania governments provide many farmers a coupon for fertilizer sufficient for an acre. The Nigerian government had a subsidy scheme during our study period (2010–2012) but our analysis showed only 5% of the farmers bought fertilizer from government sources that disbursed the subsidy.

Third, private-sector banks tend, according to much of the literature, to lend little to farmers (Poulton et al., 1998, 2010). The reasons given are that banks face high transaction costs in rural areas, farmers tend to lack collateral, and lending is risky because recovery rates are low (Dorward et al., 2009). We hypothesize that few farmers obtain bank credit, but those that do are larger farmers (based on work by Zeller and Sharma (1998) in Cameroon, Ghana, Madagascar, and Malawi).

Fourth, informal credit from friends and family and local moneylenders is often presented as a significant source of funds for farmers to buy inputs and consumption items (Poulton et al., 2006; Zeller and Sharma, 1998). Our hypothesis is thus that informal credit is important to all strata of farmers.

Fifth, finance from "tied output-credit" or "interlinked credit" arrangements (Bardhan, 1980; Poulton et al., 1998) involve an out-

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http://dx.doi.org/10.1016/j.foodpol.2016.09.014
0306-9192/

put buyer or input seller advancing the farmer cash for inputs or inputs in kind at the start of the season, and being reimbursed from the farmer's harvest. The literature presents this in two categories.

The first category is tied output credit from processing or export companies for traditional export cash crops as well as for non-traditional crops like horticulture. The literature is ambiguous as to the occurrence of this. On the one hand, a number of studies especially of particular schemes document this arrangement. On the other hand, some studies note that processing and export companies may not use this arrangement frequently or apply it to all farmers because they fear farmers will "side sell" (to other buyers) or because there is a dearth of effective farmer cooperatives to enforce repayment among their members (Shepherd and Farolfi, 1999; Poulton et al., 1998, 2010; Chao-Béroff, 2014).

The second category is interlinked credit from grain wholesalers and input dealers. This is commonly posited to be important in Asia (Bardhan, 1980; Conning and Udry, 2007) and in some reports hypothesized to be common in SSA (Pearce, 2003; Zeller and Sharma, 1998).

In both cases farmers enter these "tied" arrangements principally because formal credit markets idiosyncratically fail for them, and thus these are "second best" arrangements (Binswanger and Rosenzweig, 1986). We hypothesize that empirical analysis will show that such arrangements are common in SSA, perhaps with a bias toward traditional cash crops.

A variant on the above is a tied output-labor market arrangement where farm workers advance labor in exchange for payment (typically in kind but can be in cash) at harvest (Bardhan, 1984). While discussion of this was common in the South Asia literature in the 1970s/1980s, to our knowledge it has not been examined empirically in SSA. We hypothesize that it exists in SSA. One justification for this expectation is that labor by one household provided to another is monitored and upheld by local norms/customs and social pressure.

Sixth, household retained earnings such as from rural nonfarm employment and crop sales are in principle candidates for potential liquidity sources for farmers to buy inputs. Indeed, Haggblade et al. (2010) note that rural nonfarm income (RNFI) is a main cash source of rural households in SSA, and Reardon et al. (1994) and Davis et al. (2009) hypothesize that RNFI is a key cash source and determinant for input purchases, especially in the face of idiosyncratic failure of credit markets. Yet the empirical literature rarely compares household own-cash sources with credit as potential liquidity sources for farmers to buy inputs. Zeller and Sharma (1998) note that the literature on farm credit is largely independent of the literature on farm household income sources.

However, several studies in SSA provide evidence of the role of RNFI as a finance source for investments of rural households. Aryeetey (1997) provides evidence of the latter for Ghana for rural microenterprises but not for agriculture. Some work has shown the impact of RNFI on external input use by African farmers (e.g., Savadogo et al. (1994) for animal traction in Burkina Faso; Clay et al. (1998) and Oseni and Winters (2009) for fertilizer in Nigeria and Rwanda), and for Asia (e.g., Stampini and Davis (2009) for purchased seeds in Vietnam); some work has shown the effects of off-farm income on farm productivity (such as Rozelle et al., 1999 for China). We thus hypothesize that own cash sources are a significant determinant of input purchases.

The aim of this paper is to examine the above hypotheses and thereby "update the landscape" of knowledge of SSA farm households' sources of finance for external inputs. To our knowledge, there has been no such survey-based analysis especially over countries using recent and nationally representative data. We analyze recent (2010–2012) LSMS data sets comprising 11,000 farm households in Malawi, Nigeria, Tanzania, and Uganda.

The paper proceeds as follows. Section 2 discusses data and sampling. Section 3 descriptively examines the purchase of "external inputs" and use of credit sources for those purchases, as well as cash income sources. The analysis stratifies by country, farm size, and crop type (using the triad of crop categories in the SSA literature: traditional export crops, non-traditional commercial crops such as horticulture, and staple food grains). Section 3 focuses on Nigeria to econometrically test for the effects of different cash sources on fertilizer demand. The analysis uses panel data estimation techniques to more consistently identify the effect of RNFI on fertilizer demand by accounting for unobserved time invariant household characteristics likely to affect participation in non-farm activities and fertilizer demand. As far as we are aware, there are no other studies that have used nationally representative panel data to explore the effect of non-farm activities on input demand. Most of the older literature (cited above) focused on qualitative analysis, comparison of means and ordinary least square (OLS) estimations that are potentially biased (e.g., Ellis and Freeman, 2004). More recent empirical work such as Oseni and Winters (2009) use cross sectional data while Smale et al. (2016) use panel data but do not use a nationally representative sample (they focus on one maize producing region of Kenya).

2. Data

We use data from the Living Standard Measurement Study (LSMS) household panel surveys in four countries. The most recent years of the panels are used for the descriptive analysis in all the countries, and the most recent two years for the econometrics analysis in Nigeria. The sets are as follows: (a) the Malawi Integrated Household Panel Survey (IHPS) of 2012/2013, with 3219 farm households; (b) the second wave of the Nigeria Living Standard Measurement Study – Integrated Survey on Agriculture (LSMS-ISA) Panel for two years, 2010/2011 and 2012/2013, covering 3000 farm households; (c) the Tanzania National Panel Survey 2012/2013, covering 3047 farm households; and (d) the Uganda National Panel Survey 2010/2011 covering 2109 farm households. The surveys differ somewhat in the specific questions they use to elicit information on the variables of interest. We treat the survey datasets as uniformly as possible to ensure that the information is comparable. Where one set or the other lacks some information we note that in the table notes.

In general, the surveys used a two-stage sample design. In the first stage, enumeration areas were selected in each district of the country. Within each enumeration area a listing of households was done for the sample frame. A random sample of households was drawn from that frame. We selected only households doing any farming. In the analyses, we use sampling weights from the datasets to account for the survey design and construct nationally representative statistics. The weight for each household is the inverse of the probability of being selected based on the sample frame structure.

The data used are on farm households' use of inputs and cash and in-kind arrangements to pay for them. The analysis is done by crop, household, and plot. The data also have characteristics of the farm households such as nonfarm income, crops sales, loans received, and farm size.

3. Descriptive analysis of cropping and input purchases

3.1. Patterns in cropping

Table 1 shows crop composition by country and farm size strata. Crops are classified into sets: crops traditionally called "food