

Adjognon, S., S. Liverpool-Tasie, and T. Reardon.
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CHALLENGING CONVENTIONAL WISDOM ABOUT FARM INPUT CREDIT IN SUB-SAHARAN AFRICA

Thumbnails

Common wisdom: Access to formal credit is limited, and farm inputs are financed largely through informal credit.

Findings:

- ✓ The use of traditional credit (formal, informal, tied and untied) for financing modern inputs is extremely low. This applies in all countries, and for all crops and farm sizes.
- ✓ Farmers primarily finance modern input purchases with cash from nonfarm activities and crop sales.
- ✓ Tied output-factor market arrangements play a very minor role in financing external inputs, but appear to be relatively widely used for labor credit.
- ✓ “Traditional” cash crop farmers selling to processors rarely receive credit from processors, except in a few enclaves such as larger tobacco farmers in Tanzania

Policy message:

Rural development policies and programs that spur broad development of the rural nonfarm sector would benefit farm input purchases and thus productivity and food security. These would certainly be important complements to credit policies and programs.

THE ISSUE: HOW ARE FARMERS IN SSA FINANCING MODERN INPUT USE?

Recent evidence indicates that many farmers in Sub-Saharan Africa (SSA) purchase external inputs such as fertilizer, seeds, and pesticides/herbicides (Sheahan and Barrett, 2014). However, there is very limited information on how this increasing use of modern inputs is being financed. This paper therefore investigates empirically how smallholders in SSA finance the purchase of modern external inputs.

The paper derives its testable hypotheses from the existing literature, which has over the years fed some conventional wisdoms about how African farmers finance agricultural activities. This is viewed as having three tenets.

- First, farmers use little to no formal bank credit to finance input purchase.
- Second, farmers are thought to rely heavily on informal credit. This is from two sources. First input traders and output traders who give farmers advances, and in the case of output traders, “tie” their output sale to the provision of credit at the start of

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the season. Second, farmers are believed to get credit from friends, family and village moneylenders to finance input purchases.

- For farmers in cash crop contract farming schemes, it is widely assumed that they get input credit from the processors.

The paper tests these three sets of common wisdoms. This fills a gap in the literature because there is no current and systematic inventory of how farmers are paying for inputs. To fill this gap, the paper undertakes a cross-country empirical examination of input finance among smallholders using recently available nationally representative LSMS farm household survey data sets. These comprise about 10,000 households in four countries: Malawi, Nigeria, Tanzania, and Uganda. The paper focuses on purchases of “external inputs,” that is of non-labor variable inputs (fertilizer, pesticides, and seeds) and of labor itself. Relying mostly on descriptive statistics on formal and informal tied and untied credit sources, the paper explores the influence of crop types (cash crop versus food crops) and farm size. It also uses econometric regression methods to examine the correlates of input purchases, and the role of own cash income in farmers input purchases.

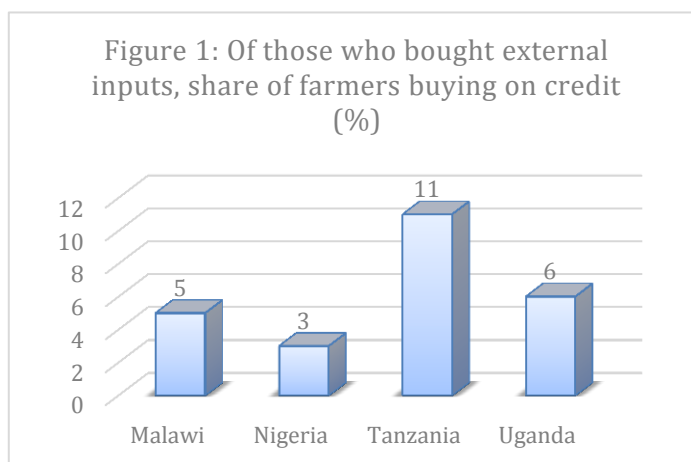
FARM INPUT PURCHASES IN SSA

There is much variation across countries in modern external input purchases

The survey data show that there is a marked contrast across countries. Nigeria and Malawi have a high share of farmers buying external inputs (71 percent and 70 percent respectively) while Uganda and Tanzania have 16 percent and 18 percent respectively. The Malawi-Nigeria results are at odds with the traditional notion that very few farmers in SSA use external inputs, but are consistent with recent literature (Sheahan and Barrett, 2014). While the results in Malawi and Nigeria might be driven by their fertilizer subsidy programs, the Nigeria survey data shows that only about 5 percent of the households who purchase fertilizer appear to have received subsidized fertilizer. Survey data did not show whether households received a subsidy in Malawi.

The use of credit for input purchases is rare

While there is significant variation across countries in terms of input purchases, there are only modest differences in the use of credit for these purchases. On average about 6 percent of households that buy these inputs use any form of credit (Figure 1). This suggests that an average of 94 percent of SSA households use their own cash (from non-credit resources such as cash sales of crops, and employment earnings) to buy external inputs. This goes against the general presumption that to the extent farmers buy external inputs, they do it at least with informal credit (from money lenders, friends and family) or trader credit. The survey data reveal not just a case of limited formal credit, but a



near absence of the use of any credit, formal or informal, tied with input or output traders, in kind or in cash.

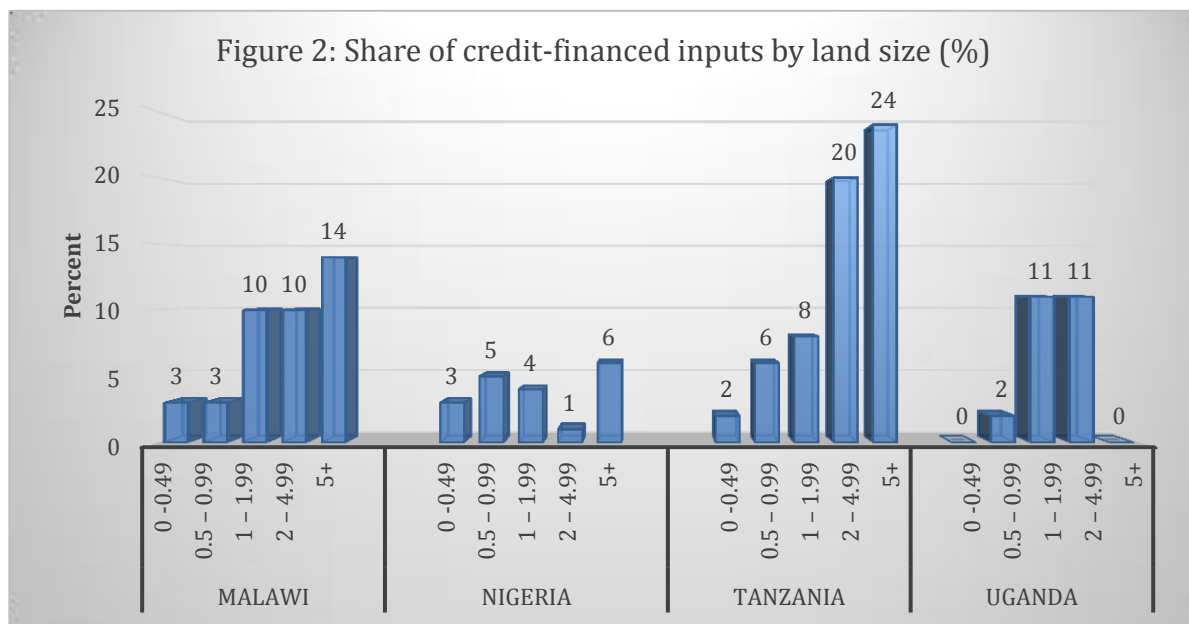
DO FARM SIZE AND CROP TYPE MATTER?

Credit is more commonly used for fertilizers than for other external inputs

The share of credit-based input purchases in total input purchase shows wide variation across countries, over inputs and across land size strata. In Malawi, input credit is important only for fertilizer, averaging around 9 percent of fertilizer input outlay, but concentrated in the upper-small and medium farmers (1-5ha), where it averages a fifth of input expenditures. In Nigeria, the share is low for all, with about 3 percent on average and does not differ much over land size strata. The share of input expenditure using credit is correlated with land size in Tanzania, with about 10 percent for smaller farmers and about a quarter and a half (respectively) for medium and larger farmers. For Uganda, credit is more important but only for fertilizer purchases and for the 1-5ha group, where it financed about a half of fertilizer expenditure. In sum, the importance of input credit tends to be concentrated in the middle to higher end of farm sizes, and to be mainly for fertilizer purchases, and not very much for pesticides and seeds. There tends to be 2-3 times more households getting some kind of credit for fertilizer purchases, compared with seeds or pesticides/herbicides.

Input credit is related to farm size in Malawi, Tanzania, and Uganda

Most credit-based external input purchases in Malawi, Tanzania, and Uganda are concentrated in farms of over one-hectare in size (Figure 2). Nigeria is an exception, with more of the input credit taken by the “under 1 ha” group. These results do not differ much over input type.



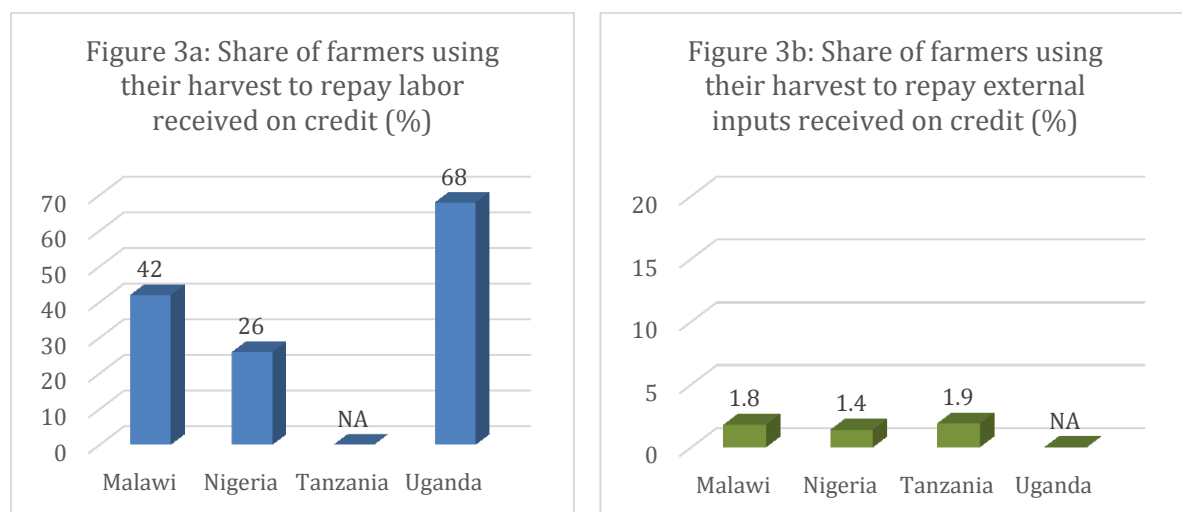
The use of input credit for traditional cash-crop production is rare

Conventional wisdom suggests that farmers growing traditional cash crops (such as cocoa, cotton, tea and tobacco) would commonly access external inputs on credit, in particular from processors, while food crop producers would not. But our results indicate that while there is a lot of variation across countries, the average share of credit financed input purchases over all traditional cash crops is 13 percent, compared with 6 percent for food crops. The cash crop share is mostly driven by tobacco producers, who represent only about 1 percent of the total sample. These producers receive input credit for tobacco production through contract farming arrangements. Excluding tobacco plots puts the overall credit share of traditional cash crop close to that of food crops.

“Tied credit” is rare for external inputs but more common for labor inputs

Tied output/input credit arrangements occur when inputs on credit or cash for inputs (received at planting) are repaid at harvest time. The paper finds that less than 2 percent of farmers across all countries are using tied credit arrangements for external inputs. However, labor-output tying is much more common, with as many as 42 percent of the Malawi, 26 percent of Nigerian, and 68 percent of Tanzanian farmers engaged in this.

Figure 3: Tied credit is important for external labor but not for inputs



HOUSEHOLD USE OF LOANS NOT SPECIFICALLY LINKED TO INPUT TRANSACTIONS

Loans are rarely used for farming

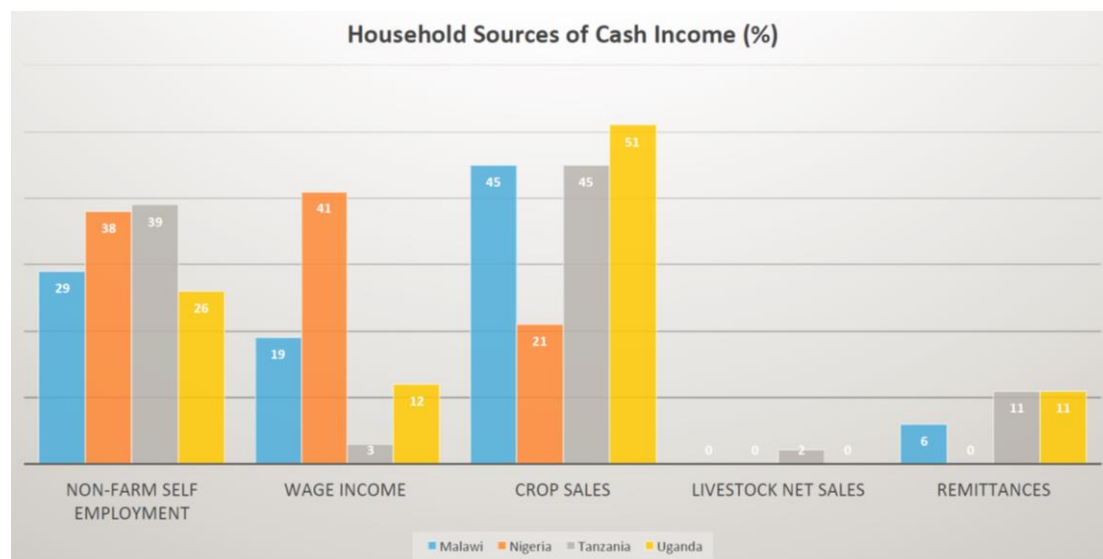
Loans (defined here as credit unconnected directly to transactions of outputs or inputs) can come from formal (banks), semi-formal (micro-finance), or informal (friends, relatives, cooperatives, etc.) sources. Though data on actual use of loans were not available in Nigeria, as many as 38 percent of the sample households took loans. In the Malawi sample, 23 percent of the households took a loan, but only 5 percent of those households did so for farming. In Tanzania 11 percent of households took loans of which 2 percent were for farming purposes. This is a 5 to 1 ratio of overall loans to farm-directed loans in both

countries. It is quite striking that loans are predominantly to finance nonfarm business startup costs and consumption.

HOUSEHOLD CASH INCOME SOURCES

Given that farmers rarely use credit to finance agricultural inputs, the paper explores what are the alternative sources of financing. Rural nonfarm employment (self-employment and wage employment) and remittance cash income represent together 55 percent of household total cash income in Malawi, 79 percent in Nigeria, 53 percent in Tanzania, and 49 percent in Uganda, a simple average being 59 percent (Figure 4). The remaining 41 percent comprises mainly farm crop sales and some livestock sales. This shows the significance of nonfarm income as a cash source available for farm input purchase. This is one likely explanation of why farmers rely very little on credit for input purchases. Farmers appear to prefer financial credit to finance the set up or expansion of their nonfarm enterprises, and to use the generated cash from these nonfarm enterprises to finance external input purchases.

Figure 4: Household cash income structure in Malawi, Nigeria, Tanzania, and Uganda.



UNDERSTANDING INPUT PURCHASES AND THEIR FINANCING

Input use and input purchase

The paper expands its descriptive analysis by a multivariate regression analysis of input use, input purchases and the choice of financing for purchases inputs. Probit, linear probability and Heckman probit models are used to identify the key factors associated with input use and the use of credit to finance input purchases (see Box).

The various models yield consistent results indicating the importance of cash income. The value of crop sales is positively associated with external input use in all study countries. Participation in non-farm enterprises by a member of the household is another positive and significant factor for external input use in Malawi and Nigeria (but less so in Tanzania and Uganda).

Relative to roots and tubers, production of grain, legumes, horticulture crops, and traditional cash crops are generally positive and significant determinants of input use and input purchase in almost all countries. This likely reflects different returns to external modern inputs. Other factors like wealth and distance to the main road (capturing transaction costs of input acquisition) are significant and in expected directions. Consistently the paper finds that cash-crop producers and plots cultivated with cash crops are more likely to use input credit in all countries except Nigeria. This effect is strongest in Tanzania, consistent with the descriptive results and suggesting that while access to input credit is generally very limited, cash crop producers are more likely to get input credit through tied input-output arrangements. Participation in non-farm employment is significant and negatively associated with the use of input credit in Malawi and Uganda, but not in Nigeria and Tanzania. This indicates that farmers with non-farm income use less credit to purchase external inputs but use earnings from their non-farm activities to finance input purchase.

Box: Econometric modelling of the correlates of input use and input purchase

The main empirical model used to estimate the correlates of input purchase is a plot-level Probit model with binary dependent variable Y_{ij} , taking the value 1 when any of the external inputs (seeds, fertilizer, or crop chemicals) is purchased for use on plot i , for household j and zero otherwise.

The basic model is specified as:

$$Prob(Y_{ij} = 1) = \Phi(X_{kij}, Z_j, u_{ij}; \beta) ,$$

where Φ is the Standard Normal cumulative distribution function. β is the vector of parameters to be estimated. The dependent variable Y_{ij} is a function of plot-level factors X_{ij} , as well as household and geographical characteristics, Z_j . X_{kij} captures crops grown on each plot. It includes dummy variables for each category of crop grown on the plot, i.e., traditional cash crops (cotton, tobacco, tea, coffee, rubber, etc.), cereals and legumes, and horticultural crops. The total value of crop sales is used to control for marketed surplus. Socioeconomic characteristics of the household include the gender of the household head, the age of the household head (a proxy for farming experience), education of the household head, and the household dependency ratio. The paper also controls for biophysical variables including annual rainfall (mm) and the nutrient retention capacity of the soil, and geographical variables in particular whether the farm household resides in an urban or rural area. This same model is estimated for each of the 4 countries (to allow comparability) using the maximum likelihood approach.

Beside estimation at the plot level, the paper estimates the model at the household level. The same explanatory variables are used as above. It uses both the linear probability (LP) model and the Probit model for both the plot and household level regressions to verify robustness of the results to the assumptions of the Probit model.

The Heckman probit model is then used to check robustness of the Probit and LP results to sample selection bias given that the use of credit to finance input purchases is observed only for those who are purchasing inputs. The first equation (specified as above) describes a farmer's decision to purchase modern inputs for use on a plot. The second equation models the use of credit to finance the purchase of the inputs. This second equation is also specified as above except that the dependent variable Y_{ij} represents the binary indicator of use of an input bought on credit instead of any input purchase. Annual rainfall (mm), Nutrient Retention Capacity, and the household dependency ratio are used as exclusion restrictions and thus excluded from the vector of household characteristics in the second equation. The system is estimated using partial Maximum Likelihood Estimation.

This model is also estimated at the household level in each country. Since the analysis was done with one cross-section of data in each country, the estimation does not address endogeneity associated with the decision to finance input purchases on credit due to unobserved household specific characteristics. Furthermore, while farmers may decide whether to finance the purchase of inputs on credit versus self-financing (with cash from crop sales or nonfarm income) the use of inputs is also likely affected by the possibility of financing such input purchase on credit. Consequently, the relationships in these regressions are correlations and cannot be given a

causal interpretation.

WHERE TO GO FROM HERE?

This study finds that very few farmers in SSA use any form of credit, formal or informal to finance external input purchases. What is still significant is the linkage between the labor and output markets through informal arrangements. While farmers take loans to finance the start-up of nonfarm enterprises rather than the purchase of external inputs, they use cash from these nonfarm enterprises and crop sales to purchase external inputs.

The important policy message of this study is that rural development policies and programs that spur broad development of the rural nonfarm sector, in manufacture and services, would benefit farm input purchase and thus productivity and food security. Developing the non-farm sector would therefore be an important complement to credit policies and programs.

The study indicates that further analysis of the factors that explain the limited use of non-cash income sources to finance external input purchase is called for. In addition to credit availability, issues such as the associated interest rates and expected returns to investing in modern external inputs should be explored. It also reveals the need to understand the link between advanced labor and the overall agricultural labor market in SSA.

IMPORTANT REFERENCES TO FOLLOW UP ON:

Conning, J. and C. Udry. 2007. Rural financial markets in developing countries. *Handbook of agricultural economics* 3: 2857-2908.

Haggblade, S., P.B.R. Hazell, and T. Reardon. 2010. The Rural Nonfarm Economy: Prospects for Growth and Poverty Reduction. *World Development*, 38(10): 1429–1441

Poulton, C., J. Kydd, and A. Dorward. 2006. Overcoming Market Constraints on Pro-Poor Agricultural Growth in Sub-Saharan Africa. *Development Policy Review* 24(3): 243-277.

Sheahan, M. and C.B. Barrett. 2014. Understanding the agricultural input landscape in sub-Saharan Africa: Recent plot, household, and community-level evidence. Policy Research Working Paper 7014. World Bank, Africa Region.