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Staff Paper

Links Between Nonfarm Income and Farm Investment in African Households: Adding the Capital Market Perspective

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Links Between Nonfarm Income and Farm Investment in African Households: Adding the Capital Market Perspective

Farm household surveys in the 1970s and 1980s showed that nonfarm activities provide an important share of household income, contrasting with the conventional image of rural African households as deriving their food entitlement almost exclusively from the land (e.g., Matlon; Collier and Lal; Low; Reardon et al.; Haggblade et al.). Much of this literature on nonfarm income has concentrated on (1) quantifying the share of nonfarm in total income, (2) identifying the factors driving households to diversify outside of agriculture, and (3) examining the equity and food security implications.

These studies have shown the range of roles played by nonfarm activities in the household economy. Nonfarm activities can be an important source of cash income which can potentially improve farm productivity if it is used to finance farm input purchase or longer-term capital investments. Nonfarm activities can also provide income during periods other than harvest time; help reduce the variance of overall household income in cases of imperfect covariance between farm and nonfarm income; and help mitigate risk and improve food security by allowing the household to buy food in cases of food production shortfall, thus smoothing income interannually. If opportunities to earn nonfarm income are weak where agriculture is weak, income from migration and other activities not dependent on agriculture will be especially important to finance farm investments or to compensate for poor harvests.

Evidence of the importance of nonfarm income should not be used to justify benign neglect of agriculture. Since most rural nonfarm activity in Africa is linked to the farm sector (Haggblade et al.; Reardon et al.), expanding nonfarm income will be difficult if agriculture is stagnant. Also, ignoring agriculture would conflict with the goal of many African governments to improve food security and overall growth by stimulating productivity-enhancing investments in agriculture (e.g., inputs to livestock husbandry, chemical inputs to cropping and improved seed, equipment purchase, and land improvements such as irrigation, bunds, terraces) in suitable agroclimatic zones.

Structural adjustment programs and shrinking government budgets, however, have brought large cuts in formal credit and input supply programs, and in subsidies for fertilizer, credit, and animal traction equipment. Moreover, natural resource conservation measures are increasingly urgent, but are difficult to finance through credit because their impact on household income is uncertain, and land improvements do not serve well as collateral.

An important agricultural productivity and food security issue, then, is how to encourage farm households to reinvest nonfarm earnings into farm input acquisition and capital formation. This reverses the question traditionally asked in the literature dealing with agricultural transformation of how to promote the investment of agriculture surplus into the off-farm sector.

Our focus: effects of nonfarm activity on farm investment

Recent work has examined the interactions between farm and nonfarm income in the farm household economy, asking in particular whether households with more nonfarm income purchase more or improved cropping inputs and have better cropping productivity. The evidence is mixed. In northern Burkina Faso where agriculture is risky and drought-prone, Christensen finds that households with more nonfarm income invest less in farm capital. By contrast, Savadogo et al. find that nonfarm earnings are reinvested into expensive animal traction packages in southern Burkina Faso where agroclimatic conditions are good.

In any case, nonfarm activities are a potentially important source of investible capital. Reardon et al. report that as much as 80% of household cash revenues came from nonfarm activity in southwestern Burkina Faso, a major cotton zone.

Studies in Africa, however, have seldom explored systematically the factors influencing the direction and nature of reinvestment. This paper addresses that gap by attempting to answer three questions: (1) in theory, what effects would one expect nonfarm activities to have on farm investment, (2) what factors condition those effects, and (3) what practical implications does this have? Our treatment of the second question emphasizes that whether the capital market (credit and savings institutions) exists and how it performs, and its interlinkages with other markets, affect whether and how the household uses nonfarm income to finance farm investment. The paper therefore adds a capital market perspective to the intersectoral

linkage literature by looking at capital flows and capital market linkages at the household level, thus complementing previous literature on the product market (Haggblade et al.) and the labor market (Haggblade and Liedholm).

Nonfarm activities and farm investments in the farm household model

Taking the agricultural household model as our basic conceptual framework, we note (with no attempt to be exhaustive) the following features that have a bearing on the issue of nonfarm-farm relationships. First, the household's objective is utility maximization based on goods consumed and leisure. Objectives of income stability, risk management, and food security are likely to be important as well. Income is derived from a combination of farm and nonfarm production activities, and wage labor. It follows that a given household may maximize its welfare by emphasizing nonfarm or wage labor activities, rather than farming.

Second, income-earning activities are constrained by the household's physical and human resource endowment, and by the physical and economic environment. Third, nonfarm and farm enterprise choices are made jointly, and compete for the household's labor and capital resources. Thus, the number of nonfarm activities engaged in by the household, and the scale of each activity, depend on the relative returns to nonfarm vs. farm activities, and on their relative resource requirements. Relative returns and access to resources depend on exogenous factors such as policies and markets.

Fourth, households must generate a surplus in either farm or nonfarm activities in order to invest in cropping inputs and improved technologies. The household might consume all the income, investing none (especially if no surplus is generated), or it might reinvest the income in nonfarm activities only, in farm activities only, or in a combination of farm and nonfarm activities. Since consumption and investment compete for use of household income, household decisions will affect the relative extent of consumption-good linkages and capital-good linkages.

Fifth, nonfarm activities will influence crop mix, indirectly through impacts on wealth and ability to bear risk, and through capital investment and input acquisition, as well as directly through the demand for farm output as an input to nonfarm activities, and vice versa.

Sixth, the reinvestment of profits from nonfarm activities into farm inputs and capital will depend on the same factors that affect the household's annual choice of farm and nonfarm enterprises, and on other conditioning factors discussed below.

Conditioning factors

Several factors beyond household characteristics and relative returns to agriculture condition the household's participation in nonfarm activities, and the use of nonfarm income for farm investment and input acquisition: (1) the physical environment, including infrastructure; (2) the economic and institutional environment,

including markets and government policies; (3) the type of available nonfarm activities; and (4) who controls farm and nonfarm activities within the household.

First, regarding the physical environment, a climate that makes agriculture particularly risky in certain zones might discourage investment of nonfarm income in cropping activities. Poor road and rail infrastructure that makes it difficult for farmers in particular zones to export their production at competitive prices might discourage investment that would increase production beyond household needs.

Second, the economic and institutional environment affects not only the household's objective function (e.g., extent of food needs to be met through own production vs. food purchase) but also the feasibility and relative profitability of nonfarm and farm activities, through its effects on output and input prices (via output, input, credit, land and labor markets), the type of technology available, and access to resources.

Market failures (where the general benefit of using the market is less than the transaction cost of using it, or where access constraints make this net benefit negative for particular households (de Janvry et al.)), and market interlinkages are particularly important conditioners.

(a) Capital markets. Credit market failure or access constraints often provide the initial stimulus for households to use nonfarm profits to purchase agricultural inputs. For example, with the disappearance of government-supported credit and peanut seed distribution programs in Senegal, farmers are increasingly using nonfarm

income to purchase these inputs (Diagana and Kelly). In zones of Burkina Faso without parastatal credit programs, purchase of cotton and maize fertilizer is more common for farmers with nonfarm income, ceteris paribus (Reardon and Kelly); in these zones, informal credit markets for farm inputs are virtually absent (Christensen). Moreover, participation in nonfarm labor markets can affect access to credit markets. In Benin (Hoffman and Heidhues) and in Kenya (Collier and Lal), nonfarm income substitutes for land as collateral in the farm inputs credit market.

Absence of savings institutions that would permit accumulation of farm and nonfarm profits could mean less frequent use of nonfarm profits to purchase high-cost technologies such as animal traction. East Africa literature (Kitching) describes the role of interest-paying savings institutions in helping those with nonfarm income save up to buy land and other lumpy inputs. In West Africa, there is no formal structure for savings that is easily accessible to rural households. Informal "tontines" are used, but these do not often permit one to control the timing of investments (a lottery used to determine who gets money in a given month). Agricultural credit often fails in West Africa because of covariance in defaults, and lack of collateral because land is rarely owned.

(b) Labor markets. Their failure can encourage households (i) to keep more nonfarm income liquid as precautionary savings to cover emergency cash needs because wage employment is unavailable, and (ii) to limit the area of land cultivated to that which can be managed with household labor.

(c) Product markets. Absence of reliable staple food markets can inhibit specialization in nonfood production (de Janvry et al.). This reasoning can be extrapolated to participation in nonfarm activity.

Third, the characteristics of nonfarm and farm activities also have implications for reinvestment of profits into farm capital and inputs, depending on (a) capital flow characteristics (requirements, lumpiness, and timing); (b) intra-household distribution and control of capital flows; and (c) inter-household distribution of nonfarm income.

(a) Capital flow characteristics. (i) Some nonfarm activities have capital requirements that are complementary to farm activities (e.g., ownership of a horse cart), while others compete (e.g., fixed investments in a tailor's sewing machine). Many nonfarm activities do not require much fixed capital (e.g. wage labor, preparation and sale of snack food), but such activities often do not generate much profit (Matlon). Some nonfarm activities require large amounts of initial financial capital, which nonetheless can be easily recovered at the beginning of the farming season and used to buy cropping inputs (ambulant traders, for example, have substantial capital tied up in stocks that they can sell readily).

(ii) Where financial institutions are absent or poor, nonfarm income in large lump sums (such as migration remittances) may be needed to allow entry into activities such as mechanized or irrigated cropping that have high initial investment requirements (Savadogo et al.). Moreover, farmers might not be willing to move

from "safety first" food cropping into risky cash cropping without a buffer of cash from nonfarm activities.

(iii) Regarding the timing of flows, it is useful to distinguish farm and nonfarm activities that are conducted in sequence (where dry season nonfarm income feeds into rainy season farm activities, which then provide cash for the next cycle of nonfarm activities), from those that are conducted in parallel. The sequential system is more likely to be found in zones with one rainfall season per year, and the parallel system more likely in zones with two rainy seasons per year. Which system applies will affect the usefulness of nonfarm activities as a source of liquidity to finance farm investment, and the degree of competition for household labor and cash resources. For example, Reardon and Kelly found that nonfarm income earned mainly in the dry season was crucial to buying fertilizer at the end of the dry season (just before planting), by which time cash crop revenues had been exhausted.

(b) Who controls the income from nonfarm activities, and to what degree they are also involved in crop production, can influence reinvestment. The distribution is partly determined by household demographics, status relationships, and the social organization of production. If women have important nonfarm income but are not allocated much land, they are more likely to concentrate on capitalizing nonfarm activities rather than channeling capital to crop production activities. If women invest in cropping, they may invest in land-augmenting inputs (e.g., fertilizer) rather than labor-augmenting technologies because they usually control only small fields. For

nonfarm income that is earned in urban areas by an absent head of household, whether that income is channeled into farm investment will depend partly on whether the resident farm family has the authority and labor resources necessary to manage the investment. Nuclear families with absent household heads (e.g., in East Africa) may therefore be less likely to reinvest in cropping than large extended families (e.g., in West Africa). Education also tends to be correlated with ability to mobilize capital through nonfarm activities. In East Africa, Collier and Lal found that farmers with education were better positioned to mobilize capital through nonfarm work and then purchase land and invest in more costly but profitable cash crops.

(c) There is evidence from West Africa that nonfarm income is distributed unequally among households. Reardon et al. found that the absolute amount and share of nonfarm income in total income increases with overall household income. Matlon found that (i) the absolute magnitude of nonfarm income increased with household income, although the share of nonfarm in total income was higher for poor than for middle-income households, and that (ii) higher return nonfarm activities had higher capital requirements and risk. Poor households who lack access to credit are also handicapped by limited access to nonfarm income, both of which restrict their access to improved farm inputs, which raises the possibility of increasingly unequal income distribution over time. Moreover, even if the poor had equal share of nonfarm income in total income, their relatively higher risk aversion would make them less willing to use this to make risky farm investments.

Conclusions

Studies of whether and how nonfarm income is reinvested in African agriculture have pointed in contradictory directions: nonfarm activity sometimes draws resources away from farm activity and does not lead to reinvestment of profits in the farm; in other cases, nonfarm profits are reinvested in the farm. The paper adds to the debate by looking more closely at conditioning factors.

Beyond the relative profitability and riskiness of agriculture, two sets of variables affect whether nonfarm income is reinvested in farming. First, the nature of the capital market, and whether it is linked with the labor market, influences the reinvestment decision. In particular, where rural credit markets do not function, nonfarm income is a key substitute for borrowed capital. Nonfarm income can also serve as collateral and thus facilitate access to credit. A practical implication is that programs that provide credit for nonfarm activities during the dry season (to help farmers build up their own liquidity), or that spread risk by lending for both farm and nonfarm activities, will be more effective than focussing only on traditional agricultural credit programs.

Second, the characteristics of nonfarm income flow have an important effect on reinvestment. This includes the timing and nature of capital flows from nonfarm activity relative to requirements in farming, and the intra- and inter-household distribution and control of nonfarm income. Thus it will matter where and to whom nonfarm programs are targeted.

References

Christensen, G. *Determinants of Private Investment in Rural Burkina Faso*. Ph.D. Thesis, Cornell University. 1989.

Collier, P. and D. Lal. *Labour and Poverty in Kenya 1900-1980*. Oxford: Clarendon Press. Oxford 1986.

de Janvry, A., M. Fafchamps, and E. Sadoulet. "Peasant Household Behaviour With Missing Markets: Some Paradoxes Explained." Econ. J., 101, 1991:1400-17.

Diagana, B. N., and V. A. Kelly. "Noncropping Income and Cropping Productivity in the Senegalese Peanut Basin." Mimeo. Dept. of Ag. Econ., Michigan State University, June 1994.

Haggblade, S., P. Hazell, and J. Brown. "Farm-Nonfarm Linkages in Rural Sub-Saharan Africa." *World Development* 17(1989):1173-1201.

Haggblade, S. and C. Liedholm. "Agriculture, Rural Labor Markets, and the Evolution of the Rural Nonfarm Economy." GEMINI Working Paper 19, 1991.

Hoffman, B. and F. Heidhues. "Credit Access in the Informal Sector: A Case Study of Two villages in the Province Oueme in Benin." In Cuevas and Benoit-Cattin (eds.), *Finance and Rural Development in West Africa*. Montpellier: CIRAD. 1993.

Kitching, G. N. "Economic and social inequality in rural East Africa: The present as clue to the past." Monograph No. 1, Center for Development Studies, University College of Swansea, University of Wales, 1977.

Kelly, V. *Factors Affecting the Demand for Fertilizer in Senegal's Peanut Basin.* Ph.D. Thesis, Michigan State University. 1988.

Low, A. *Agricultural Development in Southern Africa: Farm-household Economics and the Food Crisis*. London: James Curry. 1986.

Matlon, P. *Income Distribution Among Farmers in Northern Nigeria: Empirical Results and Policy Implications.* African Rural Economy Paper No. 18, Michigan State University. 1979.

Reardon, T., and V. Kelly. "Impact of Liquidity Sources on Chemical Fertilizer Use in Semi-Arid West Africa." Select Paper, AAEA Meetings. (unpub.) 1989.

Reardon, T., A.A. Fall, V. Kelly, C. Delgado, P. Matlon, J. Hopkins, and O. Badiane. "Agriculture-led Income Diversification in the West African Semi-Arid Tropics: Nature, Distribution, and Importance of Production-linkage Activities." In A. Atsain, S. Wangwe, and A. G. Drabek (eds.), *African Economic Issues*, manuscript, October 1993.

Savadogo, K., T. Reardon, and K. Pietola. "Farm productivity in Burkina Faso: effects of animal traction and nonfarm income." *Amer. J. of Agr. Econ.*, Volume 76, No. 3, August 1994.