

Income Diversification, Poverty Traps and Policy Shocks in Côte d'Ivoire and Kenya

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Abstract:

This paper presents evidence on the effects of two different sorts of policy shocks on observed income diversification patterns in rural Africa. In Côte d'Ivoire, households with poor endowments were less able to respond to attractive emerging on-farm and non-farm opportunities. Due to entry barriers to superior livelihood strategies, the benefits of exchange rate reform accrued disproportionately to households that were richer prior to devaluation. By contrast, food-for-work transfers to households in Kenya significantly reduced liquidity constraints, enabling project participants to pursue more lucrative livelihood strategies in non-farm activities and higher-return agricultural production patterns. Jointly, these two shocks underscore the importance of liquidity, market access and skill constraints to skilled non-farm income sources to dynamic poverty traps in rural Africa.

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Introduction

Most African smallholders derive some income from activities outside primary agriculture (“non-farm” activities), away from their own farms (“off-farm” activities), or both (Reardon,

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1997; Ellis, 1998; Bryceson, 1999; Barrett and Reardon, 2000; Ellis, 2000). Much attention has been paid to the role of non-farm livelihoods in coping with natural and policy shocks (Reardon et al., 1992; Reardon and Taylor, 1996; Ellis, 1998). Yet remarkably little is known about the reverse causality: how policy shocks affect African smallholders' livelihood diversification patterns. Policy is rarely designed with smallholder diversification behaviors in mind, so any effects are likely unintended. But if diversification provides an important means by which smallholders self-insure against risk, seize income earning opportunities, or accumulate capital for investment – be it in human (e.g., children's education or health), physical (e.g., farm machinery), or natural (e.g., windbreaks or terracing) form – then the effects of policy on diversification patterns surely matter to smallholder welfare and merit investigation.

This paper explores this question using both longitudinal data related to a macro policy shock, devaluation of the currency in Côte d'Ivoire, and cross-sectional data related to a local policy shock, the distribution of food aid to farmers in Baringo District, Kenya. By comparing two very different types of data sets and policy shocks, we hope to begin to tease out some general patterns. These are but two samples, so our results should be interpreted conservatively. Nonetheless, our evidence corroborates others' findings that diversification behaviors reveal important liquidity and skills constraints to household activity choice, constraints that are related to ex ante endowments that restrict the access of poorer populations to livelihood strategies that are relatively more lucrative, less risky, or both. Policy reforms that fail to address these constraints leave these less fortunate subpopulations trapped in low-return, high-risk livelihood strategies based largely on unskilled labor and part-time, self-employed farming. Policies that do address the underlying microeconomic constraints to activity choice facilitate income mobility.

Concepts and Definitions

The burgeoning literature on *livelihood strategies* and *diversification patterns*¹ includes many different implicit definitions for terms such as “non-farm” and “off-farm.” The farm/non-farm distinction revolves around sectoral classifications derived from standard national accounting practices while the on-farm/off-farm distinction reflects the spatial distribution of activities, with “off-farm” income generated away from one’s own land (Barrett and Reardon 2000).² But not all non-farm or off-farm activities offer equal returns. Economic theory clearly predicts that, *ceteris paribus*, returns to an activity are increasing in the difficulty of entry into or exit from that market niche. Activities unfettered by entry or exit barriers, such as unskilled farm labor, offer low returns while those with significant entry barriers – e.g., the acquisition of skills or equipment – yield positive marginal economic profits in equilibrium. Previous empirical research in rural Africa has established the existence significant entry or expansion barriers to high return niches in the non-farm economy (Reardon et al., 1992; Fafchamps, 1994; Dercon and Krishnan, 1996; Barrett, 1997; Reardon, 1997; Reardon et al., 1998, 2000).

Following the principle of revealed preference, observed diversification patterns provide important indirect evidence as to what households consider their most attractive options, given the constraints they face and their preference (including with respect to risk). Insofar as one can identify some livelihood strategies that clearly dominate other strategies, studying how policy shocks affect shifts in diversification patterns across these strategies opens an important window onto how, if at all, policy changes smallholders’ opportunity set.

Barrett et al. (2000) identify four distinct rural livelihoods strategies offering markedly different returns distributions. Their taxonomy parallels Eswaran and Kotwal’s (1986) related

work on class structure in agrarian societies. Some rural African households depend exclusively on their own agricultural (animal or crop) production for income,³ what we term the “full time farmer” strategy. Others combine own production on-farm with wage labor on others’ farm, which we refer to as the “farmer and farm worker” strategy. The other two strategies combine farm and non-farm earnings. Within this population, we draw a distinction between those who undertake unskilled labor – whether in the farm or non-farm sectors – and those who do not. The “Farm and Skilled Non-farm” strategy does not include unskilled labor and tends to be associated with higher income households with relatively better educated or skilled adult members. The fourth “mixed” strategy combines all three basic elements discussed so far: on-farm agricultural production, unskilled on-farm or off-farm wage employment, and non-farm earnings from trades, commerce and skilled (often salaried) employment. This classification scheme underscores the importance of labor market dualism in poor, rural regions; returns to labor vary substantially.

These four household livelihood diversification strategies do not offer similar returns. In comparative work across different African agroecologies, Barrett et al. (2000) found that strategies including non-farm income stochastically dominate those based entirely on agriculture, while the farm and skilled non-farm and full time farmer strategies generally offer superior returns to the mixed and, especially, the farmer and farm worker strategies, respectively. These differences arise due to variation in the degree to which each strategy involves barriers to entry.

Pursuit of the full time farmer strategy requires either sufficient ex ante land endowments or the financial or political means to secure access to additional land in order to be able to absorb the household’s whole working age labor force. This strategy may appeal if the household is in a high potential agroecology with satisfactory market access or if non-farm opportunities are too

expensive to pursue. Those pursuing the full time farmer strategy are more likely to engage in cash crop production of tradables than do farmers pursuing the farmer and farm worker strategy, which tends to prevail in areas with poorer market access. Smallholders pursuing the farmer and farm worker strategy generally have insufficient land, given labor endowments, to survive entirely off own production.

Entry into the non-farm sector depends on market access simply because people must be able to sell their handicrafts, processed farm products, labor for mining or factory work, etc. Within the non-farm sector, skill, capital or both are required to enter most higher-return activities (e.g., long-haul motorized transport, salaried employment). Returns to hard-to-finance equipment and scarce skills are typically much higher than are returns to unskilled labor, so the farm and skilled non-farm strategy typically yields higher returns than the mixed strategy does.

The most plausible explanation for rural Africans' choice of demonstrably less desirable livelihood strategies is that differences in asset endowments – especially of land, labor, education, and livestock – and access to markets and financing differentially constrain household choice (Dercon and Krishnan, 1996; Dercon, 1998; Carter and May, 1999; Barrett et al., 2000). Those same constraints often compel diversification into low-return activities. Poor endowments of productive, non-labor assets such as land or livestock commonly force poorer households to hire themselves out to work others' fields or to herd others' animals for low wages. Policy shocks will thereby affect diversification behaviors and their distributional consequences through induced effects on the incentives and the constraints faced by smallholders.

Diversification Behaviors in Response to Exchange Rate Devaluation in Côte d'Ivoire

We begin the empirical analysis with the case of Côte d'Ivoire, using the West Africa Rice Development Association (WARDA)'s farm management and household survey (FMHS) of 120 rice farming households.⁴ These were selected by stratified random sample in three distinct humid-to-sub-humid agro-ecological zones, each with relatively fertile soils, ample water, and reasonably good market access. The Ivorien data thus represent relatively high agricultural potential zones by Sub-Saharan African standards. Rice is the primary cereal in the region, with significant cultivation as well of tubers, pulses, other cereals and cash crops such as cocoa, coffee and cotton.

The WARDA FMHS collected data for three consecutive years, 1993-95, fortuitously straddling the January 1994 100 percent devaluation of the CFA franc (FCFA),⁵ which had been fixed at a 50:1 parity against the French franc for the preceding 46 years. While devaluation had been mooted for years, the extent and timing of the event nonetheless surprised most residents of the FCFA economies. For some months thereafter, there was considerable uncertainty as to how prices would change and what implications this had for farmers' livelihood strategies. Ultimately, devaluation and contemporaneous macroeconomic policy reforms had the effect of significantly increasing real returns to the production, processing and marketing of tradables, including crops like rice, cocoa, coffee, and cotton as well as many skilled non-farm activities like transport, milling, metal working, garment production and distribution, etc. Devaluation depressed real returns to low-wage, non-farm activities such as hair cutting or cleaning and to the production of nontradable primary products like cassava, cowpeas or yams.

By inducing increased cultivation of rice and other tradable crops, exchange rate devaluation induced a significant reduction in rice farming household income diversification. The

mean percent of income derived from off-farm and non-farm activities combined fell in this sample from 19.2 percent in 1993 to just 5.4 percent in 1995. So at the aggregate level, devaluation induced greater specialization, not more diversification. And although returns to rice increased in real terms, average per capita real incomes in this rice farming population fell by 4.3 percent between 1993 and 1995, reflecting largely decreased rice yields and poorer real returns to non-rice crops and wage labor

Farmers exhibited tremendous mobility among livelihood strategies between 1993 and 1995. Almost two-thirds of households switched strategies between 1993 and 1995 (Table 1), with most of the movement out of non-farm activities and into agricultural production, either as producers or unskilled farm laborers (Table 2). Just as Davies (1993) found Malian farmers to be adept at adapting livelihood strategies in response to climatic and other natural shocks, so too do we find that Ivorien farmers are clearly not stuck in a single activity for long in the wake of significant terms of trade shocks.

The aggregate figures nonetheless mask significant differences within the population of rice producing households. Those with relatively poor land endowments and incomes – those two variables are strongly, positively correlated in these data – remained more dependent on agricultural wage labor. As Table 3 shows, there is a clear distinction between households that in 1995 pursued either the full-time farmer strategy – the cohort with the most land and cattle, living furthest from town in 1993 – or the farm and skilled non-farm strategy – the cohort with the highest age of household head and secondary school completion rate, and living closest to town – and those in the other two strategies. The correspondence between ex ante endowments shown in Table 3 and the real returns to the different livelihood strategies (Table 2) is striking in its

demonstration that ex ante wealth affords superior access to high return strategies.

Those with meager endowments appear stuck in a poverty trap. The lowest quartile of the 1993 per capita income distribution still derived 11.6 percent of 1995 total income from off-farm agricultural labor, down only from 13.7 percent in 1993. More fundamentally, they were far more likely to wind up pursuing the farmer and farm worker strategy than were the upper three quartiles, with more than 70 percent of the poorest households engaged in unskilled farm labor in addition to production on their own farm. None were engaged in skilled or salaried non-farm activities in 1995. Indeed, relative to the upper three 1993 quartiles, the lowest quartile households were far less likely to receive non-farm income (skilled or unskilled) in 1995 or to be fully engaged in production on their own farm (less than ten percent). While virtually none of the households in the upper three quartiles switched into the farmer and farm worker strategy by 1995, half of the lowest 1993 quartile did, mainly (86 percent of the switching cohort) moving from unskilled non-farm labor to unskilled off-farm labor. Expansion in the tradable agricultural sector absorbed more labor, drawing the poor back to farming at the margin.

But increased employment in tradables farm production was associated with falling real wages in the wake of devaluation, so these households suffered real income losses. The ratio of the local rice price to the local unskilled farm wage rate increased 16.8 percent, 1993-95, reflecting a nontrivial real income loss for those who depend significantly on unskilled wage income. As Table 2 shows, those pursuing the farmer and farm worker strategy in 1995 suffered mean losses of 24.1 percent of real income, relative to 1993, with more than three-quarters of the 1995 farmer and farm worker households suffering real income losses.⁶ Those who stayed involved in non-farm activities, largely unskilled non-farm work, while also earning unskilled farm

wages likewise suffered mean real income losses, 1993-95, in excess of twenty percent. Table 2 shows the stark contrast in real income change between these cohorts and those who were able to concentrate entirely in on-farm agricultural production or who combined on-farm with skilled non-farm work. These latter groups enjoyed significant mean real income gains, 8.1 percent for those in the full time farmer strategy in 1995 and 12.4 percent for those engaged in the farm and skilled non-farm strategy. While there was considerable variation in real returns within each strategy, the differences between the means of the full time farmer and farm and skilled non-farm strategies, on the one hand, and the farmer and farm worker and mixed strategies, on the other, are statistically significant at the five percent level. Where the median household engaged in the former activities enjoyed significantly positive real income gains, the median household engaged in the latter ones suffered sharp real income losses.

The poor 1995 returns make it easy to understand why most people pursuing the mixed strategy moved away from that after 1993 and why few people entered. It is likewise relatively easy to understand why many people entered the high-return full time farmer strategy between 1993 and 1995.

The figures in Table 2 requiring some explanation are the low rate of exit from and the high rate of entry into the poor-return farmer and farm worker strategy, as well as the low rate of entry into the highest-return farm and skilled non-farm strategy. In order to establish why households would not move from, but rather move into, a low return strategy while not entering the highest-return strategy, we complement the descriptive statistics offered in Tables 2 and 3 with multinomial logit analysis of households' 1995 choice among the four livelihood strategies. The independent variables include household endowments and characteristics – the household's

total 1995 land area, labor supply and number of cattle owned, the age and educational attainment of the household head, and distance from town – the household's 1993 livelihood strategy, and regional fixed effects. Regional fixed effects capture differences in market access and agroecological conditions that condition opportunities across all households in a region (Dercon and Krishnan, 1996), while household characteristics and endowments then identify variation within regions. The inclusion of past strategy choice among the regressors not only directly reflects the dynamics of strategy change but also should pick up unobserved household attributes that have a time invariant effect on activity choice (e.g., skill in a particular trade or ownership of illiquid assets specific to one sort of activity). Table 4 presents the results.

The importance of household endowments and market access to 1995 livelihood strategy selection comes through clearly, especially when one does not control for prior livelihood choice. The likelihood of being in the two more attractive post-devaluation strategies, full time farming and farm/skilled non-farm, is increasing in total land or cattle owned and secondary school completion. Participation in non-farm activities is decreasing in distance from town, underscoring the importance of physical market access to livelihood choice. Past livelihood strategy is the single most important predictor of household activity choice, as reflected by the considerable difference in explanatory power between the long and short versions of the multinomial logit model. This signals not only intuitive behavioral inertia but also that unobserved factors – such as occupational preferences, social networks, particular skills, or land quality – exert a significant influence over household livelihood choice.

It appears that households with limited land endowments, low educational attainment rates and faced with binding liquidity constraints alternate between unskilled employment non-farm and

off-farm, depending on which sector is experiencing greater employment growth. But movement between the farmer and farm worker and mixed strategies and the farm and non-farm sectors does not reflect seizure of emerging income opportunities. These households' limited endowments render them unlikely to climb out of the difficult circumstances in which they find themselves in the absence of significant growth in real wages for unskilled workers, perhaps as a result of rapid growth in labor-intensive sectors.⁷ In particular, poorer households haven't the resources to overcome the skill and capital entry barriers that enable the farm and skilled non-farm strategy to yield such high rates of real return and to keep entry rates low.

So the effects of massive exchange rate devaluation on rural agricultural households' income diversification were basically three. First, it induced a significant shift back into agriculture, thereby reducing the income share most households derived from non-farm activities. Second, it induced considerable reallocation of labor and other household assets across activities, as shown by the high inter-strategy mobility figures in Table 1. Third, in spite of this obvious mobility, the real income gains from FCFA devaluation accrued overwhelmingly to those households relatively well endowed with land, educated adults, and liquidity, who were already engaged in or able to switch into production of tradables, i.e., to follow the Full Time Farmer or Farm and Skilled Non-farm strategies. Meanwhile, those with poorer endowments remained stuck in unskilled labor and nontradables' production and on average suffered significant real income losses in the wake of exchange rate devaluation.

A macro policy shock like an exchange rate devaluation thus seems to create real income opportunities in the rural economy. But the chronically poor are structurally impeded from seizing these opportunities due to poor endowments and liquidity constraints that restrict their

capacity to overcome the bad starting hand they have been dealt. Rural factor market failures indeed appear to create dynamic poverty traps (McPeak and Barrett 2001).

Food for Work Distribution and Diversification Behaviors in Baringo District, Kenya

The Kenyan data were collected by two of the co-authors in a 1994-96 stratified random sample of 308 farm households in ten sublocations of lower Baringo District, an arid-to-semi-arid region populated mainly by agropastoralists disproportionately dependent on transhumant livestock production due to high evapotranspiration rates and mean annual rainfall of only 600-700 millimeters. The main agricultural activities for rural Baringo households are production of small ruminants (primarily goats) and coarse grains: millet, maize and sorghum. So these households operate in a significantly lower potential agroecology than do the Ivorien households studied in the previous section. The biophysical context helps stimulate greater diversification out of agriculture. Human population densities in the District are moderate, with satisfactory access to large metropolitan areas of the Rift Valley (e.g., Nakuru) and the Central Highlands (e.g., Nairobi). This fuels a more active market for livestock sold to urban terminal markets down country and also opens up a wider range of non-farm options to Baringo households than exist for households in more remote arid and semi-arid lands (Little et al., forthcoming; Smith et al., forthcoming). The District suffers poverty rates above the national average, and financial intermediation is quite limited, so liquidity constraints tend to bind for many Baringo households (Bezuneh et al., 1988; Little, 1994). Between the high poverty rates and frequent droughts, food aid has played a significant role in the area since the early 1980s.

The farm household survey data used here was carried out in food-for-work (FFW)

project areas. The survey sample was stratified according to whether or not people participated in FFW projects during the survey period. Some 40 percent (125 households) of the population participated in FFW during the survey period, all at below-market wages.

In the absence of longitudinal data, measuring the impact of FFW on income and hence on diversification requires that we first understand what household income might have been if a participant household had not been involved in FFW projects. Although self-selection into FFW projects could introduce bias into simple comparisons among the groups, in this case we believe the nonparticipants actually provide a good control group for understanding the impact of FFW on recipient household behaviors. FFW's impact on income, income distribution and diversification is strictly additional if no labor substitution occurs between FFW and other income earning activities (i.e., if FFW simply induces increased labor supply). A previous study in this general area found few if any labor substitution effects (Bezuneh and Deaton, 1997). We checked this using the relative mean income (RMI) technique, which compares the mean income of each income quartile, excluding income from the treatment, in this case FFW, expressed as a proportion of the mean income of the total sample, across the groups. If the RMI patterns are statistically indistinguishable between the treatment and control groups, then the income from FFW can reasonably be treated as purely additional.⁸ As Table 5 shows, FFW participants have nearly identical RMI to non-participants in the lower half of the income distribution when FFW income is excluded, reflecting no apparent labor substitution effects. While the differences in mean RMI in the upper two quartiles are somewhat larger, with participants somewhat wealthier than nonparticipants in this upper range, once one controls for intra-quartile variation, these differences are likewise statistically insignificant at even the ten percent significance level. This

result supports our use of non-participants as a control group against which to compare FFW participants so as to establish the effects of food aid receipt on household income and diversification behavior.

In the semi-arid regions of Kenya, households typically accumulate wealth in the form of livestock, and engage in mixed crop-livestock production to generate income and satisfy household subsistence requirements. The imputed value of consumed own crop production represents a large share of income in the lower tail of the income distribution, with its share of income decreasing sharply as one moves up the income distribution (Tables 6a and 6b). By contrast, income from livestock sales increases sharply as one moves up the income distribution. At lower levels of income, livestock sales are driven largely by liquidity constraints and the seasonal needs to purchase food, or pay school fees or emergency health expenditures, while at upper income levels, livestock sales more commonly represent transactional turnover by large herders-cum-traders (Little, 1994).

Low cropping potential regions such as lower Baringo have relatively weak demand for agricultural wage laborers, so even the poor are unable to depend just on the farming sector. Almost everyone earns at least some income from non-farm work. Within the non-farm sector, however, unskilled labor yields the largest share of income in poorer households, while trades and commerce yield most of the non-farm income in wealthier households, as reflected in Tables 6a and 6b. Poorer households rely far more heavily on wage income than do richer households. Across all sample households, 27 percent of income in the poorest quartile came from wages, while only 17 percent of the richest quartile's income came from wage labor. By contrast, the poorest quartile earned only 25 percent of income from skilled non-farm activities and livestock

sales, two high-return niches protected by significant entry barriers. The richest income quartile earned better than half (58 percent) of its income from those activities.

These patterns echo the patterns reported from the Côte d'Ivoire data and found in other studies of income diversification in rural Africa (Dercon and Krishnan, 1996; Reardon, 1997; Barrett et al., 2000). The wealthy are able to access higher-return niches in the non-farm sector, increasing their wealth and reinforcing their superior access to strategies offering better returns. Those with weaker endowments *ex ante* are, by contrast, unable to surmount liquidity barriers to entry into or expansion of skilled non-farm activities and so remain trapped in lower-return, and sometimes riskier livelihood strategies.

As Tables 6a and 6b show, FFW reduces reliance on livestock sales in the poorest half of the income distribution. Since livestock are high return assets in this region sold by the poor mainly to meet immediate cash needs (Little, 1994), the replacement of income from livestock sales with FFW signals that such transfers relax poorer recipient households' liquidity constraints. Since maintaining a viable herd size is central to wealth accumulation and self-insurance in such arid and semi-arid areas (Little, 1994; Dercon, 1998; Lybbert et al., 2000; McPeak and Barrett, forthcoming), and project participation is associated with reduced livestock sales among poorer households, FFW appears to have helped participants avoid stochastic dynamic poverty traps among Baringo households.

In the lower half of the income distribution, FFW also had a modest secondary effect of increasing both crop income and non-farm income, especially skilled non-farm income earned from trades and commerce. An earlier study in this same region similarly found increased crop income resulting from food aid's relief of farmers' seasonal liquidity constraints, thereby

permitting them to adopt higher value crops and to hire in more labor during peak labor demand periods (Bezuneh et al., 1988). Since non-farm income from trades and commerce generally requires working capital with which to purchase inventories or equipment, the increase in this income likewise reflects reduction of liquidity constraints at the margin among FFW participants.

In the upper half of the income distribution, the primary effect of FFW appears to be a sharp increase in livestock sales income. This too likely reflects relaxed liquidity constraints. FFW reduces richer participant households' need to purchase food or dedicate as much labor to crop agriculture, which offers substantially lower but safer returns than livestock do in this environment. As a result, in the upper income quartile crop production value is lower among participants than non-participants but income earned from livestock sales and commerce is substantially increased, such that the participants' top income quartile earned mean income 37.4 percent higher than that of the non-participants' top income quartile.

FFW participants consistently enjoyed higher income than did their non-participant counterparts, and, with the exception of the second income quartile, the difference significantly exceeds the value of the FFW transfer, indicating additional value added, largely from being able to move into higher-return livelihood strategies associated with improved crop production, increased participation in skilled non-farm activities, and improved management of livestock assets for long-term capital gains. The patterns of income diversification are otherwise relatively similar between FFW participants and non-participants, indicating that the effects of FFW are less in inducing a substitution of labor in one area for work on the FFW project than an increase in labor supply and an increase in the productivity of the already diverse income earning activities households have outside the project.

Conclusions

In order to take advantage of livelihood strategies offering greater upward income mobility, which in rural Africa commonly involves diversification into non-farm activities, smallholder households must be able to overcome entry barriers defined by skills, contacts and capital access. Where policy change can relieve those constraints directly, as in the case of FFW in Kenya, it can thereby expand poorer households' opportunity sets, allowing them to undertake more attractive livelihood strategies. This commonly appears as increased diversification into skilled employment and self-employment. Where policy reforms ignore such constraints on smallholder choice, as in the Ivorian experience with devaluation, the poorest households tend not to be able to take advantage of emerging opportunities, especially in skilled non-farm activities, and ex ante patterns of inequality are simply reproduced or even magnified ex post. Those lacking the skills or land to fully absorb household labor are stuck in unskilled labor, unlikely to be lifted out by macroeconomic reforms that simply shift labor between the farm and non-farm sectors. Interventions must aim explicitly to relieve poor households' working capital, skills and market access constraints if they are to succeed in empowering smallholders to choose superior livelihood strategies and to avoid the sort of dynamic stochastic poverty traps that otherwise plague much of rural Africa (Barrett and Carter, 1999; McPeak and Barrett, 2001).

As the main source of employment and wage goods, improved agricultural productivity and broadened access to essential factors of agricultural production (especially land) indisputably play central roles in resolving rural poverty problems in Africa. But the evidence presented in this paper – and in the broader literature on rural livelihoods reflected in this special issue – clearly points to the importance of securing access for all to attractive niches within a vibrant rural non-

farm economy through improved liquidity, market access, and human capital formation. If progress is to be made in combating rural African poverty, donors and policymakers must recognize that the most successful rural African households enjoy uncommon opportunities to draw heavily on high-return off-farm and non-farm income sources. Policy reforms do not automatically make such opportunities accessible to the poor absent explicit efforts to address the microeconomic origins of dynamic poverty traps.

Notes

¹ We use these two terms interchangeably.

² More precisely, “farm” activities are associated with those primary sector production processes that produce raw agrifood products from natural resources (land, rivers/lakes/ocean, air). The process can involve either growing (e.g., cropping, aquiculture, livestock husbandry, woodlot production) or gathering (e.g., hunting, fishing, forestry). “Non-farm” activities are associated with those secondary and tertiary sector production processes that use raw physical intermediate inputs (such as maize, milk, iron, wood) and process them into manufactured goods (such as maize flour, cheese, pails, furniture) or use financial or manufactured capital and labor to produce services (e.g., transport, commerce, banking). Notice that sectoral assignments depend only on the nature of the product and the types of factors used in the production process. Neither location (at or away from home) nor employer (self-employed or hired for a salary or wage) matter.

³ On-farm production may include food crops, cash crops or livestock, and output may be sold to market, retained for home consumption, or both.

⁴ The data and their collection are described in detail in WARDA (1997).

⁵ The FCFA is the common currency of the 14 central and west African nations belonging to the *Communauté Financière Africaine* .

⁶ Nominal income figures were adjusted by a simple rural deflator constructed out of the prices of local products, including both tradables (e.g., imported rice) and nontradables (e.g., cassava). Relative to 1993, prices were 52.24 percent higher in 1995.

⁷Dercon (1998) describes a qualitatively similar problem of stochastic dynamic poverty traps in which weak initial endowments make it difficult to accumulate highly productive capital to move into a high-return livelihood strategy, cattle production in the Tanzanian case he studied.

⁸ If the data set had appropriate instrumental variables to implement a two-stage Heckman procedure with exclusionary restrictions, one could alternatively test for selectivity effects using the inverse Mills ratio. The data available do not permit that more conventional approach.

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Table 1: Livelihood Strategies by 1993 Per Capita Income Quartile

	1 st Quartile	2 nd Quartile	3 rd Quartile	4 th Quartile
% in Farmer and Farm Worker strategy in 1995	70.8**	29.2**	6.7*	4.8*
% in Full Time Farming strategy in 1995	8.3**	16.7	26.7*	28.6*
% with non-farm income in 1995	20.8**	54.2*	66.7*	66.7*
% in same strategy in 1993 and 1995	29.2	37.5	20.0	47.6*
% entering Farmer and Farm Worker strategy by 1995	50.0**	8.3	0.0*	0.0*

** (*) statistically significantly different from (at least one of) the other three quartiles at the five percent level.

Table 2: Real Returns to Alternative Livelihood Strategies

1995 Strategy	Percent mean change in real income 1995/1993 (std. dev.)	Percent with lower 1995 incomes than 1993	Percent switching to strategy 1993-1995	Percent exiting this strategy since 1993
Full time farmer	8.1 (9.3)*	41.3*	39.1*	36.4*
Farmer and farm worker	-24.1 (11.3)*	77.8*	51.9*	28.6*
Farm and skilled non-farm	12.4 (10.7)*	30.0*	10.0*	52.2*
Mixed on-, off- and non-farm	-21.6 (9.7)*	83.3*	16.7*	92.1**

** (*) statistically significantly different from (at least one of) the other three strategies at the five percent level.

Table 3: 1993 Mean Household Endowments, by 1995 Livelihood Strategy

1995 Strategy	Total land (HA)	Total labor ¹	Cattle	Distance to Town (Kms)	Age of HH head	Head completed sec. school (%)
Full time farmer	8.2	6.1	6.5	4.3	48.8	0.08
Farmer and farm worker	2.6	7.8	0.9	3.9	36.5	0.04
Farm and skilled non-farm	7.4	6.7	1.2	0.7	52.3	0.29
Mixed on-, off- and non-farm	1.9	7.5	0.3	1.4	32.7	0.11

¹ Adult equivalents, with children under 14 and seniors over 65 counted as one-half an adult.

Table 4: Multinomial Logit Estimation Results

1995 Strategy	Full time farmer vs. mixed strategy		Farmer and farm worker vs. mixed strategy		Farm and skilled non-farm vs. mixed strategy	
Total land owned (hectares)	0.31** (0.14)	2.32** (0.40)	0.31 (0.93)	0.42 (0.37)	0.31 (0.25)	0.51** (0.23)
Cattle owned	0.17 (0.19)	0.15* (0.08)	-0.32* (0.17)	-0.14** (0.06)	0.02 (0.32)	-0.03 (0.13)
Total labor supply (adult equivalents)	-0.02 (0.09)	-0.05* (0.03)	0.15* (0.08)	0.42** (0.12)	-0.02 (0.12)	0.03 (0.05)
Age of HH head (years)	0.03 (0.03)	0.01 (0.23)	-0.13 (0.08)	-0.12 (0.09)	0.02 (0.12)	0.08* (0.04)
Completed secondary school?	-0.14 (0.12)	-0.07* (0.04)	-0.02 (0.09)	-0.12* (0.06)	0.12* (0.07)	0.54** (0.20)
Completed primary school?	0.01 (0.03)	0.03 (0.04)	-0.04 (0.04)	-0.03 (0.09)	0.04* (0.02)	0.09 (0.05)
Distance from town (kms)	0.12 (0.09)	0.27** (0.06)	0.17** (0.05)	0.10** (0.03)	-0.10 (0.14)	-0.39** (0.13)
Full time farmer 1993? (Yes=1)	0.23** (0.05)	–	-0.12** (0.03)	–	-0.03 (0.10)	–
Farmer and farm worker 1993? (Yes=1)	-0.14 (0.24)	–	0.75** (0.12)	–	-0.30 (0.28)	–
Farm and skilled non-farm 1993? (Yes=1)	-0.13 (0.17)	–	-0.23 (0.54)	–	0.79** (0.32)	–
Constant	-0.72** (0.30)	-0.05** (0.01)	0.17* (0.09)	0.14** (0.03)	-0.23* (0.13)	-0.73 (0.70)
Joint significance (w/ 1993 strategy: $\chi^2(36)$, w/o 1993 strategy: $\chi^2(27)$)	132.5**	46.5**				

Regional fixed effects included but not shown

Standard errors in parentheses

** (*) statistically significantly at the five (ten) percent level.

Table 5: Comparison of incomes by quartiles for FFW participants and nonparticipants (excluding the value of food received from FFW)

Quartiles	Participants (n=125)		Non-Participants (n=183)	
	Income (KSh)	RMI	Income (KSh)	RMI
1 st	4,373	.23	4,220	.22
2 nd	9,069	.48	9,421	.49
3 rd	18,064	.95	15,566	.82
4 th	52,619	2.77	38,967	2.05

The mean income of the total sample is 19,014 ksh.

RMI = relative mean income, the quartile mean income relative to the strata mean income.

Table 6: Mean income per adult equivalent, by source, Kenya shillings

a. FFW participants (n=125)

Income source	1 st quartile	2 nd quartile	3 rd quartile	4 th quartile	Full sample
Farm Income					
Own consumption	2224	3105	5052	6656	4278
Crop sales	11	65	14	2568	679
Livestock sales	805	2873	7401	27235	9719
Off-farm wage labor	203	1077	1275	1036	899
Non-Farm Income					
Unskilled labor	852	1242	2889	4514	2392
Trades/skilled labor/commerce	243	647	1425	7815	2575
Other					
Food-for-work	583	890	653	914	761
Pensions, rent, etc.	36	61	125	2798	771
Total	4956	9959	18834	53533	22079

b. FFW non-participants (n=183)

Income source	1 st quartile	2 nd quartile	3 rd quartile	4 th quartile	Full sample
Farm Income					
Own consumption	1966	3955	4437	8307	4588
Crop sales	1	38	94	1911	456
Livestock sales	1022	2665	5830	14400	4891
Off-farm wage labor	188	549	696	1042	614
Non-Farm Income					
Unskilled labor	819	1486	2522	6928	2959
Trades/skilled labor/commerce	156	654	1618	5329	1842
Other					
Food-for-work	0	0	0	0	0
Pensions, rent, etc.	68	73	370	1051	281
Total	4220	9421	15566	38967	15630