

Self-Financing of Rural Household Cash Expenditures in Burkina Faso: The Case of Net Cereal Buyers

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Abstract

Two general points are made by this descriptive paper:

First, cash needs in Sahel rural households, taking Burkina Faso as the case, are substantial in good years and poor years, and fertile zones and infertile zones. The cash is need mainly to buy cereals in the poor years in the infertile zones, and to diversify the consumption basket in the fertile zones in all years. We find that in all years in all zones net buyers of cereals/pulses are in the majority.

Second, the paper contradicts the hypothesis that Sahel farm households fill their cash needs mainly by cereal and livestock sales – with cereal sales in low-price seasons to meet pressing cash needs, but with cereal purchases in later, high-price seasons ('forced sales'). It also contradicts (by drawing on other evidence) the idea that cash needs or food deficits are filled by inter-household transfers ('social safety net') or resort to credit (net borrowing). On the contrary, the import of all four cash sources (cereal sales, livestock sales, credit, transfers) is small (less than a fifth) compared to the great import of off-farm earnings. It is the latter that in all zones and years are mainly responsible for filling the substantial cash needs.

The policy implications for finance policy are that in the short to medium run the key policy thrust would be to consider how to use credit policy (in a situation where relatively little informal and formal credit market development has taken place), and other policies, to increase incomes and employment (especially in non-cropping enterprise in the low potential zones) to ensure more stable and better-distributed self-financing of cash expenditures. This does not mean that there is not a strong demand for this credit. Instead, there is reasons to believe that there are many households that are capital-constrained and thus are unable to enter off-farm activities or buy farm equipment, and are thus much more vulnerable to the vicissitudes of unstable rainfall and prices. But, they are also perhaps least likely to be considered good 'investments' by local creditors. This leads back to the thorny issue of how to 'target' such credit to the lower tercile. But even if one is pessimistic about doing the latter, increasing the overall off-farm activity level should also increase opportunities for capital-constrained households to sell labour in that sector.

Résumé

L'auto-financement des dépenses monétaires des ménages ruraux au Burkina Faso : le cas des ménages déficitaires ayant recours à l'achat de céréales

L'article de T. Reardon et M. Mercado-Peters présente deux faits généraux :

— les besoins en liquidités des ménages ruraux sahéliens (au Burkina Faso par exemple) sont importants, que les années soient bonnes ou mauvaises, que ce soit dans les zones fertiles ou non. L'argent est nécessaire surtout pour l'achat de céréales pendant les mauvaises années dans les zones non fertiles, et dans les zones fertiles pour diversifier les achats de consommation finale, quelle que soit l'année. Il est mis en évidence que les ménages ayant recours à l'achat de céréales et de légumes sont majoritaires dans toutes les zones et tous les ans ;

— l'article réfute l'hypothèse selon laquelle les ménages ruraux sahéliens obtiennent des liquidités essentiellement par la vente de leur récolte et de leur bétail (les céréales étant vendues à une période où les prix sont bas pour répondre à des besoins en liquidités immédiats, et rachetées plus tard au moment où les prix sont élevés, cette pratique étant appelée "ventes forcées"). De la même façon, il est faux de penser que les besoins en liquidités ou encore les déficits en céréales sont comblés par des transferts inter-ménages ("réseau d'entraide") ou par du crédit ("réseau de prêts"). Au contraire, la contribution de ces quatre sources de liquidités (vente de la récolte, vente du bétail, crédit, transferts) est faible (moins d'un cinquième) comparée à celle, très importante, des activités non agricoles. Quelles que soient la zone et l'année, c'est principalement cette dernière source d'argent qui permet de satisfaire les importants besoins en liquidités.

Les implications en matière de politique de financement sont que, dans le court et le moyen terme, l'important est de réfléchir à la façon d'utiliser le crédit (dans une situation où le marché des crédits formel et informel est relativement peu développé), ou encore d'autres moyens, pour augmenter les revenus et les opportunités d'emploi (surtout dans les entreprises non agricoles des zones à faible potentialité agricole), afin d'assurer une plus grande stabilité et une meilleure redistribution des ressources monétaires propres destinées à couvrir les dépenses des ménages. Ceci ne signifie pas qu'il n'existe pas une forte demande de crédit ; au contraire, il y a des raisons de penser que beaucoup de ménages n'ont pas un niveau de capital suffisant pour investir dans des activités non agricoles ou dans l'équipement agricole et que, par conséquent, ces ménages sont plus vulnérables aux aléas du climat et des prix. Mais il semblerait aussi que ces ménages soient considérés par les prêteurs locaux comme les "investissements" les moins intéressants. Nous revenons là sur un problème épineux, à savoir comment "cibler" un tel crédit sur la couche de la population la plus pauvre. Même si certains sont pessimistes à l'idée de mettre en œuvre cette politique, il semblerait qu'augmenter de façon globale le volume des activités non agricoles permettrait de créer des opportunités d'emploi pour les ménages subissant une contrainte capital.

Introduction

The issue of financing of cash needs for a Sahel rural household would be a minor affair if the traditional view of these households was true. This traditional view is that they grow what they eat, and eat what they grow, and buy little besides; that they are little engaged in the market from either demand or supply sides. This view implies that whatever minor cash needs they have are filled by selling some crops or livestock (Kowal and Kassam, 1978; CILSS-Club du Sahel, 1981; Giri, 1983; Hyden, 1986; OECD, 1988). The view also implies that households do not have significant alternatives to cropping, and that 'food entitlement' (in the sense of Sen, 1981) depends mainly and directly on own-cropping.

But recent rural household survey evidence in the Sahel has contradicted this image. New facts concerning Sahel rural households are emerging; four are presented below. Some of these are based on 'thin' evidence, and need to be researched much more.

First, there are many net cereal buyers in Sahel rural areas, and the percentage of food consumption based on purchases by these net buyers is substantial. There are several surveys that show this, mainly in one-year case studies, mainly in production-deficit areas. Case study examples include the following: Dioné (1989) found in 1985/86 in rural Mali that 39 percent of his sample were net buyers; Goetz (1990) found in 1986/87 in southeastern Senegal that 30 percent were net buyers; Kelly *et al.* (1990) found in 1988/89 for the northern and central Peanut Basin in Senegal that 75 percent of the grain diet came from purchased grains in the northern, and 20 percent in the central zone. Reardon and Matlon (1989) found in 1984/85 for Burkina Faso that 43 percent of the grain diet came from purchased grains in the Sahelian zone and 37 percent in the Sudanian zone.

Nevertheless, little is known about how the number of net buyers varies by harvest-year and agroecological zone. This is because there exist few multi-year, multi-zone surveys.

Second, household incomes are very diversified into non-cropping sources. But this varies positively with income level — the contrary of the South Asian semi-arid tropics case. Reardon *et al.* (1992) showed, for Burkina Faso, that non-cropping income averaged 52, 26, and 57 percent of total household income over 1981-1985 in the Sahelian, Sudanian, and Guinean zones, respectively. Moreover, this income diversification is associated with higher consump-

tion and incomes that are also more stable over years.

Third, inter-household net transfers are a very minor source of income, even for lower tercile households. In the IFPRI/ICRISAT Burkina study, for example, the share of transfers in income never exceeded an average of 1-7 percent over terciles and zones, in 1981-85 (Reardon, 1990).¹

Fourth, net borrowing is also a very minor source of either cash flow or net overall income because of underdeveloped informal and formal credit markets. This was found by Christensen (1989), for western Burkina Faso in 1983-1985, and Barrett *et al.* (1982) for eastern Burkina Faso. Preliminary findings from the IFPRI/ISRA Senegal study also confirm this finding (Kelly *et al.*, 1990).

In sum, case studies in Burkina Faso, Mali, Senegal, and northern Nigeria paint a picture of the Sahel rural household as: a) being very involved in the market — the cereal market on the demand side, and mainly the labour and livestock markets on the supply side, except for pockets of cash cropping; b) earning diversified incomes where it can and using these incomes to buy cereal *inter alia*; c) depending very little on credit market and inter-household transfers — hence self-financing is by far the order of the day.

To understand the forces that shape the latent demand for financial services, it is important to understand how households have self-financed their expenditures from own-liquidity sources in the near-absence of a reliable and developed local credit market. Indeed this is the rationale for presenting a paper on rural household self-financing of cash outlays at this seminar on finance and rural development — to compare current practices of self-financing with credit financing, to infer latent demand for consumption and production credit, and to understand the underlying economic structure in which new financial institutions would function.

But this understanding is currently limited because little is known about the sources, timing, and extent of self-financing of food and non-food cash expenditures in the Sahel. What are the sources of cash? How do these vary over zones and years? How important are cereal purchases relative to other uses of the money? How does the timing of cash inflows and outflows coincide?

As far as we know, no other study has provided evidence on these questions for the rural Sahel. The contribution of this chapter is to provide through descriptive data some answers from a rural Burkina Faso case study focusing on the issue

Table 1: Percentage type of farmers (Net Buyers vs. Net Sellers) by harvest-year and by zone (cereals and pulses only)

Harvest Year		sample hh	net buyers (%)	net sellers (%)	(non-zero) (%)	Autarkic purch = sell (neither sell nor buy) (%)
81/82	Sahelian	40 hh's	72	28	0	
	Sudanian	47	45	51	0	4
	Guinean	58	70	30	0	1
82/83	Sahelian	40 hh's	90	4	0	6
	Sudanian	48	59	38	0	2
	Guinean	54	78	19	0	3
83/84	Sahelian	42 hh's	55	44	0	1
	Sudanian	48	50	41	0	9
	Guinean	54	73	23	0	4
84/85	Sahelian	42 hh's	100	0		
	Sudanian	41	90	10	0	
	Guinean	53	56	44	0	

Table 2: Net Buyers of Cereals/Pulses: Allocation of Cereals and Pulses Food Consumption (upper bound, available for consumption) by category by harvest-year by zone.

Zone	Harvest Year	Sample hh	Purchased	Food Aid	Gifts	Stocks Drawdown	Own Prod. kg. cons.	Other	Total
SAHELIAN	81/82	29	33	NA	NA	NA	455	1	490
	% (CV)		6.8 (86.1)	0.0	.0	NA	93.0 (42.3)	.2 (322.9)	100.0 (37.5)
	82/83	36	91	1	NA	127	3	223	
	% (CV)		40.9 (60.9)	.5 (416.4)	.4 (180.4)	0.0	57.0 (42.9)	1.3 (238.0)	100.0 (30.1)
	83/84	23	30	0	4	2	319	2	357
	% (CV)		8.3 (74.8)	.1 (349.7)	.0 (198.2)	.6 (430.0)	89.4 (52.3)	.6 (170.8)	100.0 (49.1)
84/85	42	100	18	6	16	87	2	230	
% (CV)		43.5 (72.9)	8.0 (80.1)	2.8 (175.8)	7.1 (246.6)	37.9 (75.2)	.7 (202.3)	100.0 (50.7)	
SUDANIAN	81/82	21	10	0	NA	NA	262	0	272
	% (CV)		3.5 (142.9)	0.0	NA	NA	96.4 (57.2)	.1 (165.9)	100.0 (54.3)
	82/83	29	20	0	2	NA	151	0	173
	% (CV)		11.3 (102.9)	0.0	1.0 (274.3)	.0	87.5 (33.5)	.2 (242.3)	100.0 (28.7)
	83/84	24	11	0	2	14	141	0	168
	% (CV)		6.6 (131.2)	.0 (391.0)	.9 (169.8)	8.1 (128.4)	84.0 (60.1)	.3 (125.9)	100.0 (51.4)
84/85	37	83	1	2	17	87	0	191	
% (CV)		43.3 (203.4)	.7 (130.4)	1.1 (192.2)	9.0 (158.9)	45.8 (47.5)	.1 (107.0)	100.0 (84.4)	
GUINEAN	81/82	41	7	0	NA	NA	310	2	319
	% (CV)		2.3 (87.1)	0.0	.0	.0	97.0 (49.1)	.8 (81.6)	100.0 (46.1)
	82/83	43	69	0	2	NA	89	8	168
	% (CV)		41.1 (81.8)	0.0	1.0 (260.1)	.0	53.1 (64.8)	4.8 (123.0)	100.0 (45.7)
	83/84	39	51	0	1	15	189	6	262
	% (CV)		19.5 (106.1)	0.0	.4 (200.5)	5.7 (359.1)	72.2 (56.1)	.2 (85.9)	100.0 (52.7)
84/85	30	54	0	2	9	134	6	205	
% (CV)		26.3 (100.7)	0.0	.9 (158.4)	4.3 (184.3)	65.5 (63.3)	2.9 (79.9)	100.0 (43.5)	

and case of net cereal purchasers (only in the 'household characteristics' section are net sellers compared). The focus on this group is justified because cereal is the biggest cash outlay item, and there are space constraints. Six questions are addressed:

- what share of households are net purchasers of grains/pulses (buy more than sell)?
- how important is purchased grains/pulses in overall food consumption?
- what characterizes the net purchasers of grains/pulses?
- what share of cash outlays are for food? livestock? farm inputs?
- how are these outlays financed: by non-farm income? by net sales of livestock? of grains/pulses? of cotton? of tubers? by credit?
- what is the seasonality of cash inflows and outflows?

Data and Zones

The data come from the household survey in Burkina Faso conducted by International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). The survey covered four harvest-years (1981/82 - 1984/85), a period comprising both good and poor harvests. But the average rainfall over the study period was below the long-term average, particularly in the northern and central zones.

The sample comprised a hundred and fifty households: twenty-five per village, with two villages per zone. Three agroecological zones were covered: the Sahelian, the Sudanian, and the Guinean.

The Sahelian study zone is in the northwest of Burkina Faso, around Djibo. It is very poor agroclimatically, with the lowest and most variable rainfall of all the zones, and thus extremely variable cropping outcomes. Coarse grain yields are very poor. Yet on average the sample households of the zone were just self-sufficient in output of foodgrains, but this disguises extreme inter-year variation. Livestock holdings are highest in this zone.

The Sudanian study zone is in the middle-west of Burkina Faso, around Yako. It is poor-to-intermediate agroclimatically, with low-medium rainfall that is less variable than the Sahelian zone's. Coarse grain yields are also poor. On average the overall sample is just short of being self-sufficient in output of foodgrains, but the deficit was more steady over study years than was the case in the Sahelian zone.

The Guinean study zone is in the south-west of Burkina Faso, around Boromo. It is moderately-favored agroclimatically, with medium to high rainfall (for the WASAT) that is much less variable than in the other zones, and hence cropping is much less risky. Like the other zones, the Guinean zone produces coarse grains and pulses, but also produces substantial amounts of cotton as a cash crop.

The balance of the text is devoted to presenting the research results for the six research questions listed above, and ends with conclusions and policy implications.

Research Results

What share of households are net purchasers of grains/pulses?

Table 1 shows the percentage of households that buy more cereals and pulses than they sell — per zone and per harvest-year t (defined as the period from harvest-season in calendar year t through the rainy season in calendar year $t+1$).

As expected, in the Sahelian zone the share of net buyers varies with the volume of harvest (itself dependent on the level of rainfall of the immediately-preceding rainy season). For harvest-years 81/82 - 84/85, the percentages were 72, 90, 55, 100 — on average 80 percent. Hence, net purchasers were always a majority, even in relatively good harvest-years (1981/82 and 1983/84). In the Sudanian zone the pattern over years was 45, 59, 50, 90 — on average 60 percent. The share of net buyers is higher in the Sahelian zone, partly because it is a drier zone, but also because it has higher incomes hence more purchasing power, based on more diversified sources. Yet even in the higher potential, Guinean zone, the shares were high, but smoother over years, due to smoother rainfall patterns: 70, 78, 73, 56 percent — on average 70 percent.²

In sum, there was a very high share of net grain/pulse buyers in all zones, 80, 60, and 70 percent of the households going from the arid North to the relatively fertile South, averaged over good and bad years. In no zone even in relatively good harvest-years, did the share of net buyers of cereals/pulses drop below half. Hence, households are choosing to depend incompletely on grain sales for cash, and are earning cash from sales of other crops (mainly cotton in the Guinean zone, and tubers in the Sudanian zone), as well as of livestock, and of labour, to finance the

**Table 3a: For Net Buyers of Cereals/pulses:
Mean and CV's of Household Characteristics by harvest-year and by zone**

Zone	Harvest Year	Sample (HH)	Income/ae	% Non-Crop Income	PSR	cal/ae/day	livestock per HH
SAHELIAN	81/82	29	52468	.	.	.	.
(CV)			62.2	.	.	.	.
	82/83	36	36844	54	55	2114	158928
(CV)			74.1	51.3	38.3	30.3	176.0
	83/84	23	44586	40	157	3510	219937
(CV)			63.4	48.4	50.1	44.6	151.2
	84/85	42	37921	73	40	2094	218174
(CV)			51.0	26.9	71.0	48.5	181.6
SUDANIAN	81/82	21	38258	.	.	.	.
(CV)			76.	.	.	.	.
	82/83	29	22160	36	68	1703	74730
(CV)			74.1	62.2	32.3	26.9	108.4
	83/84	24	33666	34	77	1668	154708
(CV)			89.6	68.8	54.5	50.7	375.2
	84/85	37	26119	42	48	1873	99216
(CV)			49.3	63.9	49.2	83.9	77.2
GUINEAN	81/82	41	40395	.	.	.	.
(CV)			53.1	.	.	.	.
	82/83	43	58297	75	46	1597	182014
(CV)			114.4	27.7	56.3	46.2	317.5
	83/84	39	69538	58	108	2512	153867
(CV)			84.6	42.4	95.2	53.9	373.0
	84/85	30	49504	63	76	1959	204265
(CV)			61.4	29.9	63.2	42.7	304.7

**Table 3b: For Net Sellers of Cereals/pulses:
Mean and CV's of Household Characteristics by harvest-year and by zone**

Zone	Harvest Year	Sample (HH)	Income/ae	% Non-Crop Income	PSR	cal/ae/day	livestock per HH
SAHELIAN	81/82	11	62493	.	.	.	.
(CV)			81.7	.	.	.	.
	82/83	2	58992	48	135	2791	1512771
(CV)			33.3	13.4	25.1	25.3	58.6
	83/84	19	58453	35	208	4032	165391
(CV)			46.6	58.4	34.8	31.1	194.0
SUDANIAN	81/82	24	31169	.	.	.	.
(CV)			70.3	.	.	.	.
	82/83	18	25214	30	86	1855	213051
(CV)			89.0	71.5	38.8	32.8	322.8
	83/84	20	27149	28	71	1423	155785
(CV)			49.3	68.0	48.1	60.8	178.2
	84/85	4	37807	29	78	1604	759817
(CV)			65.5	88.4	52.8	62.9	205.2
GUINEAN	81/82	17	36883	.	.	.	.
(CV)			28.7	.	.	.	.
	82/83	10	48486	48	117	2079	63870
(CV)			66.5	54.9	78.5	71.6	124.2
	83/84	13	63249	45	124	2218	169829
(CV)			56.3	44.2	52.5	59.0	159.9
	84/85	23	66214	45	119	2078	99078
(CV)			78.4	45.2	43.2	49.7	319.3

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net inflow of grains/pulses.

How important are purchased grains/pulses in overall food consumption?

Table 2 shows for net cereal/pulse buyers the shares by source (from purchases, own production, food aid, inter-household transfers, and other) of consumption of cereals/pulses. The consumption figures are consumption-by-disappearance, and are thus 'upper bound', showing 'availability-for-consumption' rather than actual intake.

In the Sahelian zone, in the poorest two harvest-years of the four (1982/83 and 1984/85) about 40 percent of cereal/pulse consumption came from purchases — a very high figure, again iconoclastic of the traditional image of Sahel households as essentially autarkic. By contrast, in relatively good harvest-years, although there was still a high share of 'net buyers', the share of purchases in consumption was only 6-8 percent. By contrast, the share in the Sudanian zone is uniformly low over the first three harvest-years (3-11 percent) but rose to a high 43 percent in the very poor harvest-year of 1984/85.

The difference between the purchase share in the Sahelian and Sudanian zones coincides with the evidence of both higher and more diversified incomes in the Sahelian zone, and the latter's apparently successful strategy of compensating harvest shortfalls with off-farm income in poor harvest-years. The households in the Sudanian zone have been less successful in this diversification, and hence in compensation and 'consumption smoothing'. (Reardon *et al.* 1988; Reardon and Matlon, 1989; Reardon *et al.* 1992).

In the Guinean zone, apart from in 1981/82, the share of purchases is quite high even in this dynamic cropping zone — 41, 20, and 26 percent of consumption in 1982-1985.

What characterizes the net purchasers of grains/pulses?

Table 3a and 3b show the household characteristics of net buyers and net sellers of cereals/pulses. Five variables are treated: a) income levels in FCFA/adult equivalent (net cash income plus the net imputed value of crop production, the latter comprising unsold plus sold crop output); b) the percentage of income coming from non-cropping sources (livestock sales, local off-farm earnings, and migration revenues); c) PSR (production sufficiency ratio — the per-

centage of the harvest-year during which the household could feed itself adequately from the grains/pulses harvested at the outset of the harvest-year); d) kilocalories per adult equivalent per day, on average over the harvest-year, calculated as consumption-by-disappearance; and e) household livestock holdings in CFA Francs (no data were available for 1981/82 for livestock holdings).

Comparing the figures per category per zone between Tables 3a and 3b, we find the following. In the Sahelian zone, net sellers' incomes are 35 percent higher than net buyers (comparing aggregate incomes over the harvest-years). By contrast, the average income of the net buyer and the net seller is almost equal in the Sudanian and Guinean zones.

Recall that the share of net sellers is smallest on average in the Sahelian zone; the sellers appear to be richer than the net buyers. But we see that the share of their incomes from non-cropping is about the same as the net buyers' — hence the difference in incomes is mainly due to much more successful harvests in a small group of households.

The incomes of the net buyers in the Sudanian zone are the lowest, only 90 percent of the average Sahelian income level, and only 55 percent of the Guinean's. The net sellers in the Sudanian zone have incomes equal to only 70 percent of their counterparts to the north and only 60 percent of those to the south.

In sum, the households in the Sudanian zone are poorer than those in the Sahelian and Guinean, and this is equally true for net buyers and net sellers (see Reardon *et al.*, 1992, for more details and interpretation).

On the other hand, net buyers are not poorer than net sellers in the Sudanian and Guinean zones, suggesting that the strategic choices for attempting to reach food security are not reflected in overall income but rather in the composition of product and factor sales to reach similar income levels or targets.

This composition is shown in the second column, the share of non-cropping income in total income (the composition of overall cash income — from non-farm and farm sources — is explored in more detail below). Concerning the non-cropping income share among the net buyers, the Sahelian's is 56 percent and the Guinean zone's is 65 percent on average over the years — hence a majority of income from non-cropping.

Yet the Sudanian zone's net buyers depend mainly on cropping (only 37 percent of income from non-cropping), and thus are closer to the traditional subsistence image. Reardon and Matlon (1989) found that this forced the food security of the Sudanian household to fluctuate with cropping outcomes, and there were more hungry households in that zone than in the Sahelian zone during the 1984/85 drought year. This is borne out in Table 3a, where the net buyers in the Sudanian zone have substantially less caloric intake than in the other two zones.

By contrast, in all zones the net sellers have lower shares of non-cropping income in total income (for Sahelian, Sudanian and Guinean, 42, 29, and 46 percent, respectively), despite their being roughly as well-off as the net buyers.

Beside product and factor marketing strategies, what differentiates net buyers and net sellers of cereals/pulses per

zone? Interestingly, in the Sahelian and Sudanian zones, the net sellers have much larger livestock herds, perhaps due to greater integration of livestock husbandry and cropping in these two agropastoral zones. By contrast, net sellers in the Guinean zone have much smaller herds compared to the net buyers.

The above results suggest that in the dynamic cropping zone, the Guinean, cash cropping presents a clear alternate path to meeting food security and cash income objectives, and this path is taken by a minority of households. The other path is to rely much more on off-farm income and livestock sales, and be net purchasers of cereals. This is the path chosen by most households.

On the other hand, in the two northern zones, the bifurcation in the paths seems to be crop-livestock association on one hand for a minority of households, and a heavy reliance of

Table 4: For Net Buyers of Cereals/pulses: Averages and Shares of Household Cash Outlays
(with text caveat concerning downward bias in totals) by harvest-year and by zone; level in FCFA/ae is shown

Zone	Harvest Year	Sample hh	Cereals/Pulses	Farm Inputs	Other Cons. Purchases	Total Outlays	Cash Inflow
SAHELIAN	81/82	29	2585	543	NA	3128	
	(SHARE)		.83	.17	NA	1.0	
	82/83	36	7102	643	NA	7745	
	(SHARE)		.92	.08	NA	1.0	
	83/84	23	2895	655	NA	3550	
	(SHARE)		.82	.18	NA	1.0	
SUDANIAN	84/85	42	10429	1153	3121	14702	28,000
	(SHARE)		.71	.08	.21	1.0	
	81/82	21	1091	971	NA	2062	
	(SHARE)		.53	.47	NA	1.0	
	82/83	29	1961	746	NA	2707	
	(SHARE)		.72	.28	NA	1.0	
GUINEAN	83/84	24	2233	773	NA	3006	
	(SHARE)		.74	.26	NA	1.0	
	84/85	37	8696	1874	10292	20862	12,000
	(SHARE)		.42	.09	.49	1.0	
	81/82	41	2032	2173	NA	4205	
	(SHARE)		.48	.52	NA	1.0	
GUINEAN	82/83	43	5109	2895	NA	8004	
	(SHARE)		.64	.36	NA	1.0	
	83/84	39	4476	4698	NA	9174	
	(SHARE)		.49	.51	NA	1.0	
	84/85	30	4587	2910	22368	29865	38,000
	(SHARE)		.15	.10	.75	1.0	

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off-farm income and some livestock sales to make ends meet, faced with poor harvests, for the majority of households.

What share of cash outlays are for food? for livestock? for farm inputs?

Table 4 shows, for net buyers of cereals/pulses, the uses of cash by purchase-item category. Cash outlay data are biased downwards in all years because we lacked cash gift data and we have only spotty data on expenditures on equipment. Christensen's (1989) work, based on the latter data, leads us to believe that the downward bias is not very large. Moreover, we have data on purchases of non-cereal/pulse consumption goods only for 1984/85³. But despite these lacks, certain dominant patterns emerge from the data.

First, average cash outlays increase moving from north to south, but the level and share of cereal/pulse purchases decrease. In 1984/85, the share in total cash outlays goes from 71 percent in the north to only 15 percent in the south. Outlays for farm inputs increase as one goes south, as expected, but not substantially. On the other hand, non-cereal/pulse consumption outlays (with results available only for 1984/85) go up very rapidly as one goes from north to south. Purchases for food security give way to purchases for a higher standard of living via a more varied consumption basket.

Second, the inter-year variability of cash outlays is high in the Sahelian zone (as expected, as they are mainly aimed at compensating wildly fluctuating harvests), but is much less so as one moves south. This is due to more stable rainfall to ingrained habits of consuming non-food items, and to more steady annual demand for 'modern inputs' such as fertilizer.

Third, and only examining the 1984/85 figures where we have data on non-cereal/pulse consumption expenditures, cash inflows exceed cash outflows in the Sahelian and Guinean zones — substantially so in the Sahelian zone, and only slightly so in the Guinean zone. Hence, in the Sahelian zone, dissavings (as well as under-enumerated asset sales) are helping to stabilize consumption over years. By contrast, cash outlays exceed cash inflows in the poorer Sudanian zone, absorbing existing cash savings and perhaps (underenumerated) sales of assets such as jewelry.

How are these outlays financed?

The fungibility of cash income across purchase items makes it difficult to assign a given cash source to a given cash use. We lack 'origin of cash' data in our expenditure records. Hence we take the indirect approach of describing composition and timing of cash sources and expenditures and infer their links therefrom. In this section we describe the cash sources (non-cropping income, net livestock sales, and crop sales). We examine the seasonality of cash sources and cash expenditures below.

Recall that the share of non-cropping income in total income among the net buyers in the Sahelian zone is 56 percent and in the Guinean zone is 65 percent on average over the study years. Hence, a majority of income was from non-cropping activities. By contrast, the Sudanian zone's net buyers depend mainly on cropping (only 37 percent of income from non-cropping).

Non-cropping income plus crop sales is total household cash income. From Table 3a, plus data on sales of crops and livestock (not shown in this chapter's tables) we calculate the share of cash income in total income, and the share of crop sales and livestock sales in cash income. Below we report only the results for the calculations for net buyers of cereals/pulses.

In the Sahelian zone, for net buyers, gross crop sales consisted 100 percent in all years of cereals/pulses, but in no year exceeded one percent of total income. Hence the share of cash income in total income is roughly the same as that of non-cropping income in total income, i.e. an average over years and households of 56 percent.

In the Sudanian zone, for net buyers, gross crop sales consisted 75 percent (averaged over years) of cereals/pulses. Gross crop sales averaged 4 percent of total income. Hence the share of cash income in total income is 4 percent higher than that of non-cropping income in total income, i.e. an average over years and households of 41 percent.

In the Guinean zone, for net buyers, gross crop sales consisted only 15 percent (averaged over years) of cereals/pulses. Gross crop sales averaged 11 percent of total income. Hence the share of cash income in total income is 11 percent higher than that of non-cropping income in total income, i.e. an average over years and households of 76 percent.

Again, these results contradict the traditional image of the Sahel rural households as subsisting in a non-monetized economy. Cash income as a share of total income varies from 41 to 75 percent, and cropping income only constitutes from 1 to 11 percent to total income. In the southwest, the 'cotton zone', this means that only about 15 percent of cash income is from cotton sales, and only slightly more from all crop sales.

Given that self-financing of food purchases (and other expenditures) depends so much on non-cropping cash income, what share of this cash inflow is from livestock net sales? Again, from data not shown in this chapter's tables, we found the following for net buyers of cereals/pulses. In

the Sahelian zone, 17 percent of cash inflow comes from net sales of livestock. In the Sudanian zone, the figure is near zero (most of the herds had been disaccumulated over successive droughts; see Christensen, 1989). In the Guinean zone, the figure is 11 percent.

In sum, for net buyers across zones and years, livestock net sales represent only up to 17 percent of cash inflow, and crops represent only up to 11 percent. Crop plus livestock sales cash-generation is thus only 17, 4, and 21 percent of all cash inflow for the Sahelian, Sudanian, and Guinean zones, respectively. This, combined with the result from Christensen (1989) of the very small share (less than 5 percent) of net borrowing in total cash income, means that

Table 5: Net Buyers of Cereals/pulses: Seasonal Cash Outflows - percent

Zone	Harvest Year	Sample hh	Hyr Purchases	Harvest	Cold	Hot	Rainy
Cereals/Pulses Purchases							
SAHELIAN	81/82	29	100	6	16	46	32
	82/83	36	100	14	43	35	8
	83/84	23	100	2	20	57	20
	84/85	42	100	20	25	41	14
SUDANIAN	81/82	21	100	11	18	47	24
	82/83	29	100	4	44	46	7
	83/84	24	100	23	29	26	22
	84/85	37	100	36	42	14	8
GUINEAN	81/82	41	100	20	26	45	8
	82/83	43	100	18	27	50	5
	83/84	39	100	12	30	47	11
	84/85	30	100	8	25	43	24
Livestock Purchases							
SAHELIAN	81/82	29	100	12	49	6	32
	82/83	36	100	6	20	22	52
	83/84	23	100	20	14	59	7
	84/85	42	100	14	28	1	57
SUDANIAN	81/82	21	100	23	30	45	2
	82/83	29	100	52	19	16	12
	83/84	24	100	22	23	12	42
	84/85	37	100	.	7	4	81
GUINEAN	81/82	41	100	19	21	19	41
	82/83	43	100	40	28	4	28
	83/84	39	100	41	44	10	5
	84/85	30	100	20	10	30	40
Purchases-Other Consumption							
SAHELIAN	84/85	42	100	32	29	12	27
SUDANIAN	84/85	37	100	37	35	15	14
GUINEAN	84/85	30	100	17	33	23	27

more than three-quarters of cash income comes from non-agricultural sources.

What is seasonality of cash inflows and outflows?

This section treats the seasonality issue inferentially and descriptively as the goal is just to show when cash appears to be needed and when cash is available — to judge the strategic juggling at the household level to assure self-financing of food and other needs. (There are other seasonality issues related to price determinants, grain stock management, and so on that are not explored here.)

In Tables 5 and 6 we use four seasons: harvest (September-November); dry/cold (December-February); dry/hot (March-May); rainy (June-August).

Cash outflows

Table 5 shows seasonality of purchases of cereals/pulses, livestock, and other consumption goods over years and zones; only data for net buyers of cereals/pulses are presented. The seasonality of cereal/pulse purchases differs between the Sahelian zone on one hand, and the two other zones. In the former, in the relatively good harvest-years, the bulk ($\frac{3}{4}$) of purchases are in the last two seasons (when stocks are running low but off-farm revenues are available for purchases). By contrast, in the poorer harvest-years, the purchases have less pronounced seasonality, probably because own-produced stocks were depleted sooner. In the Sudanian and Guinean zones, the purchases are smoother, about half in the first two seasons and half in the second two.

But in all zones, on balance, the greatest share of purchases are in the hot/dry season (March-May), again, when off-farm income from local and migratory activities is available, own-produced stocks are running low, and labour requirements (from clearing and planting) are just starting to rise.

The only other Burkina Faso case study of which we know that treats seasonality of cereal purchases is that of Ellsworth and Shapiro (1989), undertaken in calendar year 1984 (hence corresponding to the last three seasons of the 'normal rainfall harvest-year' 1983/84, and the first season of the drought harvest-year 1984/85. Their results coincide roughly with ours in that they found that most of the purchases are in the hot/dry and rainy seasons, coinciding with conventional wisdom concerning the timing of farmer purchases.

But our results here show that it was not the typical 'forced sales' scenario that usually underlies that conventional wisdom — wherein the farmer sells cheap in the early seasons and buys dear thereafter. Rather, we show that grain sales are a tiny part of cash inflow, and hence a tiny part of what finances later-season grain purchases, and thus only one half of the 'forced sales' story is supported.

The seasonality of livestock purchases is much less clear. In the Sahelian zone, the majority of purchases are concentrated in the hot/dry and rainy seasons (the second half of the harvest-year). In the other zones, either seasonality is not marked or purchases are more concentrated in the first two seasons of the harvest-year.

The seasonality of purchases of other consumption items is concentrated in the two northern zones (where the total level of these purchases is the lowest) in the first two seasons, perhaps tied to more festivities or ceremonies. The outflows are seasonally much more even in the Guinean zone.

Inflows

Table 6 shows seasonality of inflows of cash from sales of cereals/pulses, other crop sales, livestock sales, and non-agricultural income; only data for net buyers of cereals/pulses are presented.

Recall first that the share of grain sales in total cash inflow is very small (see above) and that the share of output disposal going to sales is less than 8 percent over 1983-1985 (Reardon *et al.*, 1987). Then note that there is no clear seasonal sales pattern in any of the zones — which contradicts the 'forced sales' hypothesis where the farmer sells when the price is low in the first half of the harvest-year and then buys grains when the price is high in the second half. This iconoclasm of the established hypothesis confirms — this time with four years rather than one year of data — the results of Ellsworth and Shapiro (1989) who also found no clear seasonal sales pattern.

By contrast, sales of other crops (tubers, cotton, etc.) exhibit very strong seasonality. The interesting cases are in the Sudanian and Guinean zones (it is only there that there are substantial sales of 'other crops'). Tubers are sold in the rainy and harvest seasons, and not stored (perhaps adequate storage facilities are lacking) and sold in the dry seasons. All cotton sales are made in the harvest season in the Guinean zone to the parastatal.

Table 6: Net Buyers of Cereals/pulses: Seasonal Cash Inflows - percent

Zone	Harvest Year	Sample hh	Hyr Purch	Harvest	Cold	Hot	Rainy
Cereals/Pulses Sales							
SAHELIAN	81/82	29	100	15	9	12	63
	82/83	36	100	8	0	18	74
	83/84	23	100	34	23	27	16
	84/85	42	100	47	2	13	38
SUDANIAN	81/82	21	100	18	29	24	29
	82/83	29	100	40	33	11	15
	83/84	24	100	32	31	17	20
	84/85	37	100	21	24	14	42
GUINEAN	81/82	41	100	19	26	34	22
	82/83	43	100	35	30	7	29
	83/84	39	100	48	22	11	18
	84/85	30	100	26	51	10	13
Non-cereal/pulse crop sales							
SAHELIAN	81/82	29	100	0	0	0	100
	82/83	36	.	.	.	.	.
	83/84	23	100	50	0	0	50
	84/85	42	.	.	.	.	.
SUDANIAN	81/82	21	100	46	0	8	46
	82/83	29	100	34	0	0	66
	83/84	24	100	78	4	0	18
	84/85	37	100	58	0	0	42
GUINEAN	81/82	41	100	98	0	0	2
	82/83	43	100	99	1	0	0
	83/84	39	100	95	5	0	0
	84/85	30	100	83	0	0	17
Livestock Sales							
SAHELIAN	81/82	29	100	12	53	4	31
	82/83	36	100	12	21	26	40
	83/84	23	100	14	23	27	36
	84/85	42	100	18	18	20	45
SUDANIAN	81/82	21	100	8	71	19	3
	82/83	29	100	27	35	22	16
	83/84	24	100	29	22	11	38
	84/85	37	100	48	25	18	10
GUINEAN	81/82	41	100	25	25	39	11
	82/83	43	100	28	11	16	45
	83/84	39	100	23	38	24	16
	84/85	30	100	32	12	21	35
Non-Agricultural Income							
SAHELIAN	81/82	29	100	21	45	8	27
	82/83	36	100	21	35	19	25
	83/84	23	100	20	47	21	12
	84/85	42	100	36	32	19	14
SUDANIAN	81/82	21	100	4	46	49	2
	82/83	29	100	25	28	28	19
	83/84	24	100	27	32	25	16
	84/85	37	100	23	42	20	14
GUINEAN	81/82	41	100	30	40	21	10
	82/83	43	100	37	30	17	15
	83/84	39	100	38	28	17	16
	84/85	30	100	30	45	13	12

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Interestingly, livestock sales do not exhibit strong seasonality in any zone. If animals are sold to purchase grains, that the latter is not strongly seasonal would imply a lack of clear seasonality in the former, barring price effects. On balance, the wide range of motives and opportunities for sales, and what appears to be the spectrum of sensitivity to prices, determines that livestock are sold throughout the year.

Recall that all of the inflow sources covered above together do not exceed about a fifth of cash flow, so that even if we detected strong seasonality, it would not be determinant in terms of cash availability for food and other purchases. Moreover, we did not find evidence of sharp seasonality. Hence, the spotlight is now on the issue of whether non-agricultural activity cash inflows are sharply seasonal.

Although the patterns are less sharp than expected, a disproportionate amount of non-agricultural income is earned outside the rainy season, and is moderately concentrated in all zones in the two dry seasons, as expected.

Hence, by far the greatest share of cash inflow and to a moderate extent the greatest seasonal concentration of inflow occurs in the case of non-agricultural income, and coincides with the greatest share of outflow of cash, with the greatest seasonal concentration, for purchases of cereals/pulses for consumption.

Summary of Results

This descriptive paper makes **two general points**: first, cash needs in Sahel rural households, taking Burkina Faso as the case, are substantial in good years and poor years, and fertile zones and infertile zones. The cash is need mainly to buy cereals in the poor years in the infertile zones, and to diversify the consumption basket in the fertile zones in all years. The paper makes this point for a variety of years and agroecological zones — while prior to this the few empirical studies touching on this issue have been limited to a single year and a few zones. But we find that in all years in all zones net buyers of cereals/pulses are in the majority.

Second, the paper contradicts the long-established hypothesis that Sahel farm households fill their cash needs mainly by cereal and livestock sales — with cereal sales in low-price seasons to meet pressing cash needs, but with cereal purchases in later, high-price seasons ('forced sales'). It also contradicts (by drawing on other evidence) the idea that

cash needs or food deficits are filled by inter-household transfers ('social safety net') or resort to credit (net borrowing). On the contrary, the import of all four cash sources (cereal sales, livestock sales, credit, transfers) is small (less than a fifth) compared to the great import of off-farm earnings. It is the latter that in all zones and years are mainly responsible for filling the substantial cash needs.

Fleshing-out the two general points, the paper makes **six specific points**.

First, in all three zones, in good years and bad years, net buyers of cereals/pulses are a solid majority.

Second, the share of purchases in total consumption of cereals/pulses varies by harvest-year; it is higher in the poorer years, but on average is quite high. Even where cropping capacity is relatively high, farmers chose strategies to grow non-cereal cash crops, sell livestock, and earn off-farm incomes.

Third, there was ambiguity in the correlation between income and asset levels of households, and their status as net buyers. That is, not just the poor are net buyers — relatively well-off households can be net buyers, perhaps because they have chosen to generate cash other than by selling cereals to self-finance their food and non-food cash needs.

Fourth, in general cash outlays increase moving from the more arid north to the more fertile south, but the level and share of cereal/pulse purchases decreases rapidly. The variability of cash outlays is high over years in the Sahelian zone to compensate wildly fluctuating harvests, but are much less so as one moves south.

Fifth, the rural household economy in all zones is highly monetized, and dependence on cash inflows and outflows central to food security. The share of cash income in total income ranged from an average of 41 to 76 percent over zones. But, importantly, cash inflow from livestock and crop sales represents only 17, 4, and 21 percent for the Sahelian, Sudanian, and Guinean zones, respectively.

Thus, the great bulk of cash inflow is from non-agricultural sources in all zones. Elsewhere (in Reardon *et al.*, 1992) it is shown that contrary to the South-Asian case, the share of non-agricultural income in total household income is strongly positively related to income level. Reardon (1990) shows, moreover, that the lower tercile households also are relegated the off-farm activities that require little capital investment and are labour intensive — with low returns to labour.

Sixth, our seasonality results concerning grain sales and purchases coincided with earlier work in Burkina Faso (by Ellsworth and Shapiro, 1989) concerning the lack of clear seasonality for sales and moderate seasonal concentration (in the hot/dry season) of grain purchases. This was a renewal of the contradiction of the forced sales hypothesis, at least on the sales side.

But we showed that the great bulk of cash inflow (from off-farm activity) is moderately concentrated in the dry seasons, and thus is probably the key source of liquidity for grain and farm input purchases in this severely credit-constrained environment. By contrast, credit (and transfers) are a very minor part of cash inflow to finance these purchases.

Policy Implications

We focus here on implications that are of particular interest for this seminar on finance and rural development; the results have other policy implications, for example in the marketing and price policy spheres⁴. First, credit is a very minor source of cash inflows used for the very substantial cash outflows of Sahel households. This means that in the short to medium run the key policy thrust would be to consider how to use credit policy (in a situation where relatively little informal and formal credit market development has taken place), and other policies, to increase incomes and employment to ensure more stable and better-distributed self-financing of cash expenditures.

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This does not mean that there is not a strong demand for this credit. Instead, there is reason to believe that there are many households that are capital-constrained and thus are unable to enter off-farm activities or buy farm equipment, and are thus much more vulnerable to the vicissitudes of unstable rainfall and prices. But, they are also perhaps least likely to be considered good 'investments' by local creditors.

This leads us back to the thorny issue of how to 'target' such credit to the lower tercile. But even if one is pessimistic about doing the latter (a position taken by a number of papers at this seminar), increasing the overall off-farm activity level should also increase opportunities for capital-constrained households to sell labour in that sector.

Hence, policies and programs that promote financial market development in such a way that increases the off-farm sector opportunities for the poorest will have the greatest equity impact. Making these activities more efficient and profitable will also aid equity and increase the probability of reimbursement of loans from local creditors — which will enhance the sustainability of local finance market development. Moreover, agricultural intensification in the higher potential, Guinean zone, will increase the opportunities for labour intensive activity by the lower tercile in that zone. It will also lead to development of 'growth linkage' activities. □

Notes

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(1) Reardon (1990) reviewed evidence from Northern Nigeria (Matlon, 1979), Western Burkina Faso (Reardon, 1990), and Eastern Burkina Faso (Barrett *et al.*, 1982) and found similar results in these studies.

(2) In general one expects the shares of net buyers to be higher for the case of grains/pulses than for the case of all crops. For instance, the percentage of net buyers in the Guinean zone is much lower (46 percent) in 1981/82 for the case of all crops (not shown in the tables) than for the case of cereals/pulses (70 percent), because the sales of cotton off-set cereal purchases for a subset of households in the Guinean zone. Reardon *et al.* (1987) for the same household sample and four-year period showed that two-thirds of crop sales in the Sudanian zone were of tubers, peanuts, and cowpeas, while four-fifths of crop sales in the Guinean zone were of cotton. On the other hand, almost 100% of the crop sales in the Sahelian zone were of cereals. Hence, one would expect the main divergences between the case of all crops and that of grains/pulses to be in the Sudanian and Guinean zones.

(3) These data were collected in a companion survey to that of ICRISAT, by Reardon.

(4) For example, the importance of net purchases indicates, contrary to established wisdom, the potential strong impacts of price policy on the demand side in Sahel rural areas (rather than just on the supply side), with attendant equity impacts (see Reardon *et al.*, 1988, and Weber *et al.*, 1988).

References

- Barrett V., Lassiter G., Wilcock D., Baker D., Crawford E., 1982. Animal Traction in Eastern Upper Volta: A Technical, Economic, and Institutional Analysis. Michigan State University International Development Paper n°4.
- Christensen G., 1989. Determinants of Private Investment in Rural Burkina Faso. Ph.D. Thesis (Dept. of Ag. Econ., Cornell University)
- CILSS/Club du Sahel, 1981. L'intensification des cultures pluviales dans les pays du Sahel. Synthesis of Bamako Seminar, 12-14 May.
- Dioné J., 1989. Informing Food Security Policy in Mali: Interactions between Technology, Institutions, and Market Reforms. Ph.D. Thesis (Dept. of Ag. Econ., Michigan State University).
- Ellsworth L. and Shapiro K., 1989. Burkina Faso Grain Marketing. In: D. Sahn (ed.), Seasonal Variability in Third World Agriculture: The Consequences for Food Security. Johns Hopkins University Press.
- Giri J., 1983. Le Sahel demain: catastrophe ou renaissance? Paris; Editions Karthala.
- Goetz S.J., 1990. Market Reforms, Food Security, and the Cash Crop - Food Crop Debate in Southeastern Senegal. Ph.D. Thesis (Dept. of Ag. Econ., Michigan State University).

- Hyden G., 1986. *The Invisible Economy of Smallholder Agriculture in Africa*. In: J.L. Moock (ed.), *Understanding Africa's Rural Households and Farming Systems*. Boulder; Westview Press.
- Kelly V., Reardon T. and McNeilly L. *Sales, Purchases, and Gifts of Agricultural Products in the Peanut Basin and Senegal Oriental, October 1988 - September 1989*. Project Document 6 submitted to USAID/Senegal, October, 1991.
- Kowal J.M. and Kassam A.W., 1978. *Agricultural Ecology of Savanna: A Study of West Africa*. Oxford; Clarendon Press.
- Matlon P., 1979. *Income Distribution Among Farmers in Northern Nigeria: Empirical Results and Policy Implications*. African Rural Economy Paper n° 18, 1979. Michigan State University.
- OECD, 1988. *The Sahel Facing the Future [Le Sahel face aux futurs]*. Paris; OECD.
- Ouedraogo I., 1983. *A Socioeconomic Analysis of Farmers' Food Grain Marketing Linkages and Behavior in Eastern Upper Volta*. Ph.D. Thesis, (Dept. of Ag. Econ., Michigan State University).
- Reardon T., 1990. *Agricultural Development and Policy Issues Raised by Rural Household Income Diversification in the West African Semi-Arid Tropics*. mimeo, Washington; IFPRI.
- Reardon T., Forthcoming. *Cereal Imports in West Africa and the Potential Impacts of Sahelian Regional Protection*. World Development.
- Reardon T., Delgado C. and Matlon P., Forthcoming. *Determinants and Effects of Income Diversification Amongst Farm Households in Burkina Faso*. *Journal of Development Studies*.
- Reardon T., Delgado C. and Matlon P., 1987. *Farmer Marketing and the Composition of Cereals Consumption in Burkina Faso*. IFPRI/ISRA Conference, Dakar, July, mimeo.
- Reardon T. and Matlon P., 1989. *Seasonal Food Insecurity and Vulnerability in Drought-Affected Regions of Burkina Faso*. In: D. Sahn (ed.), *Seasonal Variability in Third World Agriculture: The Consequences for Food Security*; Johns Hopkins University Press.
- Reardon T., Matlon P. and Delgado C., 1988. *Coping with Household-level Food Insecurity in Drought-Affected Areas of Burkina Faso*. *World Development*, Vol 16, n°9, pp. 1065-1074.
- Sen A., 1981. *Poverty and Famines: An Essay on Entitlement and Deprivation*. Oxford; Oxford University Press.
- Tapsoba E.K., 1981. *An Economic and Institutional Analysis of Formal and Informal Credit in Eastern Upper Volta: Empirical Evidence and Policy Implications*. Ph.D. Thesis (Dept. of Ag. Econ., Michigan State University).
- Weber M.T., Staatz J.M., Holtzman J.S., Crawford E.W. and Bernstein R.H., 1988. *Informing Food Security Decisions in Africa: Empirical Analysis and Policy Dialogue*. *American Journal of Agricultural Economics*, Vol. 70, n°5, December.