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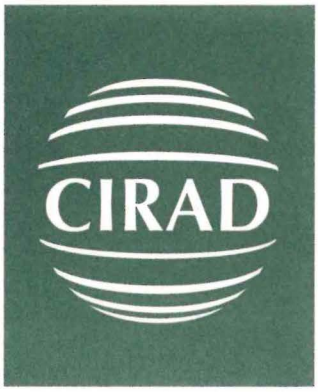

Devaluation and food security in the Franc Zone

The case of Burkina Faso

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Summary

Expectations generated by the FCFA devaluation included a recovered export competitivity, a decreased level of imports and the development of the whole economy and specially of the agricultural sector. This could have, however, important negative social impacts, specially on food security. Policies had to be implemented to attenuate the negative effects.
This paper analyzes the situation in Burkina Faso, where "socially concerned" policies were implemented after the devaluation to decrease the negative impact on urban food security. Alternative policies are simulated and analyzed to evaluate their potential impact.
The main conclusions are: the actual policy was positive both for the farmers (mainly of the west region) and urban consumers, even if the results for global trade balance were not as high as expected ; the impact of a liberal policy will be favolable for the agriculture sector of all regions, but it will be limited if there is no urban income growth, and the impact at the consumers' level will be very negative, specially for poor household ; finally, an open market for fertilizers can be positive for all regions, but its outcome will be dependant on the possibilities for farmers to accumulate capital.

Résumé

La dévaluation du FCFA devait engendrer une reprise de la compétitivité à l'exportation, une baisse des importations et le développement de l'économie en général, notamment dans le secteur agricole. Cependant, ces effets étaient susceptibles d'avoir d'importantes conséquences négatives au niveau social, notamment sur la sécurité alimentaire. Il a fallu mettre en œuvre des politiques visant à atténuer ces effets négatifs.
La présente communication analyse la situation au Burkina Faso, où des politiques "à orientation sociale" ont été mises en place après la dévaluation pour réduire l'impact négatif de celle-ci sur la sécurité alimentaire urbaine. Les différentes politiques possibles sont ici simulées et analysées pour évaluer leur impact potentiel. Les principales conclusions sont que : la politique effective a été positive à la fois pour les agriculteurs (notamment de la région ouest) et pour les consommateurs urbains, même si les résultats de la balance commerciale globale n'ont pas été aussi bons que prévu ; l'impact d'une politique libérale sera favorable à l'agriculture de toutes les régions, mais il sera limité s'il n'y a pas de hausse des revenus urbains, et l'impact au niveau des consommateurs sera vraiment négatif, surtout pour les ménages pauvres ; enfin, un marché des engrais ouvert peut être un élément positif pour toutes les régions, mais le résultat dépend de la possibilité qu'ont les agriculteurs d'accumuler du capital.

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In 1994 the countries of the zone Franc in Africa decided a devaluation of 50 % of the Franc CFA, in order to recover export competitivity, diminish imports and develop the local economy. The increase of import prices was supposed to induce urban population to shift their demand to local products, mainly food, with a positive effect on prices. This, as well as the higher prices of export products, was supposed to increase local production to respond to the increasing demand and the higher agricultural revenues were supposed, in time, to induce an upward movement of the economy. This process, however, might induce a negative impact on urban population. Policy makers choice was hard: in one extreme, to take actions to alleviate the situation on population, specially urban households, would have a consequent loss for the global economy; or, on the other extreme, to completely liberalize the economy, expecting that a new equilibrium would be reached in due time, would produce negative social impacts. The evaluation of the possible impact of these (and less drastical) alternative policy measures on the agricultural sector and on urban households food security is then necessary.

The case of Burkina Faso is a good exemple of "socially concerned" policies taken after the devaluation to thwart its negative impacts. The purpose of this paper is to show and discuss possible outcomes of other alternative policies suggested after the devaluation, both for the farmers and the urban consumers. A model of the burkinabe agricultural sector was built up to allow these simulations.

The impact of the F CFA devaluation in Burkina Faso

Before the devaluation, Burkina Faso was facing economic stagnation: among other problems, internal public treasury deficit added to internal and external debt, discouraged investments; and the share of imported food in the diet increased, with a negative impact on the trade balance. To improve the economic situation, a structural adjustment program has been carried out since 1991, but its success has been limited, mainly due to bureaucratic implementation problems. But with normal weather conditions, national agricultural production generates a surplus. Cash crops, mainly cotton, though affected by world prices depression before the devaluation, presents a stable positive trend in production. Food crops' production is usually excedentary at the national level, but some regions face deficits, like the Sahel (related to weather conditions) or the center region (overpopulation). Nevertheless, low incomes are responsible for difficult access to food, both in the rural and urban areas. After the devaluation, local prices were supposed to increase, but less than imported prices. The government, however, in order to diminish the impact on urban consumers, established controls on urban food price, mainly the ones of imported products (which by the way generated a strong negative impact on the trade balance and the public deficit.) The controls were not completely effective (inflation rate in 1994 was 24,7%[1]) so the government allowed a slight increase (10%) in nominal wages, that partially mitigated the negative impact on living standards of urban population. Further liberalisation of prices is supposed to take place gradually in order to diminish the cost

[1]This rate is however very low when compared with what happened in the other countries of the zone.

for the state of food subsidies on imports. However, urban diet, based on imported rice consumption,changed slightly, without the expected increase on local food demand (and on crop prices.)
The impact of devaluation on farmers was relatively positive even though the low increase in crop food prices and that a portion of the high cash crops prices was captured by the marketing (state-owned) company. The main thrust came from the unmodified input (fertilizers and agrochemicals) prices in 1994. However, this situation was modified in 1995, when input prices were increased. Their use decreased which induced higher deforestation[2] to extensify land allocation. Nevertheless, some specific products like vegetables as well as animal husbandry, benefitted also from interesting prices as a consequence of an increased external demand. Transportation costs increased, affecting mainly isolated regions.
As a consequence, negative impacts at the urban level were less important that they could have been, but the pay-off of the agricultural sector was lower than expected.

A model to study alternative policies

Where these measures the right ones? How could alternative policies affect farmers and urban consumers? To answer these questions, simulations were done to evaluate the possible responses. These simulation were realized through the use of the Multi-level Analysis Tool for the Agricultural sector (MATA). MATA is a tool created to evaluate response trends on agriculture production and food consumption as result of policy changes. The sector model is the result of an aggregation process which starts at the farm level (the basic unit of the model), and goes on with the regional level and finally the national level. Each representative farm's surplus is aggregated to estimate regional outputs which are again aggregated to calculate global marketed output. Total output is confronted with urban demand and this confrontation determines prices. These prices are used to estimate "actual" farm revenues. Farmers are responsive to changes in prices and the economic context. The principal hypotheses of the model are the following:
1. Farmers' decision making process is based on price "adaptative" expectations.
2. Farmers interact through exchanges in work, manure or traction.
3. Some farmer's decisions are irreversible.
4. Individual farmer's output do not influence prices
5. Individual consumer's decisions do not affect prices
6. Self-sufficiency is the basic constraint for most of the farmers.

This model is principally built up by two main modules which take into account the two extremes of the problem when analyzing the agricultural sector: the production aspects (farmer's reaction to economic environment changes) and consumers' behaviour, mainly the substitution processes between local and imported products in urban consumption. The first module represents agricultural production starting from a detailed description of farmers'/herders' behaviour. The second represents the different commodity chains, specially the process of supply aggregation and price formation

[2]Wood has also been increasingly exploited for heating and to obtain additional revenues.

mechanisms through a detailed description of consumers' behaviour[3]. A third module gives the macro-economic context for the model.
This tool is appropiate to analyze the impact of devaluation (a macro-economic decision) and alternative policies driven by different objectives according to the social group that will be favorized.

The application for Burkina Faso

The country was divided in 5 major regions (Kafando, 1995): the Sahel, the central plateau, the east, the northwest and the west. Within each region, several types of farms were modelled, according to their representativity found through a factorial analysis of the national agricultural survey(1993). For each region the production possibilities were defined as well as common and forrage lands. The number of transhumant animals is a function of forrage availability in the region(Kafando shows that the transhumants rarely leave the region where they are based). Technical schedules influence long term productivity in an ex-post manner: there is no actualisation estimation of possible gains or losses of actual decisions, only the impact on productivity of actual practices is considered.
Five simulations were done to evaluate the impact of the devaluation and alternative policies. The first simulation (*reference*) represents the situation without the devaluation. The second *(actual*) represents the devaluation with all the changes that actually took place : increase in coton price (with a higher price incertitude at the beginning), moderate rise in cereals prices, no increase in fertilizer price in the first year and an important increase (60%) afterwards, finally a constant 10% rise in urban revenues. The third one (*liberal*) represents the liberal option after the devaluation: all prices affected by external trade (imports and exports) are doubled, input trade is completely liberalized, local prices are not modified exogeneously, and urban revenues are not modified. The fourth simulation (*liberal+income*) has the same characteristics as the third one, but urban revenues increase 10% per annum. The fifth simulation (*fertilizer*) represent an alternative to the actual devaluation: a "real"[4] liberalisation of the fertilizer markets mainly to evaluate the possibility of increasing production both for the external and internal markets.

Results and comments

In the reference simulation land allocation is relatively stable and close to actual allocation in 1993 (see annex 1), which shows the property of the model to reproduce the basis conditions for which it was calibrated. This stable situation is due to the fact that no population growth is considered in the model. This choice is volontary in order to separate the effects of the different simulations from other impacts

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[3]Further information on MATA can be found in Gérard et al. 1994 and in Robilliard and Deybe, 1995.

[4]Fertilizer markets have been already liberalized before the devaluation, but fertilizer is only available for coton production.

that can be influenced by population pressure[5].
To allow the comparisons between the different scenarii, the results will be organized by specific topics: surface allocation, total production, farmers' revenues and, finally, urban consumption. The results will be synthesized qualitatively in tables: a plus implies a positive effect (higher when the number of pluses increases), a negative sign a negative impact and a zero signifies no changes.

Table 1: Impact of different scenarii on crop surface and forest.

	Surface			
Scenario	**Cotton**	**Maize**	**Sorghum-Millet**	**Forest**
Actual	++	-	0	- -
Liberal	++++	-	- -	-
Liberal+Income	+++	- -	0	0
Fertilizer	+++	+++	- - -	- - -

All the policies simulated have a positive impact on land allocated to cotton, the main cash crop considered in the model, and the higher impact will be with the liberal policy. This confirms the hypothesis of a positive impact of a devaluation on cash crops. However, the thesis that other crops production will increase in the long-run is not confirmed with the results of the model, at least for the short-term (4 years). On the contrary, land allocation for cereals will decrease, with the exception of the fertilizer simulation, which can have a very positive impact on maize land allocation. Also, most of the simulations show that the impact on the environment, measured in forest losses, as a result of the devaluation will be negative, specially with the fertilizer policy[6], because more economically attractive crops will increase the interest of farmers for these activities and they will tend to deforest to have more land to farm. The impact on production is shown on table 2. It shows the same trends as in land allocation .

Table 2: Impact of different scenarii on crop production

	Production		
Scenario	**Cotton**	**Maize**	**Sorghum-Millet**
Actual	++	--	-
Liberal	++++	--	---
Liberal+Income	+++	---	---
Fertilizer	++	++++	----

However, this analysis at a macro-economic level does not indicate how the different regions and, within each region the different farmers, will profit from the new economic context. Thus it can induce erroneous indications for policy makers.

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[5]The model is prepared to deal with population growth as well as gender differentiation within each farm. The lack of precise information on the different farm types in Burkina did not allow to introduce these two factors.

[6]This goes against common expectation.

Table 3: Impact of different scenarii on farms'cash flow within each region

	Farm Type	1	2	3	4	5	6	
	West							
	number (1000)	150	8	34	11	13		Cash Flow
	Surface	2.8	3.8	6.5	10.8	12.5		Per hectare
Scenario								
Reference		-	+	0	0	-		4084
Actual		+++	++++	++	0	++		7269
Liberal		++++++	+++	+++	++	++		11685
Liberal+Income		++++	+++	+++	+++	+++		10346
Fertilizer		++++++	++++	+++	0	++		10651
	Center							
	number (1000)	136	68	77	15			
	Surface	2	4.7	4.1	5.4			
Scenario								
Reference		0	-	-	0			2200
Actual		++	0	+	++			2759
Liberal		+++	+	+++	++			4014
Liberal+Income		+++	++	+++	+++			4562
Fertilizer		++	0	++++	+++			3969
	Northern							
	number (1000)	26	97					
	Surface	2.4	4					
Scenario								
Reference		0	0					3950
Actual		+	++					4616
Liberal		0	+					4120
Liberal+Income		0	+++					5953
Fertilizer		+	++					4771
	Eastern							
	number (1000)	45	121	58				
	Surface	1.7	2.6	3.8				
Scenario								
Reference		0	0	0				3088
Actual		+	+	+				3690
Liberal		0	0	-				2849
Liberal+Income		+	++	++				4190
Fertilizer		+	++	+				3478
	Sahelian							
	number (1000)	9	13	8	20	15	8	
	Surface	1.9	2.7	3.4	4.6	5	5.3	
Scenario								
Reference		-	-	0	0	0	0	2683
Actual		+	+	+	+	+	+	2597
Liberal		0	+	0	+	+	+	2330
Liberal+Income		+	+	+	++	++	++	4403
Fertilizer		0	+	0	+	+	+	2935

Table 3[7] shows the impact at a farm level by region. It can be observed that the devaluation had a positive impact everywhere, but the impact was extremely positive only in the regions where production is oriented towards export crops (west and center regions). When the cash flow per hectare[8] is analyzed, it can be verified that the impact is more important in the west region. Of the other policies, the better for the rest of the regions is the liberal+income growth alternative, because urban demand for local food will increase, and thus their prices, and these products are very important for the economy of these regions. The impact of the liberal alternative will not be so positive due to the impossibility of urban population to increase its demand and thus food prices will stay depressed. A main consequence can then be drown from this: even if a policy is oriented towards the agricultural sector (higher prices for food), if the other sectors in the economy do not grow, the impact will be limited due to lack of demand. Finally, the fertilizer policy will only affect the center region, even if in the principle it is oriented towards the whole country.

Nevertheless, the impact for each policy is different within each region: for exemple, a liberal devaluation will be extremely positive for small farms in the west region (and they are the most numerous group) due mainly to the improved rentability of cotton, and not so important for the bigger farms in the area. But the impact will be very low for farm type 2 in the center region or even negative for farm type 3 in the eastern region (due to higher input cost). Thus the importance of this type of approach when analyzing agricultural policies: a policy oriented towards a macro-economic objective can not have the expected impact on some regions or, what can be even more important, on the type of farmers towards which it might be addressed.

However, this analysis is not sufficient to evaluate an agricultural policy: the impact on urban consumers food security measured in caloric intake[9] might be not satisfactory. On table 4 it can be seen that only the "actual" policy after the devaluation had a positive impact on this indicator. Liberal policies will have a negative impact on consumption, which can be very important for the low-income households. Besides, the fertilizer policy can have a positive impact on the high-income households because local food prices will decrease and so consumption might increase. However there will be no impact on low-income households given the fact that their budget is too limited. A way to compensate should be seeked to increase their welfare.

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[7]The table is organized as follows: for each region, the number of farms and the surface of each farm is presented before indicating the results.

[8]Cash flow is part of the revenu that is kept in the farm to fullfill cash requirements of the following year activities (crops and livestock). It is estimated as a portion of total income. Farms' cash flows are then aggregated at the regional level and divided by the number of hectares and the number of years simulated.

[9]However, no consideration is given in the analysis to the quality of the caloric intake.

Table 4: Impact of different scenarii on caloric intake at the urban level

	household	
Scenario	low income	high income
Actual	+	++
Liberal	--	-
Liberal+Income	--	-
Fertilizer	0	+

Conclusion

The results show that the measures taken after the devaluation were appropriate considering the context of Burkina Faso: consumers were not so much affected as they could have been and farmers took advantage of the new conditions. However the impact on trade balance might not be as high as expected. The other alternatives simulated could have had better results in the long term, but they would have had a social cost and/or àn impact on the public finances[10] that might not be repaid by the gains in production. But the "actual" devaluation can have a long-run negative impact at the environmental level if the deforestation process continues which can be a consequence of the difficult access to fertilizers.

It is evident then that three main variables are fondamental to improve agriculture production: the possibilty to the farmer to increase its income to be able to improve his investment capacity; the availability of fertilizer; and the urban income. The choice will depend on the objectifs of the policy makers and the society.

It is necessary to continue the analysis with the new context induced by the devaluation, to give new indications on possible alternatives and evaluate the different impacts. Also, some of the assumptions introduced in the model should be further developped in order to improve the performance of the model.

[10]It was not possible to find out the level of subsidies/taxes affecting the export/import products to estimate internal rates of return for these options.

Annex 1: Real and simulated land allocation in the different regions of Burkina Faso

West

	Cotton	Maize	Sorghum-Millet	Peanuts	Rice
Real	104	146	646	52	10
Simulation	100	145	660	47	10

Center

	Cotton	Maize	Sorghum-Millet	Peanuts	Rice
Real	11	21	928	63	11
Simulation	9	9	898	67	9

North-West

	Cotton	Maize	Sorghum-Millet	Peanuts	Rice
Real	0	9	417	18	5
Simulation	0	11	413	20	5

East

	Cotton	Maize	Sorghum-Millet	Peanuts	Rice
Real	0	18	490	71	6
Simulation	0	0	531	77	5

Sahel

	Cotton	Maize	Sorghum-Millet	Peanuts	Rice
Real	0	3	284	3	0
Simulation	0	0	291	0	3

REFERENCES

Deybe D. (1994) Vers une agriculture durable. Un modèle bio-économique. Paris, CIRAD. 193 p.

Gérard F. (1991) Instabilité des prix des produits agricoles et influence de l'incertitude sur les comportements économiques : essai sur les problèmes associés à la régulation de l'offre. Thèse de Doctorat, Université de Paris I Panthéon-Sorbonne, France, 567 p.

Gérard F., Boussard J.M. et Deybe D. (1994) MATA : Prototype of Multilevel Analysis Tool. Paris, CIRAD. Documents de Travail URPA n°23.

Kafando B.E. (1995) Analyse de l'impact de la dévaluation du Franc CFA sur la production agricole et la sécurité alimentaire et propositions d'action. Systèmes de production. Document de travail. FAO-MARA TCP/BKF/3453

Robilliard A.-S., Deybe D. (1995) MATA: Sécurité alimentaire et politiques en Afrique Subsaharienne, présentation de la maquette. Paris, CIRAD. Notes et documents URPA n° 54.

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