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FARMING AND COOKING: THE VALUE OF HOME ACTIVITIES IN THE GRAIN-PLOUGH CULTURE OF ETHIOPIA

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ABSTRACT. This paper proposes a procedure for the valuation of village resources to show that the suppression of home activities in rural social accounting in Ethiopia may easily lead to incorrect decisions in the selection of rural development projects or other forms of agrarian policy intervention. This is apart from the adverse implication of the same accounting convention to the reliability of macro-economic figures as currently reported in the country. The paper's results are all based on the estimation of the 1988/89 crop year input-output matrix of a farming village of the grain-plough culture.

I. INTRODUCTION

Most of the grain output of village households in Ethiopia is known to be put aside for own use. However, the same grain clearly is not a final product since a number of production activities intervene between it and what is eventually served at villagers' tables. We may refer to these intermediate activities as home activities to distinguish them from activities of crop production or animal husbandry. At one end of these activities, we have the preparation of a variety of food items, beverages and services by members of each household. These are linked to farm activities by a range of activities of post-harvest processing. Both sets of home activities are supported by regular collection or preparation of fuel material and fetching of potable water, normally from a long distance. Together, these activities engage a very large share of resources in rural economies for many of which they clearly compete with farming activities. Yet value-added in home activities appears to be largely ignored in current practices of social accounting in the country, not least of all, because the outputs of such activities are not generally tradable, and imputing appropriate prices to them is not an easy task.

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Household services may be ignored in national income accounting in industrial economies with relatively little consequence in the use of income statistics in policy decisions. However, home activities in rural economies in countries like Ethiopia appear to be far more important in that respect than household services in advanced economies.

Based on a case study of a village economy in the grain-plough culture of Ethiopia, this paper proposes a procedure for the shadow pricing of all village products to show that the suppression of home activities in social accounting has two consequences. By far the more important of these is that this accounting convention may easily lead to the wrong decisions in the selection of rural development projects or other forms of public interventions in as far as it surely leads to incorrect measurement of constraints to or multiplier effects of individual interventions. The second consequence is the underestimation of rural aggregate income figures and the errors this is bound to lead to in the estimation of such macro-economic indicators as the GDP, the relative share of agriculture in GDP and the aggregate saving ratio.

The case study was conducted in the farming village of Ude located some sixty kilometers south east of Addis Ababa along the highway linking the capital to the towns of Nazareth and Mojo. The village is a territory of 680 hectares with a population of 972 in 195 households.[1] Just under 62 percent of these households are smallholders while the remaining work under a village *wolba*[2] established back in 1982. Farming under both village institutions consists of a mixture of temporary cropping and animal husbandry practiced within the broad tradition of the grain-plough culture as described in Hufnagel [6] and Westphal [10]. The major crops grown are *teff*, wheat and pulses mainly chick peas, peas and broad beans. More than half of the village crop land is taken up by *teff*, 18 percent by wheat and 20 percent by pulses. Animal husbandry in the locality consists of the raising of cattle and donkeys. This is circularly interdependent with crop production and home activities in that (a)

traction power is normally provided by oxen only, (b) donkeys are the major means of transportation of grain and fuel material, (c) cow dung in the form of *kubet* is the most important fuel material in the village and (d) oxen and other cattle are mainly fed on straw.

II. METHODS AND DATA

The place of home activities in the village economy in terms of relative share in value added and role in the input structure of other activities can be read from the village's social accounts matrix reported here for the 1988/89 crop year. This is based on shadow prices of village resources computed from the villages input-coefficients matrix, in physical units, for the same year. The Leontief inverse of the same coefficients matrix, but this time expressed in terms of prices, is a description of inter-activity linkages. Under the assumption of full employment of village resources, the inverse expresses the distribution of constraints to particular projects aimed at the village or for the relaxation of the strongest of which one may be faced with a choice from a menu of several projects. Under the alternative assumption of underemployment of village resources, the same inverse is the basis for the computation of multiplier or "backward linkage effects" in social cost-benefit analyses of alternative projects.

The following sequence of procedures was used to arrive at the village's accounts and the Leontief inverse of its production structure:

(1) obtaining physical-unit estimates of final demand for the output of farming activities and of the consumption of the output of home activities;

(2) estimating the material and labour input coefficients vector of each village activity in physical units;

(3) estimating the physical gross village output vector;

(4) use the estimated physical input coefficient matrix and the vector of gross output to obtain the physical intermediate input flow matrix of the village economy;

(5) use the estimated physical input coefficient matrix to obtain a vector of shadow prices of the entire range of village products;

(6) use shadow prices to piece together the physical intermediate flow matrix and final demand vector into a social accounting matrix; and

(7) use shadow prices to express the village input coefficient matrix in value terms, the Leontief inverse of which is used in the analysis of inter-activity linkages in the village.

The accounts reported refer to the year beginning March 1, 1988 and ending February 28, 1989. However, data collection started on August 6, 1988, with a census survey of Ude together with a sample survey of two other villages bordering it. Results of the survey were used to cross-tally households by size of landholdings, household size and ownership of livestock. This led to the identification of three wealth strata of smallholders in the village and another three of members of the village *wolba*. Ten households, out of which five were in Ude, were then selected for weekly record keeping on production activities, consumption and transactions over the next six months. Although the main criterion of selection was willingness to cooperate in regular record keeping, it was also ensured that each wealth stratum of either institution of village farming was represented by at least one household. A questionnaire was then administered on August 25, 1988 to the selected households to capture events of interest occurring between March 1, 1988 and the start of weekly record keeping. In addition, an observation sheet was used for each of the selected households to record the inputs and output of one

occurrence of each home activity. The weekly records were kept for each household by enumerators on an activity sheet and a transactions sheet, between August 28, 1988 and February 28, 1989. Monthly records were also kept on the village wolba's transaction and activities over the same period.

Output, input and purchase figures per household of a wealth stratum were initially obtained as arithmetic means of figures reported by stratum members in the household selection. Aggregate figures for a wealth stratum were then computed by multiplying the corresponding per household figures by the total number of stratum members in the village. When production or consumption events or transactions occurred at least once a month, figures obtained in this way for the period of records keeping were projected for the entire accounting year. Aggregates for the *wolba* institution were taken as those of households as members and those relating to the *wolba* as an organization. Overall village aggregates were taken as the sum of corresponding aggregates for the village *wolba* and smallholders.

III. PRICES AND ACCOUNTS

A minimum of thirty distinct production activities take place each year in Ude. Only eight of these are farming activities. Of the remaining 22 home activities seven are those of food and beverages items, namely, the preparation of *enjera, wot, dabo, kita, nifro-kolo, tella* and *coffee;* two are household services in the form of house cleaning and maintenance and washing of clothes; three involve the preparation of *kubet,* the collection of non-dung fuel material and the fetching of potable water; and ten are activities of post-harvest processing. Under the latter category, we have the production of *teff* flour, wheat flour, sorghum flour, maize flour, pepper powder, *bikil* powder, *gesho* powder, *shiro, kik a id enkuro.* The eight farming activities involve the production

of *teff*, wheat, barley, pulses, backyard crops, permanent crops, draft animal power and livestock and dairy products.

None of the 22 home activities of production except one has a tradable output, which forces us to look for a set of shadow prices if the activities are to be incorporated into social accounts of the village. The easiest approach to obtaining such prices is to look for exchange ratios between village outputs that would indefinitely sustain the output proportions of the accounting year if all village resources circulated between activity lines through exchange. In view of the micro status of the village to its broader regional environment, it is inevitable that such "equilibrium" prices fully respect the market in the valuation of all inputs imported into the village as well as in that of village labour.

$$w = \sum_{i=1}^{30} k_i w_i \qquad (1)$$

$$i = 1, \quad 2, \quad \ldots\ldots, 30$$

where, k_i is the relative share of the output of the i^{th} activity in the total market value of village tradables and w_i is the wage rate implicit in the unit market price, P_i of the same output. We have

$$W_i = \frac{\hat{P}_i - m_i}{\sigma_i} \qquad (2)$$

$$i = 1, \ 2, \ \ldots., \ 30$$

where m_i is the per unit cost of imported inputs into the i^{th} activity at market prices, $\acute{o}^{i}$ is the total of direct and indirect labour inputs, in hours per unit output of the same output, and$\dot{g}$ $P'_i = 0$ if the output i is non-traded.

It seems reasonable to suppose that all observed consumption of village produced food, beverages and other household services is at the level of a subsistence minimum, in which case w should be treated as a wage rate in surplus of such minimum. Two further assumptions have been used in arriving at our accounting prices: first that the techniques of production have the same capital intensity across village activity lines; and secondly, village labour is homogenous between activities. This is in the sense that the share of a villager in village net incomes plus subsistence consumption is strictly in proportion to his or her share in the number of person-hours spent on the villages' gross product.

Our assumptions lead to prices that simply add to the unit cost of imported inputs a mark-up proportional to unit total labour requirement:

$$P_i = m_i + w\acute{o}_i \quad \ldots\ldots\ldots\ldots \quad i = 1, 2, \ldots, 30 \qquad (3)$$

This can be written in matrix notation as

$$P' = m' + wl' (I-\bar{A})^{-1} \quad \ldots\ldots\ldots\ldots \qquad (4)$$

where P' is the 1 x 30 vector of prices, m' is the 1 x 30 vector of imported input coefficients at market prices, l' is the 1 x 30 vector of village labor input coefficients in hours, and A is the 30 x 30 matrix of village input coefficients in physical units, where the consumption of the output of home activities is interpreted as input into village activities in proportion of direct labour requirement. This is the solution to the system of equations:

$$P' = m' + (P' - m')\,\bar{A} + wl' \quad \ldots\ldots\ldots \qquad (5)$$

which clearly belongs to the class of input-output price systems discussed, for instance, in Skereka, Oky and Hejl [8], Brody [1], Taylor [9] and Pasinetti [7].

Our prices lead to a system of accounts the matrix of which has been highly simplified for our purpose into that shown in Table 1.[3] To make figures comparable to those in other villages, entries of the matrix are all in per household terms. The 7th entry of Birr 511 in the first row of the table represents "transfers" to the village of which Birr 439 is the excess of market prices of village exports over the shadow prices used in drawing up the accounts. The villages' annual gross income per household is obtained by adding the Birr 439 of "accounting transfers" to the total of the first five entries of the first row.[4] This gives a figure Bs 5730 per household of which Bs 2047 or 35.7 percent is due to home activities. Suppressing home activities as is the current practice in social accounting in the country would reduce household income figures by as much.[5] Indeed this approach would pick up only the fifth entry of the first row, plus the Bs 439 of price differences giving an average household income of Bs 3598, which is 62.8 percent of that obtained when the value added of home activities counts. If resources are valued as much when used in home activities as when they are in farming, the village's saving ratio comes to 5.9 percent against a figure of 9.3 percent arrived at with the suppression of home activities. This figure for the saving ratio is obtained from the last entry of the first column of which Bs 336 is aggregate saving the rest being transfers from the village.

The implication of the suppression of home activities to the reliability of GDP figures or related indicators as currently reported in Ethiopia should be evident. If the magnitude of underestimation observed in Ude does apply throughout the country, as seems likely, the rural component of the country's GDP could be underestimated by as

Table 1

Simplified Social Accounts Matrix in Per Household Terms
Village of Ude 1988/89, in Birr

			EXPENDITURE							
			1	2	3	4	5	6	7	Total
R	1	Institutions Current	-	1,876	171	85	3,159	-	511	5,802
E	2	Food, beverages and Household Services	5,095	-	-	-	-	-	-	5,095
C	3	Fuel, Water and post-Harvest Processing	-	2,358	-	-	-	-	-	2,358
E	4	Draft Animal Power, Livestock and Daring	-	-	33	-	813	-	474	1,320
I	5	Crops	-	41	1,903	1,171	197	-	1,511	4,823
P	6	External Supplies	129	820	251	64	654	-	132	2,050
T	7	Other Con Accounts	578	-	-	-	-	2,050	-	2,628
S		Total	5,802	5,095	2,358	1,320	4,823	2,050	2,628	

high as one third of its true magnitude. Correspondingly the aggregate saving ratio of the countryside could be as low as half that implied in current income statistics. The extent to which the urban gross product figure could be underestimated on account of the suppression of household services does not seem to be as high as that of the rural component of the country's GDP due to the suppression of home activities. In that case the relative share of the countryside in GDP as currently reported will also represent serious underestimation.

Important as these indicators are in macroeconomic analyses, they do not seem to be of frequent or serious use in policy making in Ethiopia. The warning to cautious use of their currently reported magnitudes suggested here is, therefore, not so much in a policy context as in their use in cross - country comparisons. However, the suppression of home activities in social accounting is of immediate policy relevance in as far as it influences the selection of rural development projects to which we should now turn our attention.

IV. LINKAGES BETWEEN HOME-ACTIVITIES AND FARMING ACTIVITIES

It seems that an implicit premise of rural development endeavors in Ethiopia has long been that the success of individual projects be measured in terms of impact on the marketable surplus of target communities. While there is nothing wrong in this, it appears to have led to biases, in government selection of projects, to those directly aiming at raising yields of particular farm products with insufficient regard to linkages within farm activities and, above all, between farm activities and home activities. Recently, the role of projects targeting home activities has increased but mainly due to the involvement of relief oriented non-governmental organizations in rural development programmes. This has taken the form of inclusion of the provision of flour mills and the digging of water wells as project components. However, even in such cases the

attention to home activities appears to be a rather grudging one. In many case the installation of a flour mill or the digging of a well in a programme is an afterthought following the request of local farmers and as inducement to local participation in less tested or palatable agronomic innovations. Rarely are components relating to home activities identified and evaluated in recognition of the full scope of linkages in rural activities.

One result of this bias against home activities is that disagreements between the priorities of local farmers and designers of rural development projects are more common than may be generally thought. In a certain locality of South Shewa we were able to witness the surprise of a project's personnel when farmers expressed preference of the installation of more flour mills to the supply of an improved seed variety of the staple crop that would substantially increase yields. And in the locality where this study was conducted, farmers have unanimously refused to adopt an improved seed variety of *teff* despite demonstrated grain and straw yield advantages. The reason the farmers give for their rejection is that the greater grain yield in fact translates to smaller output of *enjera*. The cause of the disagreement thus appears to be that, unlike project staff, the farmers are evaluating the proposed innovation in terms of overall impact, from grain yields all the way to productivity in the kitchen.

Whatever its implication to villagers attitude towards projects, the suppression of the linkage between farming and home activities in the designing of development programmes is likely to lead to the wrong identification of priorities even if we accept that the main objective of such programmes is to raise marketable surplus. This can be seen from a reading of the output multipliers of injections reported in tables 2 to 4. The tables were derived from the Leontief inverse of the 1988/89 input coefficients matrix of Ude, which, for reasons of space can not be fully reported here. Incorporating home activities in a description of

linkages in the villages' production structure means thinking in terms of the Leeontif inverse of an input coefficient matrix in which at least a part of villagers consumption is distributed as inputs between village activities in proportion to labour requirement. The last three columns of Tables 2 and 4 and all entries in Table 3 are obtained from such as inverse. There indeed is no reason for us to suppose that the consumption of the output of home activities as observed in the village has been in excess of subsistence requirement in any meaningful sense. Ignoring home activities in the same context means thinking in terms of an input coefficient matrix in which only direct material inputs are entered. The first three columns in Tables 2 and 4 are obtained from the Leontief inverse of such a matrix.

The interpretation of Leontief inverse multipliers depends on whether or not we assume that village resources are fully employed at the point of project intervention. In the first three columns of Table 2, where linkages to home activities are ignored, resources figure as constraints to increasing the marketable surplus of farm produce under full employment only to the extent they are employed in farm activities. Thus an increase in the sale of each arm product by Bs 1.00 requires a total increase in farm output of Bs 10.8149 and no increase in the output of home activities. On the other hand, incorporating linkages to home activities as in the last three columns of the same table shows that the same increase in marketable surplus requires an increase of Bs 22.8426 in farm activities and an even greater increase of Bs 30.0474 in thee output of home activities bringing the required total increase in village output to five times of that calculated by excluding home activities. Serious underestimation of resource constraints to projects is then one consequence of ignoring home activities in the social accounting always implicit in project selection.

Table 2

Leontief Inverse Multipliers of Village Output (Birr)
By Final Demand Injection Into Farming Activities,
Ude, 1988/89

Activity of Injection		MULTIPLIERS OF OUTPUT					
		With Variable Food Consumption			With Food Consumption at Subsistence Minimum		
		Farm Activities	Home Activities	All Village Activities	Farm Activities	Home Activities	All Village Activities
1	Draft Animal Power	2.4196	-	2.4196	4.0076	3.9699	7.9775
2	Teff	1.4999	-	1.4999	2.8902	3.4788	6.3690
3	Wheat	1.4301	-	1.4301	3.1725	4.2106	7.3831
4	Barley	1.6036	-	1.6036	3.2013	3.9973	7.1986
5	Pulses	1.4939	-	1.4939	3.2324	4.3514	7.5838
6	Backyard Crops	1.2186	-	1.2186	2.8186	4.1077	6.9263
7	Permanent Crops	-	-	-	0.8247	2.0634	2.8881
8	Livestock and Dairy Products	1.1496	-	1.1496	2.6953	3.8683	6.0636
Total		10.8149	-	10.8149	22.8422	30.0474	52.3900

Table 3

Leontief Inverse Multipliers of Village Output (Birr)
By Final Demand Injection Into Selected Farm Activities,
With Food Consumption at Subsistence Minimum,
Ude, 1988/89

Village Activity of Response		Village Activity of Injection		
		Teff	Wheat	Pulses
1	Food, beverages and Household Services	2.3714	2.8704	2.9662
2	Post-Harvest Processing	0.5313	0.6429	0.6646
3	Fuel and Water Supply	0.5761	0.6982	0.7206
4	Draft Animal Power	0.4634	0.4574	0.4535
5	Teff	1.9521	1.0734	1.0968
6	Wheat	0.1352	1.2065	0.1585
7	Pulses	0.1319	0.3527	1.5011
8	Other Farm Produce	0.0206	0.0225	0.0228
Total		6.3690	7.3831	7.5838

Table 4

Leontief Inverse Multipliers of Village Output (Birr)
By Injection Into Selected Home Activities,
Ude, 1988/89

Activity of Injection		MULTIPLIERS OF OUTPUT					
		With Variables Food Consumption			Food Consumption at Subsistence Minimum		
		Farm Activities	Home Activities	All Village Activities	Farm Activities	Home Activities	All Village Activities
1	Enjera	1.3418	0.3856	1.7274	3.0761	6.2650	9.3411
2	Dabo	1.3018	0.8313	2.1331	3.0328	6.3044	9.3372
3	Tella	1.3509	0.7769	2.1278	1.3736	6.1079	7.4815
4	Teff Flower	1.7490	1.0000	2.7440	3.3727	5.0757	8.4484
5	Shiro	1.1921	1.0000	2.1921	2.1993	5.3309	7.5302
6	Kik	1.2342	1.0000	2.2342	2.9718	5.3484	8.3202
7	Bikil Powder	0.4773	1.0000	1.4773	2.2080	5.3337	7.5417
8	Kubet	1.7523	1.0000	2.7523	3.4974	5.3422	8.8396
Total		10.3944	6.9938	17.3882	21.7317	45.1115	66.8399

Table 2 also shows that, under the assumption of full employment, the suppression of home activities is likely to lead to the incorrect ranking of individual crop projects by the strength of constraints faced. From the first three columns of the table we see, for instance, that more resources are required to increase the marketable surplus of *teff* than that of wheat or pulses while the reverse is implied by the next three columns. Table 3 shows that not matter what the farm product the marketable surplus of which is targeted to increase, the intended increase will require a greater increase in the output of home activities than in farm products. Thus a projected increase in the marketable surplus of *teff* or wheat requires greater output of fuel and water or post-harvest processing than that of draft animal power or of seed.

The assumption of full employment of village resources means that the suppression of home activities leads to underestimation of constraints to agronomic projects and the incorrect ranking of the same projects by the strength of constraints faced. Under the assumption of under-employment of village resources, the same convention leads again to incorrect ranking of projects but, this time, in terms of multiplier effects. it also leads here to a bias against projects aimed at home activities in favour of projects for farming. The first three columns of Table 2 show that a *teff* project will have the strongest backward linkage effect on other crops while those aimed at pulses have the weakest, which is the reverse of what we read from the last three columns of the same table. Ignoring home activities as is done in the first three column of each of Tables 2 and 4 leads to the conclusion that projects for directly increasing the output of marketable grain will increase total farm output by more than projects introducing rural communities to the marketing of processed grain in the form of say, flour or *kik* or food items. Taking full accounts of linkages of home activities as in the last three columns of Table 2 and 4 leads, however, to the opposite conclusion.

V. SUMMARY AND CONCLUSION

The suppression of home activities in rural social accounting in Ethiopia should cast serious doubt on the reliability of currently reported figures on the country's GDP, the relative share of the countryside in the same and the aggregate saving ratio. As apparently little use is made of such indicators in macro-economic policy making this may be a rather academic problem. However, the same accounting convention is also implicit in current exercises of rural development planning where it becomes a very practical issue. Whether or not home activities are taken into account here determines decisions of project selection or evaluation. Assuming that the objective of such projects is always to increase marketable surpluses of particular farm products or farming in general, our case study demonstrates that the convention leads to biases against projects aimed at home activities in favour of inferior agronomic projects. Within alternative agronomic projects, it is likely to lead to underestimation of overall resources constraints to each project, incorrect identification of the strongest constraint to any project and incorrect ranking of projects by the strength of constraints faced or multiplier effects generated.

These are results demonstrated on the basis of a shadow pricing procedure that is fully consistent with observed market prices. Difficulties in linking home activities to the market in the valuation of resources cannot therefore justify the suppression of their interdependence with farming in direct social accounting or that implicit in decisions on public investment in rural development. The proposed pricing procedure is easily generalizable to accounting at the regional or national levels below which social accounts are of little interest. It is true that the input-output data systems the procedure requires are too expensive at these levels. However, a feasible and fairly satisfactory substitute can be found in similar data systems on a selection of may be two or three scores of village economies that captures the diversity of

rural Ethiopia in terms of traditional farming technology, consumption habits, institutional structure and the structure of external relations.

NOTES

1. Ude satisfies the identification criteria of a village economy suggested in [2].

2. This is a village level organization of communal farming that the Ethiopian Government has been trying to introduce into the countryside since 1979.

3. The original matrix of which this is a reduction is 24 x 24.

4. Should accounting prices on the aggregate exceed market prices of exports, the corresponding transfer would be from the village rather than to the village and is included in the last entry of the first column. The effect of adding of net income at "accounting transfers" to the figure of net income at accounting prices is that all village exports will be at market prices while everything else is valued at accounting prices.

5. These remarks are based on [3], [4] and [5]. According to [4] and Disney's accounting, home activities are suppressed completely. In [3] we read that value added in home preparation of alcoholic beverages and handicraft is taken into account. However, there are activities of a rather small share in total value-added in home activities.

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