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POLICY DISTORTIONS, SUBSIDIES AND RURAL EMPLOYMENT GENERATION : A SECOND-BEST APPROACH

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This paper has two aims : first, to provide a framework for examining the effects of policy distortions on land and labour utilization in Nigerian agriculture and second, to provide guidelines derived within the framework of production theory for engaging in compensating subsidy schemes in the presence of distortions. The distortions take many forms. Urban wages unrelated to labour productivity compound existing labour market distortions; export crops are subject to export taxes of one vintage or another; the "urban bias" in the development of physical and social infra-structure and the associated poor and fragmented crop and input information networks implicitly lower farm gate prices at the same time that they raise the real prices of basic necessities and inputs in the rural sector; closely related to the above, import substitution in a "learning stage" of domestic industrial development places relatively heavier burdens on the rural sector, etc. The framework will help us answer the following questions. What are the effects of these distortions on the utilization of the stocks of family labour and land ? What are their effects on the entry and exit of farmers? On the other hand, suppose policy-makers are willing to live with the institutional reality of these distortions but are desirous of minimizing the allocative distortions induced by them, what are the compensating subsidies on inputs to achieve this ?

One important objective of African countries is gainful employment creation. This paper considers the effects of policy distortions—as exemplified by crop taxation—on resource use as well as guidelines for engaging in "compensating distortions" to promote resource employment. Previous studies have focused mainly on the output, foreign exchange and income implications of marketing board policies, almost to the total neglect of their resource utilization effects. [1, 2, 3, 11,)†] This is a serious omission particularly in an era when unemployment and under-employment are important socio-economic problems in Nigeria and other developing countries with similar institutional distortions. This paper is divided into four sections. Section I presents a model in which marketing board crop taxes are proxies for other policy distortions that analytically have the same result : they implicitly and/or explicitly lower farm gate producer prices. This section draws inferences on the effects of these distortions on the scale of farm operations in Nigeria. Section II operationalizes the model by specifying a two-crop two-input Cobb-Douglas production function in which compensating subsidies to minimize resource mal-allocation effects are derived. In section III, compensating subsidies required to minimize distortions along

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† Figures in brackets denote references given at the end of the paper.

production surfaces and also to prevent costs from rising are derived while section IV contains the summary and conclusions.

I

THE MULTI-CROP PRODUCTION FUNCTION MODEL

Nigeria displays great diversity in agricultural resource endowments. [5] The agricultural economy of the Northern states can be divided into cropping sub-regions according to climate and ecology : (*i*) land where groundnuts and food crops like guinea corn, millet, beans, etc., are grown, (*ii*) land where cotton and food crops are grown, (*iii*) land where cotton, groundnuts and food are produced and (*iv*) land in the Middle Belt where mainly food crops and some grains are grown. Much of the land and most of the labour are not crop specific. Most farms can then be represented by a multi-crop production function as in (1), written in implicit form :

$$F(Y_1, \ldots\ldots\ldots\ldots, Xn) = 0 \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \qquad (1)$$

where Y_j ($j = 1, \ldots, m$) is output of the j^{th} crop and X_i ($i = 1, \ldots, n$) is quantity of the i^{th} input. There are three components of the tax on marketing board crops : produce sales tax, export tax and the so-called marketing board surplus. Let these three components of taxes on a crop be converted to a tax rate as a proportion of the potential producer price so that a £N 10 tax per ton of groundnuts with a potential producer price of £N 50 amounts to a tax rate of 20 per cent. Denote this tax rate by c_j so that the price received per unit of the crop equals $(1 - \bar{c}_j)\, P_{yj} = U_j\, P_{yj}$; where P_{yj} is the market producer price of the j^{th} crop inclusive of taxes (*i.e.*, the potential producer price). At the same time, the government subsidizes inputs like fertilizers, sprays, chemicals, research information supplied by extension staff, etc. Let input X_i be subsidized at the rate of t_i per unit so that the price paid per unit of the input by the farmer equals $(1 - t_i)\, P_{xi} = \lambda_i\, P_{xi}$ where P_{xi} is the price of X_i.

The profit equation for a representative farm in the presence of these taxes and subsidies is

$$\pi = \sum_{j=1}^{m} U_j\, P_{xi}\, Y_j - \sum_{i=1}^{n} \lambda_i\, P_{xi}\, X_i \qquad \ldots \quad \ldots \quad \ldots \qquad (2)$$

The necessary conditions for profit maximization are :

$$\frac{F_j}{F_r} = \frac{\partial Y_r}{\partial Y_j} = \left(\frac{U_j}{U_r}\right)\frac{P_{yj}}{P_{yr}},\ j,\ r = 1, \ldots, m \qquad \ldots \quad \ldots \qquad (3)$$

This implies that if $\left(\frac{U_j}{U_r}\right)$ equals unity, meaning the rates of taxes on different products are equal, the product-product equilibrium is ensured; otherwise, distortions in production exist.[1]

Similarly, the necessary conditions for maximization are :

$$MVP_{xi,}\ Y_i = \left(\frac{\lambda_i}{U_j}\right) P_{xi}\ , \quad \begin{matrix} i = 1, 2, \ldots, n \\ j = 1, 2, \ldots, m \end{matrix} \qquad (4)$$

This implies that if $\left(\frac{\lambda_i}{U_j}\right)$ equals unity meaning that rates of input subsidies and rates of product taxes are equal, factor-product equilibrium is ensured; otherwise distortions in factor use exist. Land and labour still produce the bulk of the value added in Nigerian agriculture. Neither of these resources is subsidized on any significant scale to date; for all practical purposes, we can assume these subsidies to be zero, *i.e.*, $\lambda_i = 1$, and since $U_j < 1$, $\left(\frac{\lambda_1}{U_j}\right) > 1$, which implies that these factors were, through induced response to taxes, being used on a smaller scale than would have been the case in the absence of taxes. This would mean that as a result of taxes on marketing board crops, less labour (family and hired) and land are employed than would have been the case in the absence of taxes.[2] But from (4), $\left(\frac{MVP_{xi,yj}}{P_{xi}}\right) \begin{matrix} > \\ = \\ < \end{matrix}\ 1$ as $\left(\frac{\lambda_i}{U_j}\right) \begin{matrix} > \\ = \\ < \end{matrix}\ 1.$

With taxes on cotton and groundnuts, Tables I and II show the $\left(\frac{\lambda_i}{U_j}\right)$ ratios for land and labour in cotton and groundnut production.[3]

1. Details of induced effects of differential taxation on relative outputs of crops are presented in the author's thesis. [4]

2. There is an implicit assumption in this analysis that Nigerian farmers achieve allocative equilibrium with respect to the use of their land and labour. This is the hypothesis by Professor T. W. Schultz and the evidence by D. W Norman and D. Welsch is consistent with this hypothesis. Letting X_1 and X_2 denote labour and land respectively in a Cobb-Douglas framework, we have computed the following from Norman's data estimates [10] of output elasticities (b_1, b_2) :

Millet/guinea corn (*gona* land): $b_1 = 0.5925$, $b_2 = .3189$, $b_1 + b_2 = .9104$, $MVPx_1 = 0.58$, $Px_1 = 0.51$ from which $\frac{MVPx_1.Y}{Px_1} = 1.14$; *Fadama* land (all crops): $b_1 = .2746$, $b_2 = .8543$, $b_1 + b_2 = 1.1289$, $MVPx_1 = 0.46$, $Px_1 = 0.51$ from which $\frac{MVPx_1.Y}{Px_1} = 0.90$.

3. The evidence in these tables is only suggestive and at best indirect. Direct evidence on resource use effects of these pricing policies would require time-series data on quantities of resources used in these marketing board crops. Inferences made with available evidence rest on plausible assumptions about farmers' behaviour.

TABLE I—EFFECTS OF TAXES ON GROUNDNUTS ON REAL (RELATIVE) PRICES OF LAND AND LABOUR EMPLOYED ON NORTHERN STATES FARMS, NIGERIA, 1950-1965

Year	Total export	Export duties	Surplus to the marketing board	Produce tax per ton	Total tax as proportion of potential producer price inclusive of tax (T)	Proportion of potential producer price that was paid (U_j)	λ_i^* / U_j^*
	—£ N'000—			N𝔉			
1950	N.A.	N.A.	N.A.	N.A.	0.549	0.451	2.12
1951	N.A.	N.A.	N.A.	N.A.	0.325	0.675	1.48
1952	N.A.	N.A.	N.A.	N.A.	0.285	0.715	1.40
1953	2,905	N.A.	11	N.A.	0.365	0.635	1.57
1954	3,430	N.A.	8.2	1.0	0.315	0.685	1.45
1955	2,965	N.A.	—3.2	1.0	0.143	0.857	1.17
1956	3,192	6.2	1.4	1.0	0.210	0.790	1.27
1957	2,689	7.2	7.6	1.0	0.297	0.703	1.42
1958	2,987	3.3	— 7.8	1.0	0.052	0.948	1.054
1959	3,412	5.5	— 3.5	1.0	0.072	0.928	1.08
1960	2,686	5.9	1.2	1.0	0.180	0.820	1.22
1961	3,658	6.1	— 2.2	1.0	0.125	0.875	14
1962	3,722	5.4	— 2.4	1.5	0.127	0.873	1.15
1963	3,770	4.7	.06	1.5	0.170	0.830	1.20
1964	4,363	5.6	1.2	1.5	0.214	0.786	1.27
1965	4,831	6.4	1.1	1.5	0.215	0.785	1.27

Source : For prices and tax figures 1953-66, see H. Kriesel. [6] For prices and tax figures 1950-52, see G. K. Helleiner. [3] For 1950-52, only total tax figures available.

Note : * It is assumed that land and labour were not subsidized so that λ_i, the proportion of the unit acquisition price of the relource paid by farmers, equals unity for both land and labour.

N.A. = Not available.

TABLE II—EFFECTS OF TAXES ON COTTON ON REAL (RELATIVE) PRICES OF LAND AND LABOUR EMPLOYED ON NORTHERN STATES FARMS, NIGERIA, 1950-1966

Year	Total export duties	Produce tax	Surplus to the marketing board	Composite tax per ton purchased	Total tax as proportion of potential producer price inclusive of taxes (T)	Proportion of potential producer price that was paid to farmers (U_j)	$\frac{\lambda_i^*}{U_j}$
	——£ N'000——			£N			
1950	N.A.	N.A.	1192.4	36.04	0.328	0.672	1.49
1951	386.0	N.A.	2067.3	58.04	0.441	0.559	1.79
1952	713.7	N.A.	1166.3	29.5	0.349	0.651	1.54
1953	812.2	N.A.	1397.0	43.3	0.441	0.559	1.79
1954	775.1	N.A.	1098.8	24.3	0.306	0.694	1.44
1955	970.7	92.1	1595.5	27.0	0.331	0.669	1.49
1956	812.1	75.4	490.6	17.1	0.237	0.763	1.31
1957	750.6	68.1	199.4	14.1	0.204	0.796	1.26
1958	851.2	115.6	—1020.9	—0.04	—0.001	1.000	1.00
1960	733.1	84.3	—989.4	—2.0	—0.037	1.037	0.96
1961	1050.0	211.1	—1255.3	—0.004	0.000	1.000	1.00
1962	832.4	118.7	—548.4	4.7	0.095	0.905	1.10
1963	910.4	205.1	—98.0	6.9	0.133	0.867	1.15
1964	812.8	182.1	465.6	11.2	0.194	0.806	1.24
1965	684.5	182.1	122.5	7.6	0.141	0.859	1.16
1966	676.0	180.4	—1023.7	—1.3	0.163	0.837	1.19

* It is assumed that land and labour were not subsidized so that λ_i, the proportion of unit acquisition price of the resource paid by the farmer, equals unity for both land and labour.

Source : Price series for 1950-59: Extended and amended Kriesel series. [7] The price series 1960-66 to which the composite tax/ton are added to get the potential producer's price are our own constructed series resulting from our dissatisfaction with existing series. Helleiner's Table 11-B-6 (pp. 474-475) used only grade I cotton prices for all the years when a weighted index is clearly better. However, constructing a weighted index is beset with many problems because of the scattered sources. For weights for the price series 1960-67, see H. Kriesel (*op. cit.*, p. 55); for net taxes after deduction of produce sales tax for different grades of cotton 1960-67, see M.O. Titiloye and A. A. Ismail. [12]

N.A. = Not available.

The following conclusions may be drawn using the assumptions of the model. From the tables, both land and labour (family and hired) used in groundnut production over the period were, on the whole, induced through government taxation policies to be employed on a smaller scale than the amounts that would have been employed in the absence of government taxation of groundnuts and cotton. Government taxation policies therefore have tended to limit the size of groundnut and cotton farms in the Northern states measured in terms of acreage or size of labour or intensity of use of these two resources.

Policy distortions as exemplified by marketing board taxes have therefore had adverse effects on resource employment in Nigerian agriculture.[4] Policy-makers prepared to live with the institutional reality of these distortions may be interested in compensating input subsidies to promote employment and to compensate farmers for these distortions. In the face of distortions—for which we use marketing board taxes as a proxy—what are the compensating subsidies on inputs to minimize resource mal-allocation? To this we now turn.[6]

II

THE TWO-CROP TWO-INPUT COBB-DOUGLAS CASE

Inter-cropping, which is common among African peasants in general, is receiving new theoretical and empirical attention. In a careful study of some villages in the Northern states of Nigeria [10], the following degree of inter-cropping was found :

Village	Per cent of total cultivated acreage						
	Sole	Two	Three	Four	Five	Six	> Two
Dan Mahawayi ..	23.74	38.81	24.95	6.01	4.62	1.87	76.26
Doka	29.27	32.66	17.97	14.14	3.34	2.62	70.73
Hanwa	14.38	47.11	21.49	15.26	1.76	—	85.62

4. In a recent issue of *West Africa*, it is stated: "A total of 72,000 tons of groundnuts were produced in the North Eastern State in 1970-71 compared with 204,000 tons the previous season. Cotton production fell from 86,000 to 40,000 tons. The State Commissioner for Agriculture and Co-operatives, Alhaji Muhammadu Mai, attributed the decline to the drift of farmers to the towns . . ." See *West Africa*, 2871 (Apapa: Times Press, June 23, 1972). A correspondent in the same journal (March, 1972 issue) writes: "Once again it appears that there has not been sufficient incentive for farmers to plant out a higher acreage and while the present high prices are obtainable for other food crops, a pattern of rather smaller groundnut crops in Nigeria seems likely to continue."

5. We assume that the elasticities of demand for resources with respect to the producer prices for marketing board crops are positive. See footnote 2.

6. There may be better ways to increase rural employment and incomes. We believe that the allocative (and even distributional) consequences of this solution are easier to comprehend. The question is not whether the government should raise tax revenue in the first place and then turn around to use this revenue to subsidize the same crop and farmers. The question is, given the institutional reality of taxes on these crops, what is our second-best solution for minimizing the allocative distortion with respect to resource use induced by these taxes ?

Thus, in each of the three villages, more than 70 per cent of the total cultivated acreage were in two or more crop mixtures. The break-down by crops is even more interesting :

Crop	Per cent of total adjusted acres grown in each crop mixture class						
	Sole	Two	Three	Four	Five	Six	≥ Two
Millet	0.19	65.29	18.69	10.93	3.50	1.40	99.81
Guinea corn ..	26.56	47.57	14.70	8.14	2.12	0.91	73.44
Groundnuts .	15.65	26.42	30.86	20.18	5.48	2.41	84.35
Cowpeas	2.07	29.55	38.75	21.47	5.81	2.35	97.93
Cotton	31.34	36.34	21.35	7.14	3.29	0.54	68.66

The percentage of total adjusted acreage in two or more crops ranges from 68.66 for cotton to 99.81 for millet.

With two crops Y_1 and Y_2, the peasant farm-firm operating under taxes and subsidies wishes to maximize profits (π).[7]

$$\pi = \sum_{j=1}^{2} U_j P_{yj} A_j X_{1j}^{b_{1j}} X_{2j}^{b_{2j}} - \sum_{j=1}^{2} \sum_{i=1}^{2} \lambda_i P_{xi} X_{ij} \qquad (5),$$

where X_{1j} $(j = 1, 2)$ is the quantity of land used in the j^{th} crop, X_{2j} is the quantity of labour used in the j^{th} crop, U_j is the proportion of potential producer price actually received by the farmer of the j^{th} crop and λ_i is the proportion of potential unit acquisition price of the i^{th} input actually paid by the farmer and where other variables have their obvious meanings. The demand functions for X_1 and X_2 are, in log:

$$\log X_{1j} = \frac{(b_{2j} - 1)}{K_j} [\log(\lambda_1 P_{x1}) - \log(U_j P_{yj}) - \log b_{1j} - \log A_j]$$

$$- \frac{b_{2j}}{K_j} [\log \lambda_2 P_{x2} - \log(U_j P_{yj}) - \log b_{2j} - \log A_j], \quad j = 1, 2 \qquad (5a)$$

$$\log X_{2j} = -\frac{b_{1j}}{K_j} [\mathrm{Log}(\lambda_1 P_{x1}) - \log(U_j P_{yj}) - \log b_{1j} - \log A_j] + \frac{(b_{1j} - 1)}{K_j}$$

$$[\log(\lambda_2 P_{x2}) - \log(U_j P_{yj}) - \log b_{2j} - \log A_j], \quad j = 1, 2 \qquad (5b)$$

where $k_1 = (b_{21} - 1)(b_{11} - 1) - b_{11} b_{21}$, and

$$K_2 = (b_{22} - 1)(b_{12} - 1) - b_{12} b_{22}.$$

7. We chose the Cobb-Douglas form partly because of its computational ease and partly because we saw no reasons initially to presume that another functional form was superior to it. Indeed, most production function fitting in Nigerian agriculture has utilized the Cobb-Douglas form.

Two types of elasticities are computed : the "own" compensating subsidy elasticity of X_1 in Y_1 which gives the required percentage reduction in unit price of X_1 per unit percentage reduction in net crop price of Y_1 so as to keep the quantity of X_1 in the production of Y_1 constant, and the "cross" compensating subsidy elasticity of X_1 in Y_1 which gives the required percentage reduction in the unit price of X_2 per unit percentage reduction in the price of Y_1 if the quantity of X_1 employed in Y_1 is to remain unchanged. Table III presents our derived elasticities.

TABLE III—DERIVED COMPENSATING INPUT SUBSIDY ELASTICITIES[a]

	'Own' compensating elasticities	'Cross' compensating elasticities
To keep X_1 in Y_1 constant[b]	$-\frac{1}{b_{21}-1}$	$\frac{1}{b_{21}}$
To keep X_1 in Y_2 constant	$-\frac{1}{b_{22}-1}$	$\frac{1}{b_{22}}$
To keep X_2 in Y_1 constant	$-\frac{1}{b_{11}-1}$	$\frac{1}{b_{11}}$
To keep X_2 in Y_2 constant	$-\frac{1}{b_{12}-1}$	$\frac{1}{b_{12}}$

a. b_{ij} is the j^{th} output elasticity of the i^{th} input.

b. These compensating input subsidy elasticities are derived by setting $d \log X_{ij} = 0$ in the respective equatons of (5a) and (5b).

These compensating subsidy elasticities are all positive. The first row, first column element of the elasticities matrix of Table I says, for example, that a one percentage reduction in the price of Y_1 requires a percentage reduction in the price of X_1 equal to the inverse of one minus the output elasticity of X_2 in the production of Y_1.[8]

Available empirical evidence on output elasticities of inputs in Nigeria is on an enterprise basis. In Norman's study, "each crop mixture is considered as a distinct crop enterprise." [10, p. 98] Table IV shows computed compensating subsidy elasticities using available estimates of the output elasticities of land and labour.[9]

8. These positive compensating subsidy elasticities are derived for given price of the other input.

9. The non-availability of estimates of output elasticities of inputs by crops in crop mixtures is a constraint. We are consequently unable to present exact empirical analogue of Table III.

TABLE IV—COMPUTED SUBSIDY ELASTICITIES

Crop mixture	'Own' compensating elasticities	'Cross' compensating elasticities
1. Millet—guinea corn		
To keep X_1 constant	1.468	3.136
To keep X_2 constant	2.454	1.688
2. *Fadama* crops (maize/rice)		
To keep X_1 constant	6.863	1.171
To keep X_2 constant	1.379	3.642
3. Two crop mixtures (overall)		
To keep X_1 constant	1.399	3.508
To keep X_2 constant	2.347	1.743
4. Millet-guinea corn-cowpeas		
To keep X_1 constant	1.946	2.057
To keep X_2 constant	1.221	5.528

It is interesting to note that all the computed elasticities are positive implying that an increase in crop taxation requires an increase in compensating input subsidy. Thus a one per cent increase in (implicit) taxes on millet-guinea-corn production requires a 2.454 per cent fall in the cost or price of labour if labour employment is to remain unchanged; on the other hand, a 1.688 per cent fall in land price is required if labour employment is to remain unchanged. The less important land is in production (as measured by its output elasticity), the more it has to be subsidized in order to keep labour employment unchanged.[10]

It may be that policy-makers in addition to minimizing the resource allocation distortions of taxes and other policies also wish to minimize policy induced substitution in crop production, *i.e.*, induced movements along transformation surfaces. This may be an indirect way to tackle the negative effects of these policies on labour employment; it may be dictated by the need to check a rise in prices or it may be due to a need to conserve foreign exchange reserves at levels consistent with the nation's planning efforts. What are the compensating input subsidies to achieve this?

10. These "special elasticities" are not derived from any obvious behavioural postulate. However, we could conceive of government officials who are concerned about distortions introduced by government and marketing board taxation in the amounts of labour employed (including induced off-farm migration) but who are equally conscious of the institutional reality of the marketing board's reasoning along these lines: "at the going average rates of taxation imposed by the Government and Marketing Boards, what would be the required compensating subsidies on the price of labour that farmers pay or the price of fertilizers, chemicals, etc., that they pay so as to keep people on the farms and, say, stem the off-farm migration?" Such implicit reasoning does indeed exist among Nigerian policy-makers today.

III

MINIMIZING SUBSTITUTION IN PRODUCTION

Substitute the optimal values of X_1 and X_2 of equations (5a) and (5b) into the two-crop, two-input Cobb-Douglas function in equation (5). Set d log $Y_1 = 0$, and solve for the various elasticities : these give us the compensating percentage fall in input prices for a given percentage fall in crop producer price if the quantity of Y_1 is to remain unchanged. Similar elasticities in the case of Y_2 are also derived. The derived elasticities are shown in Tables V and VI.

TABLE V—DERIVED COMPENSATING SUBSIDY ELASTICITIES TO KEEP QUANTITY OF Y_1 CONSTANT

$\frac{d \log (\lambda_1 P_{x1})}{d \log (U_1 P_{y1})}$:	$\frac{d \log (\lambda_2 P_{x2})}{d \log U_1 P_{y1})}$:	$\frac{d \log (\lambda_1 P_{x1})}{d \log (U_1 P_{y1})} + \frac{d \log (\lambda_2 P_{x2})}{d \log (U_1 P_{y1})}$;
$1 + \frac{b_{21}}{b_{11}}$	$1 + \frac{b_{11}}{b_{21}}$	$\frac{(b_{11} + b_{21})^2}{b_{11}\ b_{21}}$

TABLE VI—DERIVED COMPENSATING SUBSIDY ELASTICITIES TO KEEP QUANTITY OF Y_2 CONSTANT

$\frac{d \log (\lambda_1 P_{x1})}{d \log (U_2 P_{y2})}$:	$\frac{d \log (\lambda_2 P_{x2})}{d \log (U_2 P_{y2})}$:	$\frac{d \log (\lambda_1 P_{x1})}{d \log (U_2 P_{y2})} + \frac{d \log (\lambda_2 P_{x2})}{d \log (U_2 P_{y2})}$
$1 + \frac{b_{22}}{b_{12}}$	$1 + \frac{b_{12}}{b_{22}}$	$\frac{(b_{12} + b_{22})^2}{b_{12}\ b_{22}}$

From Tables V and VI, it is clear that the smaller the importance of a given input (as measured by its output elasticity) in a given crop the larger the compensating percentage input subsidy will be for a given one percentage reduction in the producer price, if the quantity of the crop is to remain constant.

Tables VII and VIII show computed compensating subsidy elasticities to keep the quantities of cotton and groundnuts, respectively constant. For example, a percentage reduction in cotton prices requires a 2.318 per cent fall in land prices and a 1.879 per cent fall in labour prices, giving a total 4.018 per cent fall in input prices if the quantity of cotton is to remain unchanged.[11] In groundnuts, the corresponding percentage decreases in input prices are 2.810, 1.553 and 4.3622 respectively.

11. This aggregate elasticity may differ from the simple sum of the components because of rounding.

TABLE VII—COMPUTED COMPENSATING SUBSIDY ELASTICITIES TO KEEP QUANTITY OF COTTON CONSTANT

$\frac{d \log (\lambda_1 P_{x1})}{d \log (U_1 P_{y1})}$:	$\frac{d \log (\lambda_2 P_{x2})}{d \log (U_1 P_{y1})}$:	$\frac{d \log (\lambda_1 P_{x1})}{d \log (U_1 P_{y1})} + \frac{d \log (\lambda_2 P_{x2})}{d \log (U_1 P_{y1})}$
$1+\frac{b_{21}}{b_{11}} = 2.318$	$1+\frac{b_{11}}{b_{21}} = 1.8787$	$\frac{(b_{11}+b_{21})^2}{b_{11}\, b_{21}} = 4.0175$

TABLE VIII—COMPUTED COMPENSATING SUBSIDY ELASTICITIES TO KEEP QUANTITY OF GROUNDNUTS CONSTANT

$\frac{d \log (\lambda_1 P_{x1})}{d \log (U_2 P_{y2})}$:	$\frac{d \log (\lambda_2 P_{x2})}{d \log (U_2 P_{y2})}$:	$\frac{d \log (\lambda_1 P_{x1})}{d \log (U_2 P_{y2})} + \frac{d \log (\lambda_2 P_{x2})}{d \log (U_2 P_{y2})}$
$1+\frac{b_{22}}{b_{12}} = 2.8097$	$1+\frac{b_{12}}{b_{22}} = 1.5526$	$\frac{(b_{12}+b_{22})^2}{b_{12}\, b_{22}} = 4.3622$

The net impact of the set of policy distortions which implicity and/or explicitly reduce producer prices is to encourage the massive drift of farmers and young people from the rural to the urban areas. This reduces farm labour supply, accentuates peak season labour shortages and therefore raises labour production costs. Policy-makers may therefore be interested in compensating subsidies on other inputs for a given (induced) rise in labour costs if total production costs are not to rise.

To simplify, we use the one-crop, two-input Cobb-Douglas form :

$$Y = A\, X_1^{b1} X_2^{b2} \quad (A,\, b_1,\, b_2 > 0) \tag{6}$$

where X_1 is land input, X_2 is labour and Y is crop output. Solving for X_1 and X_2 from the equilibrium conditions for cost minimization and plugging these optimal values into the cost function for producing the output Y, we have :

$$C = P_{x2} \frac{w_1}{b_2} \left(\frac{b_2\, P_{x1}}{b_1\, P_{x2}}\right)^{\frac{b_1}{w_1}} \left(\frac{Y}{A}\right)^{\frac{1}{w_1}} \tag{7}$$

where C is total cost of producing the given output and $w_1 = b_1 + b_2$. From (5), setting d log C = 0,

$$\frac{d \log P_{x1}}{d \log P_{x2}} = -\frac{b_2}{b_1} < 0 \tag{8}$$

which gives us what we may call the "constant cost" elasticity of the price of land with respect to the price of labour : it gives the required percentage change in land prices for a given percentage change in labour wages induced by policy distortions that create artificial shortages of labour during the peak farming seasons. The negative sign of the elasticity shows what is plausible and expected—that an induced rise in wage rates will require a fall in the price of land, if total cost of producing the given output is to remain unchanged, For example, if the output elasticity of land is .05 and the output elasticity of labour is .6, a one per cent rise in labour wages induced by policy distortions will require a subsidy on land of about 12 per cent. The smaller the output elasticity of land, the heavier subsidies on land would have to be to compensate for a given rise in wages induced by public policy.

IV

SUMMARY AND CONCLUSIONS

This paper has been mainly concerned with providing a framework for examining the effects of policy distortions and providing second-best solutions to problems posed by the allocative distortions introduced by public policy. Public policies (crop taxes, unbalanced infra-structural development, minimum wage laws, etc.) operate either to implicitly or explicitly lower producer prices or to directly or indirectly raise real input costs (especially labour) on farms. The data on crop taxes for cotton and groundnuts for the period 1950-1966 suggest that farmers were induced to operate on a smaller scale and thus employed less labour than would have been the case in the absence of these taxes. The latter part of the paper provided guidelines derived within the theory of production for engaging in second-best input subsidy schemes. Generally, these compensating subsidies were functions of the output elasticities of inputs. Using available estimates of the output elasticities of land and cotton, it was found that a one per cent decrease in the producer price of cotton would require a combined compensating fall in land and labour prices of 4.0175 per cent if the quantity of cotton is to remain unchanged; in the case of groundnuts, the corresponding subsidy elasticity is 4.3622. When policy-makers want to subsidize some inputs to compensate for rising production costs induced by policy distortions, it was found that this "constant cost" elasticity was negative and was a function of the output elasticities of the inputs. In the one-crop two-input Cobb-Douglas case, it was found that with an output elasticity of land of 05, and that of labour=.6, a one per cent rise in labour wages induced by policy distortions will require a subsidy on land of about 12 per cent. Thus, the smaller the output elasticity of land, the larger would the subsidies on land have to be to compensate for the rise in wages induced by public policy.

This second-best approach has potential policy relevance especially in regimes where there are no guidelines for engaging in input support (subsidy) schemes in the face of explicit and/or implicit taxes on crops.

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