THE MOBILIZATION OF RESOURCES FROM AGRICULTURE: A POLICY ANALYSIS FOR BRAZIL

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Brazil, like many other developing countries, has discriminated rather heavily against its agricultural sector. The chronic overvaluation of the Brazilian currency has constituted an implicit export tax on the agricultural sector. In addition, there have been explicit export taxes, quotas, and embargoes on agricultural products, and complicated export licensing schemes. This discriminatory trade policy has been complemented by various domestic food policies which also attempted to restrain the domestic prices of food.

In contrast, the industrial sector has benefited from high levels of protective tariffs and export subsidies. Moreover, the overvalued exchange rate constituted something of a subsidy to the industrial sector since it was dependent on imports of certain raw materials and critical capital goods.

This combination of policies is clearly designed to capture and transfer the well-known agricultural surplus as a basis for furthering the development process. The research on which this paper is based was designed to make a partial analysis of the impact of these policies on the agricultural sector (see Lopes for the larger study). The analysis compared an overvalued exchange rate and a tax on land as alternative means of extracting the surplus from agriculture. The analytical model was developed along the lines of a model used by Floyd for an analysis of U.S. agricultural policy. It is based on a one sector model of the agricultural sector consisting of six equations: an aggregate production function, equilibrium conditions for the use of labour and capital (input demand equations), supply functions for those two factors of production, and an equation which describes the demand for farm output.

Background

Contemporary policymaking in developing nations has been strongly dominated by the idea that the agricultural sector has abundant resources in terms of both agricultural output and factors of production which can be removed from the sector. According to this perspective, the major source of funds for financing economic development, especially when it starts from a predominantly agricultural base, has to be a net resource flow out of agriculture. This idea has been a key element in shaping economic policy in developing nations.

The policy question has been how best to accomplish this transfer. Historically, many different approaches have been used. In the case of Japan, a land tax played a very important role. In the United States, a great deal of both the capital and labour moved through regular market mechanisms. Countries such as Brazil, on the other hand, have used policies that focused prinarily on product markets. These policies have, in effect, been designed to shift the internal terms of trade against agriculture, and, by this means, have drained resources from agriculture.

This study was an attempt to understand the role of economic policy in the intersectorial transfer of resources between the farm and nonfarm sectors. Its hypothesis is that development policies which focus on extracting the surplus from agriculture primarily through the product markets have had deleterious consequences for agriculture, and have influenced in an important way the general character of development.

The Relevant Theory

Brazil has used a bewildering array of trade interventions in its agricultural sector. In general, these interventions have been designed to keep agricultural

products damned up in domestic markets by limiting export markets. By thus shifting the domestic terms of trade, they transfer both agricultural output and resources from the farm to the nonfarm sector.

To simplify the discussion, we can focus on the overvalued exchange rate as a trade intervention. This distortion in the foreign exchange market was an important form of taxation in its own right. Moreover, export quotas and explicit export taxes can be converted to an equivalent form of tax.

An overvalued exchange rate, of course, is an implicit export tax. Under certain conditions, this tax can be shifted to the foreign consumer, as Brazil so effectively did when it was dominant in the international market for coffee. If the small country assumption applies, however, such shifting does not occur, and the incidence of the tax is on the domestic producers, with income being shifted from domestic producers to domestic consumers.

A number of important effects of such a tax can be identified. The domestic price will decline, which in general will cause consumption to increase. There will also be a decline in output, with the amount of the decline dependent on the elasticity of supply. Gross income to the sector will decline, and exports will be reduced. Resources will be released from the export sector to the rest of the economy. Although lost to the export sector, these resources have productive value to other sectors of the economy.

There are also various income transfers, the most notable of which from this study's perspective is a transfer of income from producers to consumers. Producers, in effect, pay a subsidy to consumers, with the amount of the subsidy determined in part by post-tax domestic consumption. An important point about this subsidy is that the government has zero disbursement costs. Moreover, there are no explicit budget costs, with their attendant political difficulties. This subsidy to the wage good sector can be an important stimulus to the nonfarm sector.

Other effects of the tax can be identified, such as a subsidy to domestic importers, and so on. But those already identified illustrate how resources are transferred, both directly and indirectly, from the farm to the nonfarm sector. They also indicate how exchange rate policy can be a means of transferring the surplus from agriculture.

Land taxes can also be an effective means of mobilizing resources from agriculture, as illustrated by the Japanese experience. A tax on the price (Ricardian economic rent) of land will always be borne by the landowner, provided that the tax does not exceed that eocnomic rent. The effect of the tax will be to lower the price of the land. In the Ricardian world, the price of agricultural output will not be affected by the imposition of a land tax. Similarly, there will be no resource allocation effects.

If the assumptions of the Ricardian world are relaxed, there will be some shifting of the tax to workers and owners of capital. There will also be some effect on the price of output. If the tax is greater than the eocnomic rent, the land may be permitted to deteriorate. Under these conditions, the tax will be shifted to the consumer in the long run. Relaxation of the Ricardian assumption of a perfectly inelastic supply of land will also permit shifting--both forward to consumers through higher prices and backward to workers and other supply sectors. Relaxing this assumption seems especially pertinent in land rich Brazil.

Despite these caveats, the presumption is that a land tax will have only limited effects on output, will tend not to be passed on to labour or other resources, and may be at least roughly proportional to asset ownership, depending on how effectively the tax is administered. On the other hand, it is likely to raise the price of agricultural products somewhat, in contrast to the implicit export tax, which tends to lower the price of agricultural output.

Empirical Analysis

The empirical analysis was implemented by means of the reduced form transformation of the six equation structural model. Estimates of the parameters for the underlying model were taken from other studies, or estimated directly. Micro data from a rather large national farm survey were used to estimate the parameters of the production functions and factor shares.

Two main sets of analyses were performed. To evaluate the effect of exchange rate and trade policies designed to shift the internal terms of trade against agriculture, we replaced the demand equation in the model with parametric shifts in the price of agricultural output. The effect of a 10 percent decline in the relative price of agricultural output on resource use and factor returns was then evaluated. This analysis was performed by size of farm, on the assumption that conditions in the factor market differed by size of farm and that therefore there would be a differential effect. The assumption of a 10 percent shift in relative prices due to trade interventions seems quite conservative in the light of the degree of overvaluation over the years and the magnitude of the other interventions. In any case, this assumption is designed to show the relative effect of the export taxes, and does not reflect a judgment about the absolute size of the distortion caused by trade interventions.

To evaluate the effect of the land tax, an estimate was made of what effect the tax would have on the use of land, assuming that in Brazil the supply of land is not perfectly inelastic. This estimate was then introduced into a somewhat different transformation of the structural equations to evaluate the effect on agricultural prices, resource use, and factor returns.

The Empirical Results

Some of the empirical results are summarized in table 1. The results when all farms are pooled together (an aggregate or sectorial result) indicate a differential impact from a shift in the terms of trade on both the level of resource use and on factor returns. The use of capital declines the most, followed by a reduction in employment of labour, and then by a relatively small reduction in the use of land. The effect of factor returns is just the obverse, with the return to land declining the most, followed by a smaller reduction in the wage rate, and a relatively small decline in the return to capital.

TABLE 1. EFFECTS OF A 10 PERCENT SHIFT IN RELATIVE AGRICULTURE PRICES ON RESOURCE USE AND FACTOR RETURNS, BY FARM SIZE, BRAZIL

	RESULTING CHANGE (PERCENT)					
FARM SIZE	EMPLOY-MENT	WAGE RATE	LAND USE	RETURN TO LAND	CAPITAL USE	RETURN TO CAPITAL
ALL FARMS	-18.19	-13.83	- 6.23	-15.77	-26.64	- 3.71
UP TO 4.9 ha.	- 3.25	- 7.23	- 1.66	- 9.08	- 1.01	- 9.59
FROM 5 to 9.9 ha.	- 3.75	- 7.25	- 2.44	-10.56	- 1.05	-11.09
FROM 10 to 49.9 ha.	-24.62	-13.39	- 6.79	-19.01	-25.94	- 2.55
FROM 50 to 99.9 ha.	-22.43	-14.78	- 6.53	-19.74	-23.42	- 3.04
FROM 100 to 499.9 ha.	-25.55	-12.01	-11.09	-21.08	-24.61	- 1.58
FROM 500 to 999.9 ha.	-32.01	-16.36	-14.50	- 6.70	-42.72	- 4.35
OVER 1,000 ha.	-33.62	-17.56	-16.02	- 7.19	-36.42	- 4.88

When the results are compared by size of farm, there tend to be relatively strong size relationships. Interestingly enough, for the small farms, the adjustment in capital and land use are relatively small, while the adjustment in employment is relatively larger. The wage rate for labour shows the smallest decline in factor returns of the three input categories, with the decline in the return to land and capital being larger and of about the same order of magnitude.

For the larger farms, the change in employment is larger, and tends to increase with size. The same applies to capital. Land use experiences a small increase, but the adjustment is larger as farm size increases. Once one moves beyond the first two groups by farm size, the relative change in the wage rate is approximately the same. Moreover, it is less than the change in employment.

The decline in the return to land is the largest for the middle size farms. It is smaller for the larger farms, but this is because the elasticity of supply of land is assumed to be relatively large for these two groups. The return to capital declines the least of any of the input categories. Moreover, there is not much of a relationship by sizes of farms.

These results suggest that taxing agriculture by means of an overvalued exchange rate and other trade interventions can have a sizable effect on both the level of resource use and on the returns to factors of production employed in agriculture. Put somewhat differently, the results indicate that such trade interventions can be an effective means to transfer resources from the farm to the nonfarm sector.

The consequences of such resource transfers are far reaching. With a labour transfer of the order of 20 percent of the farm labour force, strong pressures are put on the labour market. A labour transfer of this magnitude requires efficient labour markets. If there are barriers to labour mobility, this may have significant consequences to both wages and the distribution of income. The marginal value product of labour declines by about 15 percent as a direct result of the policy. Labour is in effect undervalued relative to its international opportunity costs. When this effect is combined with the overvaluation of labour in the industrial sector due to the protection of that sector, one begins to understand the large income differential that has emerged between the industrial and agricultural sectors in Brazil.

Land is withdrawn from production up to about 7-11 percent among the middle size farms and between 15-16 percent among the large farms. The implication of this is that in the absence of the policies, Brazil would have been cultivating an area some 10-15 percent larger than it has been. This finding helps explain the underutilization of land common in Brazil. It also explains why land on large holdings tends to be more underutilized relative to land on small farms. In effect, the data suggest that large owners are more able to escape the tax by appropriate resource adjustment. Since they tend to be more dependent on hired labour, they can release the labour, thereby causing the workers to bear the burden of the adjustment. Similarly, they reduce their purchases of modern inputs, thereby passing part of the adjustment on to the nonfarm sector.

To evaluate the effects of the land tax, alternative rates were considered, ranging from 3.45 percent to 15 percent, together with alternative assumptions about the price elasticity of demand for farm output. The results suggest that even with a tax rate as high as 15 percent there would be little increase in the price of agricultural output (1.4 percent when elasticity is -.16). A proper comparison, however, would be with the alternative tax implemented by means of trade policy. Hence, the disparities may be of the order of 10-11 percent of the relative price of agricultural products, a differential that has important income distribution consequences.

The effect of the land tax on returns to capital and labour and on the use of these inputs is quite small. Even assuming a fairly elastic product demand, a land tax of up to 15 percent would lower the returns to capital and labour by

only 0.2 and 0.4 percent, respectively. The effect on employment and capital use, although slightly higher, is still negligible.

Concluding Comments

The empirical results show that mobilizing resources from agriculture by means of trade policy has a substantial effect on resource use and factor returns. Mobilizing them by means of a land tax has a much smaller effect on the use and returns to other inputs, even though the total values of the surpluses mobilized were roughly the same.

An important fringe benefit of the results is the insight it offers into why the agricultural development process in Brazil has taken the particular form that it has. The analysis helps explain why labour has migrated from rural areas at such a rapid rate and piled up in the cities. It also helps explain why the farm-nonfarm per capita income differential is so large. And, it also helps explain why land holdings are cultivated so extensively, with the level of utilization so low. Clearly, had Brazil pursued different trade and exchange rate policies, the character of its overall development process would have been quite different, with less concentration of labour in urban centres, a larger agricultural sector, higher relative incomes in agriculture, and more intensively cultivated agriculture.

References

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OPENER'S REMARKS--Fernando de Faria Estacio

Only the relative effect of export taxes is analyzed, with no judgment about the absolute size of the distortions caused by trade interventions. Also, I have some difficulty in comparing the conclusion in the paper about the adjustment in the use of capital in small farms with the corresponding numbers in table 1. Anyway, the results in table 1 clearly suggest that overvaluation of exchange rates can have important effects on both the level of use and the returns to factors of production in agriculture, and can be an effective way to transfer resources from the farm sector to the nonfarm sector. A land tax, on the other hand, has only a small effect on the use and returns to labour and capital, even though the value of the surplus transferred from agriculture is roughly the same as that mobilized by means of trade policy.

The combination of trade interventions in the Brazilian agricultural sector has been designed, in general, to limit exports of raw agricultural commodities. Brazilian exports of processed agricultural products have increased, however. This suggests the existence of important comparative advantages in Brazilian agriculture. The effects of government intervention on resource use and factor returns identified in the paper make it difficult to introduce technical innovations needed to modernize agriculture and thus cause a misallocation of resources.

RAPPORTEUR'S REPORT--Richard F. Bates

When attempts are made to mobilize labour in developing countries, the number

of rural workers diminishes. Before a transfer of people from the agricultural sector to the nonagricultural sector can take place, there should be an increase in productivity of the agricultural sector. The methods of obtaining the increased productivity from agriculture are not accepted by farmers and hence the question arises of appropriate policy measures to obtain the required increase in productivity.

Lopes and Schuh stated that a shift of resources of the magnitude indicated in the paper would not have any impact at all, nor would a shift in the terms of trade unless there were some degree of technical change. There was an implicit assumption of inelasticity of supply of agricultural output. In empirical research, it was found that this assumption was not absolutely correct in Brazil. In the long run, there is a response, and agricultural prices begin to increase, so without technical change there would be an impact on prices and output. There is, however, a necessity for technical change to facilitate a more rapid transfer of resources.

It was agreed that land taxes are an efficient way of transferring resources from the agricultural sector. However, the elasticity of capital was questioned and was thought to be too high. It was assumed that the factor demand was implicit in the function, based on the Floyd model, and that this was a Cobb-Douglas type function. The Cobb-Douglas production function has an extremely high elasticity of substitution which leads to extremely high responses to prices on the demand side of the factor market. The relevance of this fact and of the implied assumption was questioned. Lopes stated that the absolute magnitude of change must be looked at with caution. The importance of the results is the direction and relative magnitude of the change.

The response of large scale farms in Brazil represents a phenomenal shift in the supply of labour. On small farms, a negligible shift was noted. Although the price difference (a 10 percent decline) should have caused the agricultural sector to restrict its supply of goods, it did not.

Contributing to the discussion were M. S. Igben and Samar R. Sen.