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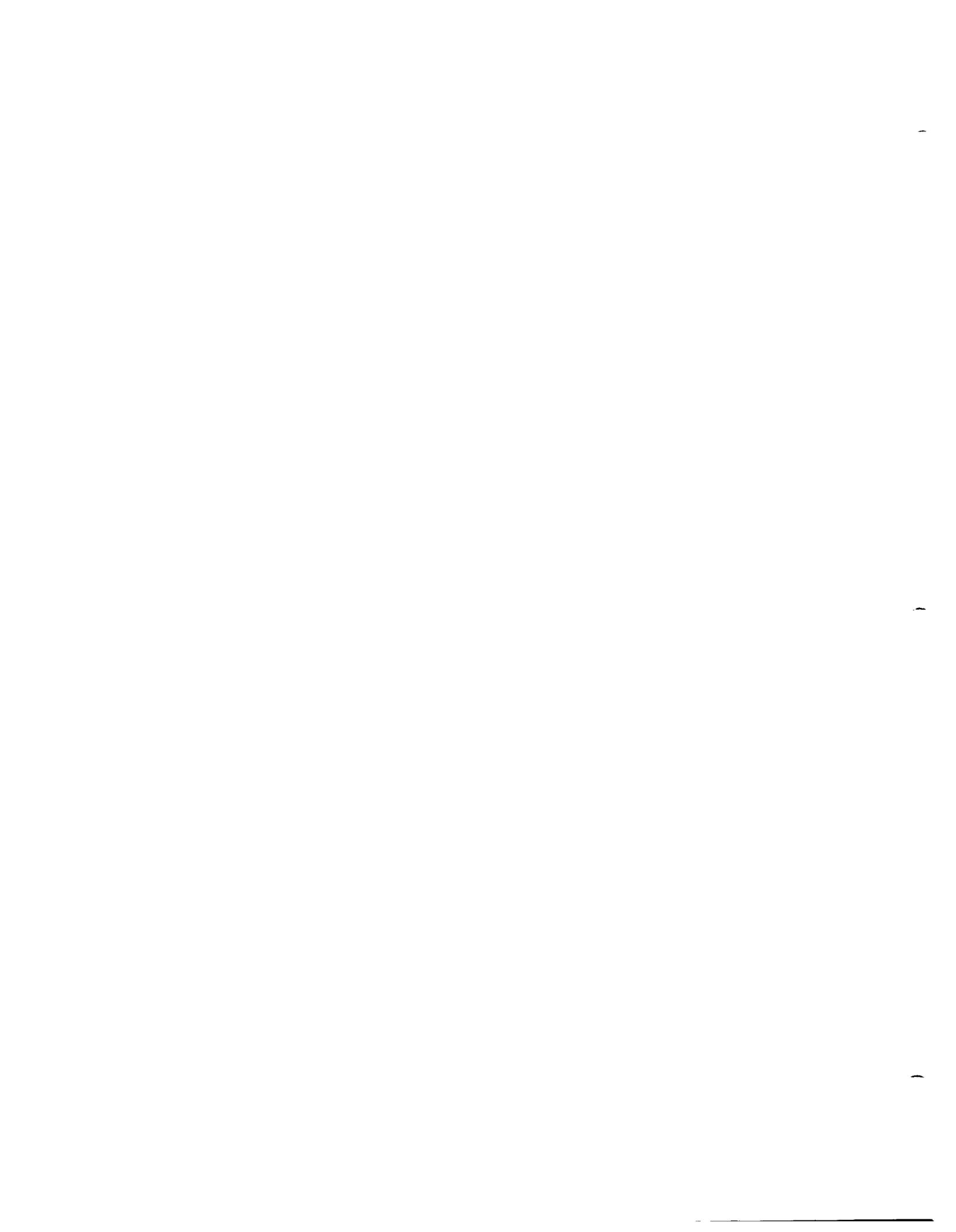

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## PRICE INTERVENTION ANALYSIS IN AGRICULTURE

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Deepak Bhattasali<sup>1</sup>

Developing countries have used a variety of tools to affect the prices of agricultural products and inputs. Price interventions have been applied at the stages of production, marketing, consumption, and trade. The results have been mixed: sometimes the desired goals have been met, but often there have been unanticipated side effects. Because of the importance of the agricultural commodities concerned and their implications for a country's growth, employment, foreign exchange earnings, and public finance, price interventions have cut across crucial aspects of development policy.<sup>2</sup>

A pervasive problem concerning price policies is the difficulty of adequately anticipating their effects. Time after time, price programs have gone awry not necessarily from lack of good objectives, but more because their effects have been inadequately understood. Usually policies have a variety of consequences, some of which are unforeseen by policy makers, owing to the responses of producers and consumers to price changes. Often, even apparently neutral devices may have the unintended and indirect effects of favoring or disfavoring the production or consumption of certain commodities. A tendency to minimize these price responses on the part of policy makers often leads to difficulties in operating the programs; for instance, the actual fiscal effects of policies frequently turn out to be significantly larger than original projections. The existence of these and other complexities calls for a systematic analysis of the context of price interventions, their nature and scope, and the issues that arise in their application. This review elaborates upon each of these aspects. (The discussion is limited to the World Bank's research in this area, although occasional references are made to other literature.)

### The Context of Price Analysis

There exists a growing recognition that insufficient attention has been paid in the past to the effects,

positive and negative, of alternative pricing options, and that rational price regimes are essential for the success of developmental strategies.<sup>3</sup> Research at the World Bank has contributed to this increasing emphasis on the proper role of prices, particularly by providing useful results in the following areas: First, a better understanding of the nature and scope of policy interventions has emerged, as will be discussed later, which is supported by the compilation of a data base to analyze policies for many countries. Second, methods have been developed to measure the effects of price distortions, which have then been applied to a number of countries, thus providing quantitative estimates of the economic costs of these distortions in agriculture.<sup>4</sup> Third, price issues are beginning to play a crucial role in policy dialogues between the Bank and member countries. While traditionally certain price reforms have been sought in the context of agricultural projects, attention is increasingly being focused on sector-level policy improvements, and many reforms are now being effected through the vehicles of import and export program credits and structural adjustment loans, aided by country case studies. Structural adjustment loans with agricultural pricing and marketing contents have been made to the Ivory Coast, Jamaica, Kenya, Republic of Korea,

1. Economists in Colombia Country Programs of the Latin America and the Caribbean Regional Office and in Malaysia Country Programs of the East Asia and Pacific Regional Office, respectively. This review has benefited from discussions with Belai Abbai, Hans Binswanger, Avishay Braverman, Sharon Blinco, Graham Donaldson, John Dulov, Anandarup Ray, Inderjit Singh, Lyn Squire, and Isabel Tsakok. Helpful comments on the paper were also provided by Phil Berlin, Gilbert Brown, Carl Jayarajah, Basil Kavalsky, and Robert Picciotto.

2. For a discussion of the role of agriculture in economic development, see *World Development Report 1982* (New York, Oxford University Press, 1982), which reviews inter alia the physical sources of agricultural growth, and the relationship between agricultural growth, food security, and poverty.

3. Theodore W. Schultz (ed.), *Distortions of Agricultural Incentives* (Bloomington, Indiana University Press, 1978) provides a compilation of recent evidence on the effects of distortions. See also Graham Donaldson, "Incentives and the Farmer," in *Economic Development and the Private Sector* (International Monetary Fund (IMF) and The World Bank, September 1981).

4. See Pasquale L. Scandizzo and Colin Bruce, "Methodologies for Measuring Agricultural Price Intervention Effects," World Bank Staff Working Paper No. 394, June 1980, and case studies published in 1980-81 within the World Bank Staff Working Paper series, listed in the reports at the end of the article. For a cross-country view, see Malcolm D. Bale and Ernst Lutz, "Price Distortions in Agriculture and Their Effects: An International Comparison," World Bank Reprint Series Number 173.

Malawi, Mauritius, Morocco, Senegal, Thailand, and Turkey. Export credits in the cases of Sudan and Tanzania and import credits for Bangladesh have involved pricing reforms in agriculture. Attention is also beginning to be focused on a better integration of sector policies into the macro-economy.<sup>5</sup>

In a general sense, much of the applied research on pricing has illustrated the importance of "getting the prices right." This has usually meant, at the basic level of analysis, that the relative border prices of traded outputs and inputs should be approximately the same as the relative market prices, adjusted for transport and marketing costs. A number of case studies have highlighted various forms of price disincentives arising in the domestic and external markets and their negative consequences for agricultural productivity and welfare. In many instances, the salutary impact of price reforms has also been shown, particularly in the context of applied operational work.<sup>6</sup> Furthermore, although much of the research emphasizes, implicitly or explicitly, the need for some degree of price liberalization, a limited role for rational pricing in developmental efforts—as a proper complement to other agricultural policies—is widely acknowledged.<sup>7</sup> The limits to pricing policy alone as a means of boosting production have been noted, particularly, in the case of countries like India and Bangladesh which have large proportions of subsistence farmers in the agricultural work force. The World Bank's *World Development Report 1982*, having pointed out the role of relative prices and the need for adequate price incentives, observes: "Pricing alone is neither a complete explanation of agricultural performance nor the sole key to progress" (page 47). Other crucial measures include efforts to exploit comparative advantage, promote technological progress, and mobilize rural resources and public sector investment and support. As nearly all country economic reports indicate, the removal of physical, social, and institutional barriers to supply constitutes a key element of successful agricultural strategy.

To achieve a proper balance in policy emphasis between price and nonprice factors is not easy for at least two reasons. First, the appropriate combination varies according to the individual circumstances and the level of economic development of each country. Second, the historical legacy of price and

nonprice policies has so affected market signals and the allocation of resources that it is difficult to disentangle the two sets of factors. A proper understanding of the nature and scope of individual interventions is an essential starting point for policy analysis.

### The Nature and Scope of Interventions

Price interventions most often involve the taxation or subsidization of one or more agricultural products or inputs enforced within the domestic market or at the stages of exporting or importing. These are often substituted or supplemented by quotas and other restrictions. In many countries, the production of key farm products is taxed by direct price controls. The purchase of export crops at prices below those that prevail in the domestic market by monopolistic marketing boards in some African countries and the forced procurement of grains by government agencies in some Asian countries are examples. Farm inputs are taxed by import quotas and prohibitions or by tariffs intended to protect high-cost domestic industries (for example, tariffs on fertilizer imports in Brazil and in other countries in Latin America). In contrast, some countries subsidize the production of certain commodities by output price supports, or input subsidies, or both. Price supports are more prevalent in middle-income countries (such as Colombia, Costa Rica, Korea, Malaysia, Mexico, Portugal, Turkey, and Yugoslavia) than in low-income countries, although some countries in the latter group (for example, Bangladesh, Chad, Malawi, Upper Volta, and Zaire) also provide price supports for selected food crops.

Interventions at the marketing and consumption stages are common, particularly for staple consumption items such as food grains. Because of their political and economic importance, these commodities are often handled by monopolistic parastatal

5. Country case studies on agricultural pricing have also been prepared by the Bank's respective country departments, in some instances jointly with the governments concerned, on Bangladesh, Guinea, Portugal, Saudi Arabia, Tanzania, Thailand, Tunisia, Turkey, and the People's Democratic Republic of Yemen; several others are in the pipeline.

6. Egypt, Ivory Coast, Kenya, Pakistan, Peru, and Uruguay are recent examples where a liberalization of producer prices to correspond better with world prices led to increases in production.

7. See, for instance, Fred Levy and others, "Brazil: A Review of Agricultural Policies," A World Bank Country Study, 1982.

agencies, although economic cost reductions from greater private marketing and storage activities are now beginning to be recognized. Urban consumers are subsidized in many countries by retail price controls or by import subsidies if the commodity is imported. Such subsidized sales of food grains, either domestically produced or imported, are found in Bangladesh, Indonesia, Korea, and a number of other countries. These policies influence the rural-urban terms of trade. The net outcome, however, differs considerably from country to country, depending on the emphasis placed on producer incentives (*vis-à-vis* output prices and input prices) and consumer welfare.

Tariffs and subsidies on imports and exports, foreign exchange controls, and quantitative trade restrictions constitute other major forms of intervention. Export taxes on principal commodities—for instance, coffee in Colombia, rice in Thailand, jute in Bangladesh, and cocoa in Togo—are levied partly to generate revenues. Taxes are sometimes used to stabilize domestic prices, as for example in the case of beef exports from Colombia, Mexico, Uruguay, and a number of African countries, and in the case of imports of certain cereals and livestock products in Korea.

A review of the Bank's borrowers reveals considerable differences in policy emphasis across countries.<sup>8</sup> Many African and some South Asian countries keep producer prices low in comparison to world prices through government price fixing and forced procurement, while most economies in East Asia and the Pacific, the Middle East and North Africa, and Latin America provide relatively higher producer prices through price supports or through nonintervention; for example, Korea and Malaysia support some domestic food-grain prices above world levels. Consumer subsidies are more widespread across regions, and depending on the system of grain purchases, the impact on the budgetary deficit varies. Input subsidies are more common in Africa and South Asia than in other regions, while the taxation of inputs to protect infant industries is found more often in Latin America. Foreign trade interventions are also more prevalent in Latin America, as well as in East Asia and the Pacific, than in other regions.

Surveys of price intervention suggest that policy objectives vary, often changing over time under

various pressures and resulting in a multiplicity of policy instruments that sometimes end up serving conflicting goals. A widely held rationale for price policy is its expected effect on income distribution. High farm price supports, for example, have often been viewed as an instrument for raising farm income and rural welfare, while urban consumer subsidies are supposed to improve the welfare of the urban poor. Farm price supports, and sometimes input subsidies, are also designed to provide incentives to farmers to increase production, particularly in importing countries striving for self-sufficiency. Some countries like Korea have viewed price policies as instruments of stabilization, aiming to moderate seasonal price patterns, or year-to-year price fluctuations, or both. Many countries interfere with trade in an attempt to insulate the domestic economy from instability generated in international markets. The export tax on rice in Thailand is partly based on this objective, in addition to that of revenue generation. Import tariffs on agricultural inputs are also intended to provide government revenue, but in addition they seek to protect domestic industry from external competition. Finally, political goals—although they are seldom as explicitly stated as socioeconomic objectives—are usually of great significance in price management. As agricultural prices directly affect the welfare of important producer and consumer groups, they are a highly volatile political issue, often providing the spark for riots and political unrest (as in the cases of the Arab Republic of Egypt and Poland), and even causing governments to fall on occasion.

The analysis of policies indicates that results have only rarely coincided with stated goals. Concerning efficiency and growth, a recent Bank survey of fifty countries shows that although policies were not intended to neglect agriculture, the net effect of domestic pricing and commercial policies in a majority of country cases was to provide disincentives to the sector.<sup>9</sup> Studies of seven countries showed

8. See J. Graves and Y. Kimaro, "Functional Review of the Treatment of Agricultural Pricing in Bank Group Economic and Sector Reports—Progress Report," Economics and Policy Division Working Paper No. 1 (The World Bank: Agriculture and Rural Development Department, 1976).

9. See "Agricultural Prices, Subsidies and Taxes: A Summary of Issues," Agriculture and Rural Development Department, Policy Note, The World Bank, February 26, 1979, and also Bale and Lutz, "Price Distortions in Agriculture."

that the nominal and effective rates of protection for agricultural products were much lower than those for industry. For major crops, farmgate prices averaged 50 percent to 80 percent of export prices. Taking into account subsidies on inputs, total price distortions added up to a 30 percent to 40 percent tax on agriculture. Additionally, the limits of price policy as a means to redistribute income have also been underlined. Discussions of price supports and marketable surpluses for Korea suggest that the effect of such policies on income distribution is, at best, ambiguous. Similarly, as indicated by data for Kenya, the benefits of fertilizer subsidies may accrue relatively more to large farmers than small farmers, contrary to stated goals. The experiences of Egypt, India, Kenya, Peru, and many other countries show that price controls intended to favor poor consumers may, after all, not meet this objective, owing to the complex consequences of these policies. Finally, the fiscal impact of policies has also been found to be usually much greater than anticipated, eventually limiting their viability. In Bangladesh, for instance, the fertilizer subsidy alone has recently constituted roughly 4 percent of the Government's development spending.

### Some Issues in Price Intervention Analysis

A review of experiences with agricultural pricing suggests that there are at least four major areas that generate critical issues. They are: efficiency and economic growth, trade and specialization, distribution, and public finances. Intervention in the food market constitutes a special area for analysis. However, research on food policy is not treated here in detail because a recent survey covered the area well.<sup>10</sup>

It should be noted at the outset that there are systematic differences between types of major crops, agricultural work-force categories, and producer/consumer subcategories that should be accounted for in analysis in each of the above areas. In the case of crops, at least three categories should be distinguished: food grains such as rice, wheat, sorghum, maize, and barley; nongrain food cash crops such as vegetables, root crops, and sugar; and export cash crops such as rubber, cotton, coffee, and jute. Clearly, the responsiveness of these crop categories to prices as well as to complementary policies and their relation to country goals are quite different. Furthermore, the effects of policies for one group of

crops on other groups—in particular, between food crops and export crops—can be important.<sup>11</sup> Similarly, the impact on various agricultural producer groups (landless laborers and deficit farmers with off-farm employment, subsistence farmers, and commercialized farmers), on the one hand, and on consumer groups (urban and rural), on the other, needs to be incorporated. Finally, it is necessary to establish an economist's overall macroeconomic objectives, particularly the relative importance of industrial versus agricultural growth, before specific price reforms can be considered. The key elements of the macroeconomic price structure (exchange rate, fiscal deficit, inflation) must be studied in conjunction with the broad objectives for the economy (e.g., rapid industrialization) and the policy goals in agriculture (e.g., export crop expansion). It is necessary to ask, given a country's socioeconomic political objectives, what is the structure of intervention that minimizes the costs to the economy (on efficiency and equity grounds) and what will assist the government in achieving its overall economic objectives? By and large, such considerations have until recently been given inadequate attention in both the Bank's research and its operational work.<sup>12</sup>

10. See Shlomo Reutlinger, "World Bank Research on the Hunger Dimensions of the Food Problem," *Research News*, vol. 3, no. 1, Winter 1981/82. See also Pasquale L. Scandizzo and Isabel Tsakok, "Food Pricing Policies in Developing Countries," Economics and Policy Division Working Paper No. 46 (The World Bank: Agriculture and Rural Development Department, July 1982). A comprehensive review of this area appears in C. Peter Timmer, Walter P. Falcon, and Scott R. Pearson, *Food Policy Analysis* (Baltimore and London: The Johns Hopkins University Press, 1983, forthcoming).

11. Recent work on Bangladesh points out the possible effects of price supports for rice and wheat on other crops. See Raisuddin Ahmed, "Foodgrain Supply, Distribution and Consumption Policies Within A Dual Pricing Mechanism: A Case Study of Bangladesh," International Food Policy Research Institute (IFPRI) Research Report No. 8, May 1979, and "Agricultural Price Policies under Complex Socio-Economic and Natural Constraints: The Case of Bangladesh," International Food Policy Research Institute (IFPRI) Research Report No. 27, October 1981.

12. Recent efforts to fill these gaps include: Choong Y. Ahn, Inderjit Singh, and Lyn Squire, "A Model of an Agricultural Household in a Multi-Crop Economy: The Case of Korea," World Bank Reprint Series: Number 222, and Howard N. Barnum and Lyn Squire, *A Model of an Agricultural Household: Theory and Evidence* (Baltimore and London: The Johns Hopkins University Press, 1980).

## Efficiency and Economic Growth

The allocative and production efficiency imperatives for agriculture are provided by the unquestionable importance of this sector and by the urgent need for solutions to the problems of food, poverty, and the balance of payments in developing countries. A central issue of efficiency relates to the finding that existing price interventions almost invariably lead to "distortions" that cause welfare losses. Two steps are involved in evaluating economic efficiency: first, measuring the "distortions" from some reference point; and second, measuring the cost of distortions in terms of economic welfare. A number of early efforts were made to investigate price distortions and their costs; these laid the foundations for further developments in the methods used at the Bank.<sup>13</sup> But it was not until recently that these approaches became more widely accepted and available.

The approach applied in much of the work to date in the Bank for measuring price distortions and their economic costs is squarely in the mainstream of research in this area. A number of limitations may be noted in using such an approach, as will be discussed later. Notwithstanding such shortcomings, several useful and practical results have been derived. Estimates of nominal and effective protection for agricultural commodities and their domestic resource costs have been calculated for a number of countries, giving some quantitative measures of the implication of price policies.<sup>14</sup> Similarly, quantitative estimates of the welfare costs and benefits of price policies to meet certain developmental goals have been provided, assisting in a comparison of alternative policy options.<sup>15</sup>

While the outcome of the research has proved useful, some issues raised by these methods need to be discussed with a view to improving their applicability. Four such issues are: the choice of a reference point from which to measure distortions in prices; the static nature of the measurements that are employed; the definition of economic welfare; and, finally, the use of such efficiency indicators in providing policy advice.

World market prices are usually chosen as a reference point against which distortions are measured. While in one sense the choice of world agricultural prices, which are supposed to measure the opportunity costs of a country's agricultural

exports and imports, predetermines the policy conclusion that emerges from the analysis without adequately adjusting for special situations among developing countries, they are a "least of all evils" choice for measuring distortions.<sup>16</sup> In most cases, world market prices are the result of stronger elements of competition than are domestic prices, and they have the advantage of both being easily visible and suitable for cross-country comparisons. Provided that the appropriate world prices can be identified and a trend price or moving average price (which averages or abstracts from fluctuations) defined, incentive/disincentive indicators may be devised in the form of nominal and effective protective rates, effective subsidy coefficients, and producer subsidy equivalents. It should be noted that the "true" reference prices to be used in each country's estimates may be higher than the c.i.f. or lower than the f.o.b. prices of traded inputs and outputs, so that appropriate adjustments to international prices need to be made for each country's special situation.

Unfortunately, in practice this method is not particularly amenable to dynamic analysis, although, in principle, elements such as "learning by doing" can be incorporated. The duration and intensity of interventions can vary quite substantially, affecting

13. Bela Balassa, "Reforming the System of Incentives in Developing Countries," World Bank Staff Working Paper No. 203, April 1975, and "Prospects for Developing Countries 1978-1985" (The World Bank: Economic Analysis and Projections Department, 1977).

14. *World Development Report 1982* (see pages 48 and 49) provides a summary of the systematic differences in agricultural incentives across countries, with nominal protection coefficients ranging from 0.3 to generally less than 1 in developing countries, and increasing to over 1 and going up to as much as 3 in the industrialized countries. Generally speaking, the undervaluation of agriculture in relatively low-income countries comes out quite clearly in the Bank's work.

15. For instance, see comparisons of price supports versus input subsidies on the one hand, and partial versus complete seasonal stabilization in George S. Tolley, Vinod Thomas, and Chung Ming Wong, *Agricultural Price Policies and the Developing Countries* (Baltimore and London: The Johns Hopkins University Press, 1982).

16. As seen in the *World Development Report 1982*, there is a systematic relationship between agricultural protection levels and a country's stage of economic development. Measurements of price distortions need to be made sensitive to this issue, just as industrial protection is often recommended as an instrument for economic development, so, too, is agricultural protection important.

the size of distortions in prices and their effects on resource allocations. Additionally, it is important to recognize that while, in the short run, additions to agricultural output can usually be obtained only by increasing real costs, over longer periods, changes in the patterns of resource use from increased investment, learning experience, and technological developments can actually lower prices. Investment in research and technology may be too low, however, to generate such resource-saving production patterns, even after favorable price policy interventions.<sup>17</sup> Also, the speed of producer and consumer responses to changing agricultural prices varies across crops and countries and needs to be taken into account. In the case of Argentina, for example, crop production rose 19 percent in one crop year, 1976-77, primarily in response to better incentives, while in the Ivory Coast increases of 26 percent and 37 percent were recorded in rice production in 1974 and 1975, after the price reforms of 1973. The introduction of risk parameters could be important as farmers rarely behave in risk-neutral ways, especially if they are in rainfed agriculture and faced with fluctuating prices and new technologies. The consequences of neglecting risk-averse behavior have been explored for Mexican agriculture; the results suggest biases, usually by an overstatement of output levels for crops in which the variance in crop revenue is high or varies positively with that of other crops.<sup>18</sup> Finally, static indicators of efficiency and incentives/disincentives are often inadequate in discriminating between elements that could be crucial in motivating policy response. For example, incentive measures should be able to discriminate between supply responses that manifest themselves through additional land use, fuller utilization of given land and multiple cropping, the use of new technologies, or even changing crop patterns to higher-valued crops. The crop typology presented earlier represents another dimension along which efficiency indicators might be adjusted.

The welfare gains and losses from price intervention are usually measured through the use of the partial-equilibrium constructs of consumer and producer surpluses; these, in turn, depend on estimates of the price elasticities of demand and supply. It is found that estimates of agricultural supply elasticity often tend to be inadequate, especially for yield responses and, therefore, partial-equilibrium measures such as "welfare gains" to producers and consumers that are based on them can only be interpreted as broad-

brush indicators. Furthermore, "the consumer and producer surpluses approach" measures the gains or losses that result from deviations from equilibrium, implying by definition that any deviation from equilibrium will cause welfare losses as measured by the "welfare triangles." It should be noted, however, that this approach can still provide estimates of a "least-cost solution" when several policy alternatives are under consideration and, in general, is amenable to adaptations in the interpretations of "welfare losses" to account for country-specific situations.

Because the use of international prices as reference points tilts pricing policy recommendations in a particular direction, the movement from measuring distortions and welfare gains and losses to recommending specific price policies, in actual country work, requires a leap of imagination and resourcefulness. While efficiency indicators are quite useful in demonstrating to policy makers the structure of incentives/disincentives and in providing some numbers with which to review and evaluate their intervention policies, additional work needs to be done to participate effectively in the policy debates that occur on the agriculture sectors of the developing countries. As a first exercise, it is often possible to do some further quantification of the employment and income implications of price interventions.<sup>19</sup> In general, however, these have been of an ad hoc nature, and are not as yet well integrated with the efficiency indicators.

### Trade and Specialization

A number of issues emerge in the policy debates on agriculture in developing countries with respect to

17. See Lucio Rea, "Argentina: Country Case Study of Agricultural Prices and Subsidies," World Bank Staff Working Paper No. 386, April 1980, and William Cuddihy, "Agricultural Price Management in Egypt," World Bank Staff Working Paper No. 388, April 1980.

18. See P. B. R. Hazell and others, "The Importance of Risk in Agricultural Planning Models," World Bank Staff Working Paper No. 307, November 1978. Also see the comprehensive survey of risk issues by J. Roumasset, J. M. Boussard, and I. J. Singh (eds.), *Risk, Uncertainty and Agricultural Development*, (Manila, Philippines: A.D.C./Searca Press, 1979).

19. See Gilbert Brown and Carl Gotsch, "Prices, Taxes and Subsidies in Pakistan Agriculture: 1960-1976," World Bank Staff Working Paper No. 387, April 1980, and Trent Bertrand, "Thailand: Case Study of Agricultural Input and Output Pricing," World Bank Staff Working Paper No. 385, April 1980.

crop choice and specialization. To a certain extent, price policy may be a cornerstone of a country's pattern of trade in agricultural products, thereby affecting government revenues, domestic inflation, and other critical macroeconomic variables. The experience of Kenya after 1975, when spectacular increases in agricultural exports were recorded with a concomitant spurt in overall economic growth, directs attention to the role, via trade, of price policy on the economic well-being of the developing countries that produce primary goods.<sup>20</sup> The issues that are discussed here are: measuring comparative advantage, exchange overvaluation and export crop choice, food self-sufficiency, and, finally, commodity price stabilization.

In general, the thrust of the Bank's policy advice has been that the structure of a country's agriculture should be determined by international comparative advantage; there is a tension, then, between the question of whether prices should be determined by domestic considerations (distribution, self-sufficiency, revenue, price stabilization) or international forces. As mentioned earlier, recent estimates of the deviation of domestic agricultural prices from world prices for a sample of seven countries showed that the domestic prices of most commodities were lower than their world prices, suggesting disincentives to domestic agricultural production and exports. Contrast this result with the protection afforded domestic *industrial* production in the same group of countries—Argentina, Egypt, Kenya, Pakistan, Portugal, Thailand, and Yugoslavia—where the domestic prices of industrial goods range between 22 percent and 150 percent *above* international prices. A first step, therefore, is to be able to measure the comparative cost advantage of producing agricultural commodities. Building on the efficiency indicators mentioned in the previous section, the commonly used measures in the Bank's research are the domestic resource cost and net economic benefit estimates. The first of these estimates, the domestic resource cost (DRC), measures the costs in domestic currency units of earning (through exports) or saving (through import substitution) a unit of foreign exchange. This is a special case of the net economic benefit measure, which is part of the Bank's standard methodology of project evaluation. As commonly used, the DRC is a static measure, though it need not be so in principle.<sup>21</sup> While data problems make it difficult to estimate these indicators accurately, they are adequate for qualitative

assessments of comparative costs in the domestic agriculture sector and for intrasectoral and intersectoral comparisons. They do not, however, answer a question relating to comparative advantage: what is the trade-off between specialization in a few crops according to comparative advantage and the risk of income fluctuations. For the developing countries, where agriculture is dominant, this is an issue of fundamental importance.

The determination of an appropriate exchange rate is a crucial issue, not only for general economic policy but also because of the specific impact on agricultural prices and incentives. Overvalued exchange rates function as an implicit tax on agricultural exports and as an incentive to import rather than to produce domestically. An associated problem is: At what rate should the price of foreign exchange be managed, and how does this affect the crop mix? Often, this is related to arbitrating between the need for export promotion and import substitution in industry and agriculture. In lieu of an export tax, overvaluation can work to limit a country's crop exports when the international demand for these exports is relatively inelastic. Alternatively, when combined with import duties on food, overvaluation may serve to provide greater incentives to domestic food production rather than to the production of cash crops for export. Using small-country assumptions, however, the central issue is that exchange rate overvaluation is a tax on exporters, which does not result in any generation of additional revenues for government. In fact, the "exchange crisis" in many developing countries may itself be caused by a lack of price incentives for agriculture. Undoubtedly, in countries like Ghana, Uganda, and Zaire, the problem calls for immediate attention, but in a more general sense it affects the agricultural exports of most developing countries.

In most of the Bank's country economic and sector work, the question of self-sufficiency in food is addressed through simple ratio analysis: the extra-

20 P. McLoughlin Associates Ltd., "A Study of Prices and Subsidies in Kenya's Agricultural Sector" (The World Bank: Agriculture and Rural Development Department, Economics and Policy Division, 1977).

21. See Lyn Squire and Herman G. van der Tak, *Economic Analysis of Projects* (Baltimore and London: The Johns Hopkins University Press, 1975, 4th printing, 1981). Also see Anandarup Ray, *Issues in Cost-Benefit Analysis* (The World Bank, 1983, forthcoming).

polation of trends in food demand, supply, and imports, adjusted for aggregate income elasticities and forecasts of aggregate growth rates. Price analysis has not played much of a role in these estimates because very few of these exercises employ explicit models incorporating the response of production, consumption, and import demand to price changes.<sup>22</sup> There is need, however, for a selective analysis of the objectives of policies for food self-sufficiency, the costs to the economy of attempting to raise the domestic prices of a few critical food crops above international prices, and the difference between foreign exchange saving and food security motivations.

A great number of attempts are made in the developing countries to insulate the domestic economy from the effects of fluctuations in international prices. The motivations for such policies are diverse, but research seems to indicate that income instability is of greatest concern to developing countries that export primary goods. There continues to be a misunderstanding that price stabilization automatically leads to more export earnings and government revenue stabilization, without sufficient exploration of the conditions under which this might be true.<sup>23</sup> Another important issue relates to whether subsistence farmers are deterred from producing cash crops because of the instability of income and consumption that would result from price fluctuations. It may often be the case that small farmers prefer stable prices to fluctuating prices, even if the latter imply a higher average price over the long run. In such cases, the appropriate form of intervention could be through crop insurance and support schemes, but it may be better in the longer run to extend credit facilities for the financing of inventories and to improve the basic infrastructure that will permit a greater role of the private sector. Much work remains to be done in exploring the appropriate forms of price stabilization.

### Distribution

The relationship between agricultural price policies and distribution is complex, but it is a crucial area in the analysis of price intervention. This is also an area where both the Bank's research effort and its economic and sector work have been less successful in analyzing or recommending policy actions. The complexity of the issues involved may be one reason for the lack of comprehensive analysis. While some

attention, *albeit* in a very aggregative fashion, has focused on aspects of agriculture sector/industry sector and rural/urban distributional issues, relatively less work has been done on the regional aspects of pricing policies and on the impact of interventions on the distribution of personal income.

It is well-known that few policy makers think of the terms of trade between agriculture and industry as an instrument of macroeconomic policy. The terms of trade are usually skewed against agriculture, thus being in line with past development theories, which see agriculture as a vast source of surpluses—labor, savings, foreign exchange, marketed output, and governmental revenue. Lately, in a post-1973 environment that is characterized by slow industrial growth, a reorientation of strategies is occurring, especially as it is becoming apparent that the slower rate of labor absorption in industry will have to be offset by rigorous job creation in rural areas. Agriculture continues to offer numerous profitable opportunities for generating foreign exchange, with trade in industrial goods not being the great engine of growth it was vaunted to be in early development theory. There is increasing evidence that savings propensities and absorptive capacities in agriculture are quite high, comparing favorably with those in industry; the problem of the seeming lack of profitable projects may be caused by policy-induced low prices; a number of projects that have recently been rejected may become viable if governmental controls on the agricultural terms of trade are relaxed. The policy dilemma that occurs in some developing countries is one where domestic agricultural prices are too high in relation to international prices, but are too low with respect to domestic nonagricultural prices. In such cases, it is necessary

22. An exception is a model for South Asia which is based on the estimation of an extended linear expenditure system, see M. Osterrieth, E. Verreydt, and J. Waelbroeck, "The Impact of Agricultural Price Policies on Demand and Supply, Incomes, and Imports: An Experimental Model for South Asia," World Bank Staff Working Paper No. 277, April 1978.

23. See E. M. Brook, E. R. Grilli, and J. Waelbroeck, "Commodity Price Stabilization and the Developing Countries: The Problem of Choice," World Bank Staff Working Paper No. 262, July 1977. Also, Jos de Vries, "Compensatory Financing: A Quantitative Analysis," World Bank Staff Working Paper No. 228, December 1975. For a comprehensive analysis of the stabilization and risk issues, see David M. G. Newbery and Joseph E. Stiglitz, *The Theory of Commodity Price Stabilization* (Oxford: Clarendon Press, 1981).

carefully to evaluate the objectives of governmental policy before designing strategies to affect either of the two sides of the terms of trade.

A corollary of the skewed terms of trade between agriculture and industry is that rural areas suffer from distinct discrimination with consequent adverse effects on rural outmigration. Undervalued agricultural prices may be a prime contributor to creating a suboptimal rural work force. The precise nature of links between the rural and urban sectors needs to be determined before exploring the effects (intended/unintended, short-term/long-term) of agricultural prices and their trajectories. These include the migration response to changes in welfare, the price elasticities of rural savings and marketable output surpluses, the nature of demand for rural products in urban areas, the rural market for industrial goods, and, for policy purposes, the welfare weights associated with individuals in the two sectors.<sup>24</sup>

Although a number of developing countries suffer from serious problems caused by a maldistribution of resources and incentives along geographical lines, the link with differential price policies has been inadequately explored. These issues are particularly visible in countries like Brazil, India, and Peru, but are equally important in countries where differences among regions in cropping patterns, cropping intensities, land intensities and land types have generated differential treatment of their outputs and inputs. Over time, regional pressure groups emerge (for example, between plantation and smallholder areas), which attempt to distort the patterns of incentives towards themselves.<sup>25</sup> Sometimes governments have restricted the movement of food grains from surplus to deficit areas, thereby distorting prices between the two regions. Pan-territorial pricing is often intended to affect regional distribution of income, but produces major distortions; these distortions are particularly worrisome because the incentives are high precisely in those areas where food production may be inefficient.

As mentioned earlier, the structure of the agriculture sector makes the personal distribution of income in these sectors greatly susceptible to the level of and changes in agricultural prices. This is particularly evident in the transmission of food price impulses where a rise in prices causes a sometimes calamitous drop in the real incomes of the poor

consumers and often causes distress sales of land and other assets by the rural poor. A substantial body of evidence suggests that often input and output subsidies which are intended to lower effective prices for specific poverty groups do not reach these groups, and the main beneficiaries are usually urban middle- and high-income groups. This is often, then, a serious constraint on recommending packages of price increases that are coupled with tax and subsidy policies to achieve income distribution objectives. There is scope for much more analysis of the income distribution issues involved in price intervention, particularly relating to the effects on the structure of employment and factor use, on different types of farmers, and on poverty and malnutrition.

### Public Finances

Relatively greater attention has been paid in the Bank's country economic and sector work to the consequences of agricultural price intervention on government revenues and expenditures than to other issues in this area, with the possible exception of structural adjustment loans. This is particularly true for those countries in which parastatal organizations play a dominant role in agricultural marketing. The measurement of the actual budgetary effects of *existing* price policies is straightforward. *Projections*, however, are rendered difficult, particularly by the need to account for a variety of indirect effects on the production and consumption sides, which often can be significant. For instance, an increase in farm price supports can increase budgetary costs to the government, both on account of the additional marketed surplus induced by the policy and because of the increased use of inputs leading to a rise in the amount of input subsidies (if such subsidies were also in existence). Equally complex are the relationships between the government's financial cost and the true cost to society represented by efficiency losses. The government's cost of an output subsidy, for instance, usually

24. See A. Braverman, R. K. Sah, and J. E. Stiglitz, "The Town-Versus-Country Problem: Optimal Pricing in an Agrarian Economy," Country Policy Department Discussion Paper (The World Bank, August 1982).

25. See Recca, "Argentina: Agricultural Prices and Subsidies," for examples of the impact of pressure groups on price policy. Also, Scandizzo and Tsakok, *Food Pricing Policies*, on "patronage."

exceeds the latter by the amounts of transfers from the government to consumers and producers.<sup>26</sup>

There are at least two dilemmas that confront policies with respect to prices and budgets, and each is concerned with equity and efficiency. The first is the choice between a strategy that holds output prices down while subsidizing inputs to provide the means for continued production and a strategy that allows output prices to rise as an incentive to greater production and substitutes consumer subsidies for input subsidies. The budgetary implications of each approach have to be measured and then adjusted by welfare weights to decide on a pricing strategy. The second dilemma relates to the choice of taxes on agriculture, given that direct taxes do not penalize incremental production as much as do indirect taxes. The fact is that very few countries use direct taxes on agriculture (for example, the land tax) sometimes because of administrative problems, but more often than not because of the opposition of large landowners with great political influence in most developing countries.

Generally, the taxation of agriculture is a strong disincentive to production, but it is an important source of government revenue. Therefore, any recommendations made to reduce agricultural taxation should identify at the same time alternate sources of revenue. Some important considerations here are the buoyancy of revenues, the diversification of the revenue base, and the differential impact of alternative taxes. With respect to the last of these, some attempts have been made towards welfare-based price policy recommendations in which the point of entry is on the fiscal side. The formal model developed for this analysis incorporates the levels of welfare of different groups in urban and rural areas, and looks at the effect of price interventions on the welfare of these groups. Price impulses are transmitted through the interlinking of markets, and the size of the public deficit is the effective constraint on maximizing national welfare.<sup>27</sup> Although there are some computational problems involved in applying this approach generally, it represents a major step towards analyzing pricing issues and responding to some major policy issues that arise in country economic work.

Input subsidies have been defended on grounds that they assist in speeding up the adoption of new, input-intensive technologies, while at the same time

keeping the prices of food and raw materials low. On the other hand, much experience cautions against the provision of subsidies over any significant length of time. The use of the inputs in question—for instance, fertilizer—is well accepted in most cases and offers high economic returns even without subsidies; furthermore, subsidies may be responsible for wastage of the inputs concerned (water, for example). Subsidized agricultural credit may stimulate investment, but often at the cost of fragmenting financial markets, discouraging labor use, and creating adverse distributional effects. In addition, it has been widely observed that once introduced, both output and input subsidies are difficult to lower or eliminate when they are no longer needed. Finally, the budgetary and macroeconomic consequences of large subsidies are often unfavorable, especially when they are transformed through political pressures or administrative convenience into quasi-fixed charges against the revenues of the government.<sup>28</sup>

The taxation of agricultural exports is an issue that commands attention in countries such as Togo where export taxes are the major source of governmental revenue. The desire to protect consumers of foodstuffs at home and the need for government revenues are the two major objectives determining the levels of such taxes. The regressivity of many export tax regimes necessitates a reformulation of objectives and instruments. Often, a more equitable regime can be devised with neutral budget consequences, as in cases where export crop lands are taxed, with differential rates applied to smallholdings and to plantations.

### Towards an Agenda for Future Work

There is, as yet, no “good book” of agricultural price interventions to provide the policy maker with the guidance necessary to analyze the structure of such

26. These effects are analyzed and quantified, wherever possible, for the cases of Bangladesh, Korea, Thailand, and Venezuela, in Tolley, Thomas, and Wong, *Agricultural Price Policies*.

27. See A. Braverman, C. Y. Ahn, J. Hammer, and R. K. Sah, “Agricultural Pricing under Government Budgetary Constraint: The Case of ‘Korea,’” Country Policy Department Paper (The World Bank, 1982, forthcoming).

28. See Sweder van Wijnbergen, “Short-Run Macro-Economic Adjustment Policies in South Korea: A Quantitative Analysis,” World Bank Staff Working Paper No. 510, November 1981.

interventions or to implement a set of rules in their proper sequence and with fewest adverse side effects. If such a book were to exist, however, it would probably need to answer some of the same questions as those that arise in the Bank's economic and sector work. The questions that are repeatedly asked are: Are agricultural prices distorted and by how much? How do these distortions affect a country's comparative advantage? Who benefits and who loses in the short and long run from price interventions? What are the macro side effects, intended and unintended? What are the government's objectives and are they well formulated and focused? How do existing price interventions help meet these goals? How should price policy be changed to serve better these objectives? Are there instruments, administrative capacities, and the political will to effect these changes successfully and in cost-efficient ways? In this concluding section, a summary is presented, as well as personal views, of possible directions that future Bank research in this area might take.

There is clearly a research gap that needs to be filled. At least four major areas can be identified for Bank research. First, it is clear that static welfare losses, while important, are relatively small in comparison to the various income transfers that take place from price intervention in agriculture. The measurement of these transfers, their impact on distribution and efficiency, and the politico-economic setting in which they operate are important areas of inquiry. Second, while there is general agreement about the price responsiveness of production, little is known about the characteristics (especially of the decision-making processes) of the responders. Specific knowledge of the behavior of deficit farmers is required, for example, to be able to understand not only the production response to price changes, but also the accompanying phenomena of land abandonment and distress sales, rural outmigration, and the increasing proletarianization of these farmers under certain pricing regimes.<sup>29</sup> Third, analytical tools that take account of multiple objectives are of relatively recent origin. These have mainly been generated in the recent literature on optimum taxation or in the related field of cost-benefit analysis.<sup>30</sup> The Bank is experimenting with such approaches: for example, the so-called "social" cost-benefit analysis approach, when fully developed for use in agricultural policy studies, will represent an improvement over the essentially

single-objective, single-period indicators in current use. Finally, there is at best only a "textbook" understanding of the links between pricing policies and major macroeconomic developments. Partly, this reflects the limited view imposed by modes of analysis that are suited to analyzing issues in developed-country agriculture, where agriculture typically constitutes a small part of total output and employment, unlike in developing countries where it is typically a more important sector. While the emphasis of micro issues is undoubtedly important, greater efforts need to be made to develop a macro perspective. For example, the link between agricultural prices and rural savings, the effects of pricing changes on aggregate consumption, investment, and, ultimately, the balance of payments requires further investigation. At the same time, while price changes in both agriculture and industry are important, food price increases are transmitted fairly quickly to wage negotiations, and the resulting wage pressures may have adverse effects on a country's exports.

A second lesson from the Bank's work is that time is an important dimension in policy reform of agricultural prices. The responsiveness of both producers and consumers increases as time passes. This should determine the phasing of reforms for at least two reasons. First, given the difficult fiscal and balance of payments situations of most developing countries today, there may be an instinctive desire for short-term solutions. The interaction between subsidies, tax collections, and import/export effects over the medium and long term are, however, the dominating influences in a country's agriculture sector, as producers and consumers seem to respond in more predictable ways when the permanency of reforms is established. Second, the distributional effects of price reforms are such that the poor usually need to be protected during the transition to new price regimes. The object of such protection is to safeguard income and nutrition levels, leaving the

29. In the design of the Bank's large-scale Muda Irrigation Project in Malaysia, for example, the off-farm employment of deficit farmers was inadequately accounted for, partly because of a lack of specific models and information on such farmers. For an example of the kinds of studies that may be required, see Inderjit Singh, "Small Farmers and the Landless" (draft book), available through the World Bank's Eastern Africa Regional Office.

30. See A. B. Atkinson and J. E. Stiglitz, *Lectures in Public Economics* (New York: McGraw-Hill, 1980).

task of raising standards of living and providing viable long-term employment to other policies.

The Bank's research and its sector work have generally avoided questioning the objectives of governmental price policies in the developing countries; this is, however, becoming increasingly important in the context of structural adjustment loans. It seems that much can still be done in country work that is not related to structural adjustment without altering in any fundamental way the nature of the dialogue between the Bank and a member country. It is possible to assist in focusing policies and formulating objectives in ways that will allow for empirical verification and feedback. For example, in examining the rather diffuse objectives in the area of food self-sufficiency, it is useful to ask: self-sufficiency in all agricultural output? in all food output? in all food-producing inputs (for example, food grain for livestock)? in a few strategic grains? or just in a single staple?

The symbiotic relationship between research and operational work that is to be found at the Bank has generated a number of useful analytical tools and insights over the years. The increase in research initiatives in the field of agricultural pricing issues portends well for the future. A point that needs stressing, however, is that probably more so in this area than in other areas of economic work, the creation of capacities within national institutions to carry out the kinds of analyses mentioned here will greatly enhance the effectiveness of policy work. One reason is that the Bank is often hamstrung in some fields of analysis where local institutions might not have the capability: for example, it is often necessary to advise governments about how to mobilize political support for pricing reforms. Another reason for transferring analytical models and skills to the developing countries is that the nature of agricultural price interventions makes it imperative that there be continuous monitoring and analysis. The ability of local institutions to do this needs to be built up over time.<sup>31</sup>

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*All internal reports cited in this section may be obtained from Philip Mitchell, World Bank Research Documentation Center, Room 1 8-203. To ensure prompt handling of requests, include payment for items marked with \*.*

### **Narangwal Population and Nutrition Project**

*Ref. No. 671-38*

Since 1976, a multidisciplinary team of researchers from the World Bank and the Department of International Health of The Johns Hopkins University have collaborated on the analysis of extensive data on fertility, family planning practices, and nutrition and health behavior in the Narangwal villages in Ludhiana district of Punjab, India. The data, collected between 1966 and 1974, were part of a controlled experiment in groups of Punjabi villages that were provided with various combinations of health, family planning, and nutrition services over time.

The experiment had been designed and executed by the staff of Johns Hopkins; the World Bank became involved in the Narangwal study at the data analysis stage. Bank economist Rashid R. Faruqee joined with a university team of public health specialists, led by Dr. Carl E. Taylor, to analyze the efficacy and cost of choices of service packages aimed at addressing a community's fertility and health objectives.

The data analysis had two focal points—a nutrition dimension and a population dimension—each responding to a similar dichotomy in the original study. For the nutritional part of the experiment, four groups of Narangwal villages were provided with different levels of nutritional services. One group received nutritional supplements and health care; another was given nutritional supplements alone; the third group received health care alone; and the control group received none. In the population part of the experiment, five groups of villages likewise received different service packages, namely, a combination of family planning, women's services, and child care services; only family planning and women's services; only family planning with child care services; family planning

education alone; and none. There was one experimental overlap between groups: the village receiving nutritional supplementation and health care for preschool children was in the population component as the group receiving family planning and child care services.

The main objective of the nutritional component was to explore the relative contributions of poor nutrition and other socioeconomic factors to child mortality, morbidity, and growth and development. The hypothesis was that poor nutrition would adversely affect morbidity and that morbidity would act synergistically to raise child mortality. Measures of maternal influences, such as birth weight and maternal height and socioeconomic status of the family (caste, landholdings, parents' occupations, education), were available. It was postulated that socioeconomic status affects child growth, development, and morbidity mainly through three intermediate variables: availability and quality of maternal care, quantity and quality of diet, and housing and environmental conditions.

On the population side of the project, the main objective was to study the outcome of integrating family planning services with health services. Due to the range of intervention strategies in the Narangwal project design and the broad coverage of socioeconomic variables, the purpose of the analysis was to gain understanding of important policy issues, such as:

- The effect of health services on family planning practices and on the health status of households with different socioeconomic characteristics.
- The possible trade-offs at alternative levels of health and family planning services between different program components.
- The influence of household, socioeconomic, and community characteristics on the demand for and use of family planning and health services.
- The effect of the perception of child mortality on family planning acceptance and child-rearing practices.
- The most successful patterns and sequences of contraceptive protection.

The results of the nutrition part of the project showed that nutrition care alone or in combination with health care significantly improved both weight



and height of study children beyond the age of 17 months. At the age of three years, children from nutrition care villages were 1.3 centimeters taller and weighed on average 560 grams more than children in the control group villages. Children in the health care villages were in between the control group and nutrition care villages. Among the many socioeconomic and demographic variables tested, sex and caste had an especially pronounced independent and additive effect, especially on male children of higher caste who experienced a two-centimeter improvement in height and gained up to three-quarters of a kilogram in weight.

Results from regression analyses on a subsample of 180 children on whom exact dietary measurements were obtained showed a strong relationship between dietary intake and achieved anthropometric status. Conversely, the amount of food consumed was associated with achieved growth and socioeconomic status. Psychomotor development was found to be directly affected by past nutritional status and, to a lesser extent, by present nutritional status and past morbidity.

Interestingly, while health care caused a significant reduction in the average duration of infectious diseases among children, it was nutrition care that significantly reduced perinatal mortality among women. While the control group of women experienced 57 deaths per 1,000 live and stillbirths, for health care villages the figure was 45 deaths per 1,000 births, and in nutritional care villages, the figure was reduced to 31 deaths per 1,000 births. For children, by contrast, services to control infectious diseases outweighed nutritional care in reducing neonatal, postneonatal, and one- to two-year-old mortality by as much as 33 percent to 50 percent.

Detailed measurement of the delivered services demonstrated clear differences between experimental groups in terms of staff time, service contacts, and costs. The costs per unit of service were very similar in all groups; however, nutritionally served village groups were most costly per capita due to the higher average number of feedings provided for each child under three years of age. The largest amounts of service time and contacts were in the combined nutritional/health care villages where the average cost a year per child under three was \$21 (in 1970 prices). The average cost per feeding was \$0.40 and

the average cost per service contact was \$0.20—about the average cost per patient visit in government primary health centers in the Punjab at the time.

The central focus of the population research component was to identify the possible effects of different levels of health, nutrition, and family planning services on family planning practices and fertility, as well as to understand their interaction with the socioeconomic characteristics of the clients' households.

The first step was to measure the changes in family planning acceptance resulting from the delivery of one of four different service packages. It was found that in each of the four sample groups about 10 percent to 15 percent of the couples had used some form of contraception prior to the study. Upon initiation of the service delivery programs, all four groups experienced a rapid increase in contraceptive use, but by the end of the program there were differences among the groups regarding continuing contraceptive use. The highest user rate was achieved in the group with combined family planning and women's services, closely followed by the group having those services plus child care services. The family planning plus education group was in fourth place for ever-users and third place for continuing users, despite the fact that costs per acceptor were eight rupees, compared with from two rupees to five rupees per acceptor in the other groups. In addition, the family planning education group required thrice the service contact time.

Based on the finding that previous use of any form of contraception predisposes participants to accept newer forms of contraception and to continue using contraceptives, it appears that if the aim of a program is to raise the level of contraceptive practice in a community, greater impact can be achieved by focusing on couples who were once contraceptors. For instance, in Narangwal, only one-third of the previous nonusers became contraceptors during the program, while almost one-half of those couples who had used traditional/indigenous methods and almost three-quarters of prior users of modern methods did so.

Socioeconomic and attitudinal variables that could mediate change were included in the analysis to obtain insights into the possible trade-offs at alter-

native levels of health, nutrition, and family planning services. Multivariate relations were measured by linear regression models. Predisposing variables in explaining variations in acceptance of family planning were found to be: education of husband, age of wife, family size, child mortality experience, interspouse communication, prior contraceptive experience, and attitude toward family planning. Services related to treatment of women's illnesses, children's services in general, and motivational programs for men were found to be significantly related to acceptance. The treatment of children's illnesses did not have significance in explaining the length of contraceptive use, but all other services provided did appear to have impact. The analysis indicated that the provision of services had significant impact on the acceptance of family planning, but less so on the duration of contraceptive use.

It was observed before the project began that there had been significant differences in family planning practice between socioeconomic groups. With the start of the project, a new relationship emerged: greater use of services was more strongly associated with greater acceptance of family planning practices. In this regard, it was important to ascertain whether the use of health services was already associated with socioeconomic advantage. In the treatment of ill children, no significant differences were found among groups. With respect to the treatment of ill women, however, those households that owned land or had modern household amenities were higher users, and women under 35 years of age were more often treated than women over 35 years.

In terms of the effect of the perception of the likelihood of child mortality, the study established a clear association between decreased fear of child mortality and increased use of contraceptives.

In evaluating the ultimate impact of the Narangwal experiment, the goal is to establish how much observed change in fertility occurred as a result of contraceptive practices brought about by the project. The analysis of the relationships between fertility of couples during the project period, on the one hand, and contraceptive practice and other intervening variables, on the other hand, is not a straightforward exercise. As a first step, however, a dichotomous variable indicating occurrence or nonoccurrence of birth in a given calendar year was considered. The impact of contraception on fertility can thus be seen

from the results of 1973, the last year of the study. The observed marital fertility rate (live births per 1,000 women) was 198; it would have been 224 if couples had not used contraception from program sources the previous year. Further analysis is needed in this area with refined variables, especially in defining fertility.

In the analysis of contraception it is also necessary to identify the patterns and sequences of contraceptive use that are most successful in sustaining high levels of protection. In the field, the level of protection was not strictly related to the clinical effectiveness of different methods, but to regularity and care in use. Among temporary methods, the failure rate, indicated by pregnancy, was highest for the pill (29.2 pregnancies per 100 women years of use), followed by the condom (26.8 pregnancies), and was lowest for the injection depo-provera (3.1) and the intrauterine device (IUD) (5.2). In continuity of use, the IUD fared best with 60 percent still using the method after two years, followed by the injection with a 40 percent continuing user rate. Condoms, the most preferred method, had a 30 percent continuation rate, and only seven percent of the pill users did so for two years or more.

Prior to the Narangwal experiment, it was not possible to examine the merit of the integration of family, health, and nutrition services in terms of their combined impact. Data from the Narangwal study, which is now well-known and well-documented, have made this possible.

The results have significance for the Bank's operations in health and population and for country planners and other researchers. Within the Bank, most population projects are health-based—primarily in maternal and child health, yet none of the Bank's own population projects has been in operation long enough to help analyze the benefits of such integration, nor are these projects cast in an experimental design to make meaningful comparisons possible. For reasons of administrative efficiency, also, most policy makers have accepted the integration of health and family planning services because health personnel can be used for family planning activities. The Narangwal data make it possible to study the critical issue: whether family planning services should be integrated with health services to get better results for desired fertility and health objectives in future projects.

Phase II of the analysis of the Narangwal data is continuing through the Bank's research project Ref. No. 672-03, which is expected to be completed in December 1982.

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of many countries, transport fuel pricing is important not only for policies affecting energy and transport, but also for macroeconomic policy, particularly for the design of structural adjustment.

The evidence shows that the policy of pricing transport fuels in many developing countries has changed erratically over the past decade, which suggests that advice is needed on restructuring the transport tax system. Good policy advice is, therefore, important but it is far from clear that it is currently available.

The Bank must often operate in a relatively piecemeal fashion when offering policy advice in connection with specific sector programs or project loans. Thus, the object of the research is to develop a methodology for setting tax rates (and, hence, prices) in the transport sector (on transport fuels or vehicles), given that the remaining tax and tariff structures in the country cannot be radically altered. Setting the right tax on transport fuels is complicated by several considerations:

- Striking the right balance between improved resource allocation and various distributional goals.
- Striking the right balance between revenue considerations, especially the extent of cost recovery, and ensuring the efficient use of transport resources.
- Fuels are typically both final consumption goods and intermediate goods, and considerable inter-fuel substitution possibilities exist.
- As a consequence of these various considerations, the structure of the rest of the tax system is important for the design of fuel taxes.
- Finally, and of central importance, transport fuels are a logical base on which to levy marginal track costs.

The researchers intend to develop a theoretical framework and methodology that should allow some preliminary estimates of the major orders of magnitude with available data, followed by tests in a "laboratory" country, yet to be chosen. Starting from tests in a data-rich country, the study will identify the kinds of data essential for application in a wide range of countries.

The methodology will provide guidelines for taxing and pricing the four main petroleum-based trans-

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## NEW RESEARCH

### Pricing and Taxing Transport Fuels in Developing Countries

Ref. No. 672-83

The World Bank needs to give sound advice on the pricing and taxation of transport fuels, both to ensure the best use of resources in the transport sector and because transport fuel consumption typically amounts to more than half of total oil consumption in developing countries. Given the large share of oil imports in the balance of payments

port fuels—gasoline, diesel, kerosene, and liquid propane gas (LPG)—and the close substitute, ethanol. It will also provide guidance on the right level of transport tax relative to public expenditure on transport and the best form of such taxes. It will help to identify and calculate the distributional impact of changes in transport taxes—an important policy matter for governments and the Bank.

The distributional impact of transport tax changes will be explored using an econometrically estimated demand system and an input-output table, which together provide estimates of the parameters needed for the choice of tax structure. The study will consider and demonstrate the consequence for tax design of ignoring distributional considerations, or attaching varying degrees of importance to them. The remainder of the tax system and substitution possibilities within the transport sector will be analyzed in order to ascertain the impact of transport taxes on resource allocation.

Researchers are: David Newbery in the Development Research Department; Esra Bennathan and Clell G. Harral in the Transportation and Water Department; and Gordon A. Hughes and William D. O. Paterson, consultants.

### **Effects of Irrigation: Matar Taluka, India**

*Ref. No. 672-84*

Irrigation, the single most important source of agricultural growth and development worldwide, is the largest subsector within the World Bank's lending for agricultural projects. Despite substantial lending, approaching \$10 billion cumulatively since 1974, little empirical evidence of the income distribution effects of such Bank investments exists. Which groups in society are reached by the Bank's irrigation programs is still an open question. In order to answer this question, there is a need to quantify the effects on farm households as well as on agricultural labor and on other sectors within an economy.

The main thrust of this study is to quantify the impact of irrigation investments in the development of the Matar Taluka area in the state of Gujarat, India. Matar Taluka is an administrative unit comprising 82 villages, many of which have been the subject of several household surveys since the 1930s,

thus providing an unusual and rich data base. No major effort has previously been made to use these data in assessing the effects of irrigation.

Matar Taluka has attracted the interest of development economists for several reasons: dairy cooperatives are unusually important in the region, canal irrigation exists in several areas, and widespread changes in agricultural technology and commerce associated with the "Green Revolution" are plainly evident.

Matar Taluka was surveyed in 1929 to find out the actual tax burden of producers; the regional survey included data on assets, debts, consumption, and employment. A resurvey was undertaken in 1965 to provide a broad picture of changes in the region over a 36-year period, and a second resurvey sponsored by the Indian Council for Social Science Research in 1974 was designed to reach the same households a decade later. Together these surveys provide a unique record of rural development at the household level over an extended period of time.

This research aims at quantifying the direct and indirect effects from irrigation. It should provide the framework and empirical basis with which to assess the importance of water resource development for the population directly or indirectly affected.

The research will study three sets of effects of irrigation on rural households: production and income, consumption, and savings and investment. The direct effects of irrigation on agricultural production and farm income, for example, are expected to occur via changes in cropping patterns, yields, and the use of inputs, while the indirect effects occur via an increased demand for labor and a general equilibrium effect on wage rates.

The Gujarat Institute of Area Planning conducted the other surveys. The institute is a state economic research organization, with which the Bank will establish a collaborative framework for the research study. The results will be shared with the Narmada Planning Group, specially created for the preparation of one of the largest Bank-financed irrigation projects.

The researchers are: Alfredo Sfeir-Younis, Agriculture and Rural Development Department; Per Ljung, South Asia Projects Department; and Anil Deolalikar, consultant.



## Liberalization with Stabilization in the Southern Cone

*Ref. No. 672-85*

After several decades of a development strategy based on import substitution and extensive direct control of all markets, Chile, Uruguay, and Argentina introduced profound reform packages in the mid-1970s—packages that included liberalization and stabilization policies. Spanning labor, commodity, and financial markets, these reforms are still in progress in Uruguay, being overhauled in Argentina, and are fairly advanced in Chile. The magnitude, sequence, and outcome of the reforms in the Southern Cone countries of Latin America offer a rare opportunity to study the transition toward a more liberal economic environment, which the research project proposes to study. The objective is to understand how these countries are adjusting to the new environment and, thereby, to identify policy packages that minimize the costs associated with transition to a more liberal regime.

The research strategy is to identify and measure the costs and benefits of the reforms at the microeconomic level, the first task being to describe the adjustment by firms to the new environment provided by the reforms. These descriptions will take into account three elements that affected the performance of firms: liberalization, market competitiveness, and stabilization. Next, models will be used to determine the sensitivity of the adjustment by firms to different reform packages, which will be determined from macro analyses. Special attention will be given to separating avoidable from unavoidable costs, with the objective of identifying policy packages that minimize the measured adjustment costs. How these adjustments at the microeconomic level add up to economywide costs and benefits will be inferred by measuring sources of growth and structural change at the sectoral level.

A complication for the research arises from the simultaneous application of macro stabilization policies to reduce inflation and of micro-oriented liberalization policies (across all markets) to increase the efficiency and extent of resource use. The evolution of such variables as interest and exchange rates, which were crucial inputs for decisions by firms, was the result of interactions between liberalization and stabilization policies. That these

interactions are still poorly understood can be seen from the variety of explanations offered. Some observers attribute the changes in these variables to events unrelated to the reforms (bank failures and the appreciation of the dollar); others to the inconsistent application of policies, resulting in high inflation and continuing uncertainty (the maintenance of a fiscal deficit in Argentina); others to a misguided stabilization program (the assumptions underlying the monetary approach to the balance of payments); and still others to stabilization policies that were too successful (in the sense of reduced inflation).

Partial accounts of experiences under the reforms are becoming available.<sup>1</sup> None, however, has been undertaken in a coordinated framework: they lack either a comprehensive comparative description of the reform packages or a comparative evaluation of the outcomes. Such a lack is true with respect to variables such as the real exchange rate and the real interest rate. Given the importance of these variables for decisions by firms, the research will supplement existing accounts of the reforms to fill the gaps.

The interaction between liberalization and stabilization measures is best understood at the macro level. Consequently, the micro research undertaken must be complemented by macro analysis, without which it could not be established whether adjustment—successful or unsuccessful—was due to the application of stabilization policies or of liberalization policies. Furthermore, the macro analysis will enrich the micro research by suggesting policy packages whose application would result in a greater net benefit during the transition.

Involving close collaboration with research institutes in Argentina and Chile—Fundación Mediterránea and Instituto de Economía, Universidad Católica, respectively—the research will be co-directed by Jaime de Melo of the Bank's Development Research Department and Vittorio Corbo of the Universidad Católica de Chile. Consultants are: Amalio H. Petrei, James R. Tybout, and others yet to be identified.

1. See World Bank Country Studies on Chile (January 1980) and Uruguay (January 1979).

## Productivity Change in Infant Industry

*Ref. No. 672-86*

In its most simple form the infant industry argument for public intervention rests on two empirical propositions: First, although the initial production costs of newly established industrial activities may exceed internationally competitive levels, they will decline over time to such an extent that the present social value of the eventual cost savings will exceed the early excess costs. And second, because of market failures due to external factors, or differing social and private rates of discount or evaluations of risk, private and social evaluations of the benefits to infant industry development may differ.

Surprisingly little evidence concerning either empirical proposition of the infant industry argument exists in the long history of economic theory and policy. For this reason, difficulty persists in answering such basic questions regarding infant industry promotion policies as: What is the appropriate level of promotion for infant industries? Which sectors should be promoted? What are the appropriate instruments for infant industry promotion and what should be their duration? The proposed research represents an effort to begin accumulating a body of evidence on the nature and sources of production cost changes over time in infant industry.

The research project has three objectives: (1) to measure changes in production costs in terms of changes in total factor productivity in new industrial enterprises; (2) to identify important sources of changes in total factor productivity, and in particular those sources that are unique to infant firms or industries; and (3) to determine the extent to which the sources of total factor productivity change are linked to market failures.

The proposed research will apply the quantitative methodology of productivity analysis, supplemented by case studies and engineering analyses, to a sample of firms distinguished by technological characteristics, policy regimes, and production environments. The research will focus on two countries, Egypt and Thailand. The comparative results from the Egyptian and Thai studies should improve understanding of the sources of productiv-

ity change at the enterprise level and of the way in which trade and industrial policies affect the pattern and rate of productivity change. The research is coordinated with a research project with similar objectives in Japan, funded by the Science Research Foundation of the Japanese Ministry of Education, and with a proposed project to be undertaken by the Technical Change Center in the United Kingdom.

Researchers are: Mieko Nishimizu and John M. Page, Jr., Development Research Department; Ronald Martin N. Bell with the Science Policy Research Unit (Sussex University, United Kingdom) as collaborator; Heba Handoussa, consultant (Egypt); and Yuji Kubo (Tsukuba University, Japan) as the director of the coordinated Japanese project.

## A Computable General Equilibrium Model for the Ivory Coast

*Ref. No. 672-87*

The purpose of this applied research application project is to develop a computable general equilibrium (CGE) model of the economy of the Ivory Coast as one of two submodels that would be used to help formulate the key policy trade-offs raised by the country's process of structural adjustment and transition to an oil economy. The specification of a long-term relative price endogenous model will parallel the development of a macroeconomic model for medium-term projections under the hypothesis of constant structure of intersectoral relationships and exogenous relative prices.

CGE models have been applied to various newly industrialized developing countries to analyze the impact of alternative trade adjustment policies (in particular with respect to exchange rates, tariffs, quantitative import restrictions, and export subsidies) on growth, economic structure, and the distribution of income. Such models have been used as part of World Bank Missions to Turkey and Yugoslavia.<sup>2</sup> However, the development of the CGE model for the Ivory Coast will represent one of the

2. See, for example, Vinod Dubey, Shakil Faruqi, and others, *Turkey: Policies and Prospects for Growth*, A World Bank Country Study (March 1980).

first applications to a developing economy strongly based in agriculture and also characterized by significant industrial sectors and interindustry relationships.

The framework of a joint program of work between the government of the Ivory Coast and the World Bank was established in response to the need to improve the country's existing macro projection tools arising from three major considerations. First, the tight foreign exchange situation experienced by the Ivory Coast since the fall in prices of its primary export products has revealed the importance of the link between public investment decisions and the external debt, thereby reducing the value and relevance of the government's own plan-budget model—a static input-output model used for short-term macro projections.

The static model's usefulness for medium- to long-range projections remains limited by its low degree of endogeneity, its static specification, and the absence of a detailed financial block. At the same time, the Bank's revised minimum standard model (RMSM) also proved inadequate to the task of providing an adequate framework to analyze the impact of structural changes on the medium- to long-term evolution of the economy.

Second, the Ivory Coast is now entering a period of rapid structural change, mainly as a result of the adjustment policies pursued by the government, especially in the industry and agriculture sectors. Third, the emergence of the oil sector, and the possibility of net oil surpluses in the second half of the 1980s, will add a further dimension to the structural adjustment process.

The objectives of the joint program are to broaden the scope of the macro policy dialogue between the government and the Bank; to prepare the groundwork for macro policy issues raised by the emergence of the Ivorian oil sector; to reinforce administrative units responsible for macro projections within the government; and to develop the collaborative abilities of Ivorian researchers.

Two previous multisector price endogenous models built for the Ivory Coast—Goreux's multilevel programming model developed in the Bank's Development Research Center and Staelin's smaller, linearized CGE model—will be carefully

reviewed for applicability in the project.<sup>3</sup> This application project will also complement research currently under way in the Bank's newly formed Development Strategy Division on problems associated with developing an integrated pair of macro-economic and multisector models in other countries, including Thailand (Ref. No. 672-47), Yugoslavia (Ref. No. 672-26), and Egypt (proposed).

The development of the CGE model for the Ivory Coast will be undertaken with the joint responsibility of the government's Directorate of Planning at the Ministry of Planning and Industry and the World Bank's Development Strategy Division in the Development Research Department and its Western Africa Programs Division 2A in the Western Africa Country Programs Department II, with codirectors at the Bank being Sherman Robinson and Michel Noel.

### **Book on Modern Tax Theory for Developing Countries**

*Ref. No. 672-92*

The World Bank is increasingly called upon to offer policy advice to developing countries. At one extreme, it may recommend substantial tax, tariff, and public enterprise price reforms in the context of structural adjustment lending, while on the other it is engaged in a more or less continuous policy dialogue with countries at the sectoral and project level, where the social profitability of specific projects may be quite sensitive to sectoral tax, tariff, or pricing reforms. This is particularly true of agricultural projects and is increasingly the case in the energy sector, where a large number of energy pricing studies have been commissioned, either by the Bank or at its behest.

The rapid development of the theory of public finance in the last decade has had a dramatic effect on the way policy interventions are analyzed. The subject is maturing rapidly, empirical applications

3. See Louis M. Goreux, *Interdependence in Planning: Multilevel Programming Studies of the Ivory Coast* (Baltimore and London: The Johns Hopkins University Press, 1977) and Charles P. Staelin, "A General-Equilibrium Model of Tariffs in a Non-Competitive Economy," *Journal of International Economics*, vol. 6 (1976), pp. 39-63.

are becoming more common, and the techniques are beginning to be applied to developing economies. However, while an increasing number of economists have heard of the new approach, very few know whether it is applicable, whether it comes to different conclusions from the traditional approach, or whether to take it seriously. The object of this project is to produce a book that describes the theory and its relevance to developing countries, demonstrates how it can be used, and raises questions suggested by the theory if it is to be made more useful for policy analysis.

The groundwork for this book was laid at a Workshop on Public Economics in Developing Countries, organized by the Development Research Department in June 1982. A range of leading writers on Public Economics, many of whom presented papers at two workshops, will prepare chapters for the book, which is aimed at the general working economist.

The proposed contents will cover: (1) a textbook exposition of the new theory, relating it to the closely allied subject of social cost-benefit analysis; (2) illustrations of the normal application of the theory to economywide tax reform; (3) a definition of the range of the theory's applicability and identification of the key assumptions that are most important in shaping policy advice; (4) an application of the theory to sectoral tax reform; and (5) a discussion of taxes affecting factor markets and development policy issues.

David Newbery of the Development Research Department's Public Economics Division in the World Bank and Professor N. Stern of Warwick University (United Kingdom) are coeditors.

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Oxford University Press, 1982. 142 pages.

LC 82-14224

ISBN 0-19-520407-7 \$17.95 hardcover

ISBN 0-10-520408-5 \$ 6.00 paperback

The International Development Association (IDA), an integral part of The World Bank, has been for more than twenty years an important channel for aid to low-income developing countries. Its work complements that of its sister institution, the International Bank for Reconstruction and Development. But unlike the Bank, which relies principally on private capital markets, IDA is funded entirely by grants from member governments. The Association has become an outstanding example of multilateral cooperation to promote long-term development.

As IDA has grown, it has naturally come under closer scrutiny by all parties. Donors have become increasingly concerned about the size of the

Association, the allocation of contributions among donors, and the allocation of credits to developing countries. Questions have been raised about the quality of IDA's projects, the terms of its loans, and the ability of these projects to reach the poorest people in developing countries. Recipients of IDA loans have also voiced dissatisfaction at times.

*IDA in Retrospect* deals frankly with such questions and traces IDA's evolution and achievements over the past two decades. This book turns a bright spotlight on the institution's strengths and shortcomings and offers many lessons for multilateral cooperation and worldwide commitment to development.

### **Monitoring and Evaluation of Agriculture and Rural Development Projects**

Dennis J. Casley and Denis A. Lury

The Johns Hopkins University Press, 1982. 145 pages.

LC 82-7126

ISBN 0-8018-2910-0 \$8.50 paperback

Rural development projects are complex, seek to benefit large numbers of people in usually remote rural areas, and involve a variety of investments. The need for monitoring and evaluating them during implementation has been accepted in principle, but effective systems have not heretofore been formulated.

This book fills the vacuum and provides a "how-to" tool for the design and implementation of monitoring and evaluation systems. It differentiates the concepts of monitoring and evaluation and sets out the issues that need to be considered in designing systems to monitor and evaluate specific projects, emphasizing the timeliness of the monitoring functions for effective management. The book further elaborates on such technical issues as selection of indicators, selection of sample methodology, data analysis, and presentation. It is directed primarily to those working with specific projects and will be useful to project appraisal teams, to designers of monitoring and evaluation systems, and to project staff who must do the actual monitoring and evaluation.

### **Inequality and Poverty in Malaysia: Measurement and Decomposition**

Sudhir Anand

Oxford University Press, 1983. 372 pages.

LC 81-14178

ISBN 0-19-520153-1 \$27.50 hardcover

The book's analysis of primary data on income distribution in Malaysia sets it among the few studies of its kind in developing countries. Viewed as an anatomy of income in this developing East Asian country, it documents the state and nature of income inequality and of poverty, and develops a methodology for this purpose. Apart from detailed measurement, a decomposition of socioeconomic variables suggests the sources of inequality and poverty. In the course of the empirical work, solutions to several statistical problems were developed. The author attempts to go beyond the mechanics of measurement and the exploitation of the Malaysian Post-Enumeration Study of 1970, upon which the data were based, to illuminate broader policy questions of poverty and economic imbalance. The final product may be viewed as an application of a framework for analyzing income distribution in a developing country.

### **India's Exports**

Martin Wolf

Oxford University Press, 1982. 203 pages.

LC 82-6309

ISBN 0-19-520211-2 \$22.50 hardcover

A principal conclusion of the book's analysis of India's overall export performance in the 1960s and 1970s is that, although performance improved, export growth continued to lag behind India's needs and potential, as well as behind the achievements of several of the country's competitors. The author suggests that the main reason for India's modest performance is that an inward-looking trade and industrialization strategy provided inadequate incentives to the country's export sector. Generally, trade barriers did not constrain India's growth, though barriers to exports of clothing and textiles did pose a significant problem to the economy.

Fortunately, India has the ability to achieve faster export growth, mainly because of its diversified economy and its current low share of the world market for many products. The book explores strategic options for taking advantage of all available opportunities.

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**The Gambia: Basic Needs in The Gambia.** Heinz B. Bachmann, mission chief, and others. December 1981. xi + 142 pages (including statistical annex). Stock No. RC-8104. \$15.00 paperback.

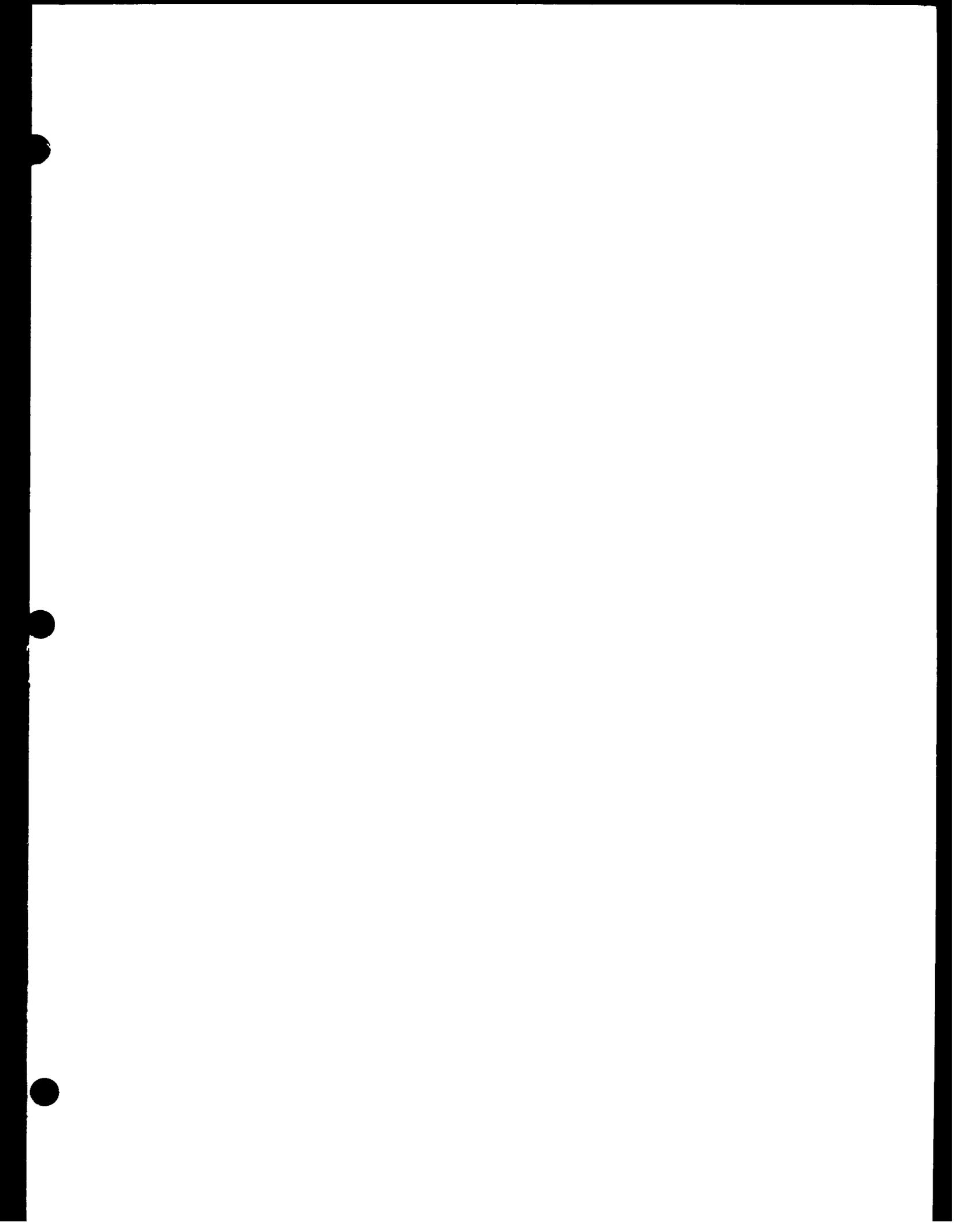
**Uganda: Country Economic Memorandum.** Mark Baird, mission leader, and others. 1982. v + 163 pages (including statistical appendix and map). ISBN 0-8213-0027-X. \$15.00 paperback.











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