

Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economywide Policies

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The impact of sector-specific (direct) and economywide (indirect) policies on agricultural incentives for eighteen developing countries for the period 1975-84 are estimated. The direct effect is measured by the proportional difference between the producer price and the border price (adjusting for distribution, storage, transport, and other marketing costs). The indirect effect has two components. The first is the impact of the unsustainable portion of the current account deficit and of industrial protection policies on the real exchange rate and thus on the price of agricultural commodities relative to nonagricultural nontradables. The second is the impact of industrial protection policies on the relative price of agricultural commodities to that of nonagricultural tradable goods. We find that (1) in almost all cases the direct effect is equivalent to a tax on exportable goods (-11 percent on average) and to a subsidy for importables (20 percent on average); (2) the indirect effect also taxes agriculture (-27 percent on average) and dominates the direct effect (whether the direct effect is positive or negative); and (3) the direct policies for both importables and exportables stabilize domestic producer prices.

There are four well-known stylized facts about the agricultural policies of developing countries, the interactions among which have not been fully appreciated. First, most developing countries have attempted to encourage the growth of industry through policies of import substitution and protection against imports competing with domestic production. Second, overvalued exchange rates have often been maintained through exchange-control regimes and import licensing mechanisms even more restrictive than those that would have been adopted in connection with import substitution. Third, many developing countries have attempted to suppress producer prices of agricultural commodities through government procurement policies (especially agricultural marketing boards), export taxation, and/or export quotas. Fourth, some governments

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have attempted to offset part or all of the disincentive effect on producers by subsidizing input prices and investing in irrigation and other capital inputs.

Suppression of producer prices has been extensively studied but there have been few attempts to estimate the combined impact of those direct policies and the three other sets of government policies. While international trade theorists have long known that protection of some activities discriminates against the remainder, that knowledge has not been transformed into usable estimates of the extent of total discrimination against agriculture.

Those few studies which have attempted to measure the indirect effects on agricultural prices and incentives have used widely varying methodologies (for example, on Chile, Valdés 1973; on the United States, Schuh 1979; on Brazil, Oliveira 1981; on Colombia, Garcia 1981; on Argentina, Cavallo and Mundlak 1982; on Nigeria, Oyejide 1986; and on the Philippines, Bautista 1987). This has precluded systematic comparative analysis of the effects of differing degrees of discrimination against agriculture.

In this article we provide such estimates for eighteen developing countries derived as the initial results of the World Bank's research project on the political economy of agricultural pricing policies. The first section gives information about the project and the way the estimates were made. In the second section we estimate the direct, indirect, and total intervention affecting incentives for agricultural output and the impact of intervention on price variability. We also present some preliminary analyses of the findings. The third section then draws some conclusions.

I. THE PROJECT ON THE POLITICAL ECONOMY OF AGRICULTURAL PRICING POLICIES

Although systematic quantification of the extent of discrimination against agriculture has been lacking, observers of the development process have long been aware of the fact that developing countries directly intervene systematically and extensively in pricing of agricultural commodities. Newspaper readers will recall riots in the Arab Republic of Egypt after President Sadat attempted to raise the prices of some key foods, riots in Zambia after prices of maize meal—a commodity consumed primarily by the urban middle and upper income groups—were increased to reduce budgetary losses, and other failed attempts at consumer price policy reform, including those in Morocco, Poland, and Tunisia. While headlines have directed attention to increased urban food prices, their counterpart is almost always suppressed producer prices, as government fiscal constraints usually preclude budgetary financing of these subsidies.

The comparative project on the political economy of agricultural pricing policies was undertaken to provide a detailed history of pricing policies, to measure the degree of intervention affecting agriculture, and to analyze the reasons for these and their effects on output, consumption, trade, the budget,

intersectoral transfers, and income distribution. Comparability across countries was achieved by applying a common methodology in all the country studies and by bringing together researchers for the individual studies to compare and assess their results during the course of the project.¹

We focus here on the magnitude of the impact of direct and indirect policies on agricultural prices and outline below the process by which these estimates were derived. For each country, major export- and import-competing agricultural commodities, including both food and nonfood products, were selected on the basis of their importance and the representativeness of the policies adopted toward them relative to agriculture as a whole. In most countries, concentration was on four to six commodities, and that coverage typically represented about half to three quarters of net agricultural product.

Country researchers then obtained estimates of the commodities' domestic producer, consumer, and border prices, adjusted for transport costs to or from producer and consumer locations, storage costs, quality differences, and other elements of the marketing margins. In the case of wheat in Chile, for instance, adjustments were made for customs duties and custom agent fees, transportation costs from the main port of entry to the mills, unloading costs and losses in transit, the annual average quality difference between domestic and imported wheat, and for seasonality (storage). The annual average producer price at the mill is the price received by farmers at harvest time (January). Imports take place six to nine months later, so that the price of imported wheat at the mill was adjusted for storage costs to ensure comparability over time as well as across locations. This adjustment for storage costs reduced the price differential between the import price at the mill (after adjusting for other marketing margin factors) and the domestic price from about 20 percent to about 4 percent on average.

There were few countries in which complexities did not arise in obtaining reliable price estimates, and painstaking research was required to develop those which were used. In Ghana, for instance, in some years use of border prices adjusted for transport costs yielded negative estimates of producer prices for some commodities. In many of the countries studied, governments had a mo-

1. Subject countries and authors are: Argentina (A. Sturzenegger and W. Otrera), Brazil (J. L. Carvalho and A. Brandao), Chile (H. Hurtado, E. Muchnik, and A. Valdés), Colombia (J. Garcia and G. Montes), Côte d'Ivoire, (A. Atsain, A. M'Bet, and S. Ehouman), Dominican Republic (T. Roe and D. Greene), Egypt (J. J. Dethier), Ghana (D. Stryker), Republic of Korea (P. Y. Moon and B. S. Kang), Malaysia (G. Jenkins), Morocco (H. Tuluy and L. Salinger), Pakistan (N. Hamid and I. Nabi), the Philippines (P. Intal and J. Power), Portugal (F. Avillez, T. Finan, and T. Josling), Sri Lanka (S. Bhalla), Thailand (A. Siamwalla and S. Setboonsarn), Turkey (H. Olgun and H. Kasnakoglu), and Zambia (D. Jansen). Summaries of country studies are forthcoming in two volumes of country studies will appear in Krueger, Schiff, and Valdés (hereafter *kvs* forthcoming); chapter 1 and the appendixes of volumes 1 and 2 will provide information on the concepts and methods used to ensure comparability across countries, and a third (synthesis) volume will cover quantification of the effects on incentives, analysis of the influence of the altered incentives on sectoral and intersectoral performance and characteristics, and a review of the political economy of agricultural price policy and its evolution over time.

nopsony on purchase and/or distribution of some or all agricultural commodities through state marketing boards, making it difficult to estimate “normal” marketing margins. Marketing boards’ costs constituted 50 percent or more of the border price of exportables in some countries, and producer prices represented an even smaller fraction of the border price. Some marketing boards lost money despite low producer prices as their sales to consumers were at or below purchase prices. In some instances, it was important also to account for the extent to which official prices were those which actually prevailed in the majority of transactions. Time series of producer prices were often developed from government files and previously inaccessible sources, and estimates of black market prices had to be weighted by their probable share of the total crop to yield accurate overall price assessments in those cases where parallel markets exist. The resulting time series of actual consumer and producer prices and costs of purchased inputs represent a major contribution of the project in its own right.

For all countries, the impact is measured relative to what prices would have been had there been no interventions and a free trade regime. For all tradable commodities, the reference prices used were the border prices that would have prevailed under an intervention-free regime.

Authors were also requested to estimate effective rates of protection (ERPs). Due mainly to data inadequacy, however, the country and commodity coverage of the ERP estimates turned out to be considerably more limited and less comparable across countries than for nominal rate estimates. For this reason ERPs are not reported in this article. Future work [in Krueger, Schiff, and Valdés (hereafter *ksv*), forthcoming, vol. 3] will provide further analyses of ERPs, although initial inspection suggests that most input subsidies were infra-marginal and that the ratios of value added to output did not vary widely across crops within countries. The implications of the removal of price interventions for the allocation of resources among goods and sectors are also beyond the scope of this article but are examined in *ksv*.²

Estimation of the effects of interventions aimed directly at agricultural inputs or outputs was relatively simple contrasted with the procedures needed to estimate indirect effects. Our analysis focuses on the real exchange rate and on the tax on agricultural production implicit in protection to industry. The economic rationale behind the estimates is discussed below; an abbreviated description of the procedures used to obtain these estimates is given in the appendix.

First, the authors had to estimate the real exchange rate which would have kept the current account at a sustainable level—taking into account normal capital flows—if all quantitative and tariff protection against imports and interventions affecting exports had been removed. This involved estimation of the equivalent tariff of import protection and of foreign exchange demand and

2. Several authors also calculated the deviations from the domestic price which would have prevailed if optimal export taxes were applied. These results are not presented here, and are forthcoming in *ksv*.

supply elasticities and comparison with the actual real exchange rate to estimate the amount of real exchange rate change needed to yield the sustainable current account level.³

Taking the border price for each commodity at the equilibrium exchange rate gave an estimate of the border price that would have prevailed in the absence of interventions. Doing the same for purchased inputs, given their shares in domestic prices, yielded estimates of what value-added would have been in the absence of these same policies. Finally, measuring the nonagricultural price index at the equilibrium exchange rate and in the absence of trade interventions (by adjusting the tradable part of the price index) gave an estimate of the value of that price index in the absence of interventions.⁴ Using these estimates, we obtained the indirect effect of the interventions on the price (and value added) of agricultural products (relative to the nonagricultural price index).

There are three major elements in our calculations of the indirect effects: first, the depreciation of the real exchange rate required for the elimination of the nonsustainable part of the current account deficit; second, the depreciation of the real exchange rate due to the removal of trade interventions; and third, the increase in the price of agricultural tradable products relative to nonagricultural tradables due to the removal of trade policy interventions, which mainly protect industry. The first two are changes of the price of tradables relative to nontradables; the third is a change of prices within the tradables category.

Identification of a “sustainable” current account balance is necessarily judgmental. Country authors used their knowledge of normal flows of aid and private investment to estimate what a “normal” current account balance would be, and they used the difference between that and the actual imbalance to estimate the nonsustainable portion of the current account deficit. Calculations of the indirect effects of policies on incentives are less sensitive to the choice of elasticity values for supply and demand for foreign exchange and to the choice of the sustainable level of current account deficit than they might at first appear.

Empirically, industrial protection has a greater impact on incentives for agriculture than does the current account imbalance. In many cases, industrial protection is so high that it is the last effect, the decline in prices of nonagricultural tradables relative to agricultural prices, that dominates the indirect effects. However, industrial protection acts both through the real exchange rate *and* through the relative prices of industrial tradables to agricultural products, so that when the real exchange rate effect of protection is taken into account, the total negative impact of industrial protection on agriculture is even larger. Thus

3. In three of the eighteen countries, the authors used alternative procedures due to data limitations or other circumstances particular to their country.

4. For the estimation of the indirect effect on the price of agricultural products relative to a price index of the nonagricultural sector, there is no need to know whether the change in the real exchange rate occurs through the nominal exchange rate or through the price of nontradables. Estimation of the change in the real exchange rate is sufficient (see the appendix).

neither the level of the sustainable current account deficit nor the foreign exchange elasticities, which both act only through the real exchange rate, are as critical in the calculations of the indirect effects as would otherwise be the case. Moreover, the indirect effect turned out to be less sensitive to the selected value of the elasticities than expected. This is due to the fact that a proportional change in the elasticities of demand and supply for foreign exchange only affects the first component of the indirect effect but has no effect on the second or third component, as reflected in equations 7 and 8 in the appendix.

For those countries for which reliable estimates of supply and demand elasticities for foreign exchange were not available, we suggested that the authors use elasticity values of one for supply and two (in absolute value) for demand on the basis of estimated elasticities from other studies. Authors who had evidence to the contrary used it, and also examined the sensitivity of their estimates to the trade elasticities.

It is well known that the “elasticities” approach to the analysis of exchange rate changes was fundamentally modified by the recognition that a change in expenditure relative to income would be required for any change in the current account. Our use of elasticities here is justified by two considerations: (1) the counterfactual “experiment” of an altered real exchange rate is undertaken to investigate relative price changes and responses to them; and (2) although underlying macroeconomic policies would clearly have to be altered in order for the real exchange rate to change, it is unlikely that the particular choice of macro policies would significantly affect the equilibrium real exchange rate solution.⁵

In the case of Ghana, calculation of the equilibrium real exchange rate involved an additional complication. The depreciation of the real exchange rate to its equilibrium value, for a given world price of cocoa, would lead to an increase in Ghana’s cocoa output. Ghana’s output is such a large part of world cocoa trade, however, that this supply rise would result in a reduction in cocoa’s world price. The equilibrium real exchange rate was therefore determined in a simultaneous system where the world price of cocoa is determined endogenously as a function of Ghana’s real exchange rate. This methodology resulted in a higher equilibrium real exchange rate than the one based on calculations which ignore the impact of Ghana’s real exchange rate on the world price of cocoa.

The total effect of the interventions was taken to be simply the sum of the direct and indirect effects (with some adjustment described in the appendix). As an example, in Argentina agriculture is taxed first through export taxes (a direct effect) which reduce agricultural prices, and second through import protection (an indirect effect) which raises the prices of import substitutes. The net impact of Argentina’s trade policies on the real exchange rate was found to be small because while export taxes lead to a depreciation of the real exchange

5. For an analysis of the conditions under which the elasticity approach holds, see Dornbusch (1975).

rate, import protection leads to real exchange rate appreciation. However, the degree of real exchange rate overvaluation due to Argentina's monetary and fiscal policies was at times extremely high and provided an additional burden on the agricultural sector. The sum of the (indirect) impact of industrial protection and real exchange rate overvaluation, and of (direct) export taxation, on agricultural incentives in Argentina, for example, has been substantial during the period examined.

II. DEGREES OF INTERVENTION

Table 1 presents estimates of the degree of nominal direct, indirect, and total intervention in representative export crops for the eighteen countries. The numbers on direct intervention provide an estimate of the percentage by which domestic producer prices diverged from those that would have prevailed in a well-functioning market at free trade (given the actual exchange rate and degree of industrial protection). The measure is equivalent to the rate of nominal protection.⁶

Although government policies differ significantly between individual agricultural commodities, the authors of each country study analyzed between three and nine commodities. We selected one which was deemed fairly representative of government policy toward agricultural exportables for reporting in table 1. As can be seen, most countries adopted direct policies which resulted in the equivalent of export taxes. Exceptions were Ghana (where a highly overvalued exchange rate resulted in such strong disincentives that some compensatory action was politically essential), Portugal, Zambia, Chile, and Turkey in 1975–79. For the latter two countries, the nominal protection accorded grapes and tobacco was less than 2 percent—very small indeed—and for Turkey direct protection turned negative in 1980–84. The suppression of producer prices in 1975–79 equaled or exceeded 25 percent in Argentina, Côte d'Ivoire, Egypt, Malaysia, Sri Lanka, and Thailand, and for the years 1980–84, all countries except Ghana and Portugal had negative direct protection of agricultural products.

The indirect effects measured include both the effect of trade and macroeconomic policies on the real exchange rate and the extent of protection afforded to nonagricultural commodities.⁷ The impact of indirect interventions on producer incentives was even stronger than the direct ones for Argentina, Brazil, Chile, Colombia, Côte d'Ivoire, the Dominican Republic, Ghana, Pakistan, the

6. The direct nominal protection rate measures the proportional difference between the domestic producer price (relative to nonagricultural prices) and the border price (after adjustment for transport, storage, and other costs and quality differentials) measured at the official exchange rate. See the appendix for further details.

7. In most studies, relatively large supply elasticities were used to ensure that calculations of the indirect effects were not biased upward. The values obtained thus tend to represent a lower bound of the indirect effects.

Table 1. *Direct, Indirect, and Total Nominal Protection Rates for Exported Products*
(percent)

Country	Product	1975-79			1980-84		
		Direct	Indirect	Total	Direct	Indirect	Total
Argentina	Wheat	-25	-16	-41	-13	-37	-50
Brazil	Soybeans	-8	-32	-40	-19	-14	-33
Chile	Grapes	1	22	23	0	-7	-7
Colombia	Coffee	-7	-25	-32	-5	-34	-39
Côte d'Ivoire	Cocoa	-31	-33	-64	-21	-26	-47
Dominican Rep.	Coffee	-15	-18	-33	-32	-19	-51
Egypt	Cotton	-36	-18	-54	-22	-14	-36
Ghana	Cocoa	26	-66	-40	34	-89	-55
Malaysia	Rubber	-25	-4	-29	-18	-10	-28
Pakistan	Cotton	-12	-48	-60	-7	-35	-42
Philippines	Copra	-11	-27	-38	-26	-28	-54
Portugal	Tomatoes	17	-5	12	17	-13	4
Sri Lanka	Rubber	-29	-35	-64	-31	-31	-62
Thailand	Rice	-28	-15	-43	-15	-19	-34
Turkey	Tobacco	2	-40	-38	-28	-35	-63
Zambia	Tobacco	1	-42	-41	7	-57	-50
Average		-11	-25	-36	-11	-29	-40

Note: Korea and Morocco are not included because all main agricultural products are imported.

The direct nominal protection rate is defined as the difference between the total and the indirect nominal protection rates, or equivalently, as the ratio of (1) the difference between the relative producer price and the relative border price, and (2) the relative adjusted border price measured at the equilibrium exchange rate and in the absence of all trade policies.

Source: Krueger, Schiff, and Valdés (forthcoming).

Philippines, Sri Lanka, Thailand, Turkey, and Zambia for 1975-79, 1980-84, or both periods. As already noted, indirect negative protection in Ghana was so large that direct agricultural policy provided something of an offset. On average, the indirect effects on incentives to agricultural producers were two and a half times as large as the direct effects.

For most countries, the effective taxation by indirect policies exacerbated the negative direct protection, often resulting in extremely large total negative protection equivalents. As can be seen, in many cases the magnitude of negative protection or effective taxation was quite large. In the Côte d'Ivoire, for example, it is estimated that for 1975-79 cocoa producers received about one-third the price they would have received under a free-trade regime at realistic exchange rates with no direct intervention, and about half in 1980-84. Sri Lankan rubber producers fared as poorly in 1975-79 and worse in 1980-84. Producer prices were half or less of the nonintervention price in Côte d'Ivoire, Egypt, Pakistan, and Sri Lanka in 1975-79 and in Argentina, the Dominican Republic, Ghana, the Philippines, Sri Lanka, Turkey, and Zambia in 1980-84.

Overall, a simple unweighted average rate of total nominal protection for the sixteen countries covered in table 1 was a negative 36 percent in 1975-79 and a negative 40 percent in 1980-84. Although the average rose somewhat, the

more notable finding is the degree to which total discrimination against agriculture remained essentially constant over the two periods. Although there were sizable variations for individual countries, there is some suggestion that unfavorable indirect changes are to some extent compensated by favorable direct changes (that is, as Argentina's exchange rate became less realistic the extent of direct discrimination against wheat producers fell).

It has long been recognized that there was discrimination against agriculture. What table 1 brings out is the degree. The negative protection accorded to producers of agricultural export commodities was a significant factor in depressing export earnings in many countries. Even those countries regarded as successful exporters of agricultural commodities such as Thailand and Malaysia adhered to this pattern. Of the eighteen countries covered in the project, only Chile in 1975-79 and Portugal over both periods maintained regimes which provided positive total protection to producers. The dominant pattern has been one of systematic and sizable discrimination.

Although developing countries have more agricultural export than import-competing products, there are a significant number of the latter. Table 2 presents data, comparable to those in table 1, for representative import-competing

Table 2. *Direct, Indirect, and Total Nominal Protection Rates for Imported Food Products* (percent)

Country	Product	1975-79			1980-84		
		Direct	Indirect	Total	Direct	Indirect	Total
Brazil	Wheat	35	-32	3	-7	-14	-21
Chile	Wheat	11	22	33	9	-7	2
Colombia	Wheat	5	-25	-20	9	-34	-25
Côte d'Ivoire	Rice	8	-33	-25	16	-26	-10
Dominican Rep.	Rice	20	-18	2	26	-19	7
Egypt	Wheat	-19	-18	-37	-21	-14	-35
Ghana	Rice	79	-66	13	118	-89	29
Korea	Rice	91	-18	73	86	-12	74
Malaysia	Rice	38	-4	34	68	-10	58
Morocco	Wheat	-7	-12	-19	0	-8	-8
Pakistan	Wheat	-13	-48	-61	-21	-35	-56
Philippines	Corn	18	-27	-9	26	-28	-2
Portugal	Wheat	15	-5	10	26	-13	13
Sri Lanka	Rice	18	-35	-17	11	-31	-20
Turkey	Wheat	28	-40	-12	-3	-35	-38
Zambia	Corn	-13	-42	-55	-9	-57	-66
Average		20	-25	-5	21	-27	-6

Note: Argentina and Thailand are not included because their main food products are exported.

Turkey was a net exporter of wheat in some years, and in the Dominican Republic rice was not traded in some years.

The direct nominal protection rate is defined as the difference between the total and the indirect nominal protection rates, or equivalently, as the ratio of (1) the difference between the relative producer price and the relative border price, and (2) the relative adjusted border price measured at the equilibrium exchange rate and in the absence of all trade policies.

Source: Krueger, Schiff, and Valdés (forthcoming).

food crops for sixteen countries (two were excluded because they have no significant import-competing crops).

Several findings are noteworthy. First and foremost, in contrast with the negative direct protection accorded to exportable products, the countries covered here with few exceptions provided positive direct protection to import-competing crops. Indeed, the degree of discrimination against exportables and in favor of import-competing crops is remarkable: contrast Malaysian rice, receiving the equivalent of 38 and 68 percent nominal protection over the two time periods, with Malaysian rubber, taxed at the equivalent of 25 and 18 percent. Direct pricing policy led to an increase in the relative price of rice of 84 percent in 1975–79 and 105 percent in 1980–84 (relative to rubber).

However, by definition, those policies which indirectly affect agriculture have the same net impact on import-competing as on exportable commodities, and the listing of indirect protection in table 2 is therefore identical to that in the equivalent columns of table 1. Taking the effects of both direct and indirect policies into account, the effects of direct price policy were in many cases reversed. In Colombia, Côte d'Ivoire, the Philippines, Sri Lanka, and Turkey (in 1975–79), positive direct effects were more than offset by negative indirect effects.

In this regard, one remarkable developing country is Korea, where direct protection to agricultural commodities (there are no exportables) is very high and the impact of indirect policies is not large by comparison. There, total protection for domestic rice production has remained quite stable at about 73 percent over the periods covered here. Despite the strong Korean protection, and sizeable total protection to rice in Malaysia, the average level of total protection for all the import-competing commodities covered here was negative, although not large, about –5 percent in both periods. If the numbers for Korea and Malaysia are excluded, the average negative total protection for import-competing crops changes to negative 15 and 18 percent in the two time periods.

These data, and others in the country studies, raise a large number of questions, one of which concerns the reasons for the policies pursued. This becomes an even more pressing question when it can be readily demonstrated (as in table 2) that agricultural producers often have larger interests in macro-economic policies than they do in agricultural pricing policies, yet their representatives usually concentrate on the latter.

A preliminary and partial answer can be given here. In almost all countries, one of the stated reasons for intervention in agricultural markets has been the perceived instability of the international market for agricultural commodities. To test the accuracy of this rationale, authors calculated the ratio of the standard deviation of the real producer price (deflated by the price index of the nonagricultural sector) to that of the real border price (at the official exchange rates) for a variety of crops. The results, for the same commodities as were represented in tables 1 and 2, are presented in table 3. A number less than one

Table 3. *Ratio of Standard Deviations of Deflated Producer and Deflated Border Prices, 1960–84*

Country	Exports		Imports	
	Crop	Ratio	Crop	Ratio
Argentina	Wheat	0.37	None	
Brazil	Soybeans	0.80	Wheat	0.41
Chile	Grapes	0.94	Wheat	0.73
Colombia	Coffee	0.87	Wheat	0.93
Côte d'Ivoire	Cocoa	0.42	Rice	1.2
Dominican Republic	Coffee	0.84	Rice	0.66
Egypt	Cotton	0.42	Wheat	0.3
Korea	None		Rice	1.58
Malaysia	Rubber	1.02	Rice	0.47
Morocco	None		Wheat	0.63
Pakistan	Cotton	0.62	Wheat	0.17
Philippines	Copra	0.94	Corn	0.27
Portugal	Tomato	1.13	Wheat	1
Sri Lanka	Rubber	0.44	Rice	0.65
Thailand	Rice	0.26	None	
Turkey	Tobacco	1.16	Wheat	0.56
Zambia	Tobacco	0.83	Corn	0.75
Average		0.73		0.69

Note: The border price is measured at the official exchange rate. The deflator is the price index of the nonagricultural sector.

Source: Krueger, Schiff, and Valdés (forthcoming).

indicates that real domestic producer price fluctuations (taking into account only direct intervention) were smaller than real border price fluctuations. As can be seen, there are only two importable, and three exportable commodities for which internal prices were more volatile than border prices, and on average direct price policies reduced producer price variability by 27 percent for exports and 31 percent for imports.⁸ The standard deviation of the producer price of wheat in Egypt, for example, was only 30 percent of what it would have been had the border price been passed on to producers, while that in Pakistan was 17 percent. Even for export crops, such as Thai rice, producers experienced considerably less fluctuation in real prices than they might have given the prevailing exchange rates and protection to domestic industry.

On average, the price stabilization as measured by the standard deviation is slightly larger for importables than for exportables. However, exportables generally are taxed while importables are protected, so that the producer price is lower than the border price for exportables and higher for importables. Thus it follows that when measured by the coefficient of variation, which divides the standard deviation by the mean, the reduction in price variability is significantly larger for importables (42 percent) than for exportables (18 percent). This should not come as a surprise because all importables considered are staples so

8. For Korean rice, prices were much more stable than world prices, but the large standard deviation is due to a few large price changes over the period analyzed.

that there is pressure for price stability not only from producers (as in the case of the exportables), but also from consumers because of the impact of food price variability on real wages.

In the face of uncertain and volatile international markets for agricultural commodities, governments typically have several policy options to deal with the price risk that consumers and farmers may face. Price schemes can be coordinated with supplementary payments (or supplementary taxes) and other risk diffusing institutions. However, such institutions do not exist or are not easily accessible to producers in most developing countries, and their development is a slow process. Governments therefore typically resort to border type interventions. The fact that some price stabilization was achieved in the individual countries studied does not prove that the interventions as undertaken were a first-best way of doing it. That is a topic beyond the scope of this article.

III. SUMMARY AND CONCLUSIONS

The above discussion, which deals only with the measurement of price intervention, has nonetheless generated some striking insights about the impact of economywide and direct agricultural policies on agricultural prices. Perhaps the most important result which emerges clearly from our findings is the fact that the impact of the indirect, economywide interventions generally dominates the direct effect, whether the direct effect is positive or negative. If the indirect effects of economywide policies on agricultural prices are ignored, on average imported food products were protected (at a rate of approximately 20 percent) and exports were taxed (at close to 11 percent). The results for *total* price interventions, however, show that both activities were taxed, at a rate of approximately 7 percent for imported and 35 to 40 percent for exported agricultural products.

Furthermore, although direct policies protected imported food at the official exchange rate, protection was significantly less than for nonagricultural tradables. Rates of protection to industry of substantially more than 20 percent have been found, both in past studies and in our calculations. Reinforcing the taxation of agricultural importables is the overvaluation of the currency, which lowers the price of tradables relative to nontradable goods.

On the basis of the data presented, two findings about sector-specific agricultural interventions seem most significant. First, a particularly marked contrast emerges between the direct policies adopted toward imported food products and exported crops: food imports are subsidized on average while exports are taxed. Second, contrary to expectations and to the treatment of exportable products, direct policies have provided protection to the production of food in about 70 percent of the countries studied.

Why does the difference in treatment of exports and imports occur? The

individual country studies suggest several reasons. If a country desires self-sufficiency in the production of staples, it may adopt tariffs to promote domestic production, eliminating that protection once self-sufficiency is attained and even taxing the product when it is exported. A dearth of easily administered and enforced taxes in a developing country may also focus government attention on exports as a relatively feasible source of revenue. The taxation of food exports, such as wheat and beef in Argentina and rice in Thailand, not only generates revenues but also encourages domestic sales at lower prices, reducing the cost of food and subsidizing consumers. Direct subsidy of the production of an imported food, however, requires fiscal expenditures, while tariffs provide revenue and promote domestic production. This may also help explain why importable food products tend to be protected rather than taxed.

Because direct policies protect food crops, maintenance of low food prices to keep money wages low does not seem to operate through direct pricing policies. Rather, it results mainly from overvaluation of the exchange rate, one of the indirect policies explored comprehensively in the study.

Our studies also indicate that the operation of direct food pricing policies has resulted in greater price stability, with a larger reduction in price variation for importables than exportables. The relative cost of that stability is another important question suggested for future research.

This article has reported results for only a subset of the products and periods included in the country studies. Future analysis will delve into additional aspects of price policies and the impact of interventions on producer and consumer prices, the effects of those price changes, and the political economy of agricultural price policy.

Many issues of political economy emerge from the analysis and have a bearing on the formulation of direct agricultural policies that are not explored here: the political strength of urban workers and industry, the political imperatives of agricultural marketing boards, fiscal pressures and the fact that price policies, once in place, have tended to have a life of their own with results often quite different from those intended. In addition, given that the impact of exchange rate and industrial protection policies was greater than that of agricultural price policies, why did agricultural producers' groups continue to focus their political attentions on issues pertaining to agricultural pricing, with little or no attention to exchange rate policies and other issues of greater importance?

Hypotheses about these and other phenomena will be set forth and examined in *KSV*. At this stage, it is evident that one contributory factor has been a failure to comprehend the implications of macroeconomic policy for agriculture. Whereas vested interests, pressures on fiscal and external accounts, and other factors all influence agricultural pricing policies, knowledge is also a contributory factor. As such, further analysis at the country and comparative level, by improving knowledge, may benefit the future development of the political economy of agricultural pricing.

APPENDIX

We first present the various measures of intervention, and then derive the equilibrium real exchange rate.

Measures of Intervention

Let P_i be the domestic producer price of a tradable agricultural product i , let $P'_i = P_i^B E_o$ be the border price P_i^B of product i evaluated at the official nominal exchange rate E_o (and adjusted for transport, storage, and other costs, and quality difference), let $P_i^* = P_i^B E^* = P'_i E^* / E_o$ be the border price P_i^B evaluated at the equilibrium nominal exchange rate E^* (and adjusted for transport, storage, and other costs), let $P_{NA} = \alpha P_{NAT} + (1 - \alpha) P_{NAH}$ be the nonagricultural sector price index which consists of a tradable share, α , with price P_{NAT} and of a nontradable home share, $1 - \alpha$, with price P_{NAH} , and let $P_{NA}^* = \alpha P_{NAT} E^* / (1 + t_{NA}) E_o + (1 - \alpha) P_{NAH}$. P_{NA} is the nonagricultural price index where the price index of the tradable part is evaluated at E^* and in the absence of trade policy, t_{NA} , affecting nonagricultural tradables.

Then the direct nominal protection rate, which measures the proportional difference between the relative domestic price and the relative border price of agricultural tradables, is

$$(1) \quad NPR_D \equiv \frac{P_i / P_{NA}}{P'_i / P_{NA}} - 1 = P_i / P'_i - 1,$$

and measures the effect of price controls, export taxes or quotas and the other policies affecting P_i . The indirect nominal protection rate which measures the effect of the exchange rate E_o differing from E^* , and the effect of trade policy on P_{NAT} , is

$$(2) \quad NPR_I \equiv \frac{P'_i / P_{NA}}{P_i^* / P_{NA}^*} - 1 = \frac{P'_i / P_{NA}}{(E^* / E_o) P'_i / P_{NA}^*} - 1 = P_{NA}^* E_o / P_{NA} E^* - 1.$$

NPR_I is the same for all tradable products since P_i does not appear in equation 2. Finally, the total nominal protection rate is

$$(3) \quad NPR_T \equiv \frac{P_i / P_{NA}}{P_i^* / P_{NA}^*} - 1.$$

$NPR_D + NPR_I \neq NPR_T$ because the denominator of NPR_D differs from that of NPR_I and NPR_T . To make the three measures comparable, we define another direct protection rate

$$(4) \quad npr_D = \frac{P_i / P_{NA} - P'_i / P_{NA}}{P_i^* / P_{NA}^*}$$

which measures the impact $(P_i / P_{NA} - P'_i / P_{NA})$ of the direct policies as a percent of P_i^* / P_{NA}^* , the relative price which would prevail in the absence of all interven-

tions and with $E = E^*$. Then, $npr_D + NPR_I = NPR_T$. These measures are the basis of the levels of nominal protection presented in tables 1 and 2.

The calculations of NPR_I and NPR_T include adjustments in the nominal exchange rate. As is shown below, these adjustments are also relevant when the real exchange rate is used.

The Equilibrium Exchange Rate

We assume an economy with three goods: an exportable, X , an importable, M , and a nontradable, H , with prices P_X , P_M , and P_H , respectively.⁹ We also assume a domestic and a foreign currency with relative price E , the nominal exchange rate, defined as the domestic currency price of foreign currency. We define the real exchange rate, e , as the ratio of the nominal exchange rate and the price of the nontradable H , that is,

$$(5) \quad e \equiv E/P_H$$

We do not consider the foreign prices of X and M in the definition of e because in the case of a small country in the world market, these prices are given and are not affected by policy changes.

We are interested in the change in e which would result from the elimination of interventions and of the unsustainable part of the current account deficit. For those countries where removal of policy interventions affects world prices (for example, Ghana), that effect was taken into account.

We assume that both the demand for and supply of foreign exchange, Q_D and Q_S , are functions of the real exchange rate, with elasticities $-\epsilon_D$ and ϵ_S , respectively.

Assume that the unsustainable part of the deficit in the current account is ΔQ_0 . Then it can be shown that the real exchange rate needed to eliminate ΔQ_0 is

$$(6) \quad e_1 = \left(\frac{\Delta Q_0}{\epsilon_S Q_S + \epsilon_D Q_D} + 1 \right) e_0$$

where e_0 is the prevailing real exchange rate and $\epsilon_S Q_S + \epsilon_D Q_D$ measures the reduction in excess demand for foreign exchange (the deficit) due to a one unit increase in the real exchange rate.

Assume now that the tariff equivalent of protection on the importable good is t_M and the export tax on the exportable good is t_X . Eliminating both meas-

9. Our model of real exchange rate determination is based on a variant of the "elasticity approach." That approach (as described in, say, Magee 1973) provides a framework for examining the impact of changes in the nominal exchange rate.

ures was found to lead to an increase, ΔQ_I , in excess demand for foreign exchange in the eighteen countries, where

$$(7) \quad \Delta Q_I = \frac{t_M}{1 + t_M} Q_D \epsilon_D - \frac{t_X}{1 - t_X} Q_S \epsilon_S.$$

Define the real exchange rate where $\Delta Q_o = t_X = t_M = 0$ as the equilibrium real exchange rate e^* . Then

$$(8) \quad e^* = \left(\frac{\Delta Q_o + \Delta Q_I}{\epsilon_S Q_S + \epsilon_D Q_D} + 1 \right) e_o.$$

The solution of the model of exchange rate determination is the equilibrium real exchange rate e^* rather than the nominal rate E^* used in NPR_I and NPR_T above, where $e \equiv E/P_H$. The nontradable sector, H , is assumed to consist (almost) entirely of nonagricultural goods and services, NAH , and therefore $e = E/P_{NAH}$. Assume t_X measures the impact on p_i of a price control, an export tax, or an import subsidy, and $t_X \geq 0$.

Then:

$$\begin{aligned} \frac{P_i}{P_{NA}} &= \frac{P_i^B E_o (1 - t_X)}{\alpha P_{NAT} + (1 - \alpha) P_{NAH}} = \frac{P_i^B E_o (1 - t_X)}{\alpha P_{NAT}^B E_o (1 + t_{NA}) + (1 - \alpha) P_{NAH}} \\ &= \frac{P_i^B (E_o / P_{NAH}) (1 - t_X)}{\alpha P_{NAT}^B (E_o / P_{NAH}) (1 + t_{NA}) + (1 - \alpha)}, \end{aligned}$$

or

$$(9) \quad \frac{P_i}{P_{NA}} = \frac{P_i^B e_o (1 - t_X)}{\alpha P_{NAT}^B (1 + t_{NA}) e_o + (1 - \alpha)}.$$

Then,

$$(10) \quad \frac{P_i'}{P_{NA}} = \frac{P_i^B e_o}{\alpha P_{NAT}^B (1 + t_{NA}) e_o + (1 - \alpha)},$$

and

$$(11) \quad \frac{P_i^*}{P_{NA}^*} = \frac{P_i^B e^*}{\alpha P_{NAT}^B e^* + (1 - \alpha)}.$$

As can be seen from equations 9, 10, and 11, to derive NPR_I and NPR_T it is sufficient to know e_o and obtain e^* , and information on E^* and P_{NAH}^* is not needed.

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