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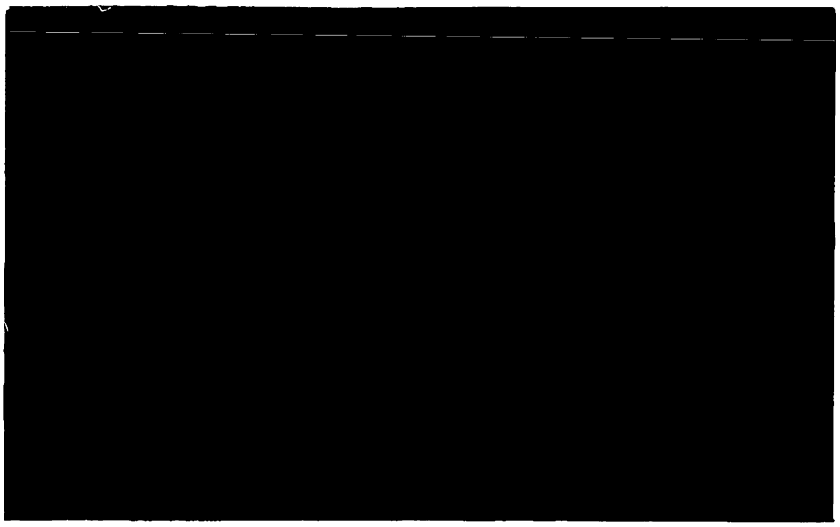

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AGRICULTURAL PROTECTION IN INDUSTRIAL COUNTRIES

by

Bruce L. Gardner

Department of Agricultural and Resource Economics
University of Maryland
College Park, Maryland 20742

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Agricultural Protection in Industrial Countries

Bruce Gardner

The U.S. is not playing on a level playing field in agricultural trade. However, the U.S. has itself been a substantial contributor to the sorry state of this field. The omission of agriculture from the post-war GATT agreements was a feature that the U.S. desired, because entrenched political realities required price supports at levels that would have drawn large imports of grain, dairy products and other commodities in the 1950s had imports not been restrained. [For details, see Johnson, Hemmi, and Lardinois (1985), Paarlberg (1988), or USDA (1987).]

Since the 1950s, the U.S. has been increasingly reliant on agricultural export markets, and this has led to a turnabout in the U.S. position. The Reagan Administration made liberalization of agricultural trade one of its high priority areas in the Uruguay Round. The Bush Administration gives every sign of following this lead, even appointing the Reagan chief negotiator, Clayton Yeutter, as Secretary of Agriculture. This signals an unprecedented willingness to subordinate domestic farm policy to the requirements of negotiations for freer trade in agriculture. However, Congress has not signalled an equivalent willingness. The Reagan Administration appeared willing to see the "mid-term review" of the Uruguay Round have no progress to report rather than compromise on the U.S. position that the negotiating countries should accept as a goal the complete elimination of agricultural protection; but the U.S. Congress has not expressed a bit of friendliness toward this goal. Therefore, the current situation and prospect for

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agricultural protection in the U.S. (and elsewhere) is quite uncertain.

This paper elaborates on these points and on the world agricultural trade picture generally. Its focus is on an assessment of the importance of current distortions in agricultural trade in the industrial countries and on the prospects for reducing these distortions.

Agricultural Commodities in World Trade

The trend over the last century has been for agricultural commodity output to decline as a percentage of GDP in every country, as real incomes have grown and the income elasticity of demand for these products is less than 1. Between 1965 and 1985, agricultural GDP declined from 41 to 32 percent of total GDP in the low-income countries and from 5 to 3 percent in the industrial market economies (World Bank classification). Nonetheless it would be a mistake to think of agriculture as a chronically sick industry, comparable to U.S. "rust belt" industries in which lack of productivity growth has caused a lack of international competitiveness. Both labor productivity and total factor productivity have risen at a steady and quite respectable pace in the United States, the other industrial countries, and in much of the Third World. Only in the centrally planned countries and parts of Africa can a lack of gains in efficiency be substantiated as a cause of economic problems. Where agricultural/nonagricultural productivity comparisons have been made, agriculture has fared quite well. (For further discussion of international agricultural output and productivity trends, see Gardner 1988).

With respect to trade, in recent years the share of world trade accounted for by agricultural products has declined, from 32 percent of trade volume in 1960 to about half that percentage currently. Nonetheless, the

volume of agricultural trade has been increasing at about 4 percent annually since 1960 (3.6 percent for grains, the key traded products). Moreover, agricultural trade is growing faster than agricultural production. Some relevant data are shown in table 1. Despite heavy protection of key commodities such as sugar and dairy products, agricultural protectionism has not been sufficient to cause any apparent stagnation of trade in farm products on a world scale.

The United States, however, has seen its agricultural export situation deteriorate in the 1980s. This decline in net exports, coupled with the European community's expansion of grain exports (tables 2 and 3), has led to complaints against EC export subsidies as a main contributor to an uneven playing field currently. The EC has countered that U.S. deficiency payments to grain and cotton producers constitute an effective export subsidy regime. And since 1985 the U.S. has introduced in its Export Enhancement Program (EEP) an explicit system of export subsidies.

Economics of Agricultural Protection

Protection of agriculture is rampant in industrial countries, but the economics of late-1980s agricultural protection are not as straightforward might be expected. Difficulties abound both in measuring protection levels and in assessing the trade distorting effects of the protection (and hence in assessing the gains from liberalization). This section reviews the general picture of governmental activities in support of farmers in industrial countries and then provides more detailed discussion of measurement issues. Detailed treatment is given of key U.S. policies.

Table 1. World agricultural production and trade

	1960	1986	Annual rate of growth
Aggregate agricultural production -- index, 1976-78 = 100			
Industrial countries	78	111	1.4
U.S.	73	109	1.5
Western Europe	77	115	1.6
Developing countries	62	126	2.7
Centrally planned countries	60	122	2.7
World	67	119	2.2
Grains (including rice) -- million metric tons			
World production	845	1682	2.7
Area (hectare)	647	710	0.4
Yield (tons/hectare)	1.31	2.37	2.3
Trade (excluding intra-EC)	73	187	3.6

Source: U.S. Department of Agriculture, Agricultural Outlook

Table 2. U.S. agricultural trade

Year	Grain exports	All agricultural exports	Imports	Net exports
	- - - - - - - - - - - - billion dollars - - - - - - - - - - - -			
1960	1.7	4.8	3.8	1.0
1965	2.5	6.2	4.1	2.1
1970	2.5	7.3	5.8	1.5
1975	11.4	21.9	9.3	12.6
1980	17.7	41.2	17.4	23.9
1981	19.0	43.3	16.8	26.6
1982	14.3	36.6	15.4	21.2
1983	14.7	36.1	16.6	19.5
1984	15.6	37.8	19.3	18.5
1985	10.5	29.0	20.0	9.1
1986	6.9	26.2	21.4	4.8
1987	7.7	28.6	20.4	8.2
1988*	11.6	37.6	21.0	16.6

*Estimate made by extrapolating January-October data.

Source: U.S. Council of Economic Advisers

Table 3. Net grain exports (million tons annually)

Region	1960	1980	1985
United States	33	116	63
Western Europe	-25	-11	16
Eastern Europe and USSR	0	-43	-32
Africa, Asia, and Latin America	-15	-98	-61

Source: U.S. Department of Agriculture

Protectionist Policies in Industrial Countries

Of the twenty countries identified as industrial market economies by the World Bank, all but one (New Zealand) provides substantial income support for farmers. This income support takes many forms, including subsidy payments, exemption from certain taxes and regulations, and technical and other forms of assistance, but is concentrated on regulation of commodity market prices. In particular, imported products receive protection by means of import barriers and exported products tend to receive subsidies. The resulting output expansion -- every industrial country except Belgium has increased its food production per capita since 1980 -- has created large commodity surpluses through most of the 1980s.

The industrial countries, by reducing their absorption from and increasing their supplies placed upon the world markets, drive down world commodity prices. The low prices create an unfavorable environment for the production of these commodities in Third World countries. This is unfortunate and inefficient because many of these countries have a comparative advantage in food crops (see World Bank, 1986). The low prices also create continual tension among the industrial countries themselves, who find their budgets for agricultural subsidies escalating. The budgetary pressures are among the main causes of interest in negotiated reductions in agricultural protection in the current GATT round.

Two types of agricultural trade situations exist in the industrial countries, each leading to a different type of policy regime. The first group of countries is the former colonial powers who had developed special trading relationships with non-European colonies or former colonies. An important aspect of these special relationships has been the importation of cereals, raw

fibers, tropical products, and other foods. These importing countries (Europe and Japan) have based their agricultural protection first and foremost on tariffs and other restrictions upon imported agricultural products.

The second group of industrial countries is the former colonies who became industrial countries themselves. They were traditionally food exporters and remain so. They include Australia, New Zealand, Canada, and the United States (South Africa, Argentina, and Brazil are similarly traditional exporters but are not reckoned by the World Bank to be "industrial"). Agricultural protection in these countries has been based primarily upon subsidies in the form of price supports, subsidized inputs, technical assistance, and export promotion. The rates of support have typically been lower than in Europe and Japan.

A third group of countries, the newly industrialized ones in Asia, are notable as instances in which agriculture was formerly taxed rather than subsidized; but as economic development has made these countries richer they have begun to protect agriculture as the older industrial countries do. (For detailed discussion and attempts at explanation, see the studies in Anderson and Hayami, 1986).

The exact form and rate of protection by commodity varies from country to country. The key elements for the major agricultural trading countries are as follows.

Europe. The largest and most striking example of the global politics and economics of agricultural protection is the Common Agricultural Policy (CAP) of the European Community. Since the inception of the common market the CAP has been one of its most important and contentious features, in recent years being a prime source of budgetary crisis for the Community. The cornerstone

of the CAP is a system of variable levies, tariffs which are adjusted as needed with changing world market prices in order to maintain internal commodity prices at politically determined levels that have been well above world market prices except for a brief period in the 1970s.

Under this price umbrella, European agriculture has prospered and expanded, converting the EC from the world's largest importer of wheat in the 1970s to the second-largest exporter in the 1980s. Because internal European prices have remained so much above world levels, however, the subsidies paid to sell the European surpluses abroad have become a major budgetary drain. For dairy products, which with sugar are the most heavily protected commodities on a worldwide basis, it has at times been necessary to sell EC surpluses at only 10 percent of the corresponding price paid to producers.

European countries outside the EC -- the Nordic countries, Austria, and Switzerland -- have similar policies. Indeed their protection rates even exceed those of the EC. However they are not as favorably situated to transform themselves into agricultural exporters and have not faced budgetary crises on the EC's scale.

Perhaps the most telling example of problems in EC policy is the Sugar Protocol of the Lomé Convention. While the former agricultural colonies of England -- principally Australia, New Zealand, and Canada -- were essentially left to face world commodity markets for grains, meat, and dairy products on their own, special provisions were made to preserve export markets in Europe for tropical suppliers of sugar. This gives the 18 Lomé Convention countries plus India access to Europe's high-priced sugar market for limited quantities. Countries whose exportable sugar supplies fall below these quantities find it profitable to buy sugar on world markets which is then sold to EC countries.

Moreover, EC prices are high enough that Europe itself has generated exportable surpluses. So the EC pays subsidies to export sugar which in effect it then buys from developing countries at high prices (World Bank, 1986). In part this is simply a means of limited foreign aid to developing countries, but it is an inefficient form of aid in that it de-rationalizes the world pattern of sugar production and trade. Sugar policy is a paradigm of what D. Gale Johnson had in mind in entitling his book on agricultural policies, World Agriculture in Disarray.

Japan is the world's foremost food importer, and moreover has substantially expanded food imports in recent years. Nonetheless, Japanese agriculture remains highly protected, mainly by import quotas, and under liberalized trade would import still more. Japan's overall rate of protection is higher than for any industrial country except Switzerland. Table 4 shows nominal protection rates for an average of 12 commodities as estimated by Honma and Hayami (1986). Japan has recently negotiated bilaterally with Australia and the United States for increased quotas of beef, citrus, and other products, and has already increased imports of several commodities. But the centerpiece of Japan's agricultural policy, the rice support program, remains firmly entrenched with internal prices 3 to 4 times the world price. For more details, see Hayami (1988) and Australian Bureau of Agricultural and Resource Economics (1988).

Industrial-country food exporters. Australia, New Zealand, and Canada are essentially price-taking exporters of agricultural products. As key members of the "Cairnes Group" they are prime movers behind the attempt to liberalize agricultural trade in the Uruguay round of GATT negotiations. Although these countries view themselves as non-subsidizers, they have

Table 4. Nominal rates of protection in agriculture

Country	1955	1960	1965	1970	1975	1980	1984	1986
	Percent							
Japan	18	41	69	74	76	85	102	210
European Community	35	37	45	52	29	38	22	63
France	33	26	30	47	29	30	12	46
Germany, FR	35	48	55	50	39	44	25	75
Italy	47	50	66	69	38	57	49	86
Netherlands	14	21	35	41	32	27	20	67
United Kingdom	40	37	20	27	6	35	15	58
Denmark	5	3	5	17	19	25	15	54
Sweden	34	44	50	65	43	59	36	63
Switzerland	60	64	73	96	96	126	153	260
United States	2	1	9	11	4	0	6	6

Source: Honma and Hayami (1986)

protected agriculture through input subsidies, direct assistance, and schemes under which domestic consumer prices are held at levels above world prices. The Australian Wheat Board, for example, sells wheat competitively in export markets, but has used its authority as sole domestic distributor (now being phased out) to sell at higher prices internally. Canada subsidizes rail rates, thus reducing the spread between internal and port prices. But the levels of intervention in these countries are substantially less than in the industrial food importing countries (see table 5).

The United States is in a similar position to the Cairnes Group countries in that it also has pushed for agricultural liberalization in the Uruguay round. But the U.S. is somewhat different in supporting its domestic producers more generously in the 1980s and in its being a larger factor in the main exported commodities. The large-country feature has led the United States to use production control methods to drive up world market prices, which changes the international politics of intervention considerably. Indeed, it has been estimated that U.S. tobacco and peanut programs have exercised sufficient monopoly power through reducing exports that U.S. interests taken together have received a net gain from the programs at the expense of foreign buyers (Sumner and Alston 1986; Mehra, 1989).

Measuring Protection

Substantial effort has been expended by individual scholars and national and international agencies in measuring the protection afforded agricultural commodity markets. The task is most straightforward in the case of importing countries which impose fixed or ad valorem tariffs. Unfortunately, most agricultural protection does not take the form of tariffs. The analyst has to convert import quotas, and even more difficult, voluntary restraint agreements

Table 5. Estimated nominal protection rates -- percentage by which domestic market price exceeds world market price, 1980-82 -- and the OECD's producer protection rate, 1979-81.

Commodity and county	IIASA	World bank		OECD (PSE)
	Consumer[a]	Consumer[a]	Producer[b]	
Wheat				
U.S.	0	0	15	17
EC	84	30	25	28
Australia	15	8	4	3
Canada	13	12	25	18
Japan	35	25	280	96
Avg.	---	20	19	22
Dairy Products				
U.S.	80	100	100	48
EC	70	80	75	69
Australia	-7	40	30	21
Canada	53	95	95	66
Japan	106	190	190	83
Avg.	---	93	88	64
Sugar				
U.S.	---	40	40	17
EC	---	70	50	25
Australia	---	40	0	-5
Japan	---	160	200	48
Avg.	---	68	49	27

[a](Market price paid by consumers/border price) - 1
[b](Price received by producers/border price) - 1

(such as on beef imports into the U.S.), to a tariff equivalent. Moreover, export subsidies have been taken as the equivalent of an import tariff, since export subsidies similarly drive up the instigating country's internal price relative to the world price. But export subsidies and import tariffs have opposite effects on trade volume, so their equivalence is limited. However, the focus of the measurement efforts has been on price, not traded quantities.

The earliest comprehensive attempts to measure worldwide agricultural protection (Tyers and Chisholm; Parikh, et al.) used tariff equivalent measures. Some results are shown in table 5. But some relevant policy interventions are omitted. Many countries, especially developing countries, tax agricultural exports and so so have negative protection rates; but at the same time they subsidize inputs, notably "modern" inputs such as fertilizer, irrigation, and new seed varieties. Studies at the OECD pushed this line of thinking further by including publicly funded research and extension activities and other governmentally provided services. Their "PSE" (producer subsidy equivalent) measures are shown in the right-hand column of table 5.

Comparing the different measures shows the lack of precision in the estimated protection rates. Even though the OECD measure is more comprehensive (see table 6) it shows less protection than the World Bank's estimate of the border distortion for several commodities.

One problem in measuring protection is that world market prices of the commodities tend to be volatile, while the protected domestic price is held relatively constant. The EC's Common Agricultural Policy (CAP) is the most important example, in which the variable levies are revised weekly if necessary in order to maintain internal commodity prices at pre-arranged levels. In U.S. sugar policy, quotas and import fees are adjusted so as to

Table 6. Types of intervention incorporated in OECD's Protection Measure

(1) Market Price Support
- two price systems
- price premiums
- import quotas/voluntary export restraints
- tariffs/import levies
- export refunds/credits
- home consumption schemes
- supply management (production/acreage quotas)
- monopoly organizations (marketing boards, organizations)

(2) Direct Income Support
- direct payments (disaster, deficiency, direct storage payments, etc.)
- embargo compensation
- levies paid by producers (negative support)

(3) Indirect Income Support
- capital gains
- concessional credit (interest subsidies)
- input subsidies (fuel, fertilizer, transport, etc.)
- insurance
- storage

(4) Other Support
- research, advisory, training
- inspection
- processing and marketing
- transport concessions
- taxation concessions
- provincial/state measures

Source: OECD, 1987, p. 102

maintain the domestic (New York) price at about 22 cents per pound. During 1985-88, the comparable world price ranged from 4 to 12 cents per pound. Thus the protection rate, using the world price as a base, ranged between 83 and 450 percent, depending on when domestic and international prices were observed. With such volatile markets an annual average can be quite sensitive to how the average is constructed. For example, an average of 4 observations per year, say on March 1, June 1, September 1 and December 1 can give quite different results from an average of all the roughly 250 daily prices in a marketing year.

There are also difficulties in determining the appropriate internal and world prices to compare with one another. The U.S. sugar case is among the easiest, with an organized spot and futures market for the product at the same stage of processing (raw sugar) differing only by off-shore and landed New York location. But often the internal price data are not at ports or are for a qualitatively different product internally as compared to quoted world market prices. These problems exist even for standardized products like "wheat" and "rice", much less aggregates like "dairy products."

Given these difficulties, the agreement of different estimates of protection rates is more notable than the differences. It remains surprising, though, that the OECD's much broader conception of protection rates are generally lower than protection rates using the narrower definitions of IIASA and the World Bank.

An analytical complication arises in the case of large countries which intervene in domestic markets but have minimal border distortions. The most notable case in point is U.S. grain policy. Both IIASA and the World Bank show zero protection for U.S. wheat in the sense that there is no policy-

created wedge between the price a U.S. buyer pays and the world market price. Nonetheless, U.S. wheat policy does distort the domestic (and world) price. U.S. producer price guarantees and acreage controls cause worldwide market price movements. This becomes clear when U.S. policy changes. Figure 1 shows what happened to U.S. and international wheat prices in recent years.

The clearest evidence of U.S. influence on world wheat prices is in the monthly data of mid-1986 and mid-1988. The 1988 U.S. drought was the only large exogenous event to impact the market in June and July of that year, so the price rises at that time can be fairly attributed to the expected reduction in U.S. supplies. In 1986, a substantial cut in the U.S. support price (the dashed line) caused world prices to fall. In both cases, the price changes were as large at non-U.S. locations as at the Gulf ports, suggesting that policy-induced U.S. cuts would raise prices by an approximately uniform percentage world-wide, so that the worldwide market power of the U.S. can be measured by looking at any one of the international prices.

How should such intervention be accounted for in protection rates such as those in table 5? The answer depends on the question that protection rates are supposed to address. Here are three questions: 1. What is the market price effect of commodity policies? 2. What is the producer income effect of the policies? 3. What is the trade volume effect? The first two questions suggest a protection measure comparing prices with and (counterfactually) without the intervention. But the second can't be addressed properly in terms of prices only (for example, it can make a big difference whether producers can produce all they like at the support price, or have their production decisions constrained). For the third question it is obvious, and perhaps it is for the first two also, that one needs an economic analysis of the

intervention in order to measure the protection rate. And with the economic analysis, one can proceed directly to the next step, assessing the consequences of liberalization.

Effects of Agricultural Policies and their Liberalization

Recently several large-scale studies of multi-country agricultural trade and policy liberalization have been completed. Their basic thrust is to model supply and demand for a set of agricultural commodities (with residual nonagricultural sectors in the general equilibrium models of IIASA and Burniaux et al), incorporating policy wedges isolating domestic markets from international trade. Then the wedges (or a subset of them) are removed and the changes in national and international price and quantity changes simulated.

Different studies take different approaches to commodity coverage, country coverage, measurement of initial wedges, modeling both the statics and dynamics of the supply and demand equations, and the type of liberalization simulated. Choices among these approaches are difficult, and difficult issues remain even when these are all made and the required modeling is accomplished. I would like to illustrate some problems with reference to current U.S. policies.

Effects of Current U.S. Policies

The analysis here focuses on wheat, but the same basic structure applies to feed grains, rice, and cotton. Each of three main policy instruments can influence the world market for the commodity in question.

1. The "loan rate", or market support price, is the price at which the Commodity Credit Corporation accepts grain as collateral for loans to farmers,

which the farmers need not pay back. The CCC ends up acquiring the commodity, hence removing sufficient quantities from the market to prevent the market price from falling much below the loan-rate level for any sustained period such as a marketing year. Since no significant U.S. border distortions exist for the main crops, supporting the U.S. price means supporting price at all other locations around the world in which the domestic market price is not insulated from world markets. This characteristic led some economists to say during the early 1990s when CCC stocks were growing rapidly that the U.S. was bearing the burden of worldwide price supports by having CCC loan rates set too high. In the 1985 farm bill, loan rates were sharply reduced for all the major commodities. The effect on world price was seen most dramatically in rice and cotton, where all effective market price support ceased in 1986. Rice and cotton prices at U.S. border and other international locations fell by as much as 50 percent within a few months.

2. The "target" price provides price insurance by making payments to farmers to supplement market receipts. The payments are roughly sufficient to guarantee producers the target price -- "roughly" because the payments are based on U.S. average prices, not on each producer's actual price, and farmers have to hold acreage idle in order to qualify for payments. When target prices were introduced in their present form, in 1973, they were below market prices. The rice legislation of 1975 established a target price above the market price, but like the 1973 Act made payments only on long established base acreage so that payments would not create a direct production incentive (no subsidy at the margin). The Food and Agriculture Act of 1977, however, made the fateful change of basing payments on current production, and with a target level already above the market price for wheat, grain sorghum, and

barley. By 1982 target prices were above market prices for all the covered crops. The target price consequently turned into a production incentive price which tended to increase CCC stock buildup at the loan rates. When loan rates are cut, such excess supplies depress world prices.

3. Acreage controls: Payments made to farmers for not growing crops were a mainstay of 1950s programs (the "Soil Bank") and evolved into the "set-aside" and voluntary (paid) diversion programs of the 1960s. Set-aside were phased out in the mid-1970s, but in 1977 were reinstated for wheat, in response to accumulating CCC stocks. Set-asides require farmers to idle a fraction, typically 10-20 percent, of an average base in order to qualify for target prices and CCC loans. In 1978, paid diversion programs were reestablished. These are essentially offers by the government to rent a farmer's land, which is then left idle. As compared to set-aside this approach is much preferable to farmers.

The scale of acreage diversion was much expanded under the Acreage Reduction Programs (ARP) of the 1980s, especially in 1983-87 when payment-in-kind (PIK) programs used CCC stocks quite generously to achieve the dual goals of reducing production and government-held stocks simultaneously. In 1983 and again in 1987 and 1988 about 20 percent of the cropland base for the main supported commodities was idled under ARPs, a larger percentage than at any time in the Depression-era programs of the 1930s or the "Soil Bank" of the 1950s. The world market effects of ARPs are the opposite of target prices -- indeed the two policy instruments could be tuned to have offsetting output effects so that net world supplies would be neither increased nor decreased by the overall program.

A supply-demand depiction of how these program elements fit together for wheat is shown in figure 2. The data pertain to the June 1987 - May 1988 marketing year. The average farm-level market price was $2.57 per bushel ($94 per tonne), which was above the $2.28 loan rate. The CCC was not acquiring wheat and indeed was dispersing stocks through PIK payments, EEP bonuses, and auctions. Consequently, domestic use of 1.1 billion bushels and 1.6 billion bushels of exports can be identified with points on the domestic and total (domestic plus export) demand curves for wheat, as shown by point A' and A in figure 2.

On the supply side, the key program instrument is the 27.5 percent ARP requirement. With 83 percent of wheat enrolled in the program and 30 percent slippage (output decreasing less than acreage) the implication is that 1987 output was reduced by $.275 \cdot .83 \cdot .7 = .16$ or 16 percent below output with no program constraints. Since output was 2105 million bushels in 1987, with yield about normal (on trend), the implied no-program quantity is $2105/.84 = 2506$ million bushels. In addition some land in the Cropland Reserve Program (CRP) land came out of wheat production. The USDA estimates 4.4 million acres of wheat land in the CRP in 1987. Assuming this land had an average wheat yield on one-half the U.S. average yield, we have another 85 million no-program bushels for a total of 2590 million bushels that would have been produced in 1987 if acreage restraints had not existed.

What price would have been required to induce this output? There is no single price which provides the right answer. Non-participants respond to the market price, and so do participants in current acreage and yield decisions. But the incentive price for participating, which drew producers into ARPs, is higher. On a U.S. average basis we can estimate the appropriate price at

which to locate the 2506 million no-program output by assuming that it is this average incentive price that made 2105 million bushels the chosen output given the program parameters. The average incentive price is the return per bushel received by a participant who had average yield and production costs.

The calculation of returns from participating is as follows:

	Per acre	Per bushel
Yield	38 bu.	
Revenue from .725 acres planted	$120.67	$3.18
Saved variable costs on .275 acres diverted	$16.50	0.43
Returns for participating farmers	$137.17	$3.61

Since $3.61 is higher than the $2.57 that producers received in 1987 at the farm-level market price, it pays to participate. Still, 13 percent of base acreage was on nonparticipating farms. As an approximation, take .13(2.60) + .87(3.61) = $3.45 as the appropriate price on the restricted supply curve caused by ARP provisions, yielding point B in figure 2, where P = 3.45 and Q = 2590 million bushels.

In order to estimate what price and output would be without the wheat program, we need the remainder of these curves, or at least enough to find the supply-demand intersection. The most straightforward way to proceed is to use estimates of supply and demand elasticities from econometric studies of the wheat market. This is equivalent to assuming that the supply and demand functions have constant elasticities over the relevant range (e.g., between point A and the no-program equilibrium point). Using -.7 as the total demand elasticity and 0.3 as supply elasticity, point E is obtained as the no-program

equilibrium. Output at point E exceeds $\bar{S}$ -- that is, the 1987 wheat program reduced wheat output and thus had a price supporting effect. On the other hand, the effect of CCC stock release, which permitted U.S. domestic and export sales in 1987 to exceed production by about 600 million bushels (16 million tonnes), was to depress world prices. The appropriate way to view point E is as the equilibrium that 1987 supply-demand conditions would imply once government stocks had been eliminated.

The accuracy of point E depends on having located A and B properly, and having the correct elasticities. The location of A and B could be inaccurate because of failure to estimate parameters such as slippage or the producers' incentive price accurately. Even if accurate, the points pertain to 1987, so the estimate of gains and losses will provide information about the difference the wheat program makes under 1987 conditions. Other years give quite different results, especially because export demand is volatile. Moreover, the elasticities may be wrong and if so point E is incorrectly placed even if points A and B are correct.

The preceding discussion indicates, if nothing else, what a tricky business it is to estimate the world price effects of U.S. farm programs. Overall, it is clear that U.S. policy has depressed the world prices over short-term periods when CCC stocks were released and has supported world prices when stocks were accumulated. The more fundamental supply-demand question is whether the output-expanding effects of target prices and the (much smaller) input subsidies on farm credit and irrigation water have been more than offset by acreage diversion efforts. For the parameter values that are to me most plausible, U.S. policy for the grains and cotton has been

slightly output depressing, hence world price supporting, in the 1980s overall, but substantially world price depressing in the period since 1985, as the U.S. dumped previously acquired stocks.

For the aggregate of all agricultural commodities, I estimate that U.S. intervention as of 1987 generated $16.5 billion for producers (mainly economic rents to farmland owners) at the cost of $22.5 billion to consumers and taxpayers (see Gardner 1988 for details). The deadweight loss of $6 billion is principally the opportunity cost of idled land and of handling surplus stocks of commodities.

Simulation of Multi-country Liberalization

None of the global modeling efforts cited earlier has in my opinion modeled the U.S. interventions appropriately. The studies may have done better with the EC and other countries' policies, but one is justified in not taking their results as definitive. Nonetheless, the results are interesting as indicating the order of magnitude of effects of current policies, and of potential gains from reform of these policies.

The most widely circulated estimates have been the findings of the World Bank (1986) that as of 1982 agricultural protection was generating a worldwide deadweight loss of $41 billion annually. This is the potential net gain from global liberalization. This figure, resulting from work of Tyers and Anderson (1986), is an aggregate of gains and losses of producers and consumers in both industrial and developed countries. Some groups would lose from liberalization, notably producers in developing countries. These countries receive an overall gain from liberalization, but the goal of their becoming more nearly self-sufficient in food would be set back by liberalization. This result depends importantly on the developing countries liberalizing their own

policies. If only the industrial countries liberalize, then the resulting increase in world commodity prices would make developing countries worse off because they are net food importers. But food production in these countries would be stimulated, leading to potential long-run benefits. (For further discussion, see Quizon, Gardner, and Quinn, 1988.)

Prospects for Liberalization

The probability of a substantial reduction in agricultural protection is enhanced by the ongoing (March 1989) GATT negotiations in Geneva on this very topic. Were it not for these negotiations the probability of liberalization would be about zero for foreseeable future. Because of the GATT the probability might be .1 or .2. This conjecture refers to substantial reduction, a reformation of how the industrial countries treat agriculture. There is a much greater likelihood of modest reductions in protection -- indeed some liberalization has already occurred in several OECD countries -- as budgetary costs have pinched the U.S. and EC in particular. But unilateral radical reform has occurred in only one OECD country -- New Zealand -- and is not in prospect in the U.S., EC or Japan.

Indeed, the ongoing GATT negotiations have made unilateral reforms even less likely than would otherwise be the case. The reason is that abandoning export subsidies, for example, is seen as unilateral disarmament leaving the reforming country with less to bargain away at Geneva. When the U.S. Export Enhancement Program (EEP) was put in place in 1985, the then Secretary of Agriculture said that this program amounted to "shooting ourselves in the foot" [by providing importers with limited (intramarginal) quantities of commodities at lower prices, at the expense of U.S. taxpayers] but that we

would do it anyway in hopes it would force the EC to do something similarly costly in retaliation. President Bush's incoming Secretary of Agriculture said at his confirmation hearings this year that one aspect of previous policy would certainly be maintained -- the EEP. The apparent purpose is to keep up the pressure to negotiate and to have something to give up in Geneva.

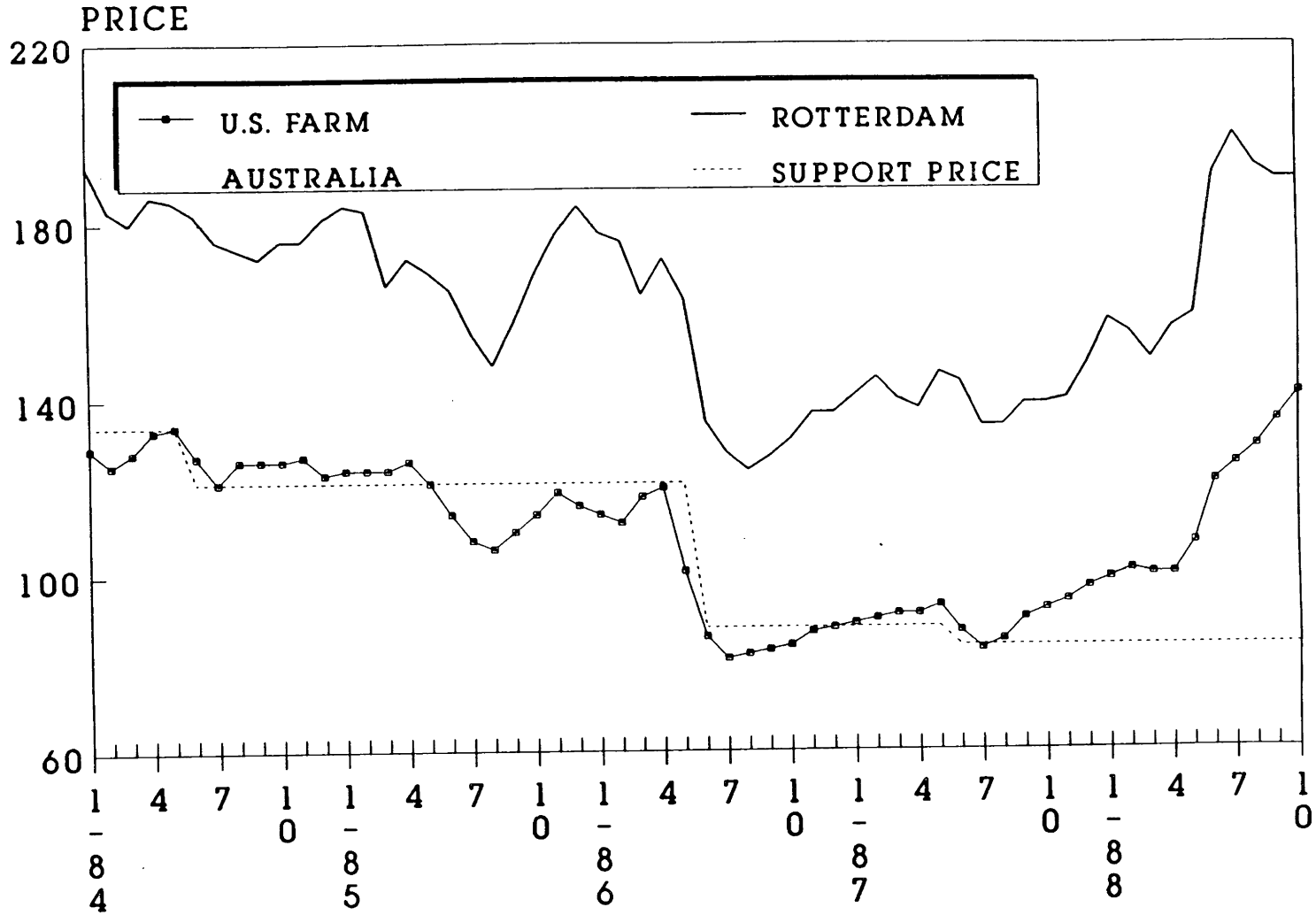
The strategic situation also affects the way different policy instruments are viewed. Acreage controls can be considered, for negotiating purposes, as the opposite of protection, since supply reduction by any large country drives up world prices and makes agricultural protection elsewhere cheaper and less necessary. This creates the risk that international negotiations on agricultural policy are tempted to turn in the direction of an international cartel arrangement, as international commodity agreements have in the past. It is a natural outcome when each country wants to assist its producers even at the expense of its consumers or taxpayers if necessary; and it is necessary. From this perspective it is helpful that some developing countries which want to tax their producers or at least to subsidize food consumers are presently in the GATT.

In sum, for the short term the GATT negotiations are hindering unilateral agricultural policy reforms, but such reform is quite unlikely anyway. For the long term, the GATT negotiations are increasing the probability of reform, but the probability is still low. The main hope is to obtain mutual agreement among countries to shift their protection to less distortionary (more nearly lump-sum) mechanisms. Of course, countries should wish to make such shifts unilaterally, so the question arises why this outcome becomes more plausible in a multi-lateral context. The answer is that the distortions tend to be output increasing so that they raise the costs of other countries' protection.

Therefore, the other countries are willing to give up something valuable to each instigator to reduce distortion while maintaining protection if that is possible.

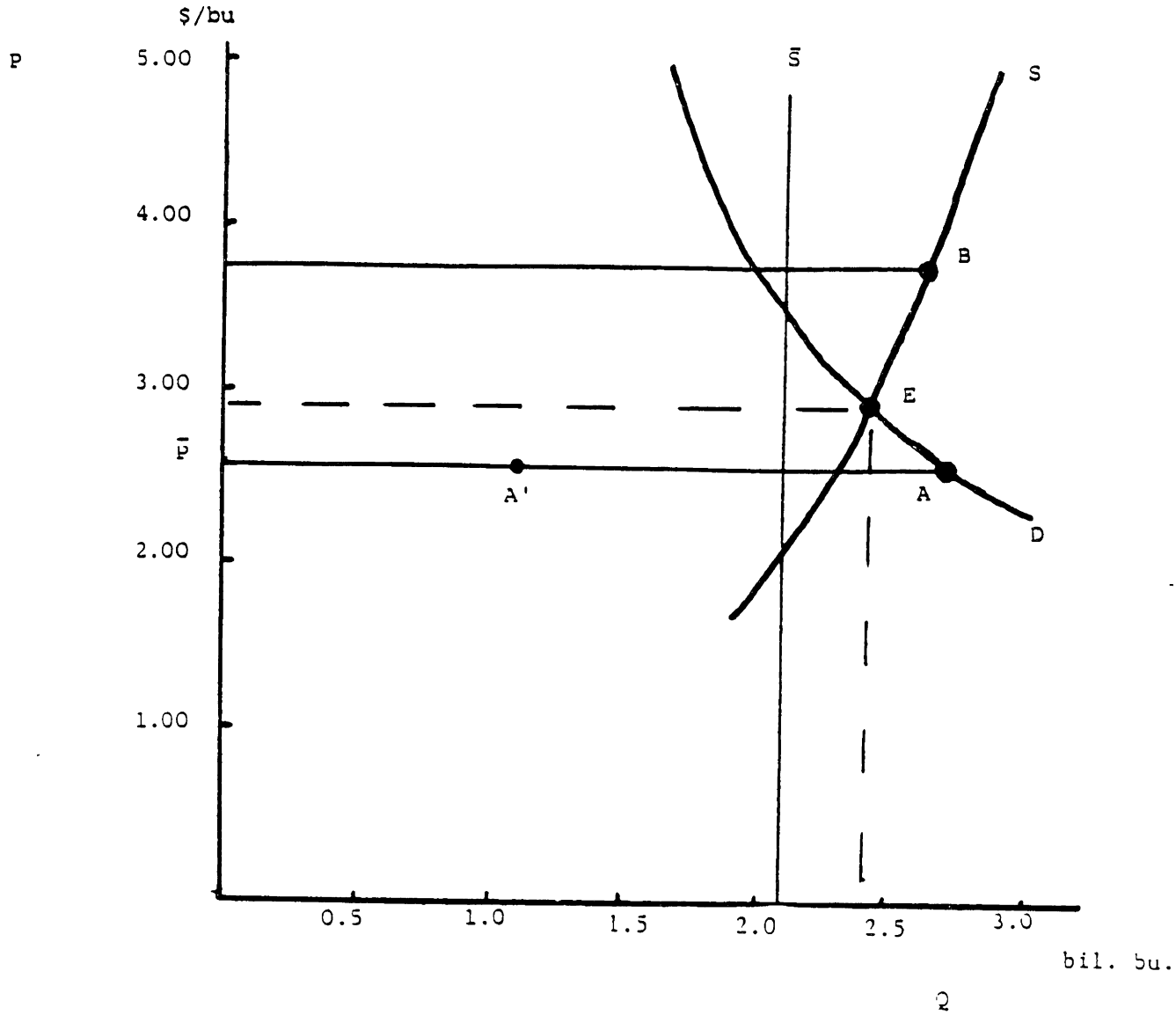
FIGURE 1.

MONTHLY WHEAT PRICES



DOLLARS PER TONNE

Figure 2 1987 Wheat Program



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