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by

Vernon W. Ruttan and Harald von Witzke



Department of Agricultural and Applied Economics

University of Minnesota
Institute of Agriculture, Forestry and Home Economics
St. Paul, Minnesota 55108

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Vernon W. Ruttan and Harald von Witzke

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Abstract

Since World War II barriers to international trade in industrial commodities have been reduced while barriers to agricultural commodity trade have become more severe. During the last several decades the world has experienced cycles of "food pessimism" and "food optimism." Nevertheless, as a result of technical change the terms at which the world's consumers can expect to have access to food appears to be more favorable in the future than in the past. If consumers are to have access to the greater abundance that can be made available, it will be necessary for developed market economies to reduce the distortions resulting from agricultural commodity and trade policies. It is in the interest of both producers and consumers, in developed and developing countries, that the world move toward an international trading regime in which agricultural commodities move across national borders at least as freely as financial resources.

TOWARD A GLOBAL AGRICULTURAL SYSTEM

Throughout history a common concern of mankind has been to assure an abundant supply of food. Since the early 1980s, however, the world has appeared to be awash in excess supplies of agricultural commodities. In the developed market economies farmers and their representatives have turned their attention to policies designed to reduce the flow of agricultural commodities into national and world markets. The fear of scarcity has been replaced by a fear of abundance.

In this article we argue that it is in the interest of the world's agricultural producers and consumers to embrace rather than react against the opportunities for abundance that are within our grasp. We also discuss the reforms in the United States', in the European Community's and in a number of other countries' agricultural commodity policies that will be necessary if the world community is to have access to the abundance that advances in agricultural technology can make available.

Disintegration in World Agriculture

In the international system that emerged toward the end of the nineteenth century agricultural commodities and raw materials were exported from the recently settled countries of the temperate region and from the tropical-colonial areas to the developed countries. Industrial products were exported by the more developed countries to the less developed world. It was believed to be to the economic advantage of both

the developed (DC) and less developed countries (LDC) for each nation to pursue its comparative "natural advantage."¹

The system gradually broke down after World War I. The period between the two world wars was characterized by both great instability and slow economic growth. Protectionism contributed to and was reinforced by the Great Depression of the 1930s. Efforts to preserve national markets for domestic producers during the depression resulted in further declines in agricultural trade.

In contrast, the period after World War II, until the late 1970s, was characterized by unprecedented rates of growth in production and trade. In the developed countries agriculture became more fully integrated into the rest of the economy. Purchased inputs accounted for an increasing share of the value of agricultural output. The share of the labor force employed in agriculture declined sharply. The volume of agricultural trade expanded. Yet the policies pursued by both the DC's and the LDC's have frustrated attempts to achieve the more complete integration of agricultural commodity markets.² Agricultural trade became even more distorted. The developed countries have adopted even more protectionist policies. They supported agricultural prices, restricted agricultural imports, and dumped surpluses onto the world market. The less developed countries reacted to loss of market opportunities and domestic pressures for cheap food by policies that hold prices paid to their farmers below world market levels--in effect forcing their agricultural sector to bear the costs of protecting domestic industry.

The Great Transformation

While the policy regimes being pursued by both the developed and developing countries was widening the distortions in agricultural commodity markets, the basis for comparative advantage in agricultural production was undergoing a dramatic change. Prior to the beginning of this century almost all increases in food production were obtained by bringing new land into production. By the first decade of the next century almost all increases in world agricultural production must come from higher yields--from increased output per hectare. In the developed countries the transition was well underway during the first half of the century. Human capital and technical inputs became the dominant sources of growth in agricultural production. The basis for comparative advantage in agricultural production shifted from natural resource endowments to scientific and technical knowledge and skills. Agriculture in the developed countries was evolving from a resource-based to a science-based industry.

During the 1960s and 1970s a number of developing countries also began to make the transition to higher levels of agricultural productivity. A new international agricultural research system was put in place. A number of national agricultural research systems--in countries such as India, Brazil, Thailand and Kenya--began to achieve substantial capacity to provide their farmers with the new knowledge and technology needed to sustain agricultural production.³

Many developing countries, however, are only now beginning to put into place the agricultural research and extension capacity needed to begin the transition from a resource-based to a science-based agriculture.

Agricultural technology, particularly biological technology, is highly location specific. In those countries and regions which do not make the research investments necessary to gain access to the global advances in scientific and technical knowledge, farmers will be unable to provide the agricultural commodities necessary to make effective use of their particular resource endowments or to meet the elementary subsistence needs of their consumers.

Technology Pessimism and Food Pessimism

The 1960s and the 1970s were characterized by a profound skepticism regarding the benefits of advances in science and technology. A view emerged that the potential power created by advances in science and technology--reflected in the cataclysm of war, the degradation of the environment, and the psychological costs of social change--were obviously dangerous to the modern world and to the future of the human species. The result was to question seriously the significance for human welfare of scientific progress, technical change, and economic growth.⁴

The ethical and social criticisms of scientific and technical change seemed confirmed by a pessimism stemming from a new perception of the limits to growth imposed by resource scarcity. There was a pervasive pessimism regarding the adequacy of natural resource endowments and the supply of resource commodities and services. Until well into the 1980s there were intense arguments about whether energy and other commodity prices would continue to rise until well into the early years of the next century or if they would stabilize near the high prices that prevailed at

that time. Almost no consideration was given to the possibility that agricultural commodity prices would actually decline.

This technology and resource pessimism was readily translated into pessimism about world food supply capacity. Rising levels of food imports by developing countries were projected toward the end of the century and beyond. But the historical record has not been consistent with the expectations. Experience has again seemed to confirm the optimistic hypothesis that a stretch of high prices has not yet failed to result in the location of new resources, improvements in the exploitation of old resources and the development of technology to facilitate the substitution of more abundant for less abundant resources.⁵

By the mid-1980s the fear of scarcity had largely dissipated. The new technology and the new productive capacity that had been generated by more than a decade of rising commodity prices began to disgorge their products into an economic environment that was experiencing a global recession. We were confronted by what seemed to be excess capacity at a global level--in energy, in automobiles, in steel, and in agricultural commodities. The fear of scarcity was replaced by a fear of abundance. Slow growth of effective demand has obscured the fact that the rate of growth of basic food staple production declined in the developing countries from the 1960s to the 1970s and again in the 1980s.

There was one clear lesson from those resource and technology assessment studies of the 1970s. The analysts who constructed and interpreted the futures models had great difficulty in insulating themselves from the short run trends and events that dominated the intellectual and policy environment at the time that the assessments were

made.⁶ There are large elements of subjective judgement that enter into estimation of the "trend" and the "analytical" models and in the use of the models to simulate alternative futures. The simulations for the 1980s and 1990s were strongly influenced by the pervasive climate of "food pessimism" and, more broadly, of "technological pessimism" that dominated much of the decade of the 1970s. It seems quite clear that the model builders and futures simulators were influenced by an intellectual environment that would have regarded more optimistic projections as "out of touch with reality."

Greater Abundance

Now that agricultural commodity prices have begun to recover from the depressed levels of the 1980s, it does not take too much prescience to again anticipate a new round of concern about long run food futures. Nevertheless, the long term outlook is for a continuing decline in the real prices of agricultural commodities. Most of the worlds consumers can expect to have access to agricultural commodities on increasingly favorable terms.

This judgment is based on two fundamental assessments. The first is that sometime in the next century, world food demand, resulting from population growth and income growth, can be expected, at the global level, to level off at somewhere in the neighborhood of 20 percent of biological food production potential.⁷ The second is that, as noted above, a large number of countries have now established the agricultural research capacity and the capacity to supply the technical inputs needed to sustain agricultural production. At the very least the broader geographic bases on

which science-based agriculture now rests should imply both greater stability and greater competition in meeting global food needs.

In the developed countries advances in agricultural technology will be driven primarily by advances in biological and information technology rather than by advances in mechanical technology. Advances in animal health and animal productivity will come first, followed by advances in plant protection and only later by plant productivity. But we see nothing in the recent rash of technology assessments that leads us to anticipate, over the next several decades, the flood of excess production envisaged by some of the biotechnology enthusiasts.⁸ Productivity gains in the developed countries--measured in terms of decline in real costs of production--are unlikely to exceed the rates achieved since 1940 (a) as a result of the reduction in farm labor and work animal inputs associated with advances in mechanical technology and (b) the advances in crop yields and animal feed efficiency resulting from advances in plant and animal breeding and in crop and animal nutrition. The cost of saving an additional man day by adding more horsepower per worker is now playing itself out in countries like the United States, Canada and Australia.

In the developing countries the major gains in crop and animal productivity over the next several decades will continue to come from conventional sources. In the case of crops this means from conventional crop breeding, from more effective management of water resources, and from higher levels of plant nutrients. In animals it means continued efforts to enhance feed efficiency through improved animal health, improved feed quality and improved management. Those countries that are not able to

establish viable public and private sector agricultural research capacity will not be able to draw on even these conventional sources of growth. Nor will they be able to address the serious environmental consequences will emerge either from the impact of growth on demand, arising from population and income growth, pressing against increasingly fragile environments or from the impacts of use of higher levels of industrial inputs associated with greater intensity of crop production.

Structural Change

Beginning in the 1960s it became clear that the economic environment of agriculture had begun to change significantly. The international financial markets became more and more integrated. The collapse of the Bretton Woods system resulted in increasingly volatile currency markets. Agricultural commodity prices and the incomes of farmers became increasingly sensitive to the economic environment outside of agriculture--to domestic fiscal and monetary policies and to the increasingly unstable exchange rate regimes.⁹

With development agriculture tends to lose its comparative advantage relative to other sectors of the domestic economy. In this situation policymakers in newly industrializing countries such as Japan, Korea and Taiwan, have tended to follow the policies of the older industrial countries by switching from taxing agriculture to subsidizing it.¹⁰ However, attempts to use agricultural producer price supports to resolve the intersector income disparity problem have become both ineffective and increasingly expensive.

Changes in technology and in the macro-economic environment are forcing continued structural change within the agricultural sector. Some of these changes are so subtle that they are frequently overlooked by casual observers. In many cases the adjustment process is obvious. Farming is discontinued altogether and new employment is taken outside of agriculture. With growing integration of agriculture into the rest of the economy the structural adjustments may become more subtle. Farmers and their families in high income countries find part-time employment outside of agriculture. Outmigration occurs gradually over several generations. The growing share of income of agricultural households from non-farm employment reduces the relative importance of agriculture as primary source of income. In the 1940s about 27 percent of total income of US farm households came from nonagricultural employment. In 1980 it was more than 60 percent¹¹.

The phenomenon of the increasing integration of agriculture into the economy via non-agricultural employment has important implications for agricultural policy. One is that as the portion of the income of farm families accounted for by non-farm sources rises, agricultural policy can do less and less to support the income of farm households via agricultural price and/or income support. A second is that as the share of the labor force in agriculture declines, organized farmers make increasingly attractive partners in coalition politics. They are thus able to maintain political influence that substantially exceeds their relative economic significance.

The distribution of benefits from agricultural programs that subsidize or protect farm prices are highly skewed. Wealthy farmers are the main

beneficiaries. Farmers at the lower end of the income range are, all too often, the ones that deserve some income support by any general standard of social policy in developed countries. But those farmers do not benefit much from subsidies.¹² Finally, agricultural subsidies tend to be capitalized into land values. Hence, it is the landlords who benefit rather than the tillers.

Agriculture is subject to considerable risk and uncertainty due to natural sources--weather, and plant or animal disease. Prices tend to fluctuate sharply as a consequence of only slight changes in supply and/or demand. Over centuries farmers in both less developed and industrialized countries of our times have learned to cope with these instabilities. The pervasive nature of government market intervention together with the growing integration of agriculture into the world economy has added a new institutional source of instability. It is frequently argued that policy related instabilities far exceed the 'natural' sources of instability in agriculture. Of course, less developed countries are much more susceptible to agricultural instabilities--both because a large share of their labor force is employed in agriculture and because they are vulnerable to the effects of policies adopted to protect farmers in the developed economies. Many developing countries have, for example, experienced a sharp decline in their sugar exports because the high sugar prices in developed countries have artificially stimulated the development of the corn sugar (fructose) industry.

Policy Distortions: Agricultural Price Support in the United States and the European Community

Both the European Community and the United States are major producers and exporters of important agricultural commodities. Agricultural policies in these two political entities have a significant impact on world markets of agricultural commodities and on international agricultural trade patterns. Both employ a large variety of agricultural policy instruments that aim at supporting agricultural incomes such as minimum prices, import tariffs, export subsidies or supply controls. The resulting international effects are that production and exports in both the United States and the European Community are higher and world market prices lower than without government intervention. Central elements of agricultural policy in both political entities are minimum prices for domestic production. While the objective and the principles of government market intervention in the United States and the European Community are similar, namely to provide income assistance through government market intervention, the specific mechanisms employed are quite different. Furthermore, the level of support in the Community is generally higher than in the United States.

In the European Community agricultural prices are kept above international levels predominantly by a system of variable import levies, export restitutions (export subsidies) and minimum prices for domestic production. As long as the degree of self-sufficiency is below 100 percent imports are charged with a variable levy which is the difference between the so-called threshold price (minimum import price) and whatever the world price is. If domestic production exceeds consumption, the Community's policy intervention is symmetric. In essence, it buys the surplus

production and pays producers at fixed prices. These are the so-called intervention prices which have been set on most important agricultural markets. As the intervention prices are above world market levels, the surplus production is subsidized via export restitutions in order to make EC agricultural surpluses more competitive on the world markets.

Until a decade ago the European Community was a net importer of many agricultural commodities. Rapid productivity growth in EC agriculture combined with CAP price supports and export subsidies have transformed the Community into a major net exporter of agricultural commodities in an increasing number of markets. The widening gap between costs of production, which have been lowered by productivity growth, and the higher prices recovered by farmers, resulting from CAP policies, have increased the costs of the program. The export subsidies and other CAP related outlays have also resulted in rapidly growing budgetary expenditures which have created financial tensions and resulted in growing political disputes. In spite of considerable political tension the financial resources available to the Community have been increased. In addition, domestic production controls of one form or another have been introduced to limit budget costs. The Community is also contemplating the introduction of additional trade distorting interventions such as import restrictions on protein meals or a consumption tax on nondairy fats and oils.

These additional trade distortions aimed at increasing the financial resources of the Community would harm the United States and a number of other developed and less developed commodity exporting countries. The United States, in turn, has threatened to retaliate if the Community were to introduce these additional trade restrictions. And other exporters,

organized as the Cairns Group, are attempting to use the forthcoming "Uruguay Round" GATT negotiations to bring pressure for more rational agricultural commodity prices.

The participation in agricultural policy programs in the Community is mandatory. It is, for the most part, voluntary in the United States. The major United States agricultural commodity programs can best be understood as a system of renting sufficient land from farmers in order to bring production into line with expected domestic utilization and exports at acceptable price levels. The two central mechanisms of US agricultural price support programs are the loan rate and the target price. The loan rate represents the price at which the government provides loans to farmers to enable them to hold the crops for later sale. If the market price exceeds the loan rate, farmers can sell their crops at the market price and repay the loan. If the market price is below the loan rate, farmers can forfeit the commodities placed under loan to the government instead of repaying the loan. The loan rate, therefore, provides a price floor for domestic producers.

Deficiency payments, based on the difference between the target price and the loan rate or the market price, are used as a second inducement for farmers to participate in the program. By setting the loan rate at a relatively low level and the target price at a high level the US can achieve market prices that enable US agricultural commodities to move in international markets without direct subsidies.

As in the European Community price support and productivity growth have led to burdensome budgetary expenditures which have led to various additional measures of domestic supply control, including deficiency

payment limitations. In recent years the United States has also introduced targeted export subsidies in order to penetrate overseas markets.

Two major reforms are required in the EC, the United States and other developed countries. One is the delinking of income support for disadvantaged farmers from commodity production. The second is the integration of agricultural commodity markets among countries. In the next section we consider some of the essential reforms necessary to bring about an integrated global agricultural system.

Toward a Global Market

Doing away with policies that distort agricultural production, consumption and trade would have many benefits. Consumers, producers, taxpayers--the world economy as a whole--would benefit greatly. In LDCs, abolishing the discrimination against agriculture would not only lead to more efficient resource use but also to increased agricultural production which in turn would reduce balance of payment problems.

Many critiques of agricultural policies, especially of those in DCs, have frequently argued that the benefits of removing distortions in agriculture are so large that it would be beneficial for each individual country to reform agricultural policies irrespective of what other (developed) countries do. This argument is certainly valid. However, agricultural policy makers in the DCs do not follow this advice. This is because a significant part of the benefits of policy reform in one country, where reform is not coordinated with other major trading countries, may be eroded by the other country's policy adjustments.

It has been shown that international interactions of national agricultural policy decisions occur quasi-automatically.¹³ To illustrate this consider a situation in which the United States would unilaterally do away with all agricultural price support. Since the United States is a large country in terms of agricultural production, the reduction in US production resulting from declining producer prices would be followed by a rise in world prices of agricultural commodities. This would, in turn, reduce the per unit export subsidies paid by the European Community and thus lower EC agricultural budget expenditures. The Community tends to react to budgetary relief with further upward adjustments of its price support. The effect would be to stimulate production in the EC and reduce world market prices. This would, in turn, drive up agricultural adjustment costs in the United States. If the European Community would unilaterally reduce agricultural price support, the reaction of US agricultural policy would be analogous.

An open international trading system that is free of policy distortions is a public good--it would be beneficial to all parties. But a single country cannot supply itself with this international public good. Reforms toward free trade in agriculture will not come about in the presence of incentives to free ride on other countries' agricultural trade liberalization. Thus an effective movement toward freer trade will require international policy coordination.¹⁴

Since it is in most countries interest (at least in the long run), to establish and maintain a free and open international trading system, each country also has an incentive to pursue international agreements on agricultural trade liberalization. Perhaps the only way a more open

international trade regime for agricultural commodities can be produced is through a system of reciprocal obligations in which each country contributes to the public good--that is each country agrees to remove or reduce domestic policy distortions conditional upon other countries doing the same.

The General Agreement on Tariffs and Trade (GATT) has been rather successful in establishing a system of international trading rules that have resulted in a reduction in tariffs and freer trade in industrial products since World War II. The major exception, however, is agriculture. Agriculture has, for the most part, been exempt from GATT rules. A major objective of the current Uruguay round of multinational trade negotiations will be to remove pervasive government intervention in agriculture with all its attendant negative economic and political consequences. In an increasingly international world only multilateral policy coordination has a chance to bring about a freer and more open international agricultural trading regime.

The proposed reforms will not be easy to bring about. They will be opposed by agricultural interest in the EC, the US and in Japan. The main proponents will be a group of smaller developed and less developed countries that depend heavily on agricultural commodity exports. However, the persistent international disputes over agricultural trade restrictions have increasingly attracted the attention of consumers and taxpayers in the EC, the US and Japan.

We must also keep in mind that at some time in the future it may become possible to incorporate the centrally planned economies in to a more fully integrated agricultural system. The reforms associated with the

"household responsibility system" in China have resulted in a decade of exceptionally rapid growth in agricultural production. If similar reforms were to occur in the USSR, it is possible that Soviet agriculture could again become a significant exporter of food grains. One step that might be taken immediately is for the centrally planned economies to engage in a more active scientific exchange with both the developed market economies and the less developed economies. The other centrally planned economies should also follow the lead of Poland and begin to play a more active role in the GATT. If this should happen, it may, in the future, be possible to achieve a truly global agricultural system.

A Perspective

The abundance that advances in agricultural science and technology can make available has made the protectionist agricultural policies pursued by the developed market economies expensive to both consumers and producers. The discriminatory policies toward agriculture pursued by many developing countries has deprived producers of the incentives that are necessary to make the potential abundance available to their poor consumers. It is in the interest of both producers and consumers, in developed and developing countries, that the world move toward an international trading regime in which agricultural commodities move across national borders at least as freely as financial resources. The objective of the current round of GATT negotiations should be to reform world commodity policies and markets against that objective.

Table 1. Comparison of the nominal rates of agricultural protection between East Asian countries and twelve other developed countries, 1955 to 1980.

	(%) ^a							
	1955	1960	1965	1970	1975	1980	1984	(1986) ^b
East Asia:								
Japan	18	41	69	74	76	85	102	(210)
Korea	-46	-15	-4	29	30	117	137	(117)
Taiwan	-17	-3	-1	2	20	52	43	(na)
European Community:								
Denmark	5	3	5	17	19	25	12	(46)
France	33	26	30	47	29	30	25	(75)
Germany, FR	35	48	55	50	39	44	49	(86)
Italy	47	50	65	69	38	57	20	(67)
Netherlands	14	21	35	41	32	27	15	(58)
United Kingdom	40	37	20	27	6	35	15	(54)
<u>Average^c</u>	<u>35</u>	<u>37</u>	<u>45</u>	<u>52</u>	<u>29</u>	<u>38</u>	<u>22</u>	<u>(63)</u>
Non-allianded Europe:								
Sweden	34	44	50	65	43	59	36	(63)
Switzerland	60	64	73	96	96	126	153	(260)
Food Exporters:								
Australia	5	7	5	7	-5	-2	na	(na)
Canada	0	4	2	5	7	-3	-3	(-9)
New Zealand	na	2	0	-5	-4	2	na	(na)
United States	2	1	9	11	4	0	6	(6)

a. Defined as the percentage by which the producer price exceeds the border price. The estimates shown are the weighted averages for 12 commodities, using production valued at border prices as weights. The 12 commodities include rice, wheat, barley, corn, oats, rye, beef, pork, chicken, eggs, milk and sugar.

b. Calculated by applying the exchange rates of September 1986 to the 1984 prices.

c. Weighted average for all six countries shown after 1970, but excluding Denmark and the United Kingdom for earlier years.

Source: Kym Anderson and Yujiro Hayami, The Political Economy of Agricultural Protection: East Asia in International Perspective,

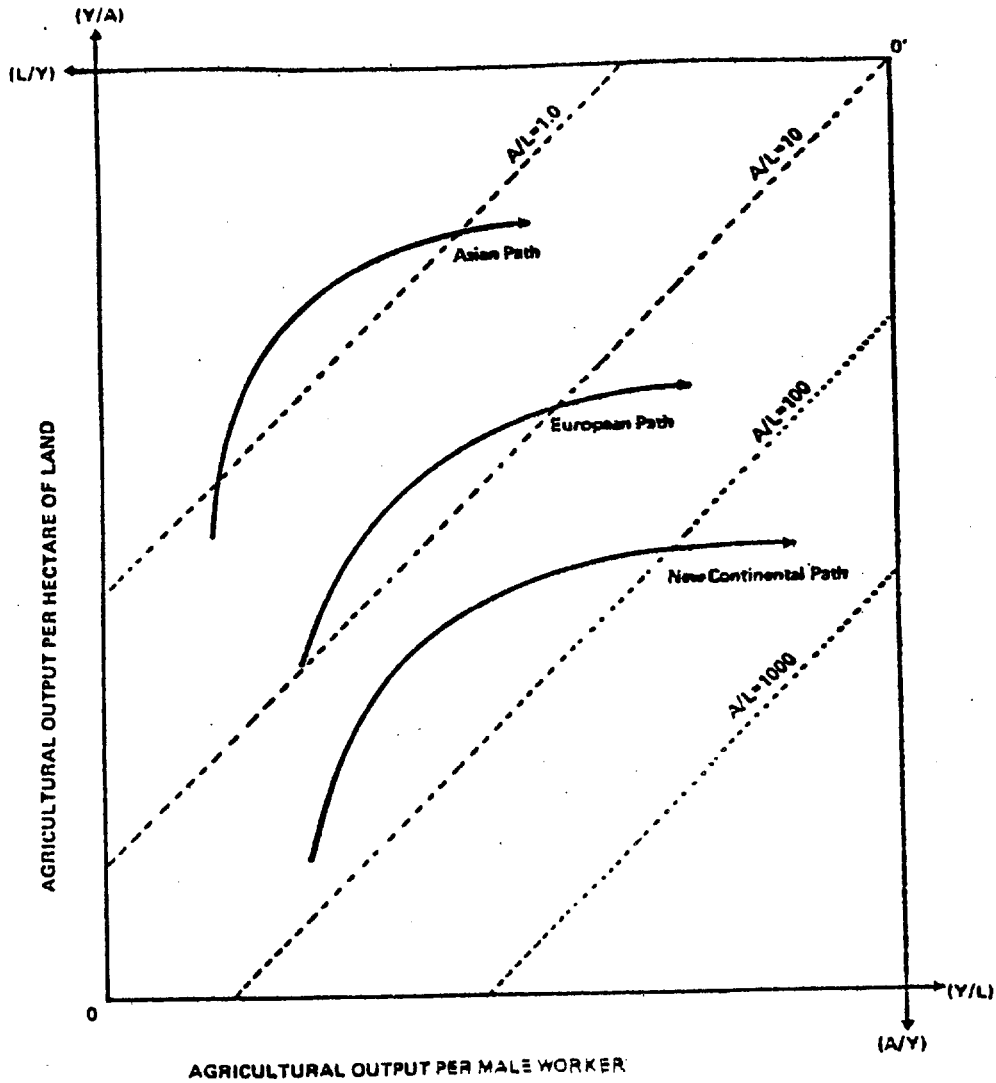
(Sydney London and Boston: Allen and Unwin, 1986), p.26; Masayoshi Honma, "Kokusaiteki Kantan Karamita Nihon Nogyo no Hogosuijun" (Agricultural Protection Level of Japan in an International Perspective), Paper presented at the Modern Economics Mini-Conference, held at the Hitotsubashi University Institute for Economic Research, 31 January 1987.

Table 2 : Per capita income shares of the agriculture population in the United States from farm and non-farm sources, 1935-39 to 1975-80

Period	35 -39	40 -44	45 -49	50 -54	55 -59	60 -64	65 -69	70 -74	75 -79	80
percent farm income	66.7	71.4	73.5	69.1	63.4	58.4	51.9	52.4	47.8	37.4
percent non-farm income	33.3	28.6	26.5	30.9	36.6	41.6	48.1	47.6	52.2	62.6

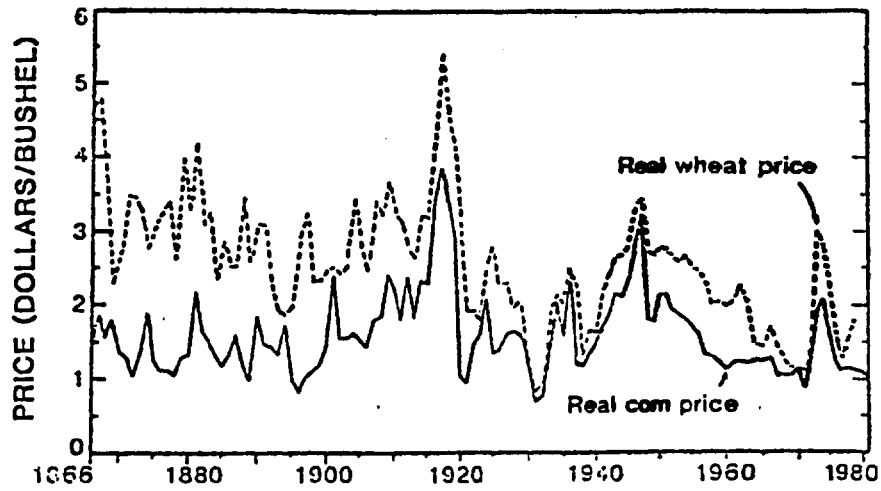
Source: G. Schmitt, "Die andere Dimension der fortschreitenden Integration der Landwirtschaft in eine wachsende Volkswirtschaft: Das Beispiel der Vereinigten Staaten." Berichte ueber Landwirtschaft 62 (1984): 13-39.

FIGURE 1. Stylized patterns of growth in labor and land productivity in agriculture



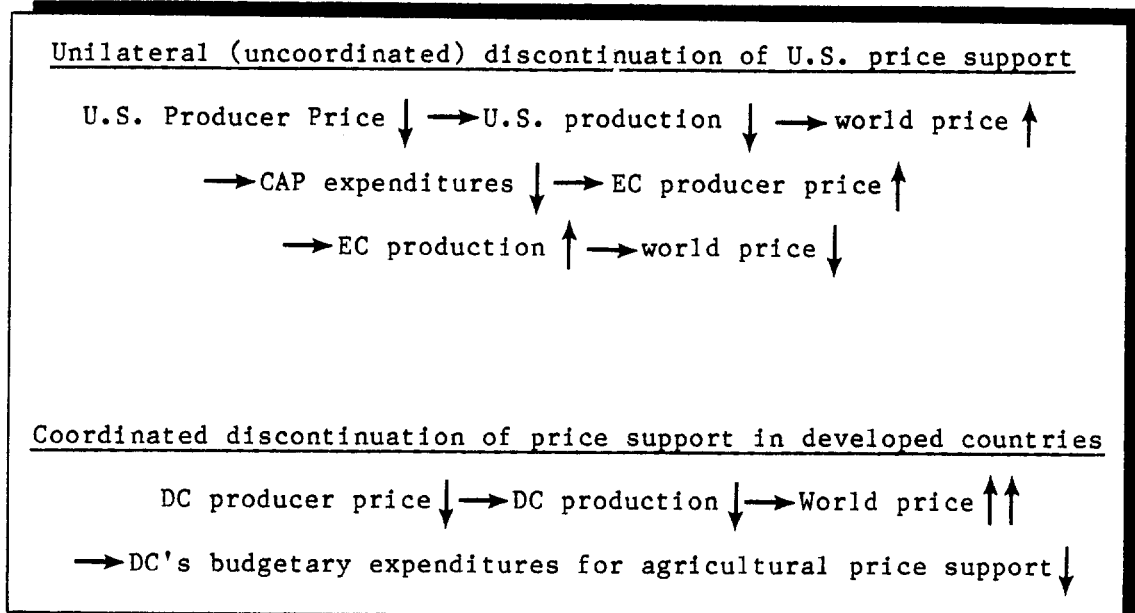
Source: Yujiro Hayami and Vernon W. Ruttan, Agricultural Development: An International Perspective, (Balitmore: The Johns Hopkins University Press, 1985), p. 124.

FIGURE 2. Real prices of wheat and corn, 1866-1981.



Source: Michael V. Martin and Ray F. Brokken, "The Scarcity Syndrome: Comment," *American Journal of Agricultural Economics* 65 (February 1983):159.

Figure 3. Models of international adjustments associated with unilateral and coordinated discontinuation of price supports.



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ABOUT THE AUTHORS

Vernon W. Ruttan is Regents' Professor, Department of Agricultural and Applied Economics and the Department of Economics, University of Minnesota, St. Paul, Minnesota, USA. A native of Michigan, he studied at Yale and Chicago, served with the Tennessee Valley Authority, The President's Council of Economic Advisors and the Rockefeller Foundation (at the International Rice Research Institute). He has been President of the American Agricultural Economics Association and the Agricultural Development Council. He has been elected a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science and the American Agricultural Economics Association. He is the author of several books on agricultural development and research policy. Address: Department of Agricultural and Applied Economics, University of Minnesota, 332 Classroom Office Building, 1994 Buford Avenue, St. Paul, Minnesota 55108, USA.

Harald von Witzke is Assistant Professor in the Department of Agricultural and Applied Economics of the University of Minnesota. A native of Germany, he studied agricultural economics at the University of

Goettingen, served with the ministry of agriculture, and taught agricultural economics at the Universities of Bonn and Goettingen. He is the author of several books and numerous articles on agricultural development, policy and trade. Address: Department of Agricultural and Applied Economics, University of Minnesota, 248 Classroom Office Building, 1994 Buford Avenue, St. Paul, Minnesota, 55108, USA.

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