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THE NEW MACROECONOMICS OF AGRICULTURE

G. Edward Schuh

Invited Address, Annual Meetings of the American Agricultural Economics Association, State College, Pennsylvania, August 15-18, 1976.

August 9, 1976

The New Macroeconomics of Agriculture*

G. Edward Schuh**

Most of the literature on the macroeconomics of U.S. agriculture is cast in the context of a closed economy. Moreover, it considers a world in which there is rapid technological change, and focuses on the problems involved in the so-called agricultural transformation - the process whereby an important share of the agricultural labor force is transferred out of agriculture and new modern inputs produced in the nonfarm sector are introduced.[1/] Consequently, it tends to ignore our linkages to an international economy, and focuses instead on the secular income problems that agriculture faces as it is subjected to the processes of economic growth.[2/]

That perspective no longer seems relevant to the major problems now facing us as we consider our rapidly changing food and agricultural sector. Outmigration from agriculture has declined markedly, our long-sustained growth in factor productivity appears to be leveling out, and major shocks to the U.S. food and agriculture sector have come from abroad as a result of the American economy having become more open. At the same time the rules governing the trade and exchange relations among countries have changed, and there is pressure for even further change as the less developed countries push their demands for a New International Economic Order.

My paper addresses these new conditions and the implications they

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have for us, both as a nation and as a profession. What perhaps most differentiates it from previous looks at the macroeconomics of agriculture is an attempt to examine the agricultural sector in the context of an open world economy. As we look ahead, the major analytical and policy problems we face will have to do with how U.S. agriculture and the economy as a whole fit in to a rapidly changing, interdependent, world economy. Those problems have to be understood in the context of our present stage of development and the major forces impinging on agriculture. Hence, part of my paper will be concerned with these issues as well.

The Setting

The contribution of agriculture to the economic growth of the larger economy is undergoing marked changes. In the past, its contribution consisted primarily of furnishing abundant supplies of food to the domestic economy at constant and/or declining real prices, the release of large numbers of workers to man an ever expanding non-farm sector, and the supplying of large amounts of capital - both human and nonhuman - for the development of the rest of the economy. As we view it from our present perspective, however, the capital flow may now well be the other way, the outflow of labor has slowed in the aggregate, and relative food prices are no longer as low as they once were. Moreover, agriculture now is a major source of export earnings, and thereby enables us to purchase the growing amounts of petroleum, raw materials, and finished products we import from abroad.

Agriculture continues to be an important market for goods from the non-farm sector, and in the recent recession was an important point of strength as farm incomes held up remarkably well due to the domes-

tic restructuring of welfare support and a strong export demand. This was probably the first time in our modern history that a severe recession in the general economy had little effect on agriculture.

The early 1970's have seen major shocks to U.S. agriculture and to the U.S. economy. After a long secular decline in the real price of agricultural products, food and agricultural prices were in the vanguard of an unusual peacetime inflationary spiral. Rather than subsidizing exports, we put on export controls in one form or another in each of the last three years. Food aid on concessional terms was reduced dramatically as commercial sales abroad burgeoned. And average per capita incomes of farm people rose above those in the nonfarm sector. From a chronic problem of low relative incomes for farm people, we have shifted to what many believe will be a chronic problem of instability.

The question that emerges is whether these recent events reflect a change or changes in the macroeconomics of agriculture. In my view they do. And some of the changes have important implications for the welfare of U.S. citizens and for policy makers as they attempt to devise policies that are in the best interests of the nation.

Changes in the Economic Environment of U.S. Agriculture

A number of broad economic forces and events have shaped the economic world we now live in. The U.S. economy experienced unprecedented growth in the decade of the 1960's. There was also unusual growth in other parts of the world, including in some of the LDC's. The regime of fixed exchange rates established at Bretton-Woods broke down and we have fitfully

moved to a system of floating exchange rates. And population growth around the world presses hard against the stock of land, despite technological breakthroughs in birth control and concentrated efforts by at least some countries to reduce their growth rates, and despite technological breakthroughs in agriculture that were prematurely labeled a Green Revolution.

Let us now turn to a brief look at the more specific changes relevant to agriculture.

Reduced Outmigration from Agriculture

It is generally recognized that the chronic farm problem of the 1950's and 1960's was a result of the inability to transfer labor out of agriculture at a sufficiently rapid rate. The U.S. had chronically under-invested in the education of its rural people, with the result that farm people often did not have the skills and talents required for nonfarm employment. The agricultural labor market naturally tends to be rather imperfect, in part due to its geographic dispersion. And, of course, during the 1950's and early 1960's, fiscal and monetary policy caused the level of unemployment in the general economy to be relatively high, and this constitutes an important barrier to the outmigration of labor.[3/]

As we entered the decade of the 1970's, however, the agricultural labor market appears to have reached an equilibrium. Employment in agriculture has remained almost stable since 1970, the real agricultural wage rate rose relative to the wage rate in the private nonagricultural sector from 1965 through 1974, and average per capita incomes in the agricultural sector were larger than those in the nonfarm sector in both

1973 and 1974.[4/] Median family incomes of farm people, while still less than median incomes of nonfarm families, have risen dramatically relative to those in the nonfarm sector.[5/]

There will undoubtedly be a continued outflow of human resources from agriculture, particularly from the Northeast and Southeast. On the other hand, there may well be some return flows in other regions, and the aggregate outflow will most likely be greatly reduced compared to the past. Average annual net outmigration during the 1950's and 1960's was 741,000 and 592,000 respectively, but from 1970 through 1974 the average net outmigration was only slightly over 110,000 per year, in a total labor force of some 90 million (Council of Economic Advisers, 1975).

Stagnating Productivity Growth

Increases in total factor productivity have been an important source of output expansion in the past. From 1940 to 1970 total measured physical inputs in agriculture increased only 4 percent, while output increased 58 percent. Clearly, the major source of output expansion was an increase in factor productivity.

More recently, there has been a marked and little understood decline in the rate of measured productivity growth in agriculture. During the decade of the 1950's, total factor productivity grew by 27 percent. In the decade of the 1960's it grew by only 11 percent, or at a rate only slightly more than a third as large as in the previous decade. This stagnation in productivity growth first emerged in the period following 1965, after a continued and sustained rise in the previous 15 years. Total factor productivity grew by some 10 percent in 1971, but has again stagnated since that date.

The National Academy of Science in May 1971 organized a Committee on Agricultural Production Efficiency to evaluate the adequacy of this nation's policies, knowledge, and technology relative to agricultural research and educational efforts. Although far from being a prognostication of doom, the Committee's report is indeed sobering. Their data show rather strong diminishing returns from the application of fertilizer to land, with the rate of increase in crop yields per pound of fertilizer added tapering off since 1965. The number of eggs laid per hen is apparently leveling off at near 230 per year, and a similar biological limit is expected to emerge with respect to the production of broilers per pound of feed. In addition, number of people fed per farmer and the number of people fed per acre are also leveling off.

In looking ahead, the Committee indicated that no major scientific breakthrough comparable to hybrid corn or DDT can be reasonably predicted for the next one or two decades, although they believe there remain promising potentials for improving productivity from the application of known technology and from new technology now in the research and development phases. On balance, however, they indicate that the biological realities suggest a slowing in the rate of productivity growth for most crops in the foreseeable future, and they express similar concerns about productivity in the livestock sector.

Willis Peterson has pointed out that total factor productivity in U.S. agriculture did not start growing in a substantial way until the 1940's, despite the fact that our research, teaching, and extension infrastructure was put in place in the late 19th Century. The petering out of productivity growth in recent years suggests that we may have

passed through a technological "epoch" that is playing itself out until (and if) a new burst of innovations come on the scene. The truth of the matter, however, is that we are far from completely understanding the technological revolution through which U.S. agriculture has passed.

The Shift to Floating Exchange Rates

The rules that have governed trade relations among nations in the post-World War II period were largely established by the Bretton-Woods Conference of 1944. At this Conference the industrialized Western countries, under U.S. leadership, established an elaborate system of trade, tariff, and financial arrangements which in its broad outlines lasted through the early 1970's. Central features of the system included reliance on fixed exchange rates and a number of reserve currencies, the most important of which became the U.S. dollar. In its role as supplier of the major reserve currency, the U.S. ran a persistent deficit in its balance of payments, collecting seigniorage in the process (Grubel).

This system encountered periodic difficulties as one country or another got out of adjustment, but for the most part it served the developed countries of the world reasonably well. World trade grew at a faster rate than world GNP, and a growing interdependence among countries evolved, especially among those of the industrialized West.

As inflation picked up in the U.S. economy during the late 1960's and early 1970's, however, the U.S. dollar became increasingly out of line with the currencies of its major trading partners, and the deficit in the balance of payments grew increasingly larger. In August 1971 the dollar was devalued in relation to gold by 8 percent, and

again in February 1973 by another 10 percent. In the process the U.S. closed its gold window. De facto generalized floating among the industrialized countries was adopted in March, 1973.

These successive devaluations of the U.S. dollar and the shift to floating exchange rates ended what in my view was a discrimination in economic policy against the agricultural sector (Schuh, 1974). An over-valued currency is in effect an implicit export tax which, depending on the elasticity of foreign import demand and the elasticity of domestic factor supplies, has its incidence on the exporting sector. When combined with the tight monetary and fiscal policies designed to stem the gold outflow and control the balance of payments deficit, the result was a severe squeeze on agriculture - at the very time it was already experiencing a considerable adjustment problem due to the adoption of new production technology and substantial investments in nonhuman capital.

Changes in Our International Environment

In addition to the shift from fixed exchange rates to a system of floating exchange rates, there have been a number of other important changes in the way the U.S. relates to the world economy. In the first place, the U.S. has over time become a great deal more dependent on its external sector. The share of exports in the total economy has doubled in the last 15 years, and the share of imports has doubled in just 7 years. U.S. exports and imports are each currently about 7 percent of total GNP and are still rising. This puts them only slightly below the same ratios in Japan and the European Common Market as a group, which are about 9 percent and fairly stable (Bergsten and Cline). In addition, about one-third of the profits of U.S. corporations

now derive from overseas activities, primarily their foreign direct investments. Bergsten and Cline argue that if these profits are taken into account along with trade, the U.S. economy has probably become more open in quantitative terms than Japan or Western Europe (as a unit). The U.S. already imports more than 50 percent of nine of the 13 key industrial raw materials required by the domestic economy (Bergsten and Cline).

As one aspect of this general opening of the economy, U.S. agriculture has become more closely integrated with the world economy, especially on the export side. The export coefficient for agriculture doubled between 1950-53 and 1970-74 (Brandao and Schuh). At the same time, other countries have become increasingly dependent on the U.S. as a source of supply for grains. Although the U.S. has been an important and growing source of supply throughout the post-World War II period, it has become of major significance in the early 1970's (Brandao and Schuh).

A third, and perhaps the most important respect in which U.S. agriculture has become more strongly linked to the world economy is through its increased importance in the trade balance. Although little recognized in contemporary discussions of trade and trade problems, there has been a major shift in the structure of U.S. trade, with the result that agriculture now makes a major contribution to our trade balance. The U.S. was a net importer of agricultural products from about 1920 through 1962, and only in the mid-1960's did the trade balance for agricultural products turn positive, a balance that has grown successively larger. On the other hand, a deficit in our trade accounts in non-agricultural products began to emerge in 1968, for the first

time since 1930 (ERS).

The deficit in our trade balance of non-agricultural products literally burgeoned in the period 1971 through 1974. But at the same time, the surplus on the agricultural trade account also burgeoned. In 1973 that surplus was more than sufficient to offset an $8 billion deficit in our trade in non-agricultural products. In 1974, it was just $3 billion short of offsetting an almost $15 billion deficit in trade in non-agricultural products. And in 1975, of course, the $12.4 billion surplus in our agricultural trade accounts contributed mightily to the record $11.1 billion surplus in our total trade accounts.

This change in structure of U.S. trade is of major significance to the U.S. economy. It also imposes an important constraint on our economic policy vis-a-vis agriculture, while at the same time making both the agricultural sector and the general economy subject to shocks from the agricultural sectors of other countries.

The final significant change in the international environment is the increasing demand by the LDC's for a New International Economic Order. Encouraged by the success of OPEC, these demands constitute a program for structural change in the system of trade and international relations among countries that was originally designed by the West. The argument of third world leaders is that the prevailing system is exploitative, that it functions to preserve the economic dominion of the West, and that it has prevented the non-industrialized countries from developing. Their desire is to use trade to attain political objectives and to redistribute the world's income and resources in their favor.

Implications

There are six implications of these changes that I would now like to address:

1. The secular income problem in agriculture is now largely behind us.

The emerging equilibrium in the labor market is of major significance in this respect, for the inability to withdraw labor from agriculture at a faster fate was an important reason that incomes of farm people lagged behind those in the nonfarm sector. When this equilibrium in the labor market is combined with the decline in the rate of productivity growth, the release of most of our idled land back to production, and the shift to the right in the demand for agricultural products as a result of the devaluation, the result is an almost total disappearance of the excess capacity we had at prevailing price ratios for such a long period of time.[6/]

The conditions of product supply have also undergone important changes, determined in part by changed conditions in the factor markets. With labor dammed up in agriculture and up to one-sixth of our farm land withheld from production by agricultural policies, output was in the past fairly elastic in response to rising prices. Land could be released to production, labor could be more effectivly utilized, and output could be expanded fairly easily. This is in part what happened on the occasion of the first post-World War II food scare in the mid-1960's.

That degree of flexibility on the up side no longer exists, however. The land in retirement under government programs has all been released to production except for that under long term contracts. To the surprise of many, only about 37 million of the 60 million in retirement

actually came back into production. In addition, agriculture now has to bid against the nonfarm sector to bring forth a larger supply of labor services, rather than to just slow down the rate of outmigration. This combination of a positively sloping supply curve for the two primary inputs, land and labor, suggests that sudden shifts to the right in the demand for agricultural output will be reflected in higher product prices. We have lost much of the previous flexibility we had on the upside, at least when evaluated at where we now stand in terms of input use.

On the down side, however, we have probably gained flexibility. A larger share of total farm inputs now comes from the nonfarm sector. Farmers are particularly responsive to the relative price of these inputs, with the result that declines in farm prices will result in a reduction in their use. Similarly, once the present recession is behind us, it will probably be easier to shift labor out of agriculture in response to a decline in relative prices. The agricultural labor force makes up a smaller proportion of the total labor force than it once did, and has also become more closely integrated into the nonfarm labor market.[7/]

Overall, there has probably been an increase in the short-run supply elasticity of U.S. agriculture due to the increased importance of purchased inputs and the increased human capital intensity of the labor force which increases farmers' ability to deal with disequilibria (Schultz, 1976). To the extent that there is an asymmetry in supply response, the rigidity may now be on the up side rather than on the down side as it has been in the past.

None of this, of course, is to deny that there still might be in-

come problems in agriculture in response to short term imbalances. However, it would appear that these would be of a transitory nature, and not the secular problems we have experienced in the past.

2. The management of agricultural policy will be more complex.

The evolution to a more open economy and the shift to floating exchange rates makes the management of economic policy a great deal more complex, if for no other reason than that there are more variables to keep track of and more policy instruments to manage. With floating exchange rates there are rather complex interactions among domestic monetary policy, the exchange rate, and the competitive potential abroad. An increasing tightness in monetary policy, for example, will attract a larger capital inflow, other things being equal, due to the rise in interest rates which it implies. The larger capital inflow, other things being equal, will raise the value of the dollar, and in turn reduce the competitive potential on the trade account.

Similar considerations apply to the monetary and trade policies of other countries, especially those that are major trading partners such as Japan and Germany. If they should pursue tighter monetary policies, the results will be to weaken the dollar relative to their respective currencies, thereby putting U.S. traded products such as grains in a stronger competitive advantage vis-a-vis their domestic production.

These interdependencies mean that agricultural economists have to give greater attention to monetary and fiscal policy if they want to understand what is going on in agriculture, and if they want to make useful forecasts of trade and other variables in the economy. Moreover, being sensitive to domestic monetary and fiscal policy is not enough. We also have to be concerned about policies in other countries.

A further complication arises from the importance of agricultural

trade in our balance of payments. The exchange rate now has to be treated as endogenous with agricultural trade. Weather-induced fluctuations in foreign import demand can affect the exchange rate and in turn influence the allocation of our exports among alternative markets. Equally as important, if we should impose controls on our agricultural exports - as we have done in each of the last three years - the value of the dollar can decline in international markets. This in turn will raise the prices of our imports. If such import controls are imposed under the guise of controlling domestic inflation, they will therefore be short-sighted, although that does not deny the validity of such interventions under certain circumstances. Obviously both the distributional and growth consequences of a decline in our food prices are very different than those from a rise in prices of our import goods.

The increased complexity in the management of economic policy is not necessarily a disadvantage, although it obviously increases the scope and magnitude of our information and research needs for decision making. The obvious corollary of the increased complexity is an increase in the degrees of freedom in the management of policy, since there are more variables to do the adjusting. Moreover, the consequence of an increase in the number of variables that can adjust is that a given shock to the system is diffused on a much wider basis. For example, if world trade were free and all exchange rates were floating, a short-fall in grain output in another part of the world that led to a large increase in demand for U.S. exports would bid up the value of the dollar on international exchange markets. This would make our exports more expensive to other countries, thereby causing them to reduce the quantity they demand.[8/] In that way the cost of the shortfall would

be spread more widely around the world, and not be limited to just a small number of exporting and low income countries, as it has been in the recent past.

The problem, of course, is that we are far from having completely free trade and generally floating exchange rates. As D. Gale Johnson has pointed out, much of the instability in international markets in recent years was due to barriers to trade and rigidities in domestic agricultural policies. But that only points up the importance of the current round of multilateral trade negotiations in which the U.S. is attempting to have agriculture included in the next round of trade liberalization. It also points up the importance of engaging the LDC's in a constructive dialogue so that they can be induced into more liberal trade policies. Without such developments, the U.S. food and agriculture sector will continue to be buffeted by shocks from the international economy - unless, of course, we go back to a costly program of grain reserves.

3. The price of food to the U.S. consumer will be determined in part in international markets.

The increased openness of the U.S. economy, especially for agriculture, means that the price of food at home will be determined in part by international markets. No longer will a major share of the benefits of technical change in agriculture redound directly to consumers in the form of lower food prices due to an inelastic aggregate demand for food. Although the foreign demand for output is not perfectly elastic, it does appear to be on the order of -5.0 or -6.0 (Tweeten). With the growing share of U.S. output going abroad, the aggregate price elasticity of demand for U.S. output increases. Hence,

domestic consumers will tend to benefit more from the increased export capability which technological change in agriculture represents than from an immediate decline in relative food prices.

Similarly, to the extent that there is a world food problem, U.S. consumers will share in it in the form of higher food prices - just as we have in recent years. Export controls and other trade interventions could keep us from bearing the costs directly in the form of higher food costs, But such interventions would raise the price of our imports through their effect on the exchange rate, so the income loss would be experienced in any case, although with quite different income distribution consequences than if it were through higher food prices.

4. U.S. consumers now have a vested interest in agricultural research and development abroad.

Food prices in the U.S., to the extent they are determined by the price of raw agricultural products, will decline only as the world supply of agricultural output increases relative to demand - with the important caveat about trade restrictions noted above. Despite the size of our agricultural exports and our technological superiority, we alone cannot lower world food prices. Hence, our consumers now have an interest in improving world agriculture and in bringing world population growth into balance with potential food supplies. This interest should no longer derive from a feeling of benevolence toward the world's poor, but because it is in the best interest of consumer groups.

The technological gap between U.S. agriculture and that in the LDC's is sizeable, so there is much potential to be exploited in increasing world food output. Investments in agricultural research in other lands

will be the key, of course, but we should not limit our activities to that. We also have a vested interest in training the people required to develop the indigenous institutional capability in other lands, and in improving international capital markets and the flow of capital to agricultural development in the LDC's.

5. Domestic agricultural research policy needs to be revamped.

Two aspects of our domestic agricultural research policy appear to be in need of change. The first is the balance we strike between basic and applied research. With the apparent realization of much of the potential from our existing scientific and technological knowhow, the need would appear to be to put a greater emphasis on basic research. Yet the current emphasis on accountability and the financial pressures on our educational and research institutions drive us to a greater emphasis on applied research. This emphasis needs to be changed.

Equally as important, we need to devise new means of financing agricultural research at home. The more elastic demand for agricultural products that the increasingly open economy brings with it confers on land owners and other resources that are inelastic in supply a larger share of the benefits from domestic R and D. Under these conditions it is not likely that a consumer-dominated body politic will be willing to support domestic R and D as they have in the past.

Given that agricultural land owners and producers will now receive a larger share of the benefits of domestic R and D, a case can be made that they bear a larger share of the costs. The long-used check-off system used to finance cotton research is one means of solving this problem, as is the recent legislation on Poultry and Egg Promotion and Beef Promotion. Alternatively, a land tax might be devised for

this purpose, since an important share of the benefits of technical change will be realized in the form of higher land values. Still another means would be by way of an export tax, although at the present time the Constitution prohibits such a tax. With a little bit of ingenuity, however, we ought to be able to devise a new label for the export tax.

6. New sources of productivity growth for labor need to be identified.

Increases in labor productivity are important if wage rates and the income of farm people are to continue to increase. Similarly, increases in productivity in the economy at large are important if growth rates of the past are to be sustained. The decline in outmigration from agriculture has implications for both of these.

For agriculture, it implies a decline in the rate of productivity growth for that sector. Growth in labor productivity in U.S. agriculture has been unusually high throughout most of the post-World War II period. And it is not difficult to understand why. Output has been expanding steadily, the labor force has been declining, and other non-labor inputs such as fertilizers have increased substantially. As a result of these adjustments, factor proportions have shifted markedly. The land/labor ratio has risen, the physical capital/labor ratio has risen, the fertilizer/labor ratio has risen, and society has imbedded more human capital in labor in the form of higher levels of education. It is little wonder that labor productivity has grown so rapidly.

The consequences of a decline in the rate of out-migration will be equally multi-faceted. In the first place, the land/labor ratio should change more slowly. Additional mechanization can and undoubtedly will take place, although it is important to note that agriculture is

already one of the most capital-intensive industries in the economy. The use of other inputs such as fertilizer can also be increased, but in this case too the factor proportions will probably change slower in the future. And as noted above, there is evidence of diminishing returns against land in the application of fertilizer. In summary, the expectation is that there would be a decline in the rate of growth of labor productivity as the rate of outmigration declined.

The data suggest that there has in fact been a marked decline in the rate of productivity growth over the years, just as the analysis suggested (Table 1). The time periods were chosen so as to coincide with observed changes in the labor market. The rate of out-migration started to decline in 1965, and by 1971 it began to flatten out even more.

This decline in the growth rate of labor productivity is one explanation for the leveling out of the growth rate in total factor productivity. It has been reinforced by the decline in the growth rate of crop production per acre - a decline that is even more pronounced than the decline in labor productivity growth. Together, these data give one cause for concern about the potential for productivity growth as a source of output expansion in the future, unless there should be a major breakthrough in production technology.

The decline in outmigration from agriculture also has implications for the economy at large. In the past, an important source of aggregate growth in the economy has been the reallocation of labor from the low productivity agricultural sector to the higher productivity industrial and nonfarm sector (Denison). Given the magnitudes of the labor transfer during the post-World War II period, the gains from this source have been sizeable. With the transfer process apparently nearing an

TABLE 1. Growth Rates (Percent) in Productivity of Land and Labor, Selected Periods, 1950-1975, U.S.

Period	Farm Output Per Unit of Total Labor	Crop Production per Acre
1950-1965	10.8	3.7
1965-1971	6.9	2.0
1971-1975	2.0	0.4

Source: Synthesized from data in Council of Economic Advisers, 1976. Tables B-84 and B-87.

end, this source of productivity growth for the economy at large declines or disappears.

This development points up the importance of productivity growth in other sectors of the economy if our aggregate growth rates are to be sustained. The service sector, where some 60 percent of the labor force is now employed, is a strong candidate. The growing government sector as a component of service employment is especially important. And of course the payoff to society of reducing the high levels of unemployment among blacks in the 16-24 year age group also promises to have a high social payoff.

Of more direct implication to food and agriculture, productivity in the processing and distribution sector can be an important source of growth, and a means of lowering food prices to consumers. Sixty percent of the food bill is provided for goods and services from this sector. Labor practices now impede the adoption of such technologies as the central boxing of meat, and consumers resist the computerized checkout at supermarkets - both of which can be important sources of productivity growth.

As these examples indicate, the sources of growth are not lacking. They just will be different in the future than they have been in the past. But society does need to seek them out, and when changes in labor practices and other rigidities are needed to bring them about, those changes need to be made.

Emerging Institutional Challenges

The new macro-economics of U.S. agriculture involves a decline in the outmigration from agriculture, a leveling out of productivity growth, the evolution of the U.S. economy into a more open world economy, and changes in the international environment. The institutional challenges

to us as a nation and to us as agricultural economists are great. In this section I would like to briefly address just a few of those challenges.

The first challenge is to be successful in our negotiations for freer world trade. The current Tokyo Round of multilateral trade negotiations is potentially more important to us than the previous Kennedy Round, especially if we can make progress in liberalizing trade in agricultural products. If we can sustain the past movement towards freer world trade and at the same time extend the domain in which exchange rates float freely against one another, we will have taken large steps towards the much sought after goal of world food security, and without the political problems of a government-managed grain reserve.

Under such a system we should find our exports on the margin shifting sharply from one country to another in response to changes in exchange rates and to change in internal proces in countries around the world. Therefore, a major challenge in such a system will be to maintain confidence so that individual countries can depend on having open access to markets, either as buyers or sellers.

The evolution of such a system requires the introduction and development of new institutions that provide a means of making the emerging world economy work more efficiently. A more efficient system of monitoring world agriculture and diffusing the resulting information to the world economy is needed, as are improved marketing arrangements. Steps also should be taken to improve the functioning of the international capital markets, with all the political difficulties that that entails.

Clearly, the thrust of these suggestions is in the direction of

strengthening an international market system to better serve the world economy. To some that may sound utopian; to others it will sound imperialistic. The truth of the matter, however, is that we are already taking important strides towards an international market economy.

Domestically, we face challenges in both our research and teaching programs. On the research side, we do not have an adequate institutional capability to do the research necessary to understand world agriculture. Researching and understanding international trade per se will not be sufficient. To shape and reshape a continuously rational policy we need to understand more about world agriculture and the forces that shape it. Moreover, we need to understand how economic policy is shaped in other countries and how changes in those policies influence international markets and in turn our own agriculture.

Changes are also needed in our educational program. Students need to be given stronger training in macroeconomics and in the aggregate aspect of agriculture. Their training also needs to be strengthened in trade and in the economics of an open economy. And finally, they need to be given some familiarity with world agriculture and with the economic and other forces that shape the agriculture in other lands.

Our task in public education is no less great. The educational needs of our adult population are very similar to those of our students. In addition, some of the major policy choices we face in the years ahead have to do with our role in the world economy and how we relate to it. Rational policy will evolve only as we have an informed body politic.

Some Concluding Comments

Agricultural economics is by definition a sectoral discipline.

This has been both a source of strength and the source of one of our major weaknesses. It has been a source of strength because it has caused us to specialize in understanding the problems of a single sector of the economy. Our initial start in dealing with the art and science of farm management gave us a strong under-pinning in the micro-economics of the sector. And our close association with correlary disciplines in the various schools of agriculture, which have for the most part been our academic homes, gave us a perspective that few fields in economics have had.

At the same time, however, our sectoral emphasis has caused us to neglect the linkages of agriculture with the rest of the economy, and to underestimate (or under-emphasize) the inter-relationships between agriculture and the larger economy. Agricultural economics earned its spurs and has made most of its contributions to science and knowledge with its work at the micro level. If we have had one major failing over the years, it has been this failure to fully grasp the macro-economics of agriculture.

Members of our profession have made important contributions to economic theory, however. For example, agricultural economists have contributed as much to development economics as has any other sub-discipline of economics. We have contributed to methodological improvements. And members of our profession have also played an important role at the national policy making level.

We are now faced with new challenges. The domestic structure of agriculture is changing, especially in the way that agriculture is linked to the nonfarm sector and in the contribution that agriculture makes to the larger economy. At the same time we are increasingly linked

to a large and rapidly growing world economy. Events in the rest of the world are now as important to the strength and vitality of the food and agriculture sector (yea - the welfare of all U.S. citizens) as are developments in the domestic economy.

It is now almost an imperative that we give strong macroeconomic training to our students, that we challenge them to understand world agriculture and world economic development, and that we develop a research capability that will enable us to provide useful analytical and empirical inputs into the policy-making process, and that will enable us to effectively discharge our larger educational responsibilities to the citizens of this country. Our challenge will be to do this without weakening the micro-economic work that is so much a part of our tradition, and which can serve us so well in developing the macroeconomic theory and in doing the macroeconomic work that is before us.

Footnotes

1/ For a survey of the literature on the agricultural transformation, see Johnston.

2/ An important landmark in this literature is Schultz (1953).

3/ Evidence on the role of unemployment in reducing the outflow of labor from agriculture can be found in Hathaway, Schuh (1968), and Sjaastad. For an explanation of why tight monetary and fiscal policies were pursued in the 1950's and early 1960's, see Schuh (1974).

4/ Supporting data for these assertions are readily available from public sources such as the Economic Report of the President. They will be provided by the author on request, however.

5/ From 1970 to 1973, median family income of the farm population increased by 30 percent in real terms, compared to 6 percent in the nonfarm sector (Council of Economic Advisers, 1975).

6/ For a more detailed discussion of this development, see Council of Economic Advisers, 1975, chapter 6.

7/ The real income per capita from nonfarm sources increased markedly for farm operators after 1960. See Gardner.

8/ It would also lower the domestic price of our imports, thereby helping to offset the rise in food costs that might result from such a shock.

References

Bergsten, C. Fred, and William R. Cline, "Increasing International Economic Interdependence: The Implications of Research", American Economic Review, Papers and Proceedings, Vol. 66, No. 2 (May 1976), pp. 155-161.

Brandao, Antonio S., and G. Edward Schuh, "The Changing Structure of U.S. Trade: Implications for Agriculture", Department of Agricultural Economics, Purdue University, 1976 (mimeographed).

Committee on Agricultural Production and Efficiency, Agricultural Production Efficiency (Washington, D.C.: National Academy of Science, 1975).

Council of Economic Advisers, Economic Report of the President (Washington, D.C.: U.S. Government Printing Office, 1975 and 1976).

Denison, Edward F., The Sources of Growth in the United States (New York: Committee for Economic Development, 1962).

Economic Research Service, Foreign Agricultural Trade of the United States (Washington: U.S. Department of Agriculture, May 1975, Table 24, p. 70).

Gardner, Bruce L., "The Effects of Recession on the Rural-Farm Economy", presented at Southern Agricultural Economics Association Meetings, February 2, 1976, Mobile, Alabama (mimeographed).

Grubel, Herbert G., "The Seigniorage Problem and International Liquidity", in Robert A. Mundell and Alexander K. Swoboda (eds.), Monetary Problems of the International Economy (Chicago: The University of Chicago Press, 1969).

References (cont.)

Hathaway, Dale, "Migration From Agriculture: The Historical Record and Its Meaning", American Economic Review 50:379-391, May 1960.

Johnson, D. Gale, "World Agriculture, Commodity Policy, and Price Variability", American Journal of Agricultural Economics, Vol. 57, No. 5 (December 1975) pp. 823-832.

Johnston, Bruce F., "Agriculture and Structural Transformation in Developing Countries: A Survey of Research", Journal of Economic Literature, Vol. VIII, No. 2(June 1970), pp. 269-405.

Peterson, Willis L., "Organization and Productivity of the Federal-State Research System in the United States," in Arndt, et.al. (eds.) Resource Allocation and Productivity in International Agricultural Research (Minneapolis: The University of Minnesota Press, forthcoming).

Schuh, G. Edward, "Interrelations Between the Farm Labor Force and Changes in the General Economy". Chapter 12 in Rural Poverty in the United States, A Report to the President's National Advisory Commission on Rural Poverty, 1968.

_____, "The Exchange Rate and U.S. Agriculture", American Journal of Agricultural Economics, Vol. 56, No. 1 (February 1974), pp. 1-13.

Schultz, Theodore W., The Economic Organization of Agriculture (New York: McGraw-Hill Book Company, Inc., 1953).

_____, "The Value of the Ability to Deal with Disequilibria", Journal of Economic Literature 13(September 1975): 827-846.

Sjaastad, Larry, "Occupational Structure and Migration Patterns", in Labor Mobility and Population in Agriculture, Ames, Iowa State University Press, 1961.

Tweeten, Luther G., "The Demand for United States Farm Output", Food Research Institute Studies, 7(1967):343-69.