Staff Papers Series

FOREIGN AGRICULTURAL ASSISTANCE:
ALLY OR ADVERSARY

James P. Houck

Lᴍ

Department of Agricultural and Applied Economics

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

November 1986

FOREIGN AGRICULTURAL ASSISTANCE: ALLY OR ADVERSARY

James P. Houck*

It is no secret that large and growing exports are absolutely crucial to the economic well-being of U.S. agriculture. The dismal price and income performance of our farm economy in recent years is a direct consequence of a weak export market. Between fiscal 1981 and 1986, annual agricultural exports decreased 34.4%, from $43.3 billion to $27.5 billion. From 1985 to 1986 exports slid 12%.

Agricultural shipments to the less-developed nations of the world fell slightly faster than the total over this 1981-to-1986 period. They dropped by 38.1%. This distinction is worthy of concern since the less-developed nations took about 43% of all U.S. agricultural exports in 1986, down from 45% in 1981. Furthermore, the less-developed countries, individually and as a group, exhibit more volatility in their farm imports than richer nations like Japan, Canada, and the members of the European Community.

---

*Professor, Department of Agricultural and Applied Economics, University of Minnesota.

The reasons for the stagnation and decline of U.S. farm exports are numerous and complex. They involve international recession, currency exchange rates, bumper crops around the globe, international debt repayment problems, political maneuvering, and trade-strangling policy adjustments. Another candidate for blame is foreign assistance to the agricultural sectors of those less-developed countries who have been important traditional customers for U.S. farm products. Figures compiled by the OECD indicate that, even after accounting for inflation, agricultural assistance from rich to poor nations has more than doubled in the ten years since 1975-76. In particular, United States' funding for such work has increased more than 50 percent over this 10-year period.

The Issues

Spending public money for foreign aid has long been unpopular with lots of Americans. Spending it for agricultural assistance abroad is especially unpopular nowadays with U.S. farmers and many agricultural organizations. Their view is that more foreign agricultural development is simply another threat to our dismal farm export markets. The argument is that we teach them how to grow commodities that we are good at producing ourselves. Then they do it and replace our exports, leaving American farmers holding the bag. These aid opponents are loudly critical of agricultural assistance dispensed by government agencies like USAID, by Land Grant schools like the University of

Minnesota, and by U.S.-supported international organizations like The World Bank.

The objective of this paper is to examine and, perhaps, throw some light on this argument. At the outset, we need to recognize that the chain of reasoning that leads from one end of this assertion to the other is quite complex and not at all straight-forward. Let us look at it briefly. First, we have to assume that dollars appropriated for agricultural assistance actually find their way into existing or new projects for technical assistance or education. Then it must be true that these projects actually boost farm production in the favored countries beyond that which otherwise would have occurred. Next, we must be prepared to argue that this augmented farm production somehow replaces imports of agricultural goods from or expands exports to the world market. Finally, we are required to assert that these changes work their way through the complex channels of world commerce to the detriment of U.S. agricultural interests.

Considering today's rapidly changing and uncertain international environment, no one could reasonably test all the links in this chain. The part that we will focus on here is a central proposition in this argument; namely, that agricultural development in the less-developed world leads to diminished trade. For simplicity, we will assume that agricultural assistance is, in fact, successful and increases farm productivity in affected countries. What more can be said? The answer to that rhetorical question relies on some rather

technical analysis conducted recently with information drawn from a sizeable cross section of developing nations. It is also buttressed by related work by other researchers such as Bachman and Pauline, Ruttan, Schuh, Abbot, Kellog and colleagues, Lee and Shane, Timmer, and Paarlberg.

The Basic Data

To examine the agricultural productivity versus trade questions, we assembled data for a rather large group of the world's poorer nations. The countries included in the analysis were drawn from two categories of the World Bank's listing of national economies by stage of economic development; (1) "low income economies" and (2) "lower middle-income economies". Cross section data from 1983 and 1984 for countries in these two categories were assembled from recent (1985 and 1986) annual issues of the World Bank's World Development Report.

The countries falling into these two categories and reported by the World Bank have populations in excess of 1 million persons and jointly represented 65% of the world's 1984 population. In 1983, they ranged in annual per capita gross national product (GNP) from Ethiopia's $120 to Colombia's $1,430. In 1984, Ethiopia was still on the bottom at $110 per person with Syria listed as the highest at $1,620. Although the number of countries reported in these two categories totaled 72 in 1983 and 76 in 1984, the availability of suitable data limited our sample to a maximum of 44 countries in 1983 and 48 countries in 1984.

The Framework

Here is how the investigation unfolded. First, we adopted the premise that if agricultural development is successful, whether assisted by outsiders or not, then the economic value of farm workers in the affected nation must increase. So, for our sample countries we collected 1983 and 1984 data on "value added per worker in agriculture". This particular measure is the total annual value of agricultural output in each nation less the value of purchased inputs used in production, all divided by the number of agricultural workers. This variable summarizes the economic performance (or productivity) of agriculture in each sample country.

Second, we related this agricultural value-added measure for each nation to its 1983 and 1984 per capita Gross Domestic Product (GDP). The idea here is that since virtually all of these countries depend heavily on agriculture for employment and output, the link between economic performance in agriculture and economic performance in total is likely to be significant. Incidentally, GDP is quite similar to the more familiar GNP as an overall measure of national economic activity and somewhat more suitable for international comparisons.

Third, we linked per capita GDP data to 1983 and 1984 national imports of food and related products. In one version, we used per capita cereal imports, and in another we used the per capita value of _all_ food imports, including grains. This linkage enabled us to examine how the overall economic performance of

these nations affects their agricultural importing behavior.

Agricultural Development and Economic Performance

The sample nations displayed a relatively close, positive association between agricultural productivity, as measured by value added per worker, and per capita GDP in both 1983 and 1984. Overall, a 10% increase in value added per agricultural worker, however achieved, was associated with an average 10-12% increase in per capita GDP across the various countries. (Interested readers will find the statistical results summarized in an appendix to the text of this paper).

Of course, there are many other factors that influence GDP, even among low-income nations. However, the dominance of agriculture in these nations makes this simple estimated relation rather compelling and not at all surprising. In fact, approximately 60-70% of the proportional variation in GDP from one country to another in 1983 and 1984 can be accounted for simply by variation in value added per agricultural worker. Statisticians would characterize this linkage as "highly significant".

These simple aggregate results were not seriously disturbed even when somewhat more complicated analyses were conducted. By also taking account of differences in manufacturing productivity, more than 70% of the proportional country-to-country variation in GDP for the two years can be explained. Yet, the contribution of agricultural productivity remains approximately equi-proportional

with GDP.

Nothing in this work implies that expenditures for assistance projects will necessarily lead to improved productivity in agriculture much less to overall economic growth. But _if_ projects are successful, then farm productivity will surely rise. If agricultural productivity rises, then broader economic benefits clearly ensue.

Economic Performance and Agricultural Trade

Having established an important, positive link between agricultural productivity and GDP, let us now consider the connection between national GDP and agricultural import behavior. Many factors influence trade activity, but no one seriously doubts that income is one important element. Without attempting to devise an elaborate economic model, we postulated a simple relation between GDP per capita and agricultural imports, assuming that other influences in our sample of nations do not systematically, over-ride and obscure this fundamental linkage.

The statistical work (also reported in the appendix) revealed a rather strong, positive relationship between per capita GDP and per capita _cereal_ imports (wheat, rice, rye, and coarse grains). Overall, a 10% increase in per person GDP from country to country was associated with a 7-15% increase in the volume of cereal imports in 1983 and 1984.

Again, this linkage was quite significant in a statistical sense, with 30-46% of the proportional variation in cereal imports

systematically linked to variation in countries' total economic
performance. The stronger the economic performance of these low
income nations, the more cereals they tend to import from world
markets.

This same basic linkage with GDP appears even when a broader
measure of agricultural trade is used. This broader measure is
per capita food imports, encompassing all food items in the
Standard International Trade Classification, Sections 0, 1, and 4
plus live animals, beverages, tobacco, nuts, fats, oils, and
oilseeds. As before, nations with higher per capita GDP's
imported more food products of all kinds on a per capita basis.
This relation was even more significant than with cereal imports
alone.

Middle Income Countries

Substantial controversy surrounds almost any financial
assistance, agricultural or otherwise, to nations in the middle
income group--those with annual per capita GNP's between Chile's
$1,700 and Singapore's $7,300. The reasons for controversy are
diverse. Several nations in this group are mired in
international debt problems; several are major
international competitors with the United States for grain,
oilseed, and other farm product markets around the globe; and
several are enmeshed in sensitive political and military issues
with the United States.

Not surprisingly, the simple approach that succeeded with
the lower-income group was less revealing with this middle group.

However, some general impressions can be gleaned. First, there is, for middle-income nations, a positive net relation between value added per agricultural worker and GDP. This positive connection also emerges even after netting out the effects of manufacturing productivity upon GDP. The actual calculations border on statistical significance across a 22-country sample, but they are not compelling.

Similarly, the link between GDP per capita and food imports was not at all clear for middle-income nations. The computations indicate a generally positive connection, but the results could not be said to show a significant relationship. Recall that this whole inquiry involved data from many countries observed at particular moments in time. The lack of clear results for this middle group does not imply that significant, systematic relations are absent within individual nations over time.

In any case, the evidence concerning the middle-income group as a whole does not point to any negative relation between agricultural productivity and imports of food and related products. There is nothing in the data to support such a view.

In addition, no clear relationship emerged between value added in agriculture and farm exports from this group. Hence, the view that agricultural assistance leads directly to increased competitive supplies on world markets is not borne out in these cross-country comparisons.

Productivity versus Production

An important feature not to be overlooked in this analysis is that agricultural productivity not agricultural output was specified as the key factor associated with general economic development. This is a crucial distinction. It is likely, but not necessary, that farm output expands as productivity advances. However, we expect farm output to expand less rapidly than productivity per worker since the movement of resources including people out of agriculture is a widespread phenomenon of economic development.

Summary and Conclusion

This simple analysis is surely not going to be the last word on these matters. But the lessons are clear, at least for the low-income nations on this planet. In particular, a strong case can be made for the idea that advances in agricultural productivity are associated with increases in imports of cereals and other agricultural products. The connection comes via the positive income effect of general economic development. For these countries, investments in agricultural development through successful technical assistance and education are not detrimental to U.S. farm export interests. They are generally beneficial.

For middle-income nations, the case is not so clear and probably more controversial. What can be said is that nothing in the aggregate data leads one to conclude that improvements in farm productivity among middle-income nations is generally or

systematically threatening to U.S. farm exports across a broad international spectrum.

Naturally, specific episodes of U.S. trade displacement in some products by some countries can be identified and perhaps associated with agricultural assistance. However, wider evidence shows that the burden of proof clearly rests with those who insist that agricultural assistance for poor nations is usually a bad thing for American farmers. On the contrary, it is mostly a good thing.

References

Abbot, Philip C. "Agricultural Production in The Third World: Implications for U.S. Trade and Policy", Unpublished paper prepared for the Agricultural Trade Project, American Enterprise Institute, Washington, D.C. August 1986.

Bachman, K. L. and L. A. Paulino, Rapid Food Production Growth in Selected Developing Countries, International Food Policy Research Institute, Research Report 11, Washington, D.C., October 1979.

Kellog, Earl, "University Involvement in International Agricultural Development Activities", Unpublished paper presented at annual meeting of the Association of U.S. University Directors of International Agricultural Programs, Athens, GA., May 31, 1985.

Kellog, Earl, Richard Kodl, and Philip Garcia, "The Effects of Agricultural Growth on Agricultural Imports in Developing Countries", Invited paper, American Association of Agricultural Economics Annual Meeting, Reno, Nevada, July 29, 1986.

Lee, John E. Jr. and L. Matthew Shane, "United States Countries: the Critical Linkage", Economic Research Service, USDA, Unpublished paper presented at NPA Food and Agricultural Committee Meeting, Denver, CO, April 1985.

Organization for Economic Cooperation and Development (OECD) Twenty-Five Years of Development Cooperation: A Review, Development Assistance Committee, Paris, November 1985.

Paarlberg, Robert, L., "U.S. Agriculture and The Developing World: Partners or Competitors?" Unpublished paper presented at a Curry Foundation conference on U.S. Agricultural and Exports and Third World Development, Washington, D.C. July 1986.

Ruttan, Vernon W., "Why Foreign Economic Assistance?", Unpublished paper, March 1986.

Shuh, G. Edward, The United States and the Developing Countries: An Economic Perspective, National Planning Association, Washington, D.C. 1986.

Timmer, C. Peter, "Agricultural Development, Income Growth, and
    Grain Imports: The Implications for American Agriculture",
    Unpublished paper, November 1985.

U.S. Department of Agriculture <u>Agricultural Outlook,</u> ERS,
    Washington, D.C. various monthly issues.

World Bank, <u>World Development Report</u>, Oxford University Press,
    New York, 1985 and 1986 issues.

Appendix*

The following variables for 1983 and 1984 were assembled for each included low and lower-middle income country from basic data reported in the World Bank's <u>Development Reports,</u> 1985 and 1986.

GDP — Per capita gross domestic product. This variable is similar to the more familiar Gross National Product (GNP) as a measure of national economic activity but somewhat more suitable for international comparisons.

VAW — Value added per worker in ~~manufacturing~~ *agriculture*. This is the total value of national agricultural output less the value of purchased inputs all divided by the number of agricultural workers. This variable indicates the economic performance or efficiency of agriculture in each sample country.

VMW — Value added per worker in manufacturing. This was calculated for the manufacturing sectors in the various sample countries. This variable indicates productive efficiency in manufacturing.

CIC — Per capita cereal imports, including wheat, rice, rye, and coarse grains.

FIC — Food imports per capita. This includes food and feed products in SITC sections 0, 1 and 4 plus live animals, beverages, tobacco, nuts, fats, oils, and oilseeds. This variable is a very broad measure of food and agricultural products in international trade.

*Hugh Maginnis, research assistant at the University of Minnesota, conducted the computations and statistical analyses reported here.

In all analyses reported here, the variables were converted to natural logarithms so that proportional relationships could be highlighted. This conversion is indicated by an asterisk (*) attached to the variable symbols in tables 1 and 2.

The ordinary least squares estimates in table 1 reflect the linkage between agricultural productivity and GDP for two cross sections of country data, 44 countries in 1983 and 48 countries in 1984. Equations (1) and (3) illustrate the simplest formulations. The coefficients of determination (r^2) are relatively high for cross section studies of this kind, .61 and .71. Notice that the estimated regression coefficients on VAW* in equations (1) and (3) are highly significant and quite close to +1.0, suggesting a nearly equi-proportional relation between agricultural productivity and overall economic activity.

Equations (2) and (4) provide a somewhat more sophisticated look at the same phenomenon. Here, differences in GDP* are related to the simultaneous influences of productivity in both agriculture (VAW*) and manufacturing (VMW*). (Lack of manufacturing data precluded the inclusion of two nations in 1983 and one in 1984). The addition of manufacturing data naturally added to explanatory power of each equation and did so with statistically significant coefficient estimates. Moreover, the basic result of a nearly equi-proportional net relation between VAW and GDP was strengthened by the more elaborate analysis.

The ordinary least squares estimates in table 2 illustrate how GDP* and agricultural imports were related in our sample for 1983 and 1984. Equations (5) and (7) show how per capita cereal imports and GDP were associated with each other in the two years across the sample. The estimates indicate that 30 to 33 % of the proportional variation in cereal imports across the countries is directly and significantly associated with differences in per capita GDP. The coefficients on GDP* are close to +1.0 suggesting an equi-proportional relation.

Estimated relations between GDP* and a broader measure of food imports (FIC*) were very similar to those for cereals only, equations (6) and (7). In fact, the r^2 values are somewhat higher. The smaller samples used in equations (6) and (7) arise because data on FIC* was not available for some of the nations in the original group. Together, the estimates in table 2 suggest that a significant, positive statistical relation exists between overall economic activity in poorer nations and imports of agricultural products. This relation is present no matter whether the imports are measured in terms of cereals or a much broader category of agricultural and food commodities.

Table 1. Cross section regression estimates associating agricultural

productivity per worker (VAW*) and manufacturing productivity per worker (VMW*)

with per capita income (GDP*) in less-developed countries, 1983 and 1984.

Year and dependent variable	Constant term	Coefficient on:		r^2	Number of observations
		VAW*	VMW*		
1983					
(1) GDP*	− .74 (− .88)	+1.15 (8.03)		.61	44
(2) GDP*	− .87 (−1.13)	+0.90 (6.26)	+0.26 (3.91)	.70	42
1984					
(3) GDP*	− .61 (− .99)	+1.12 (10.62)		.71	48
(4) GDP*	−1.05 (−1.66)	+1.02 (9.48)	+0.15 (2.58)	.74	47

Values in parentheses are estimated standard errors; all variables measured
in natural logarithms.

Table 2.   Cross section regression estimates associating per capita income
(GDP*) with per capita imports of cereals (CIC*) or with per capita imports of all
food (FIC*) by less-developed countries, 1983 and 1984.

Year and dependent variable	Constant term	Coefficient on GDP*	r^2	Number of observations
1983				
(5) CIC*	-3.77 (-2.52)	+ 1.15 (4.58)	.33	44
(6) FIC*	-4.06 (-3.32)	+ 1.11 (5.51)	.46	37
1984				
(7) CIC*	-3.33 (-2.14)	+ 1.07 (4.11)	.30	48
(8) FIC*	-4.00 (-3.05)	+ 1.08 (5.07)	.45	34

Values in parentheses are estimated standard errors; all variables measured in natural logarithms.