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AGRICULTURAL GROWTH AND IMPORT DEMAND IN THE LDCs*

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The less-developed countries (LDCs) have been the fastest growing source of demand for U. S. agricultural exports during the last two decades. This is particularly true for food grains in the lower income LDCs and for feed grains in the upper income LDCs. Among these countries, it is those with the highest economic growth performance which have also been the ones with the highest growth in import demand. The performance of U. S. agricultural exports has thus been inextricably tied to the economic performance of the LDCs, and this is even more likely to be the case in the future.

This interlinkage between LDC growth and agricultural trade, however, creates a serious challenge for the exporting countries. This is due to the fact that, except for countries with a strong mineral export base or already well established on the international market for industrial products, most LDCs need to anchor their economic performance on that of their agriculture. If their agriculture produces commodities which are competitive with U. S. exports, there exists the possibility that agricultural growth will reduce import demand for these products unless the economywide income effects created in part by agricultural growth are strong enough for rising demand to outpace rising supply. It is this dilemma which we explore here in four stages.

1. Agricultural Growth, Economic Growth, and Import Demand:
   A Country Classification

Table 1 gives a two-way classification of 41 LDCs based on the observed growth rates in per capita agricultural production (countries with negative and positive growth rates) and in per capita GDP (countries below and above

TABLE 1

Country Classification by Agricultural and Income Growth, 1965-1981

1965-1981 — Annual growth of agricultural output per capita < 0

Indicator[a]	Annual growth of gross domestic product per capita < 2 percent — All countries[b]		Annual growth of gross domestic product per capita > 2 percent — All countries[c]	
N	12		4	
Pop	170.5		87.9	
$\dot{A}g$	-.9		-2.2	
$N\dot{A}g$	1.1		4.1	
$N\dot{A}gX$	3.1		11.6	
Aid	27		4	
	Mean	Growth	Mean	Growth
WRM	4,044	3.8	2,067	12.9
CCM	1,244	26.9	139	not sign.
CeM	5,288	6.9	2,207	14.0

1965-1981 — Annual growth of agricultural output per capita > 0

Indicator[a]	GDP per capita < 2 percent — India		GDP per capita < 2 percent — All other countries[d]		GDP per capita > 2 percent — $\dot{y} - \dot{A}g \geq 2$[e]		GDP per capita > 2 percent — $\dot{y} - \dot{A}g < 2$[f]	
N	1		6		10		8	
Pop	593		36.4		400.1		97.7	
$\dot{A}g$	.5		.3		1.6		2.0	
$N\dot{A}g$	2.1		.7		5.7		3.5	
$N\dot{A}gX$	4.9		-1.2		12.6		5.4	
Aid			15		12		17	
	Mean	Growth[g]	Mean	Growth	Mean	Growth	Mean	Growth
WRM	3,782	-12.1	1,243	5.0	12,586	9.4	3,222	.8
CCM	509	not sign.	93	not sign.	3,171	28.7[h]	1,386	8.4
CeM	4,291	-11.9	1,336	5.2	15,757	15.9	4,608	3.0

[a] Number of countries (N); average population in thousands (Pop); annual growth rate of per capita real agricultural value added ($\dot{A}g$), nonagricultural value added ($N\dot{A}g$), and GDP ($\dot{y}$); share of aid in total imports of cereals in 1976-1978 (Aid); net imports of wheat and rice (WRM), of coarse grain (CCM), and of grains (CeM) in millions of wheat equivalent MT.

[b] Ethiopia, Ghana, Mauritania, Niger, Tanzania, Togo, Senegal, Honduras, Jamaica, Peru, Venezuela, and Bangladesh.

[c] Morocco, Ivory Coast, Nigeria, and Panama.

[d] Liberia, Sierra Leone, Sudan, Bolivia, Chile, and Nicaragua.

[e] Algeria, Egypt, Syria, Brazil, Dominican Republic, Ecuador, Mexico, Indonesia, Korea, and Singapore.

[f] Israel, Tunisia, Cameroon, Colombia, Costa Rica, Paraguay, Philippines, and Sri Lanka.

[g] For 1965-1977; net exports after 1977.

[h] For 1972-1981; net exports prior to 1972.

2 percent). Growth rates are calculated over 16 years and thus give a characterization of long-run tendencies. The fact that most countries fall on the first diagonal of the table indicates that countries with a strong agricultural growth performance tend also to be the ones with a strong overall economic growth performance. While this correlation does not establish causality, studies of annual time series data show that there exists a significant one- or two-year lag between agricultural and manufacturing performances in a large majority of countries indicating the key role of agriculture in economic development.

Countries with strong agricultural and GDP growth have the highest annual growth rate in cereal import demand (15.9 percent), unless the performance of GDP does not sufficiently exceed that of agriculture (less than two points in the difference in growth rates). This indicates that agriculture may be a necessary source of growth for most LDC economies but that successful agricultural growth is not per se sufficient to insure growth in import demand. It has to be complemented by strong growth in nonagricultural value added and/or in nonagricultural exports. It is the countries with high agricultural and GDP growth and higher GDP than agricultural growth that absorb the bulk and a rapidly rising share of cereal exports, where growth in feed grains is particularly high reflecting changes in consumption patterns toward animal products, and where the share of aid in total cereal imports is relatively low (12 percent).

2. Roles of Agriculture and Industry in LDC Economic
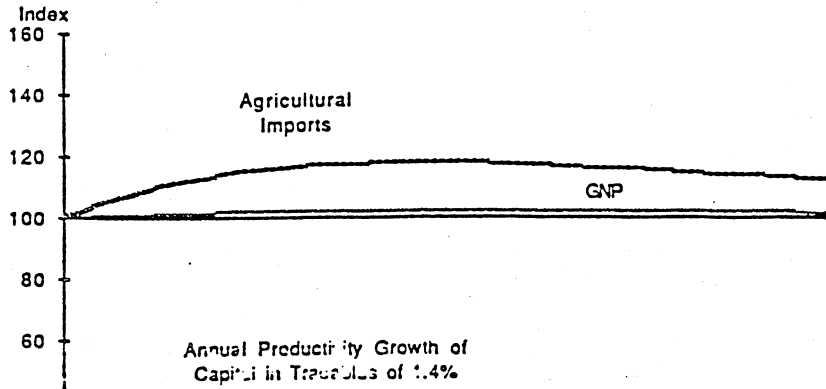   Growth and Farm Import Demand

While a classificatory analysis allows us to establish broad long-run associations between agricultural growth, economic growth, and food/feed

import demand, it is unable to trace out the causal mechanisms involved. It also does not provide information on the crucial question of the time lags involved between productivity growth in agriculture and the emergence of rural and urban income effects that will eventually increase demand more than supply. To obtain information on causality and time lags, we use general equilibrium models for archetype LDCs at different levels of GNP per capita (de Janvry and Sadoulet). A key feature of these models is to evidence how productivity growth in agriculture helps generate (through exports) or save (through import substitution) foreign exchange which is used to import the excess demand of food and feed grains and capital goods for the industrial sector.
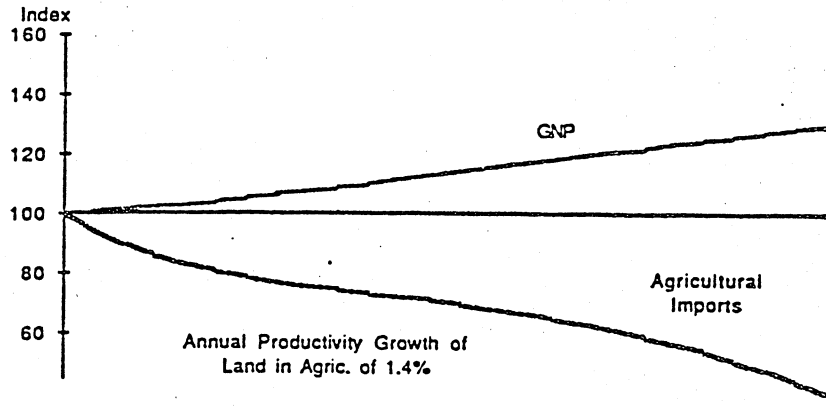
For the more-developed countries (MDCs) agricultural exporters, the ideal LDC development pattern would be one with a strong export performance based on mineral, industrial, or nontemperate agricultural goods and where food and feed grains consumption requirements are imported. The examples of Hong Kong and Singapore which export industrial goods to import food show the possibilities of this type of development.

For countries that do not have strong mineral exports or which are not already well established in the international market for industrial goods, Figure 1(A) shows that this pattern of growth cannot be sustained over time as GNP stagnates. Productivity growth in industry with a stagnant agriculture and at best a constant share of industrial output exported leads to rising food imports that block the possibility of rising capital goods imports for industry. While this development strategy benefits MDC food exporters, it is clearly untenable for the LDC.

1(A)

Index

160

140

Agricultural
Imports

120

GNP

100

80

60

Annual Productivity Growth of
Capital in Tradables of 1.4%

1(B)

Index

160

140

120

GNP

100

80

Agricultural
Imports

60

Annual Productivity Growth of
Land in Agric. of 1.4%

1(C)

Index

160

140

GNP

120

100

Agricultural
Imports

80

60

Annual Productivity Growth of Land in Agric. and
Capital in Tradables of 1.4%

40

20

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
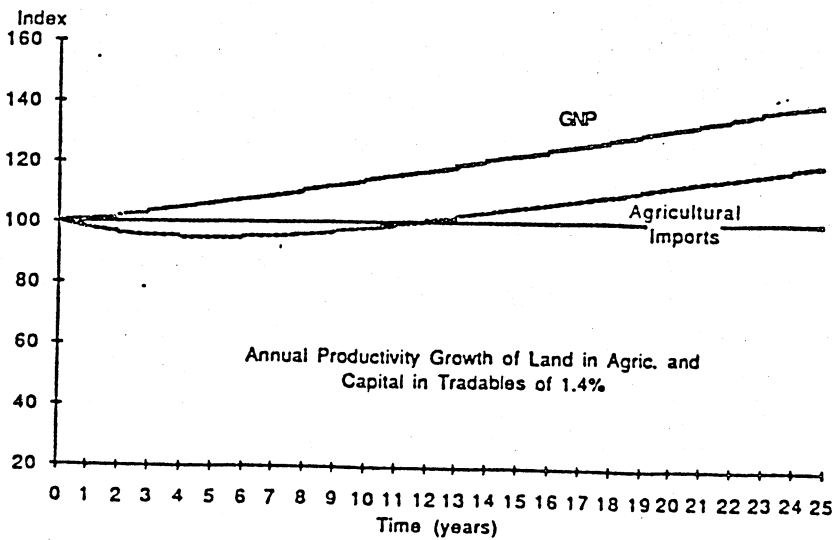
Time (years)

Figure 1 - Growth in GNP and Agricultural Imports
with Different Development Strategies

With productivity growth in agriculture but no productivity growth in industry, Figure 1(B) shows that GNP grows steadily but that there is a strong conflict of interest with MDC food exporters. The LDC becomes increasingly food self-sufficient, eventually becoming a food exporter itself.

This leads to the conclusions that (1) agricultural growth is necessary to sustain economic growth in the absence of another strong generator of foreign exchange and (2) resolution of the conflict between LDC growth and MDC farm exports requires income effects in the LDC that must derive not only from agricultural growth but also from productivity growth in industry. The latter is shown in Figure 1(C). With a 1.4 annual rate of productivity growth in both agriculture and industry, farm imports will decline at first but will start rising as income effects cumulate and will exceed their initial level after 12 years.

3. Alternative Discount Rates: The Political Economy of Aid and Trade

If aid to the LDCs focuses on enhancing their agricultural productivity growth as a necessary condition for overall economic growth and if aid to agriculture is complemented by aid to stimulate productivity growth in industry as well, the conflict between aid and trade (rising demand for agricultural imports) can be resolved after a certain lag. Yet, since short-run trade losses are compensated for by long-run trade gains, the acceptability of this aid-trade project will depend upon the level of the discount rate at which it is assessed. And this, in turn, depends upon which particular social group is doing the discounting.

If aid is looked at as basically a long-term social project with a sub-jective discount rate of, say, 2 percent, the present value of the changes in

the volume of trade is 438 percent. As seen by public agencies, international organizations, and private foundations that operate with this type of discount rate, there is unquestionable harmony between aid and trade. At rates of discount above 14.5 percent, the present value of the changes in trade becomes negative. If agricultural exporters and farm lobbies in the MDCs have private discount rates above that level, there indeed exists for them a conflict between aid and trade. Resolution of this conflict will require reducing the time lag at which imports exceed their initial level by accelerating and increasing income effects. This can be done by

   i.   Increasing the rate of productivity growth in industry above that in agriculture.

   ii.   Decreasing the capital/labor ratio in industry and increasing the productivity of imported capital goods.

   iii.   Increasing the elasticity of supply in the nontradable sectors of the economy so that the level of economic activity in those sectors is basically demand-led. This will ensure that rising productivity and incomes in agriculture have strong multiplier effects on employment and incomes in the nontradable sectors.

4. On Which Countries should Aid be Targeted?

The impact of productivity growth in agriculture and industry on GNP growth and on cereal import demand is different in countries at different levels of economic development (measured by GNP per capita). This is due to the fact that, as GNP per capita increases, the share of agriculture in GNP decreases, the share of labor in industry rises, and the share of feed grains

in total cereal consumption increases. The results in Table 2 and Figure 2
contrast countries at four levels of development: very low income, low
income, medium income, and newly industrialized countries (NICs).

The results show that there never exists a conflict between aid and trade
in the NICs as agricultural imports demand increases without lag. This is due
to the strong income effect that productivity growth in industry creates in
already highly urbanized and industrialized economies. At a private discount
rate of 15 percent, the present value of this aid project is 29 percent. In
these countries, 88 percent of the increase in cereal imports after 25 years
is for feed grains as opposed to food grains. It is, however, in the very low
income countries that the percentage increase in farm imports will have
increased most after 25 years even though the impact on import demand is
negative for the first five years. This results from the very high income
elasticity for cereals that exists at low levels of income. At a social
discount rate of 2 percent, it is, consequently, in the very low-income -
countries that the aid project will have the largest trade effect. Finally,
it is in the low-income countries that the GNP growth effect after 25 years
will be the largest due to the fact that the sectoral balance in these
economies maximizes the total growth effect of productivity gains in both
agriculture and industry.

Agricultural exporters and farm lobbies will, consequently, be most
interested in directing aid toward the NICs. Seen in a long-run social
perspective, however, it is in the very low-income countries that aid has
the highest payoff for trade expansion. But even when assessed at private
discount rates of 15 percent, aid to agriculture (with productivity growth
occurring in industry as well) in the very low- and the middle-income

TABLE 2

Impact of Aid by Level of Economic Development[a]

Countries	Impact after 25 years on		Share of feed in increase in cereal consumption	Present value of net increase in cereal imports at discount rates		Time lag[b]
	Growth in GNP	Growth in agricultural imports		r = 2	r = 15	years
	percent					
Very low income	37	35	22	946	25	5
Low income	40	19	46	438	-11	11
Middle income	35	22	68	569	7	8
Newly industrialized countries	30	28	88	799	29	0

[a]Experiment with a 1.4 percent annual increase in productivity in both agriculture and industry.

[b]Time lag is the number of years before agricultural imports reach their initial level again.
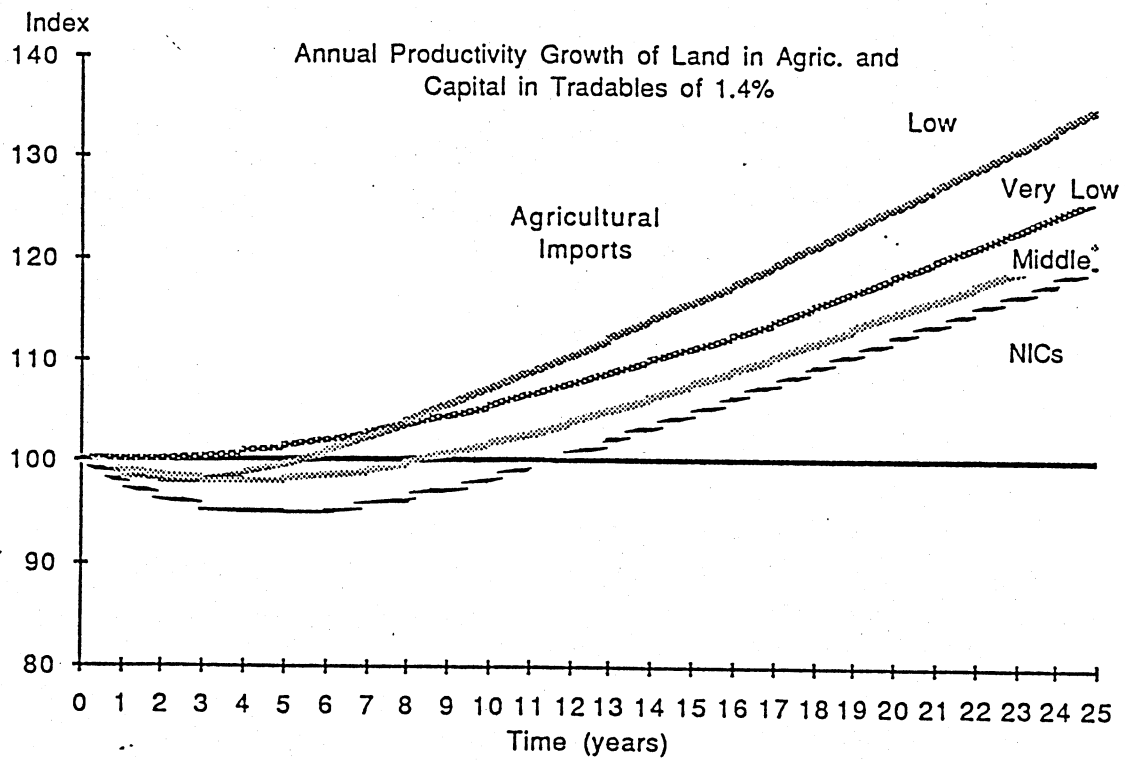
Figure 2-Impact of Aid on Agricultural Imports
at Different Levels of Development

countries yields significant positive payoffs. The negative effects over import demand in the first five and eight years, respectively, should not be misread as indicators of conflict between aid and trade.

5. Conclusion

Aid to productivity growth in LDC agriculture, e.g., through diffusion of the Green Revolution in cereals, is both necessary for overall economic growth and not necessarily incompatible with increased demand for cereal imports by these same countries. Compatibility between aid and trade, however, requires:

i.   Delivering aid in complete intersectoral packages that promote productivity growth in industry at the same time as in agriculture. It is notable that most aid is, by contrast, offered in specialized sectoral or commodity programs.

ii. Increasing the linkages between agriculture and industry to maximize the overall income effects of agricultural growth.

iii. Maintaining access to aid for the NICs in spite of the levels of per capita income reached since it is in these countries that the harmony between aid and trade is the greatest at high discount rates.

iv. Viewing aid as a social project to increase both LDC growth and their agricultural import demand. In this perspective, it is the poorest LDCs that are the most advantageous long-term investments for MDC farm exports.

Reference

de Janvry, A., and E. Sadoulet. "The Conditions for Compatibility Between Aid and Trade in Agriculture." Economic Development and Cultural Change, forthcoming.