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SOME ASPECTS OF AGRICULTURAL GROWTH, PRICE POLICY AND EQUITY IN DEVELOPING COUNTRIES†

This paper offers some reflections on the relationship between agricultural and nonagricultural growth and the allocation of investment between the agricultural and nonagricultural sectors, the relative role of price policy and technology policy in stimulating growth, and possible reconciliation of agricultural growth and equity.[1]

AGRICULTURAL GROWTH AND INVESTMENT

Raising the level of investment and inducing its rational allocation is clearly recognized, even in the neoclassical tradition, as the most important task of macropolicy makers in developing countries because privately preferred investment is inadequate and its allocation is suboptimal, because capital markets are nonexistent or fragmented, or because there is much divergence between private and social return (Musgrave, 1969, Chapter 8; McKinnon, 1973, Chapter 2). The share of direct state investment in the total may be high or low. But broad allocations of the total must be steered by the state either directly or through an appropriate incentive system.

Farm specialists are of course deeply concerned about developing some objective method of determining the required rate of agricultural growth and the minimum necessary share of agriculture in national investment. The actual share of investment in agriculture in any country can then be compared with the standard appropriate for it, and some judgment can be made about the priority that has been given to agriculture. In some recent research the terms of trade of agriculture[2] have been used as a criterion of priority. But the share of investment is a better criterion.

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[1] Though most of the argument is general, some parts are oriented more to the Asian situation.

[2] In this paper terms of trade are defined as domestic ratios of agricultural and nonagricultural price indexes facing farmers. The more open the economy, the closer they are to the corresponding international border price ratios.

The use of the terms of trade as a measure of the priority assigned to agriculture rests on at least two assumptions: first, that the growth of aggregate farm output is related positively and strongly to the terms of trade, and second, that governments can vary the terms of trade as they like. The first assumption may be true, but its proof requires a large number of empirical aggregate farm-supply functions (as distinguished from single-crop functions) with positive and significant terms-of-trade coefficients, and very few of these have been estimated so far. These are discussed in a later section.

The assumption that governments control terms of trade can be true where the government confiscates, taxes, or purchases a substantial part of farm output, or monopolizes, taxes, or sells a substantial part of farmers' purchases. This is the case in some but not in all countries.

Investment allocations provide a less ambiguous measure of the relative priorities given to the agricultural sector. The allocation of investment between farm and nonfarm sectors is necessarily related to the projected or targeted rates of growth of the two sectors. Knowing the projected rates of growth and reasonable magnitudes of incremental capital-output ratios, the desirable share of agriculture in total investment can be approximated. Analysis on these lines shows that quite a few developing countries have been underinvesting in agriculture.

Agricultural and industrial[3] growth are best regarded as complementary, rather than competitive, processes. Satisfactory growth in either sector depends on adequate deliveries of its input requirements from the other sector. Grain, raw materials, and labor must flow from agriculture to industry in adequate measure, and consumption goods, farm equipment and other modern farm inputs, and advanced technological skills must flow back from industry to agriculture.

The two sectors are also interdependent on the demand side. In relatively closed economies, a succession of bad harvests can generate an industrial demand recession, as in India in the mid-1960s and mid-1970s. And in the economies of Asia, Africa, and Latin America that depend on agricultural exports, every industrial recession abroad depresses farm incomes.

If the intimate interdependence of agriculture and industry is recognized, the voluminous literary controversies between agricultural and industrial fundamentalists appear to be unnecessary and irrational. The estimation of balanced growth rates for the two sectors emerges as the only rational approach—balanced in the important sense that the total output of each sector has to grow enough to meet the total (final plus intermediate) demand for it. Modeling of the input-output or optimizing variety, with exogenous or endogenous final demands, is the obvious technique for determining such balanced rates.

Numerous modeling exercises suggest that in countries like India and Pakistan, where the value of imports is small relative to the Gross National Product (GNP), farm growth rates of the order of 2 to 5 percent can be balanced only by fairly high industrial growth rates of 6 to 10 percent (Rudra, 1972; India,

[3] Industrial and nonagricultural growth are not distinguished in this discussion. The coverage of industry is noted where necessary.

1964; Eckaus and Parikh, 1968; Lieftinck, 1969). The required industrial growth rate normally turns out to be two or three times the agricultural growth rate. Historically in the United Kingdom, France, and the United States, long-period industrial growth rates (of the order of 2 to 5 percent) were typically 2 to 6 times the agricultural growth rates (which seldom exceeded 2 percent) (Table 1). In Japan, in successive periods, the industrial growth rate (5 to 7 percent) turned out to be 2.5 to 6.8 times the agricultural growth rate, and for the whole period 1876 to 1938 the ratio was 3.4 (Klein and Ohkawa, 1968, p. 74).

TABLE 1.—LONG-PERIOD AGRICULTURAL AND INDUSTRIAL GROWTH RATES, SELECTED COUNTRIES

Country	Period	Agricultural growth rate (*Percent per annum*)	Period	Industrial growth rate (*Percent per annum*)	Ratio of industrial growth rate to agricultural growth rate
United Kingdom	1880–1915	0.10	1874–1913	1.79	17.90
	1915–1935	0.67	1913–1937	2.11	3.15
France	1880–1915	0.60	1874–1913	2.71	4.52
	1915–1935	0.78	1913–1937	0.90	1.15
United States	1880–1915	1.63	1874–1913	4.99	3.06
	1915–1935	0.47	1913–1937	2.71	5.77
Japan	1880–1915	2.20	1874–1913	4.43	2.01
	1915–1935	0.99	1913–1937	6.73	6.80

Source: Agricultural growth rates from Yujiro Hayami and Vernon W. Ruttan, 1971, *Agricultural Development: An International Perspective*, Johns Hopkins, Baltimore, Maryland, pp. 114, 327-331. Industrial growth rates from Lawrence Klein and Kazushi Ohkawa, 1968, *Economic Growth, The Japanese Experience Since the Meiji Era*, Richard Irwin, Homewood, Illinois, p. 79.

The periods for which long-period agricultural and industrial growth rates are available are not identical. They differ by four years, but it is assumed that long-run rates for identical periods would not be significantly different from the figures given.

The actual record of the last two decades in low-income and middle-income countries also shows that the industrial growth rate remained at least two times the agricultural growth rate. In the low-income countries, the agricultural growth rate averaged between 2.5 and 2.0 percent in the 1960s and 1970s, and the industrial growth rate between 6.6 and 4.2 percent. In the middle-income countries the agricultural growth rate was between 3.6 and 3.0 percent and the industrial growth rate between 7.4 and 6.5 percent in those decades.[4]

[4] The data are derived from World Bank (1981). "Industry" includes mining, manufacturing, construction, gas, water, and electricity.

Recent experience also confirms the existence of strong intersectoral complementarity. If we choose 3 percent as the cut-off point to separate "low" and "high" agricultural growth rates, and 5 percent to separate low and high industrial growth, a high agricultural growth rate was associated with a high industrial growth rate and a low agricultural growth rate with a low industrial growth rate in 36 of the 58 countries for which both growth rates were available and positive in the 1970s (Charts 1a and 1b). In 23 countries both growth rates were high and in 13 both were low. In 15 countries, however, a high industrial growth rate was accompanied by a low agricultural growth rate. Only seven countries had a high agricultural growth rate associated with a low industrial growth rate.

In general terms, this would mean that although complementarity between agriculture and industry is dominant, where it is weak or does not exist the likelihood of a high rate of industrial growth without a high rate of agricultural growth is greater than that of a high rate of agricultural growth without a high rate of industrial growth. A high industrial growth rate without a high agricultural growth rate is most likely in relatively open economies where the input-dependence as well as the demand-dependence of industry on agriculture is weak, but in most parts of the world policy makers can rightly assume strong complementarity between agricultural and nonagricultural growth. The contrast in the 1970s between the low-growth complementarity of the two sectors in South Asia (India, Pakistan, and Sri Lanka) and the high-growth complementarity in Eastern Asia (Indonesia, China, Thailand, Malaysia, and the Philippines) is particularly striking. The latter countries achieved industrial growth of 8 to 11 percent along with agricultural growth of 3 to 6 percent. Similar groups of countries are identifiable in Latin America, where Brazil, Colombia, Guatemala, El Salvador, and the Dominican Republic are in the high-growth complementarity group, and Argentina, Peru, Panama, and Uruguay are in the low-growth complementarity group. In Africa, too, countries like Sudan, Zambia, and Ethiopia recorded low growth rates, and Kenya, Tunisia, Malawi, and the Ivory Coast managed high rates in both sectors (Chart 1b).

In contemplating the relation between agricultural and nonagricultural growth it is also useful to bear in mind the long-run historical perspective. As D. Gale Johnson has said, "Agriculture is a declining industry when economic growth occurs. This is inevitable and desirable" (Johnson, 1973, p. 33). This does not mean, of course, that agricultural output declines absolutely. Output keeps growing but the share of agriculture in national output must decline. The share of agriculture in total employment must also decline. There is in fact "no theoretical basis for assuming that the decline of employment opportunities in agriculture will come to an end" (Johnson, 1973, p. 98). The monotonic reduction of the relative size of agriculture in the economy in these dimensions is confirmed both by long-term data analyzed by Kuznets (1966) and by the Chenery-Syrquin stylization of structural change on the basis of international cross-section data. A rise in income per capita from $70 to $1,500 (in 1964 United States prices) reduces the share of food consumption in GNP from 41

to 17 percent, the share of primary production in GNP from 52 to 13 percent, and the share of the primary sectors in the labor force from 71 to 16 percent (Chenery and Syrquin, 1975, p. 20).

Two familiar forces drive down the share of agriculture in demand (output), employment, and the capital stock: variants of Engel's law on the demand side, and absolute differential (labor) productivity growth on the supply side (Kuznets, 1966, pp. 120–121).

The income elasticity of demand for food products falls steadily from 0.9 at a per capita income of $165 to a mere 0.16 at a per capita income of $2,190. The income elasticity of demand for textile fibers, too, declines from unity to nearly zero across the same income range (Johnson, 1973, pp. 72–73). On the other hand, productivity per worker in agriculture eventually grows very fast (4 to 7 percent a year) but productivity in industry grows even faster, so that value added per capita in agriculture reduces to only about one-third of value added in nonagriculture (Johnson, 1973, pp. 68, 214, 215).

Developing countries as well as developed countries cannot escape the working of these long-run forces. But the tendency more relevant to poor countries is that in the medium run the agricultural growth rate can, and normally should, accelerate, though later it may decelerate. This is evidenced by some well-documented case histories. In successive phases the Japanese agricultural growth rate accelerated from 1.6 to 3.1 percent, the Taiwanese from 2.8 to 4.2 percent, and the Korean from 0.5 to 4.5 percent. But over long periods the Japanese agricultural growth rate averaged only 1.7 percent (1876 to 1967), the Taiwanese only 3.0 percent (1913 to 1970), and the Korean 1.94 percent (1920 to 1969) (Hayami et al., 1979, pp. 17, 35, 61, 92).

Cross-sectionally, too, we see that in the 1970s the agricultural growth rate averaged 2 percent in the low-income countries, 3 percent in the middle-income countries, and about 1 percent in the high-income countries (World Bank, 1981, pp. 136–7).

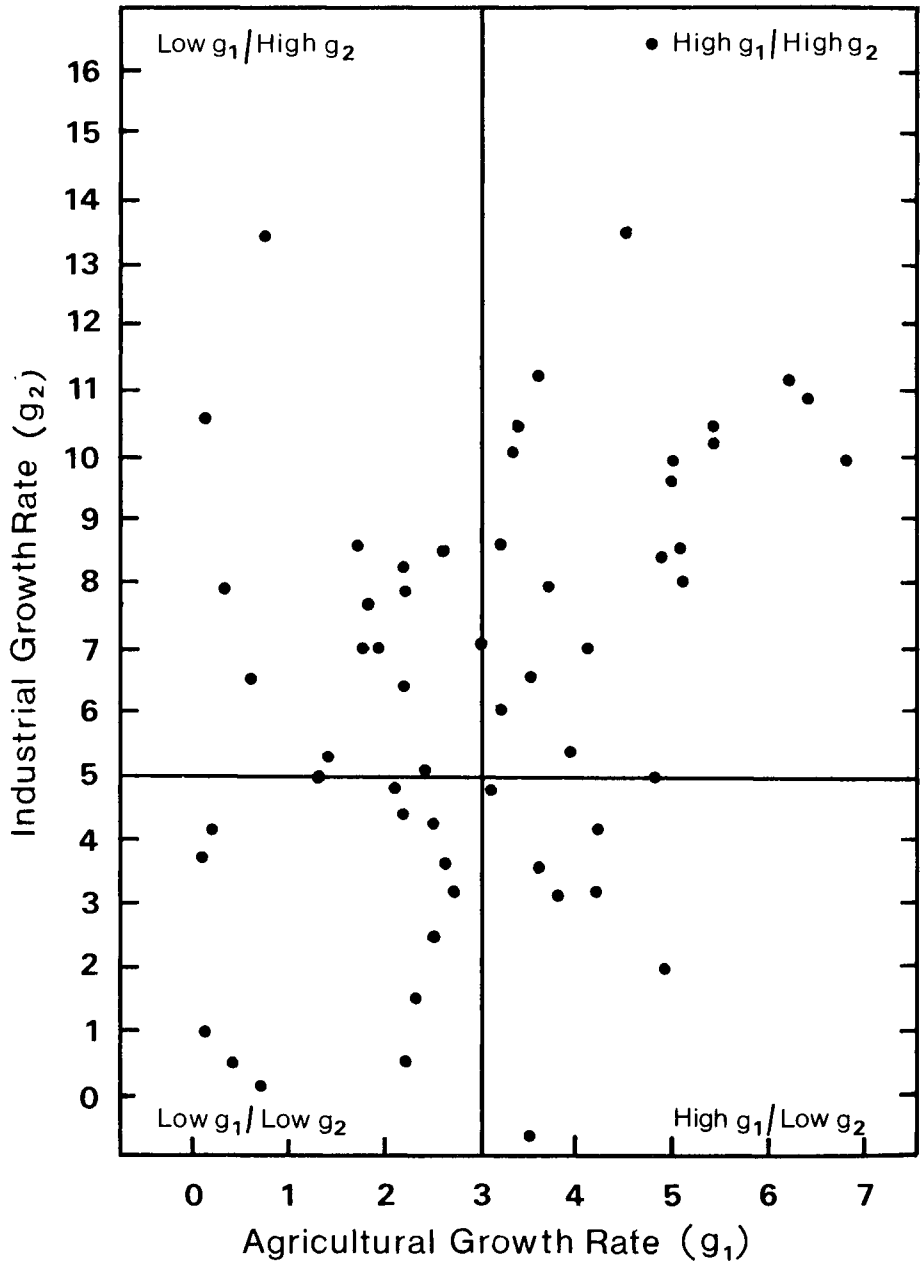
Thus the historical role of agriculture in the developmental transition seems to be to accelerate its own rate of growth, thereby facilitating industrial growth at a rate that is at least twice agriculture's own rate of growth, and to keep shrinking in size relative to the rest of the economy. In the early stages of development, agricultural growth can and should accelerate to 3 to 5 percent, but over the long run it is normal for it to average 2 percent or less. On the other hand the industrial growth rate can and should be not less than 5 percent in the early stages and keep accelerating to 8 to 10 percent or even more.

Very little material is available on incremental capital-output ratios in agriculture in developing countries. Practical planners as well as theoretical economists have generally tended to underestimate them and hence the investment requirements of agricultural growth in low-income countries.[5] It has been customary to exclude capital altogether from the agricultural production functions in dualistic development models.[6] Planners usually assume low

[5] There is a widespread tendency to ignore or undervalue direct, internal capital formation in agriculture due to unpaid or underpaid labor (Jones, 1965).

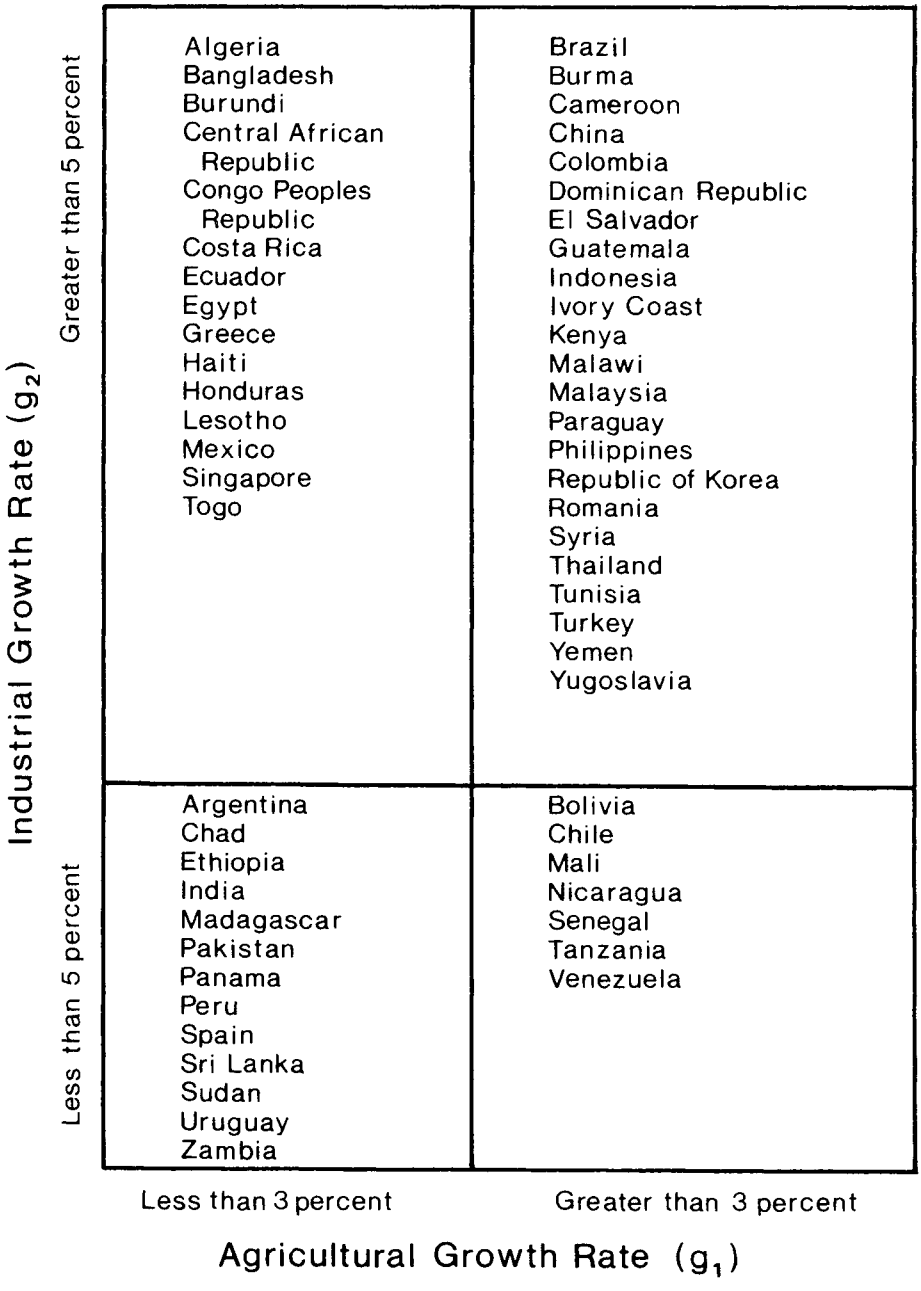
[6] See, for example, Jorgenson (1969) and Taylor (1979).

CHART 1A.—AGRICULTURAL AND INDUSTRIAL GROWTH RATES OF 58 DEVELOPING COUNTRIES, 1970 TO 1979
(*Percent per year*)



Source: World Bank, *World Development Report, 1981*, p. 136.

CHART 1B.—CLASSIFICATION OF 58 DEVELOPING COUNTRIES BY AGRICULTURAL AND INDUSTRIAL GROWTH RATES



Source: World Bank, *World Development Report, 1981.*

incremental capital-output ratios of the order of 1.0 to 1.5 for agriculture and therefore come up with relatively small investment allocations for its development. But there is evidence to show that in some phases of development the incremental capital-output ratio in agriculture (k) can be as high as in manufacturing.

Kuznets, analyzing "all" the available historical evidence on sectoral incremental capital-output ratios for seven countries for various periods prior to the mid-1950s (Table 2), noted that "the capital-output ratios for the A (agricultural) sector are *higher* than those for the M (mining and manufacturing) sector, *with no exceptions*... In practically all cases, the sectoral ratio for the M sector is distinctly lower than the countrywide" (Kuznets, 1961, p. 45, italics added). This finding should surprise development theorists and planners who are accustomed to assuming the relative inexpensiveness of agricultural development.

TABLE 2.—SECTORAL AND AGGREGATE INCREMENTAL CAPITAL-OUTPUT RATIOS, VARIOUS PERIODS
(Based on constant price totals)

Country	Period	Agriculture	Mining and Manufacturing	Aggregate
Norway	1900–1953	2.5	2.3	3.0
Sweden	1861–1950	5.2	2.6	4.3
United States	1880–1948	2.2	1.1	1.4
Canada	1928–1953	10.9	3.3	5.8
Australia	1865–1935	3.1	2.2	5.9
Argentina	1905–1955	6.4	4.5	8.3
South Africa	1919–1955	4.4	2.1	3.1

Source: S. Kuznets, 1961. "Long-Term Trends in Capital Formation Proportions," *Economic Development and Cultural Change*, July. The years shown are mid-years of moving average periods.

Scattered bits of evidence on recent values of agricultural k in developing countries also seem to support the Kuznets conclusion. In a U.N. study, for example, the ratio for the mid-1960s (1967 and 1968) in 12 developing countries was reported to be 3.2 for agriculture, 2.8 for manufacturing and 3.0 for the whole economy (UN, 1971, pp. 80–81). Thus the ratio for agriculture was higher than the overall ratio.

The absolute level of k can often exceed 2.5. Kuznets' long-period estimates range from 2.5 for Norway to 10.9 for Canada. Only for the United States was k less than 2.5 (2.2). For Pakistan a World Bank study computed the agricultural k as 3.5 in making projections for the period 1963 to 1975 (Lieftinck et al., 1969). In India k seems to have been relatively low, but it has risen from 1.9 in the early 1950s to 2.7 in the early 1970s (Kelkar, 1980).

Perhaps the longest Asian time series of fixed capital and gross value added

in agriculture are available for Taiwan and Japan (Hayami et al., 1979). Using these series, ratios of fixed capital increments to gross value added have been computed for the periods usually identified as distinct phases of Japanese agricultural development (Table 3 and Chart 2). The ratio rose steeply from a low of 0.4 between 1876 and 1904 to 2.2 in the pre-World War I period (1904 to 1918), declined steadily to 1.4 in the post-World War II period (1947 to 1957), but then rose again to the record level of 8.9 in the 1960s. In Taiwan it fell from 2.6 during 1913 to 1923 to 0.5 in the 1950s and then rose to 1.2 in the 1960s.[7]

TABLE 3.—AGRICULTURE IN JAPAN AND TAIWAN
RATIO OF FIXED CAPITAL INCREMENTS
TO GROSS VALUE ADDED

Period	KF	KT
	Japan	
1876–1904	0.37	0.40
1904–1918	2.22	2.30
1918–1938	1.88	2.08
1938–1947	1.42	1.56
1947–1957	1.43	1.67
1957–1969	8.90	9.53
	Taiwan	
1913–1923	2.58	2.80
1923–1937	1.14	1.24
1937–1946	0.60	0.79
1946–1951	0.46	0.55
1951–1960	0.47	0.59
1960–1970	1.17	1.48

Source: Constant price time series in Hayami et al. (1979, Table J4 and T4). Periods are the same as in Hayami et al. (1979, pp. 35 and 61). Years shown are center years of five-year moving average series.

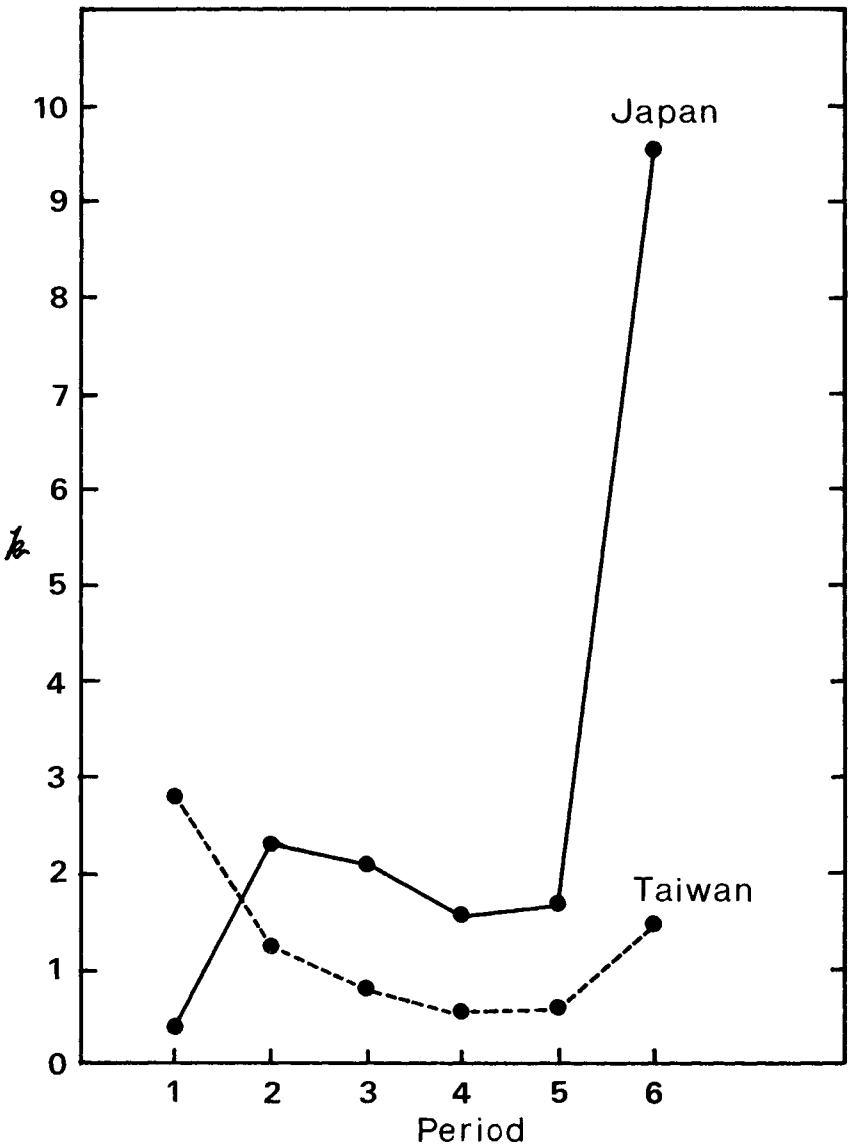
KF = Ratio of fixed capital increments to gross value added.

KT = Estimated ratio of total capital increments to gross value added, assuming incremental working capital is one-third of current inputs.

This behavior of k in Japan and Taiwan is consistent with the surmise that in the Asian context, k rises in early periods when basic investments in irrigation, drainage, and land development are made, and again later when mechanization becomes necessary. And it declines in a middle period when productivity

[7] Ratios would be higher if they included working capital, for which estimates are not directly available. The time series of "current inputs," including expense on seed and fertilizer, consistently grew at rates much higher than fixed capital or gross value added. If working capital is assumed to be one-third of current inputs, the Japanese ratio of total increments of capital to gross value added would rise from 8.9 to 9.5 for the 1957 to 1969 period, and the Taiwanese from 1.2 to 1.5 for the 1960s (Table 3, Chart 2).

CHART 2.—INCREMENTAL CAPITAL-OUPUT RATIO (KT) IN AGRICULTURE JAPAN AND TAIWAN



Source: Table 3. Estimated ratio of total capital increments to gross value added, assuming incremental working capital is one-third of current inputs.

multiplies mainly because of the increasing application of biochemical inputs (Ishikawa, 1978).

Values of k available for various countries and periods are hardly comparable and serve only as broad indicators of the range of k. Measurement of k involves numerous well-known problems of concept choice, valuation, lagging, and data deficiencies. But the bits of available data, particularly the relatively reliable Japanese and Taiwanese data, do suggest that it would be an error to assume values of k lower than 2.5 for planning investment in the early stages of development.

In particular wherever there is a large irrigation slack, a high k should be assumed. One reason that k could fall in the middle periods in Japan and Taiwan from a high initial level was that all paddy land was under controlled irrigation in Japan as early as 1880 and 60 percent in Taiwan as early as 1910 (Hayami et al., 1979). Pakistan, Sri Lanka, and Malaysia have raised their overall irrigation ratio to more than 50 percent in recent decades. In India, Indonesia, and the Philippines it remains less than half (ESCAP, 1980, p. 105). India's overall irrigation ratio was raised from 18 to only 26 percent over 30 years at a very high and rising investment cost. Over this period the irrigation investment cost per hectare rose 10 times in current prices and doubled in constant prices; it now stands at about $2,000, and at least 57 million additional hectares remain to be brought under irrigation (CMIE, 1981, 3.2, 12.4).

In sub-Saharan Africa, where less than one percent of total arable land is irrigated, there is considerable scope for expanding irrigation (Rado and Sinha, 1978, pp. 450–451). But the World Bank has recently reported $10,000 as the probable cost per hectare in parts of Africa (World Bank, 1982, pp. 4.13, 4.14).

Unutilized irrigation potential around the world is estimated to be 1.1 billion hectares (Scrimshaw and Taylor, 1980). The mobilization of this potential, even over several decades, will obviously involve vast investment outlays.

The high overall investment cost of agricultural development simply has to be accepted as a necessity and provided for. Many rough estimates of the investment requirements of agriculture in the near future are available. All these show an insufficiency of current investments. To cite an estimate for irrigation alone, the Trilateral Commission (1977) has calculated that "foodgrain production [in developing countries] can be doubled at present levels of technology by 1990 (4.8 percent per annum) at an annual irrigation-investment cost of $4.5 billion (at 1975 prices) or about six times the current investment rate of $700 million. This implies an annual growth in irrigated command area of over 5 percent per annum compared with the current rate of 2 percent... this rate of irrigation growth in demand will be inadequate to meet a 3 to 4 percent growth in demand for food" (Barker, 1978, pp. 156–157).

Large gaps between actual and potential levels of use exist for other modern inputs as well as controlled irrigation water. Recent World Bank documentation highlights the research slack (World Bank, AR, 1981, p. 58). Poor countries have 16 scientists per million of agricultural population, the rich have 62; poor countries spend $0.26 per person in the agricultural population, the rich

spend $1.57. Extension density as measured by the number of agricultural graduates per 10,000 farm workers varies across countries from less than one to 30 (Hayami and Ruttan, 1971, p. 325). A decade after the introduction of HYV seeds only about one-third of the wheat and rice area in the developing world was planted with them (World Bank, AR, 1981, p. 21). And the range of fertilizer (NPK) use is as wide as 20 to 500 kilograms per hectare.

As developing countries strive to realize potential input levels over the next few decades the agricultural k should be expected to rise.[8] This tendency would be in tune with the general tendency of the overall k to rise over time. In eight developed countries (United Kingdom, United States, Germany, Japan, Sweden, Denmark, Canada, and Australia) the gross overall incremental capital-output ratio (reproducible capital/GDP) rose from a range of 3 to 4.5 in the late nineteenth century to levels between 4 and 6 in the 1950s (Kuznets, 1966, pp. 254–256, 260). But the real cost per unit of output could still decline because technology embodied in new capital raises total productivity faster than it raises k.

The share of national investment that needs to be devoted to agricultural development at various stages can be roughly computed if, in the light of the empirical tendencies mentioned above, realistic values of the agricultural growth rate (g) and capital output ratio (k) are selected. Two additional parameters are required: the share of agriculture in national income (r), and the national investment-income ratio (s). The required share of agricultural investment in total investment can then be roughly calculated as gkr/s.

In view of historical as well as international cross-section experience the growth rate (g) should be expected to rise and then decline over time; the capital-output ratio (k) to rise, decline, and rise again; the share of agriculture in GDP (r) to fall continuously; and the investment rate (s) to rise and then stabilize. Table 4 shows the share of agriculture in total investment computed at four stages as the parameters g, k, r, and s follow this pattern.

In the low-income stage, when farm product is half of GDP and the gross investment rate 20 percent, a 3 percent annual growth in agricultural output would require 22.5 percent of total investment with a high k (3.0).[9] But then as the share of agriculture in GDP goes down to 33 percent, the investment rate rises to 25 percent, and a lower agricultural growth rate is required (2.5 percent), only 10 percent of total investment is needed for the farm sector. Still later, when only 2 percent growth would suffice, agriculture's share in GDP shrinks further to 20 and 15 percent, and the investment rate stabilizes at 20 percent, only 4 to 4.5 percent of total investment is required for agriculture.

These computations suggest that for the typical low-income and lower-middle-income developing country, a 21 to 22 percent share of agriculture in total investment can be used as a criterion. But not one of the 20 countries mentioned in the UN study cited above allocated 20 percent of total fixed

[8] Aggregate direct investment required for 3.7 percent agricultural growth in developing countries has been estimated as $1,690 billion (in 1975 prices) from 1980 to 2000 (FAO, 1981).

[9] If the investment rate (s) is lower at 15 percent, and k only 2.5, agriculture would need 25 percent of total investment.

TABLE 4.—REQUIRED SHARE OF AGRICULTURE IN TOTAL INVESTMENT IN DIFFERENT STAGES

	Cases			
	I	II	III	IV
Desired agricultural growth rate (g)	0.03	0.025	0.02	0.02
Agricultural incremental capital-output ratio (k)	3.00	3.00	2.00	3.00
Share of agriculture in GDP (r)	0.50	0.33	0.20	0.15
Aggregate investment/GDP ratio (s)	0.20	0.25	0.20	0.20
Required share of agriculture in total investment (grk/s) (percent)	22.50	9.90	4.00	4.50

investment to agriculture between 1966 and 1968. Only three allocated as much as 15 percent. About half allocated less than 10 percent. More recent national accounts[10] for the 1970s reveal similarly low shares of agriculture in fixed investment: less than 15 percent in most countries for which the ratio is available, and less than 20 percent in two of the biggest low-income countries—India and Pakistan. In national accounts of the few low-income countries in Africa and Latin America for which sectoral investments are reported, the share was less than 10 percent (Table 5).

These numbers are subject to obvious errors of measurement. The coverage of national accounts is often incomplete. Criteria for categorizing direct agricultural investments are arbitrary and vary across countries. Estimates of direct private capital formation by farmers, particularly with family inputs, are often unavailable or unreliable. There are also the usual problems of valuation. Direct agricultural investment in any case excludes much investment that is classified as nonagricultural but is critical for agricultural growth. For instance, the investment in industries producing farm inputs like seeds, fertilizer, pesticides, and equipment is usually classified as industrial, and the rural share of public investment in infrastructure and human capital is classified as utility or service investment. More research is obviously needed to develop better estimates of actual and required investment shares.

Nevertheless, the available range of shares (which are almost all subject to similar errors and are hence perhaps comparable) constitute *prima facie*

[10] Only shares in sectoral gross fixed capital formation can be computed from the data on national accounts. It is assumed that the shares would not alter much if other investments were included in the figures of farm investment and aggregate investment.

TABLE 5.—THE RATIO OF GROSS FIXED CAPITAL FORMATION IN AGRICULTURE TO TOTAL GROSS FIXED CAPITAL FORMATION (IN SECTORS) IN SELECTED DEVELOPING COUNTRIES, 1975
(*Percent*)

1–4	5–9	10–14	15–19	20 or more
		Asia		
	South Korea	Thailand	India Pakistan	Malaysia
		Africa		
Gabon Togo Zambia	Botswana	Ethiopia Kenya Mauritius Tunisia Zimbabwe	Libya	Swaziland
		Middle East		
	Iran Iraq Israel Egypt	Syria		
		Latin America		
El Salvador Trinidad	Jamaica Venezuela	Guatemala		Honduras

Source of basic data: United Nations, 1980. *Yearbook of National Accounts Statistics 1979*, Vol. 1. Excluding fixed capital formation by "producers of government services" and capital formation in inventories.

evidence of widespread underinvestment in agriculture in many parts of the developing world. Agriculture does not need, as some extremists seem to think, a major share of total national investment; 20 to 22 percent would suffice in most low-income situations as direct investment, but much less than this is provided in many countries. In this sense agriculture is neglected.

For the allocation of total agricultural investment among different growth-promoting activities, programming has been attempted.[11] But at least three difficulties beset the use of agricultural investment modeling. First, private (farmers') investment decisions can be influenced only indirectly. Second, much interdependence (complementarity) characterizes agricultural investments. This makes it difficult to separate and compare the productivity of specific investments, or creates the need for substantial mixed packages. The same increases in income and output are attributed to different investments depending on which investment is currently being studied or justified! The zone of

[11] Good examples are available in Goreux and Manne (1973).

interdependence extends beyond direct agricultural investments to "nonagricultural" investments in infrastructure and human capital. And third, the usual successive processing of single projects by national planning and international financing agencies can hardly produce an overall allocation that is rational in any sense. Thus, an ambitious modeling of agricultural investment allocation may not be feasible.

But there is one paradoxical feature of farm input relationships that allows considerable flexibility in the allocation of investment. Farm inputs are interdependent, yet independent over a wide range. A given percentage increase in many inputs, say improved seed, irrigation, and fertilizer, made simultaneously would generate more additional output than the sum of additional outputs due to the same percentage increase in each of them alone. But at the same time an increase in either of them alone might yield a high enough return over a considerable interval.[12]

Therefore agricultural investment can be in a state of dynamic Hirschmanian intersectoral imbalance:[13] a rough allocation can be made initially, covering clearly linked requirements; unforeseen constraints (or opportunities) are then encountered, and investments to relax the constraints and utilize the opportunities follow.

But research on the decomposition and explanation of growth in successful cases suggests that at every stage the farm investment package should include investments in infrastructure and human capital as well as in material inputs on the farm. Except in very sparsely settled regions, the growth of farm area per capita ceases to be a significant source of growth after a short initial period (as in almost all Asian countries). After this period, growth in output depends almost entirely on increases in yields. In the dynamic phase when output grows 3 to 4 percent a year, about 50 to 75 percent of growth is attributable to increasing productivity, i.e. technological change, and only a minor part to growth in conventional inputs (Hayami et al., 1979).

Productivity growth, however, though directly and mainly due to input growth and innovation, depends critically on development of infrastructure and human capital. The essentiality and social profitability of these have been documented in much recent work.[14]

One may even say that there is no need now for detailed studies to prove that investments in research, extension, high-yielding seed, irrigation, fertilizer, energy, transport, health, and schooling yield a high social return exceeding the opportunity cost of capital. Analyses are needed only to choose the most

[12] Indian data indicate that traditional yields of major cereals on rain-fed lands, which stagnate at 0.7 to 0.8 metric ton per hectare, can be raised by 25 to 50 percent by irrigation, seed improvement, or chemical fertilizer separately; but the simultaneous use of the three inputs multiplies yields 2.5 to 3 times (Sarma, Roy, and George, 1979; CMIE (S), 1981, T 8.16, 8.17). Studies of the international grain production potential suggest that irrigation development can double cereal yields in developing countries, but HY seeds, irrigation, and high doses of NPK together can raise them fivefold or more (Scrimshaw and Taylor, 1980).

[13] See Hirschman (1958).

[14] See World Bank (1980), Welch (1978) for education, Hasan (1976) for Korea, and Fei, Ranis, and Kuo (1979) for Taiwan.

cost-effective forms and doses of these inputs, adapted to different farming communities. But the access of every farming community to all these inputs can now be regarded as a right.

PRICE POLICY

In the field of price policy, as in the field of growth policy, we have to reckon with the prevalence of fundamentalism. Like agricultural-industrial growth fundamentalism, there is price fundamentalism. The rational escape from the former is provided by the notion of balanced sectoral growth; likewise, a rational answer to price fundamentalism would be a balanced view of the role of price policy and nonprice (technology) policy in promoting growth. The need for balance is clearly suggested by the present state of research on farm supply response.

Although supply response is a heavily researched area, there are surprisingly few studies of the response of aggregate farm output to lagged terms of trade and other shifter variables. Such studies are obviously crucial for measuring the marginal leverage of terms of trade in stimulating agricultural growth. In recent survey papers of the World Bank tabulating about 100 single-crop price elasticities of acreage or supply for developing countries, only two aggregate supply elasticities are recorded: for Argentina and the Indian Punjab (Sobhan, 1977, Table 1 and p. 13; Scandizzo and Bruce, 1980, Appendix II, Table 1). For Europe and the United States, however, as many as nine of the 36 elasticities tabulated by D.G. Johnson are aggregative (1973, p. 113).

In the OECD region, of course, the "short-run" aggregative elasticities are in the same range (0.25 to 0.45) as single major-crop elasticities. The Argentinean "short-run" elasticity came out to be 0.21 to 0.35 in different regressions. The Punjab study yielded a significant positive elasticity (0.22) for the prewar period (1907 to 1946) but a negative elasticity (-0.06) for the postwar period. The author explicitly noted that in the postwar period output expanded while the terms of trade declined, and suggested that growth was primarily due to technological change (Herdt, 1970).

In order to examine the effect of the terms of trade of agriculture on aggregate farm output, two new equations have been estimated for Japan and India using the available terms-of-trade series.[15]

Japan (1881 to 1919)

$$(J.1)\quad Q_t = \text{constant} - 132.80\ P_{t-1} + 30.52^{***}T + 0.17\ Q_{t-1}$$
$$(t) \qquad (-0.53) \qquad (4.77) \qquad (0.97)$$
$$(e) \qquad [-0.05]$$
$$R^2 = 0.90$$

[15] Using series from Hayami et al. (1979), Kelley and Williamson (1974) and Thamarajakshi (1977). Of the three terms of trade series available for India, the deflated index of foodgrain prices yielded relatively more significant coefficients. The simple Nerlovian specification is maintained to get estimates comparable with earlier ones.

India (1952/53 to 1974/75)

$$(I.1)\quad Q_t = \text{constant} + 0.14^{*}P + 0.49^{***}W_t + 3.08^{**}Z_t + 0.45^{**}Q_{t+1}$$

(t)	(1.49)	(4.68)	(2.11)	(2.44)
(e)	[0.18]	[0.54]	[0.68]	

$R^2 = 0.92$

where:

Q = farm output,
P = terms of trade,
T = time-trend,
W = weather index, and
Z = percent of cropland irrigated.

(Figures in the parentheses are t-values of regression coefficients. Figures in square brackets are elasticities at the means of variables, and *, **, and *** mark coefficients significant at the 10, 5, and 1 percent level, respectively.)

The price coefficient is only marginally significant in the Indian equation, and the one-period elasticity is about 0.2. In the Japanese case the one-period price elasticity is negative, low (-0.05), and statistically zero. At best these equations (as well as the Punjab and Argentinean results cited above) would suggest a one-period aggregate price elasticity of about 0.2 and a long-run price elasticity of about 0.4.[16]

The terms-of-trade movements do seem to have a positive effect on aggregate output. And a favorable price environment must be considered indispensable for agricultural growth. But for a balanced view of the relative role of price and nonprice factors in promoting growth, two implications of supply studies should be noted.

First, if we consider, for a moment, price policy as the sole instrument for fostering agricultural development, the order of annual terms-of-trade increases required is certainly more than a poor country can manage on macro grounds. Suppose, for instance, that the one-period price elasticity is 0.2, the "long run" implied by the usual lag coefficient (0.5) is about five years, and a low-income country needs 3 percent annual growth in farm output. Then, the long-run elasticity being 0.4, 16 percent growth over five years would require a one-shot 40 percent increase in the real terms of trade of agriculture. This is equivalent to a 7 percent annual increase over this period, which will also, of

[16] The possibility of these elasticities being underestimates is discussed below. But the recent estimates of the aggregate agricultural supply elasticity ranging from 1.25 to 1.66 (Peterson, 1979) would seem to be gross overestimates to the economists of developing countries. It is difficult to believe that sample observations from Japan and Pakistan, the United States and Denmark, Chile and Paraguay, and Niger and Upper Volta, used in the Peterson study, come from the same structural universe. It is also difficult to accept the implication that in the typical developing country, say in Africa or South Asia, all that is required for a 3 percent growth of farm output is a 2.5 percent increase in the real price of output. For price increases of this order have occurred frequently and continued for many years in these regions while aggregate output increased very little or stagnated.

course, spread out the resulting output growth. This order of terms-of-trade increases is hardly a practical proposition, even assuming that a government can fix terms of trade. (Even if the long-run elasticity is assumed to be 0.6, i.e., roughly equal to that for most of the individual cash crops, instead of 0.4, the required 27 percent one-shot increase, or a 5 percent annual increase, in the terms of trade would be infeasible.)

The second important fact relevant here is that in most supply regressions the elasticities of supply with respect to shifter variables (proxies for technological change, like the irrigation ratio) exceed the price elasticities. In the Indian function (I.1) above, the irrigation elasticity (0.68) is more than three times the price elasticity (0.18). In postwar Indian wheat functions, the irrigation elasticity (0.75 to 0.80) has been found to be 1.5 times the price elasticity (about 0.5) (Krishna and Raychaudhuri, 1979; Krishna and Chhibber, 1981). And in an early supply response study of 11 crops in the Indian Punjab it was observed that the irrigation elasticity exceeded the price elasticity in every equation where irrigation was included (Krishna, 1963, Table 1b; Krishna, 1967). The irrigation elasticity was in fact 1.5 to 5.5 times the price elasticity for cotton, millets, and wheat. In the Japanese equation (J.1) given above, the time-trend is very strong while the price coefficient is not even significant.[17]

These numbers suggest that a unit percentage change in the important shifter variable (technology) will yield much greater growth than a unit percentage price shift.[18]

During many episodes in the record of advanced countries, the terms of trade facing agriculture have stagnated while farm productivity has grown 2 to 3 percent a year.[19] The explanation, again, lies in technological dynamism.

[17] In the Asian context, at least, the irrigation ratio, or more inclusively the proportion of area under water control, can be shown to be the best single proxy for the supply shifters. Irrigation growth has been found in many studies to have been the critical precondition, and most important determinant, of the growth of area under HY varieties, fertilizer consumption, and cropping intensity. The World Bank has noted that 50 to 60 percent of the increase in output over the past 20 years is due to higher yields on previously or newly irrigated areas (World Bank, 1982, Chapter 4, p. 13). For India see Jha (1980) and Sanderson and Roy (1979).

In Meiji Japan and India, the treatment of a major part of irrigation growth as an autonomous or non-price-induced process also seems justified. For in Japan, irrigation and water control had been extended to almost all paddyland in the Tokugawa period itself. This is the reason for specifying only time-trend and the terms of trade as the main variables in the supply function for the Meiji period. And in India, the development of canal-irrigated area, which now accounts for more than 40 percent of total irrigated area, has been a public sector activity. Tanks and traditional wells have existed since ancient times. But their renovation and the recent expansion of pump irrigation has been largely due to growing public outlays on construction and exploration, outright grants, and the expansion of subsidized credit. About 20 percent of public irrigation investment goes for "minor irrigation," and the medium-term credit from state institutions grew 16 percent a year in the 1970s (CMIE(S), 1980 and CMIE, 1981).

Surely some part of irrigation growth and the associated technical input growth is attributable to relative price movements, but it cannot be isolated with available data. If this effect could be measured, the measured long-run price elasticity would be somewhat greater than 0.4.

[18] Ideally, we should compare the elasticities of output with respect to the dollar costs, rather than the direct indexes, of price movements and supply shifters. But studies making such comparisons have yet to be made.

[19] See Johnson (1973, pp. 68–122) for OECD countries, and Kelley and Williamson (1974) and Hayami et al. (1979) for Japan.

The price fundamentalist would, of course, argue that technological change itself is induced by relative price movements. This proposition has a core of proven truth (Hayami and Ruttan, 1971). But only some aspects of innovation, in the broadest sense, can be shown to be price-induced. The price milieu determines the relative, privately perceived profitability of different techniques made available by completed applied research and hence influences the rates of their adoption (diffusion). But it cannot by itself explain the evolution of basic scientific knowledge and the level and growth of public investment in research, extension, infrastructure, and human capital in different parts of the world. The growth of basic knowledge has some irreducible nonlinearity, discontinuity, and randomness. And governments have been far less rational than farmers in making investment decisions.

The authors of the "induced innovation" hypothesis have documented the discontinuity of basic breakthroughs, for example the acquisition of the theoretical and empirical knowledge of processes of inheritance, the mastery of crossing techniques, and the development of methods of mass seed production, which added up to the "invention of a method of inventing" varieties and reproducing them.

Public sector investment in farm research in the United States has been shown to be economically rational since the 1920s. But it would be hard to prove that the initial setting up of the farm research infrastructure in the late nineteenth century was price-induced.

In Japan, too, for 300 years of the Tokugawa period, "constraints of feudalism" left a "substantial backlog of unexploited indigenous technology." And even when a rational research system existed, responses to price changes were very slow (Hayami and Ruttan, 1971, pp. 147–148, 151, 156, 162).

As for the currently developing countries, much evidence has been presented to demonstrate:

1) the absence of any significant research prior to 1950, except in colonial crops;

2) the utter nonoptimality of the level and allocation of public investment in the production of technology;

3) the continuing neglect of research on noncolonial crops, and especially on crops like cassava (manioc), coconuts, sweet potatoes, peanuts, and chickpeas;

4) the necessity and inadequacy of research even to "adapt" imported technologies (varieties, machines, and chemicals); and

5) the failure to promote the genetic improvement of farm animals (Hayami and Ruttan, 1971, pp. 164–166; Evenson, 1981).

If relative price movements alone were sufficient to generate high-yield technology, this technology should have emerged in the areas of recurrent drought-induced food-price inflations (in South Asia and African societies) in the nineteenth and early twentieth centuries. But it did not develop there; it developed elsewhere and is still to be made indigenous and widely adopted in these scarcity-ridden societies.

The upshot seems to be that a congenial price regime is a necessary but not a sufficient condition for agricultural growth. An unbiased listing of growth

factors would have to be dualistic: including favorable price movements as well as induced and autonomous technological and institutional innovations. Theoretically, one can conceive of three supply curves (responses): the response to a price increase along an unshifted supply curve (lowest); the response along a supply curve including the effect of price-induced innovations or shifts (next higher); and the total actual supply growth associated with a price increase but including a price-induced shift as well as autonomous shifts. It is tempting for the fundamentalists to attribute the whole or none of supply shifts to price movements. The true supply response to price would most probably include a part but not the whole of the shift. But so far it has not been possible to identify this part because of deficiencies of data and the difficulty of identifying induced and autonomous innovations.

Technological change, by definition, increases the total factor productivity of the aggregate conventional input. Even at unchanged output and input prices, therefore, it must increase the return per unit of cost. To see this, one has only to write the ratio of returns to cost as the product of terms of trade and total factor productivity. Let the returns-to-cost ratio (r) be written as PQ/pF, where Q and F are total output and total input, and P and p are output and input prices. If the terms of trade are defined as $p^* = P/p$ and total factor productivity as $t^* = Q/F$, then $r = p^*t^*$. In growth rates (denoted by a dot $\cdot$), $\dot{r} = \dot{p}^* + \dot{t}^*$. Profitability (r) can be raised either by improving the terms of trade (p^*) without innovation ($\dot{t}^* = 0$), or by improving productivity (t^*) at unchanged prices ($\dot{p}^* = 0$), or by improving both.

Successful innovation is thus an alternative, as well as a strong supplement, to an increase in the output-input price ratio as a means of raising the ratio of returns to cost and thereby stimulating growth.

In this important sense, a good technology policy is equivalent to a good price policy. A balanced policy should of course include both. But there is a case for giving primacy to a technology policy. For, as we have seen, the (partial) elasticity of output with respect to indexes of technical change is generally higher than with respect to relative price indexes, and would, in all probability, remain higher, even if the price elasticity were measured to include the effect of price-induced innovations. The measured social return to agricultural research and extension is also known to be very high (48 to 53 percent) (Hayami and Ruttan, 1971, p. 41). It would perhaps be much higher than the return to price policy alone, if the latter could be measured. National policy makers and international development bankers will therefore do well to devote at least as much attention and effort to the development of technology, infrastructure, and human capital as to the price environment.

Price policy should not, however, be negative. It is essential that the output-input price ratio for products whose output growth is to be accelerated is not allowed to fall; otherwise the growth-inducing effect of innovation would be reduced. The relevant price ratio is of course net of taxes and subsidies. Abstracting here from tax and subsidy policy, two major issues arise with regard to direct product price policy: (1) the determination of the support price or the government purchase price level for any product; and (2) the maintenance of appropriate interproduct price relatives in the support/purchase prices.

Despite numerous studies showing the undesirable allocative and distributive effects of price support, it is a safe assumption that support policies will continue in OECD and developing countries alike, though the mixture of motives for these policies differs between these two sets of countries. In the OECD group, it includes income support, stabilization, risk reduction, and the discouragement of excess production. In developing countries it comprises stabilization, risk reduction, encouragement of production growth, food security, and diversification. (All of these concepts carry varying meanings in different countries.)

Taking growth promotion to be the major aim in a poor country, there seems to be no alternative to the adoption of "full average cost" (including the imputed value of family resources at market prices) as the basic principle of fixing support prices for any single crop. This principle has been questioned on many theoretical grounds. First, it has been pointed out that the cost of specialized resources is demand-determined, and, therefore, not independent of the product price. Including this cost in the administered price would involve circularity. Every time the product price rises, the "cost" of these resources would rise and the administered price would have to be raised. Second, it has been noted that in the presence of uncertainty the cost that determines producer decisions is subjective opportunity cost that cannot be measured objectively for the purpose of price fixing. And, third, the variance of cost across farmer groups and regions is very high; therefore the choice of groups and regions whose cost is fully covered by the administered price would be arbitrary (Pasour, 1980). But there are counterarguments favoring the full-cost principle. It is of course difficult to estimate the theoretically ideal cost as a basis of support. But for administrative purposes some less-than-ideal measure has to be chosen. Wherever cost data are generated by regular sample surveys the full-cost principle has proved to be administratively feasible (as in India). Second, under certain circumstances, the cost principle will entail a lower treasury cost than the parity principle. It is interesting in this connection that the cost principle has been accepted recently, in the United States Food and Agriculture Act of 1977, as an alternative to parity. Third, the coverage of full average cost provides downward price stability or insurance against the risk of a price decline below cost in the sense most meaningful to farmers, particularly the small farmers in poor countries. Fourth, the cost variance problem can be handled for practical purposes by ordering the sample deciles according to their average cost and ensuring that the average cost of at least a major part of output is covered.[20] And finally, the inclusion of the return to specialized

[20] In practice there are three options: to cover the major part (more than 50 percent) of (a) output, (b) area, or (c) holdings, after ordering sample farms by average cost. (In business management practice "bulk-line" costing sometimes covers as much as 85 percent of output.)

The position taken here is that at least the cost of 50 percent of output (in sample farms ordered by average cost) should be covered. This avoids protecting the higher average cost of relatively inefficient farms.

In the term "full average cost" the adjective "full" refers to the fact that the imputed value of family resources is included in cost; and the adjective "average" is applied to the cost on each farm. It is not necessarily the sample average cost and it is not marginal cost.

(family-supplied) resources at (lagged) market-determined prices can be viewed as a way of providing a surplus for investment (a necessary incentive for growth in poor countries).

Thus on balance the cost principle can be used as the least unsatisfactory basis for price support. While the support price is a guaranteed minimum, entailing "passive" purchases by the government when the market price goes below it, many governments engage in "active" purchases of grain for running a concessional subsidized grain supply system, or building up public sector stocks. These purchases need to be made in principle at the going market price even if it is much above the support price. If direct redistribution of income is not feasible and the low-income population of a poor country would suffer unacceptable cuts in food consumption at market-clearing prices, the operation of a concessional (subsidized) food-supply system to serve this population and the associated dual pricing become a second-best necessity, though they have been criticized as a distortion. But the subsidy must be financed from the general revenues and not by forcibly reducing the price realized by (and thus taxing) farmers only.

In many countries supporting the prices of many farm products, the interproduct price relatives need to be deliberately rationalized. Otherwise farmers switch resources between products (wheat and rice, cereals and pulses, fine and coarse grains, foodgrains and feedgrains, food crops and cash crops, crops and livestock) in response to "wrong" signals, generating excess demands and excess supplies in different product markets. This particular problem is often caused by the practice of fixing support (purchase) prices for different products one by one, with uncoordinated formulas. The problem can be reduced by fixing a coordinated support-price package for all supported crops. The determination of this package—the consistent price set—can be guided by the solution of a farm-sector equation system for related products with exogenously projected or endogenous output levels. Operational research on such models to derive consistent administered price sets deserves priority.[21]

TAXES, TRADE, AND SUBSIDIES

The argument so far has treated price policy in abstraction from the effects of taxation, trade policy, and subsidies on farmers and consumers. Some issues of policy in these areas are considered in this section.

Substantial empirical work has been done to measure the combined effects of the whole mix of these macro policies in several countries. An excellent summary of the methodology and the main results of this work is available in Scandizzo and Bruce (1980). But the assumptions underlying this methodology and the policy implications that follow merit a critical examination in view of the multiple objectives of policy makers in developing countries, as well as the current thinking in the fields of public finance and international economics

[21] Attention may be drawn here to the recent work of IIASA on sector modeling. See Parikh and Rabar (1981).

relevant to these countries. The following review will show that many forms of discrimination and trade restriction, prevalent in these countries, are undesirable for agricultural development, but some interventions appear to be fully justifiable.

Taxation

In the field of taxation, the basic issue is whether the tax system should discriminate at all against or in favor of a whole production sector such as agriculture. Unfortunately, there is a long tradition of classical liberal as well as Marxist arguments for discrimination against agriculture. They add up to the theory that the exploitation or immiserization of agriculture is an inescapable requirement of industrialization. These arguments continue to influence some economists and administrators in developing countries. But all of them appear, on scrutiny, to be invalid.

In the Marxist tradition the main argument for discrimination against agriculture is that accumulation by landlords and usurers—of rent, interest, and the output of unpaid serf labor—constitutes the main initial investable surplus that a revolutionary government should seize and invest in industry. This argument, combined with the general antipeasant, antiagriculture bias of early Marxist thought (Mitrany, 1951), resulted in the collectivization and exploitative treatment of agriculture under the early Russian and East European five-year plans.

In the liberal tradition, the argument for a heavier taxation of agriculture emanated from the dominance of the rental component in agricultural income. Since taxes on economic rent could not be shifted, they were regarded as especially desirable.[22]

Another argument that reinforced the rent argument for the taxation of agricultural income was the notion of a perverse supply curve of labor in agriculture. A tax on agricultural labor income was deemed desirable because this perversity would not allow an adverse output effect.

Unless one is a doctrinaire antiagriculturalist, the substantive point in the Marxist view can be rationalized in the proposition that in the early stages of development a government in search of investable funds should tax surpluses —excesses of income over subsistence—heavily and progressively wherever they happen to be. Since they happen to be with traditional landlords and moneylenders as a result of previous accumulation, they have to be taxed there. But if they happen to be with a prerevolutionary nonagricultural bourgeoisie, or with the postrevolutionary public and private sectors, they have to be taxed equally. The object of developmental taxation must be all surpluses and not agricultural surpluses alone. But Marxists somehow do not accept equal treatment of farm and nonfarm surpluses.

In considering classical liberal arguments it is necessary to raise the basic question of the validity of tax discrimination between different types of income. For equity the magnitude of income alone is important; its sectoral

[22] See Wald (1959, Chapter 4).

origin is irrelevant. Governments, however, do treat different types of income differently. One distinction that has now come to be accepted as valid by the theorists of finance is the one between "earned" and "unearned" income. This distinction is really intended to be an approximation to the economically meaningful distinction between labor income and property income. Discrimination between the two can be rationalized on grounds of equity because the Gini coefficient of labor income is usually less than the coefficient of property income. If it is accepted, the consequence should be that if there are two equal incomes, one of which has a larger property income component than the other, the former should be taxed more heavily.

Now, on this principle, a case for heavier taxation of agriculture can be derived only if it is true that the property income component of value added in agriculture is always larger than the property income component of value added in nonagriculture. But data do not confirm this expectation. In India, for example, the ratio of the wage bill to value added in large-scale industry and mining averaged 40 to 42 percent between 1955 and 1958 (Mukerji, 1965, p. 161). The ratio of labor income to value added in agriculture estimated from Indian farm management data turns out to be 42 to 53 percent. Therefore, the residual share of property income in value added cannot be larger in agriculture than in industry. It follows that heavier taxation of agriculture as such cannot be justified if the intention is merely to discriminate between labor income and property income.

In order, then, to make an argument for discrimination against agricultural income, one would have to go further and argue that landed property income should be taxed more heavily than nonland property income. If this discrimination is based on the notion that landed property income is absentee income, it is again untenable and iniquitous. For all urban property income from real estate and financial assets, that is, all urban property income except income from household industry, is necessarily absentee income, whereas the bulk of the income of the small owner-cultivator from agricultural land is directly due to his own labor.

The conclusion to which we are thus driven is that if heavier taxation of property income than of labor income is considered just, all property income, agricultural and nonagricultural, should be similarly treated, and all labor income, agricultural and nonagricultural, should be similarly treated. Absentee property income in the village cannot be regarded as any more or less odious than absentee property income in the city. If one is against citizens having pivate absentee ("unearned") incomes simply because they happen to have accumulated income-yielding assets in the past, one should be proposing either the abolition of all private property in such assets or a capital levy on all property, rather than fiscal discrimination against only certain forms of it.

The whole trend of contemporary thinking is to treat all durable productive assets, land and nonland, equally as forms of capital. The belief in the specialty of land as a durable asset is a leftover from the past that still bedevils some fiscal thinking. But it is high time that this notion disappear. Neither in its productive role nor in the determination of its capital value and rental value

is land different from any other productive asset. The only component of rent that has a noncapital character in theory is pure site value. But it is nearly impossible in practice to measure and assess it as a separate component of the empirical rent.[23]

Moreover, the rigidity of the supply of land for a society as a whole is no longer so categorically distinctive a feature of land as it was in the nineteenth century because modern technology has enormously increased the possibility of reproducing and substituting the productive power of land.

As for the nonshiftability of taxes on rent, Ursula Hicks has rightly disposed of the generality of the argument: "It was argued that the full effective incidence of the tax would be on the landlord, because an overcharged tenant would move away, and so the tax would have no disincentive effects. This may well have been true in English conditions during the time of the Napoleonic wars and the Industrial Revolution, when Ricardo put forward this analysis. But the Indian peasant had neither the knowledge nor the opportunity to get away from an extortionate landlord" (1965, pp. 104–105). In countries where the proportion of the agricultural labor force in the total remains greater than 50 percent and millions of landless households compete for insecure crop-sharing contracts from year to year, it would be untenable to argue that any tax on the landlord could not be shifted.

There remains the labor supply-curve argument. Unfortunately we do not yet have a sufficient number of estimated labor supply curves for various milieus and various classes of farmers. But theoretically, even supposing that these curves have negative slopes, we can build a case for heavier taxation of agricultural labor income only if similarly estimated nonfarm labor supply curves are shown to have positive or smaller negative slopes. But if all labor supply curves had similar slopes, the case for heavier taxation of farm labor income would not follow. All labor income would have to be treated similarly.

Thus, none of the classical economic arguments for discrimination against the agricultural sector, including those of orthodox Marxists, stand critical scrutiny.

Besides, a sector is neither an income-earning entity nor a tax-paying entity for fiscal purposes. The whole of the value added in a sector accrues to individuals, families, and firms who are the real tax-paying units. And if a tax system has horizontal equity in the sense that units with equal taxable incomes are taxed equally, and vertical equity in the sense that the elasticity of tax payment with respect to taxable income has some socially acceptable value greater than unity, then the concept of intersectoral equity (or discrimination) used by some economists is operationally unnecessary.

It has been argued that "considerations of horizontal equity do not justify an absolute corporation tax, that is, a tax that goes beyond the objective of extending the personal income-tax to retained earnings" (Musgrave, 1959, pp. 173–174). If there is no case for an absolute corporation tax, there is evidently none at all for an absolute sector tax.

[23] See Wald (1959, pp. 77–78, 80, and 93).

On grounds of vertical equity, again, if the difference between the tax-income ratios of different income brackets reflects the socially desired degree of progression, it is immaterial whether the taxpayers in each bracket are farmers, workers, technicians, or entrepreneurs.

Every consideration, then, shows up the weakness of arguments supporting heavier direct taxation of agricultural income simply because it is agricultural.

In the field of indirect taxation, discrimination between (a) wage goods and luxuries; (b) ordinary and merit goods; (c) consumption, intermediate, and investment goods; and (d) traded and nontraded goods, is accepted as valid under certain conditions. On these principles, foodgrains, farm-produced raw materials that go into the production of wage goods, farm inputs and small-scale farm equipment should attract no, or only low, domestic indirect taxes.

Unfortunately, these principles too are widely violated and many farm inputs and outputs are subjected to unjustifiable discriminatory taxation. They are also discriminated against in nonfiscal policies.

The main nonfiscal mode of exploiting agriculture is the use of monopoly power to purchase farm output at less than competitive prices, and the sale of important inputs (particularly fertilizer and equipment) at more than competitive prices by state marketing agencies or large national and multinational corporations. These monopolistic operations of public and private agencies are fundamentally objectionable from the allocative as well as the distributive points of view. They entail a heavy allocative social cost and a grossly inequitable transfer of income from millions of low-income peasants to bureaucrats and local and foreign capitalists. Production of crops like bananas, cocoa, and coffee for export is particularly afflicted by monopoly power—frequently exercised by state and multinational agencies in cooperation. In fact, there seems to be little difference between state monopolies and private monopolies in their ability and willingness to squeeze farmers—though some socialists do not appreciate this identification of the behavior of the old and new rentier classes. Much descriptive documentation is available of the similar "exploitative" character of both kinds of agricultural marketing monopolies.[24] More detailed research is needed to measure the allocative and distributive effects of specific state and private marketing monopolies. But *prima facie* the effects must be regressive. There is thus an obvious case for maintaining maximum pluralism in marketing.

The questions of trade taxes and restrictions on international trade raise complex issues requiring a separate discussion.

International Trade Policy

Agricultural policy and overall international trade policy are inseparable. It is necessary, therefore, to consider briefly the basic orientation to trade policy that underlies recent research in project and sector analysis.

[24] For a selective summary of the operations of multinational marketing monopolies, see Lappe and Collins (1977).

In much of this research, based on the Paretian paradigm, differences between border prices and domestic producer prices due to trade interventions, and between domestic producer prices and consumer prices due to domestic interventions, are regarded as sources of "distortions."

Interventions that cause these distortions are of course prevalent in OECD as well as developing countries. It has been estimated that in the European Economic Community, the consumer-plus-treasury cost of agricultural interventions in 1968 was $13 billion (or 55 percent of farm GDP). In the United States it was $9.6 billion, or 38 percent of farm GDP (Johnson, 1973, pp. 50–51). Currently, farm policy has caused domestic prices in EEC countries to be 1.4 to 5 times the world prices for milk powder, 1.5 to 4 times for butter, 2.5 times for cheese, 2 times for beef and 1.5 to 2 times for grains (World Bank, 1981). It is obvious that rich countries do not believe in a free-trade–free-market regime that would equate border prices and domestic producer and consumer prices. Tariff and quota protection, producer price support, and consumer subsidies are the general rule in OECD countries. And these policies will very likely continue, with some variations, despite a large and growing number of studies measuring their enormous "welfare costs." There are reasons, often good reasons, why such policies are pursued. They lie in the concern with objectives other than Paretian efficiency. It is necessary to consider these reasons sympathetically, for they have even greater relevance and force in low-income countries than in the developed countries.

The several reasons for producer price support have already been mentioned. In the OECD countries the most important of these is assurance of downward price stability as a means of income support for farmers. In the poor countries it is full cost coverage as a means of maintaining producer incentives. Since a free market cannot ensure either downward price stability or full cost coverage, intervention becomes unavoidable.

The reason for food subsidies for consumers was also noted earlier. It is an inevitable second-best policy alternative to a direct redistribution of income.

Given these reasons for producer price supports and consumer subsidies, producer-price and consumer-price differentials will continue to exist.

There remains then the difficult issue of the relation between border prices and internal prices, which involves all the questions of trade policy. There is a vast literature on why free or freer trade that eliminates or reduces the difference between external and internal prices is desirable, and also on the circumstances in which trade intervention is justified.

From the point of view of developing countries, it is necessary only to reiterate that an orthodox free-trade bias is inherent in most current project and sector analysis. Like the OECD countries, the low-income countries cannot accept this analysis without qualification because of its monistic preoccupation with static efficiency and the neglect of other objectives. When these other objectives and some structural features of poor economies are kept in view, many major arguments exist for first-best and second-best trade interventions (import and export taxes).

Whenever the border price of a product is used as a "criterion" price in

project or sector analysis, a free-trade bias is built into the analysis. No domestic activity would pass the test of such analysis unless it would produce at a cost lower than the border price, or generate an acceptable internal rate of return (say 0.1 or higher) at the border price. The inputs of labor, capital, and foreign exchange may be shadow-priced, but the free-trade bias of output pricing remains.

The free-trade bias is essentially a bias for cheapness (minimization of cost per unit of output or maximization of product per unit of resources), which is the sole concern of Paretian optimality.

Shadow pricing of inputs does qualify this monism in favor of objectives other than cheapness (such as fuller employment), but it still ignores the objective of long-run self-reliance—the establishment and expansion of productive capacity in key sectors on domestic territory—to which all governments, including the present rich-country governments, implicitly attach a significant independent weight in their (the governments') objective functions. They are prepared to sacrifice considerable cheapness for the sake of self-reliance.

If immediate cheapness were the main criterion of choice, western Europe and the United States should greatly reduce or discontinue the production of various farm products and textile products, shoes, cars, and certain types of electronic goods. But employment and self-reliance objectives prevent them from doing so.

In countries with chronic labor surpluses, the employment argument for tariffs applies with greater force than in the OECD countries. For in the OECD countries, tariffs only protect existing employment; in labor-surplus countries they may be required to generate net additional employment. The weight attached to long-run self-reliance, too, cannot be less in the ex-colonial countries than in the OECD countries. The sectors in which a high degree of self-reliance is considered critical by policy makers are of course different in the two sets of countries. They may include crude oil in the West, and food, capital goods, and defense equipment elsewhere. But self-reliance in some fields is regarded as vitally important in most countries, and trade restrictions are invariably used to promote it.

Besides arguments based on the objectives of fuller employment and self-reliance, there are at least three other sets of concerns that may be served by taxing international trade, such as (a) preventing adverse movements in the terms of trade; (b) protection of infant or advanced industries to realize the gains of "learning by doing," external economies, and high technology; and (c) defense against trade barriers imposed by other countries.[25]

The terms-of-trade argument justifies trade taxation as a first-best policy whenever a country faces less than infinite foreign demand elasticities. Insofar as a poor country sells low-elasticity goods and early growth tends to worsen its terms of trade, it can reduce the resulting loss of national income by imposing taxes on selected exportables.

[25] See Corden (1974) for a welfare analysis of these arguments.

In certain conditions, trade taxation as a defense against barriers to foreign trade erected by other countries is also a first-best policy.

For generating employment, assuring self-reliance in key sectors, and promoting infant or advanced industries, tariffs are second-best policies or worse; direct wage or industry subsidies are better. But if subsidy costs are high, or collection of nontrade taxes costly, trade taxes may be the preferred alternative.

Thus the field of theoretically appropriate trade intervention in developing countries is quite extensive, and evaluation of trade policies in poor countries cannot fairly proceed with a simple, free-trade-biased methodology. A better approach would be multiple-objective programming with structural constraints specific to each country.[26]

The use of consumer and producer surpluses as measures of welfare in the current methodology is also subject to basic theoretical limitations that are recognized by practitioners. They can do very little about them for want of data or other reasons. Still, strong categorical judgments are made about policies in developing countries on the basis of the surplus methodology. It is enough to recall a few of the well-known basic difficulties.[27]

There is, first, a fundamental inconsistency between recognizing the key characteristic of backwardness as pervasive fragmentation of labor and capital markets and then using the ordinates of supply curves estimated from crude aggregate production or sales data as measures of the true opportunity costs of resources.

Second, only the integration of areas under zero-income-effect demand curves can be valid for welfare analysis. But in low-income countries the proportion of income spent on agricultural output is so high that agricultural price changes have substantial income effects. Therefore, the integration of the ordinates of ordinary demand curves would measure changes in consumer welfare with large, unknown errors.

Third, the distribution of gains and losses between producers as a group and consumers as a group is of much less interest to policy makers than distribution between rich producers and consumers on the one hand, and poor producers and consumers on the other. Conventional welfare analysis sheds very little light on distribution of gains among income brackets in the absence of disaggregated demand and supply schedules and distributional weights.

Finally, the substantial general equilibrium effects of quantity and price changes in a sector as important as agriculture in developing countries are ignored by partial analyses.

For all these reasons, although the numerical measurements of welfare gains and losses due to agricultural policies using crude demand and supply elasticities are interesting, it is premature and misleading to derive strong judgments from them. Multiple-objective programming, with some of the objectives specified as inequalities in the constraint system, is a much better approach.[28]

[26] For examples, see Chenery (1971, 1979).

[27] See the survey paper by Currie, Martin, and Schmitz (1971).

[28] For the methodology of such programming, see Loucks (1975).

Subsidies

The circumstances under which food subsidies may be needed have already been referred to. The choice between input subsidies and product price support is controversial. There are strong arguments for both.[29] Product price supports (on a full average cost basis) may be essential in any case as a general incentive to stimulate the growth of the output of selected commodities in developing countries. If input subsidies are added, they only increase the treasury cost.

Input subsidies are considered to be necessary to accelerate the adoption of particular inputs. But then if every important input is subsidized, the total cost tends to become excessive. And if inputs are in short supply, subsidies accrue only as rents to some marketing agents; the majority of farmers continue to pay high market-clearing prices. Therefore, it may be desirable to subsidize only credit linked to the purchase of modern inputs at market prices. And credit subsidies (or quotas) may be reserved on grounds of equity only for small farmers or landless households buying productive assets or inputs.

EQUITY

In the general thinking about income distribution, two major empirical generalizations have held the field: (1) that there is a trade-off between growth and equity due to the negative effect of redistribution on the incentives to work and save; and (2) that during the developmental transition income inequality increases and then decreases with increasing per capita income, as postulated by Simon Kuznets (1955, 1963).

But some countries' experiences have cast doubt on the generality of both of these beliefs. As regards saving, Arthur Okun has pertinently pointed out that

> the nation can have the level of saving and investment it wants with more or less redistribution, so long as it is willing to twist some other dials. For example, any threat that greater progressivity would make saving inadequate could be offset by more federal saving... or more middle-class saving through special incentives....
>
> In 1929 [in the U.S.] when all federal tax rates were low and barely progressive, the nation saved and invested 16 percent of GNP; in 1973, with all the allegedly onerous "soak the rich" taxes, it saved and invested the same 16 percent of GNP (Okun, 1975, pp. 98–99).

This observation on the loose link between progressivity and the saving rate was made in the context of American debates. But it seems to be generally true. Otherwise one cannot explain the average gross domestic saving rates being nearly the same in low-income, middle-income, and high-income countries (23, 25, and 22 percent in 1979), with their divergent Gini coefficients; nor can one explain the range of (positive) saving rates, as wide as 2 to 32 percent within the low- and middle-income groups, and 11 to 42 percent within the

[29] See Krishna (1967).

high-income group (World Bank, 1981, pp. 142–143). Obviously the policy environment can make it possible for countries with a relatively low income per capita and a low Gini coefficient to have a relatively high saving rate, and countries with a high income and Gini coefficient to have a rather low saving rate.

For the rural areas some recent studies show that after significant farm income growth has begun, even at low income levels when the aggregate average saving rates are low (5 to 8 percent), the marginal rates can be 3 or 4 times as much; and in regions where new technology brings higher income streams within the farmers' reach, they can quickly raise their average savings rates to 10 to 44 percent (Krishna and Raychaudhuri, 1982, pp. 18, 25). In a Taiwan study the rural marginal propensity to save was found to be between 38 and 72 percent in different years in the 1960s; even for households with less than a hectare, its range was as high as 30 to 60 percent (Ong, 1980). Thus it cannot be assumed that redistribution necessarily reduces the saving rate.

Regarding work incentives (again in the American context), Okun has noted that researchers

> have uncovered virtually no significant effects of the present tax system on the amount of work effort of the affluent. Some limited effects of transfer payments have been found on the work effort of secondary earners...in low-income families, but virtually none on primary earners (1975, p. 97).

Little work has been done on redistribution and work incentives in poor countries. But it is doubtful that large (absentee) landowners, traders, moneylenders, upper-middle-class professionals, and corporate owners would respond to a real redistribution by working less. If anything, a real land reform may induce large landholders to work and utilize their land more fully for the first time. And at the low end, real transfers may actually increase the effective labor input by improving nutrition.[30]

Therefore the neoclassical reservations about the negative effect of redistribution on saving and effort are empirically weak. The effect depends on the total policy mix.

The Kuznets hypothesis has a firmer empirical basis. As recently estimated, the Kuznets curve shows maximum inequality at about 800 ICP dollars (internationally comparable to 1970 United States dollars) of income per capita (Chenery, 1979, p. 466). But again, the Kuznets curve should be viewed only as a summary of the average historical tendency in the absence of special intervention. Many countries have been and can always be far beyond the curve. In recent decades Yugoslavia, Korea, and Taiwan have been particularly notable for successfully combining growth and poverty reduction.

As Fei, Ranis, and Kuo (1979) have observed on the basis of their uniquely interesting decomposition of the reduction of inequality (measured by Gini G) in Taiwan between 1964 and 1968:

[30] See FAO (1962) and recent theoretical work by Mirrlees (1975).

> The Kuznets effect is a complex phenomenon that needs to be disaggregated. In its extreme form, it really is relevant only to the nonagricultural sector. In countries where agricultural activity is important—as it is in Taiwan and in most LDCs—growth does not necessarily conflict with equity, even before the turning point has been reached.

Fei, Ranis, and Kuo show in fact that in Taiwan the tendency of nonfarm growth to increase G was overpowered by the tendency of more egalitarian farm income growth to reduce it, so that overall G came down.

Agriculture thus happens to be the one sector where the Kuznets law need not operate and growth and equity can be reconciled even in the early stage of development if a suitable pattern of growth is chosen.

Since nearly 80 percent of world poverty is estimated to be in rural areas, it is imperative to fashion a poverty-reducing pattern of agricultural growth. But historical experience also suggests that in the long run the reduction of rural poverty requires a rapid shift from farm to nonfarm activity. For in all countries, at all stages of development, nonfarm income per worker is higher than farm income per worker; and the gap between rural and urban family incomes is eventually reduced only by migration out of rural areas, or by an increase in the proportion of family income derived from nonfarm activity in farm families.

Thus a twofold equity strategy is indicated: (1) to structure equitable agricultural growth; and (2) to accelerate nonagricultural growth and its demand for rural labor as much as possible, outside as well as inside the rural areas.

Equitable agricultural growth in most poor countries of Asia and Latin America essentially requires (1) land reform, especially in regions where extreme inequality in the distribution of land coexists with surplus labor; and (2) a strong preference for small farmers in the distribution of inputs and credit. The growth of nonfarm activity requires (3) rural works to provide infrastructure (water supply, energy, and transport) and social services (health and education) for all rural communities; and (4) the promotion of industry in the rural areas or migration.

There is a very broad-based consensus in the development community about these ingredients of an active redistributive policy, particularly in the rural areas of low-income countries (Chenery, 1979; Adelman and Morris, 1973; World Bank, AOWP, 1975). Therefore, it would suffice to accent very briefly some of these ingredients.

Land Reform

It is obvious, and has been shown, that the distribution of land is the dominant determinant of the distribution of farm income and of access to nonland inputs.[31] Gini coefficients of land distribution generally range from 0.4 in Asian countries where land reform has been carried out to 0.6 and 0.7 in other Asian countries and in parts of Africa, and 0.8 to 0.94 in Latin America (Berry

[31] See Repetto and Shah (1975) and studies cited in Lappe and Collins (1977).

and Cline, 1979). The ranking of their income inequalities is similar (World Bank, 1981, p. 183).[32] Redistribution of land is economically feasible without loss of output because of the existence of the "inverse relationship," that is, the decline in the average productivity of land with an increase in farm size. The evidence on this relationship, estimated with international cross-section data from 41 countries of the developing world, has been summarized elsewhere (Krishna, 1979). National evidence on it covering seven Asian, six Latin American and two African countries has also been presented (Krishna, 1979; Berry and Cline, 1979). Therefore the existence of the inverse relation in most parts of the developing world can hardly be doubted. It implies that a less unequal distribution of a given area of land would increase rather than decrease the productivity of land, provided, of course, that there is nondiscriminatory access to nonland inputs. This was indeed its effect in postwar Japan, Taiwan, and Korea.

But the prospect for land reform does not depend in the least on the intellectual demonstration of its economic feasibility. It depends entirely on the political power acquired by the rural poor—the small farmers and the landless—through conscientization, unionization, and struggle (Barraclough, 1978; Lappe and Collins, 1977; Janvry, 1982). The national and international intelligentsia interested in land reform (or redistribution of nonland inputs, for that matter) have to think of funding and promoting an adequate network of organizations for bringing about the universal unionization of the rural poor in the shortest possible time. Redistribution in the modern industrial sector has been associated with unionization and struggle, and it is hardly likely to come about without unionization and struggle in the rural areas.

If and where land reform is undertaken, it is critical for its success that its implementation is not left to institutions dominated by the old oligarchy or a bureaucracy linked with it. It should be entrusted to local committees with at least 50 percent direct representation of the beneficiaries or the intelligentsia sympathetic to them. This was the case in the land reform committees in Japan.

The Small Farm Sector

Preference for small farms in the allocation of nonland inputs seems to be a widely accepted policy: rightly, because a majority of farms in low-income countries are small [33] (50 to 94 percent in Asia) and most of the rural labor force (50 to 90 percent of the total in Asia) is on these farms. In densely populated countries the share of the labor force in agriculture declines slowly; until it does, the small-farm structure is there to stay and the only policy option is to maximize its productivity by means of adequate investment in technological and institutional change. The inverse relationship justifies the investment.

Since credit is the key to the use of modern nonland inputs (assuming that the inputs are available) an equity policy must give to small farms a highly

[32] Separate rural income distribution data are not available for most countries.

[33] Less than 2 hectares or 5 acres.

preferential access to credit. "Credit reform" in this sense is a good substitute for land reform, insofar as modern inputs are a good substitute for land. But credit distribution is skewed. "It is common to find 70 percent or 80 percent of small farmers in a given country with virtually no access to institutional credit" (World Bank, 1975, p. 5). Since institutional credit itself is a small fraction of total rural credit, the small farmers' share in the total can hardly be more than 10 percent except in a few countries.

Three requirements of a credit policy to reverse this situation need to be stressed.

First, at least half, if not more, of institutional credit should be reserved for small farmers. In principle, large farmers should have no claim whatever on low-interest institutional credit provided by the public sector. In equity, they should be required to draw all their credit needs from their own substantial surpluses (which are usually lightly taxed, if at all) or from fully commercial private credit. This requirement will be fulfilled if public sector credit is reserved only for small farmers. The World Bank has successfully applied the principle of reservation, as in its lending to the Agricultural Credit and Refinance Corporation in India.

The principle of reservation has to be extended to the operation of the whole banking system. For it is plain that, left to themselves, commercial banks, and even nationalized banks, would not lend enough to agriculture, and certainly not enough to small farmers. It is only through a policy of reservation—or fixing percentage quotas for agriculture and for small farmers in the total lending of banks by legislation or executive action—that the share of agriculture and of small farmers in total institutional lending has risen in recent years in many countries. Without the minimum necessary compulsion, bankers in developing countries always prefer the soft option of lending to urban industry and trade.

Second, there is a strong case for bringing rural lending into the mainstream of commercial bank lending in every country rather than keeping it as a small, inferior subsector consisting of special institutions. Even if it is true that in some periods and regions commercial bank lending to agriculture may bring lower returns than lending to industry and trade, it is not an argument for the segregation of rural lending into a separate subsector. Rather, it strengthens the argument for pooling rural lending with other lending, because institutions with a large high-return turnover can bear some low-return turnover more easily than institutions forced to specialize in low-return turnover.

Third, in the case of short-term credit to buy modern inputs, the expected additional income itself should be the basis and the security of the credit given, and in the case of medium-term and long-term credit for the purchase of assets, the hypothecation of assets and one or two personal securities or group guarantees, rather than landed security, should be acceptable as collateral.

Finally, banks serving small farmers should transplant onto the national scene a principle with which international development banks already try to operate. They do not wait for projects to come from applicant governments. They send out their own expert technical teams to prepare projects, appraise

and process the projects, and then negotiate and deliver the loans. Development banking for the poor in Asian countries will have to become "borrower-chasing banking" in a similar way. If poor borrowers knew all the technical possibilities, knew how to prepare feasible, bankable schemes and how to do the paper work and the legwork and the lobbying and the bribing required to get loans, they would not be poor. Therefore, much that needs to be done to get a loan has to be done for them by the lenders themselves.

The integration of credit and intensive technical help is also the only answer to the loan recovery problem. Overdue rates tend to be high in small farm credit. But it is remarkable that in some well-administered programs, the overdue rates of share-tenants, marginal farmers, and small farmers have been found to be lower than those of others. In 20 blocks of the West Bengal (India) CADP operation from 1974 to 1977, as much as 84 percent of total lending was channeled to these categories of borrowers with a strong technical and delivery backup. Their overdue rate was only 18.25 percent as compared to 45 percent for other categories of borrowers.[34] In all fairness, high overdue rates should not be regarded as an inherent peculiarity of every small-farm lending operation. If the program itself is efficient in raising borrower incomes substantially with adequate technological and input supply support, there is no reason at all why the delinquency of small farmers should be larger than that of large farmers. In fact there is some basis for the presumption that large-farmer delinquency should be higher because large farmers wield greater political influence. They manage to get repeated loans in spite of default because they often control the lending institutions themselves. The small farmers on the other hand have every reason to repay their loans to be able to get new loans; they have no other leverage. Thus the main answer to the repayment problem lies in maximizing the income effect and increasing the structural efficiency of the credit operation itself.

Leakage of credit earmarked for small farmers is also a serious problem. It can only be reduced by direct and adequate representation of small farmers on the boards of banking institutions.

Rural Works

Any concrete list of rural works always contains (1) land, water, and forest development projects; (2) the construction component of infrastructure development (water supply, energy, and transport); and (3) the construction component of social service development (health and schooling). Each of these activities is clearly productive or essential for raising the productivity of agriculture and decentralizing some industries; yet somehow they are usually treated as unproductive. It should be remembered in this connection that the universal extension of infrastructure and social services to the rural areas was a key factor in bringing about equitable and dispersed agro-industrial growth in Taiwan. Besides being productive, these activities have the merit of being the

[34] See CADP (1978).

only activities in which the surplus labor of small-farm and landless households can be quickly given employment and poverty-line income. Thus just as land reform and credit reform can reconcile productivity and equity in the small-farm sector, rural works schemes can combine them for the poorest landless sector. Two problems usually afflict works projects: the lack of adequate technical input in their formulation and misappropriation of funds. But the answers are obvious: the setting up of good, local project formulation bureaus and vigilance by committees of unionized beneficiaries.

Nonfarm Income

The record of all success cases shows unmistakably that the share of nonfarm income in the income of rural farm families must eventually rise, and migration accelerate, if the rural-urban family income differential is to diminish. From 1967 to 1969 about 45 percent of the income of farm families in Japan and the United States was derived from nonfarm sources (Johnson, 1973, pp. 215–216). In Taiwan the share of rural household income from nonfarm sources increased form 35 to 58 percent from 1964 to 1972 (Fei, Ranis, and Kuo, 1979, pp. 92–93). Such shifts can be regarded as "occupational migration" within the rural areas. Besides such occupational migration, geographical migration occurs, which eventually reduces the share of the rural labor force in the total to a small fraction (less than 20 percent). The two types of migration together ensure that per capita rural consumption is 80 to 96 percent of per capita urban consumption, even though per worker farm productivity remains only 30 to 40 percent of per capita nonfarm productivity even in rich countries such as United Kingdom, United States, and Japan (Johnson, 1973, pp. 215–216).

The policy implication of this dynamics is unambiguous. It is essential for equity that nonfarm sources of income be expanded in the rural areas or barriers to migration be reduced by subsidizing skill development and information flows.

This brief review shows that an economically rational and feasible mix of growth-cum-equity policies for the rural sector does exist. But equity can rarely be a gift from above. The rural poor will have to secure it with their own organized political power.

SUMMARY

The main propositions advanced in this paper are condensed below.

Growth and Investment

The state must steer the broad allocation of national investment, without necessarily undertaking much of it directly, since the market-determined allocation of investment is recognized as nonoptimal even in the neoclassical tradition.

Though agricultural and industrial fundamentalism, overstressing agricultural development or industrialization, is widespread, the empirical relation between agricultural and industrial growth is dominantly complementary in the sense of interdependence for input supplies and final demands.

Modeling of the consistent or optimizing variety (with exogenous or endogenous final demands) can be used to compute balanced sectoral growth rates.

Modeling exercises for some developing countries, the actual experience of these countries in the last two decades, and the historical record of OECD countries suggest that the industrial growth rate is usually at least two times the agricultural growth rate. Typically, while agricultural output grows 2 to 3 percent, industrial production expands 5 to 8 percent a year.

Though the share of agriculture in net output, labor force, and capital stock normally declines all the time due to Engel's law and differential productivity growth, there is a middle phase in which the growth of agricultural output often does and should escalate to 3 to 5 percent.

Contrary to the assumption of some dualist development theorists and planners that the incremental capital-output ratio for agriculture (k) is low (1 to 1.5), it has often been found to be 2.5 to 3, or even more, in the historical record of major OECD countries and Japan, and in the record of many developing countries in the last three decades. Kuznets has shown that k has usually been higher for agriculture than for mining and manufacturing. Recent data also suggest this ranking, at least in some countries and periods.

Long-period East Asian time series point to variations in k over time: it tends to be high in the early phase of infrastructure investments, declines in the middle phase when productivity grows mainly as a result of biochemical input growth, and rises again when extensive mechanization comes along.

With realistic parameters, the required share of agriculture in total investment turns out to be 20 to 22 percent in the early stages of development and then falls to 10 and 4 percent in later stages. Available data show that most low-income developing countries have not been allocating for agriculture even the low percentages of total investment. In this sense they have neglected agriculture and they must consider giving it more priority.

There are large gaps between actual and desirable or potential levels of all major farm inputs—irrigation (water control), fertilizer, high-yielding seeds, research, extension, energy, transport, health services, and primary education. Estimates show that vast investments would be needed (often at rising cost per unit of input) and should be mobilized to bridge these gaps. But the real cost of output should still fall because productivity should rise faster than the cost per unit of resources.

Price Policy

Numerous studies have generated more than a hundred estimates of the price elasticities of supply (usually positive) of single crops. But only two well-known studies of aggregate farm-supply response in developing countries are available. These two studies, and new equations for India and Japan, indicate,

at best, a single-period elasticity of the order of 0.2 and a long-period elasticity of about 0.4. Assuming the long-run elasticity to be even 0.6 (allowing for some technological shifts to be price-induced), if price policy is regarded as the sole instrument to promote growth, the real terms of trade of agriculture will have to be raised 5 percent a year for agricultural output to grow at 3 percent a year (from the fifth year onward). The inflation implied would be impractical in poor countries on both macroeconomic and political grounds.

Since the elasticity of output with respect to major autonomous technological shifters, such as the irrigation ratio, has been found in many studies to be 1.5 to 5.5 times the price elasticity, a balanced policy should stress a technology policy more than price policy, while the price environment is kept as favorable as possible.

As the return-cost ratio is a function of the terms of trade and total factor productivity, the profitability of agriculture can rise, and has risen in many countries, when innovation raises productivity, even if terms of trade stagnate.

The present state of information does not permit decomposition of price-induced and autonomous elements of innovation. But historical evidence on the utter inadequacy and irrationality of public investment in technology in poor countries contradicts extremist views of price movements alone being sufficient to produce needed innovations. Other evidence also refutes the alternative extremist view that price movements are irrelevant.

With all its limitations, average full cost of production, including the market valuation of family resources, remains the least unsatisfactory principle for determining support prices for commodities whose production is to be stimulated. Purchases for government distribution systems should, however, be made at going market prices, so that farmers alone are not taxed for consumer subsidies.

Research on determining consistent sets of administered prices for important related products is needed to prevent socially undesirable shifts in the product mix.

Taxation and Trade Policy

None of the classical liberal or Marxist arguments for tax discrimination against the agricultural sector, which continue to be influential in some developing countries, stands critical examination. In direct taxation, the principles of horizontal and vertical equity are sufficient; they require nondiscriminatory fiscal treatment of farm and nonfarm incomes and surpluses. And in indirect taxation, the bulk of farm output deserves lighter treatment, as it consists of wage goods and intermediate inputs.

The systematic exploitation of farmers by national (private and state) and multinational monopolies and oligopolies is objectionable from the allocative as well as the distributive standpoint, and opinion needs to be created in favor of maximum pluralism in marketing.

There are at least five sets of theoretically well-established arguments for trade taxation as a first-best or second-best policy: 1) the employment argu-

ment; 2) the self-reliance argument; 3) the terms-of-trade argument; 4) the "infant-industry" type of argument; [35] and 5) the defense-against-foreign-barriers argument. Like the OECD countries, the developing countries would continue to have interventionist trade policies on the basis of these arguments. Therefore trade policies cannot be judged solely with the theoretical paradigm of a nonexistent free-trade world. They should rather be derived from multiple-objective programming exercises for individual countries.

Project and sector analysis using border prices as the sole or main criterion carries a heavy implicit free-trade bias and can no more be accepted by developing countries than by developed countries.

Analyses assuming producer and consumer surpluses as measures of welfare are also subject to severe limitations. In imperfect, underdeveloped, or fragmented markets, ordinates of supply curves do not represent social opportunity costs. The required zero-income-effect demand elasticities are not available, particularly where farm products form a high proportion of expenditure. Distribution of gains among income classes is not measured by the gains of producers and consumers. And general equilibrium effects are ignored by sector analyses. Therefore judgments of policies based on "welfare" analyses must be held for the time being to be premature and nonoperational. Alternative policies need to be evaluated with multiple-objective programming models.

Equity

Recent research casts doubt on the generality of neoclassical assumptions about the negative effects of redistribution on incentives to work and save as well as on Kuznets' U-curve. Saving rates show surprisingly small differences among regions with divergent income levels and Gini coefficients. The institutional and policy environment can raise the rates in relatively poor, and lower them in rich, countries. The work incentives of primary earners do not seem to be affected by redistributive policies.

Some countries, including Yugoslavia, China, Korea, and Taiwan, have successfully reconciled high growth with poverty reduction even in the early stages of development, and Taiwan has demonstrated that, with a suitable growth pattern, the reconciliation is easiest in agriculture.

Apart from the equity argument, there is a strong efficiency argument for land reform, particularly in densely settled regions, because of the well-documented inverse relationship between farm size and productivity per hectare. But land reform will remain a paper promise in most parts of the developing world until the landless are intensely politicized.

Other equity policies have also proved their merit in some regions: preferential allocation of inputs and credit for small farmers; rapid provision of the socio-economic infrastructure (energy, transport, health, and schooling) to rural areas, thereby creating employment and nonfarm income streams for the underemployed; and the removal of barriers to migration. But they will not be

[35] Or its variants derived from the need to foster "learning by doing," external economies, and high technology.

implemented nor benefit the target beneficiaries unless the beneficiaries are enabled to acquire enough political leverage to countervail the power of old and new oligarchies.

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