

13 Resource Flows from Agriculture: Japan and India

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This paper analyzes and compares the experiences of Japan after the Meiji Restoration and of India after Independence with regard to one major facet of agriculture's contribution to industrial development: resource flows from agriculture. To this end, we have pulled together different estimates and sources of piecemeal data to present a more carefully cross-checked and comprehensive treatment of the problem than has been available hitherto.

The political and administrative changes ushered in by the Meiji Restoration of 1868 brought in their wake a profound reordering of Japan's economic arrangements, setting the stage for modern economic growth (MEG) in Kuznets's sense. This transitional period appears to have reached completion with the end of the Matsukata deflation policy in 1885 (Ohkawa and Shinohara 1979). The following half-century saw the transformation of Japan from an agrarian economy to a modern industrial power at a pace till then unknown in human history. The post-Independence period in India is roughly comparable to the post-Restoration period in Japan as a development stage.

There are, however, significant differences in the two countries' heritages and in the growth processes in the periods compared here. Two dissimilarities are particularly important in our analysis. The first is the institutional and technological change within agriculture in Japan during the Tokugawa period, which made possible significant increases in output through intensive application of human labor, for which there is no parallel during the colonial period in India (see Smith 1959). Second, population growth in India since Independence has

In the preparation of this paper, the authors have greatly benefited from the help and suggestions of Professors Kazushi Ohkawa, Simon Kuznets, and Shigeru Ishikawa (who was the main discussant of the paper at the 1982 CA Conference). Helpful comments were also made by other conference participants, especially Professors Gustav Ranis, Hugh Patrick, John C. H. Fei, Juro Teranishi, Nobukiyo Takamatsu, and Yujiro Hayami. Dr Mundle would like to acknowledge a grant from the Japan Foundation. This made it possible for him to visit Tokyo to collaborate with Professor Ohkawa and other members of staff at the International Development Center of Japan in constructing resource-flow time series for Japan.

been much higher than in Japan in the late 19th century, and, again in contrast with Japan's experience, the bulk of the increment has had to be absorbed in agriculture.

We begin by outlining concepts and definitions used in measuring intersectoral resource flows. This framework is then used to analyze Japan and India. Data limitations prevent our drawing firm conclusions. To facilitate further research, these data problems are discussed in some detail for the Indian case. Similar discussion of the Japanese data are available in Mundle and Ohkawa (1979) and the LTES volumes from which the Japanese estimates have been computed. Lack of data also means that for both countries we must take the nonagricultural sector as a whole, rather than only the industrial sector, even though our concern is with agriculture's contribution to industrialization.

Measuring Intersectoral Resource Flows

One facet of agriculture's contribution is its financing of nonagricultural investment. Conceptually, this is equivalent to the excess of total savings in the agricultural sector over and above the total investment in that sector. We refer to this as the savings surplus transferred from agriculture to nonagriculture. There is, however, an altogether different sense in which agriculture may contribute to development of the nonagricultural sector, arising from the intersectoral flow of commodities. The flow of investment leads to a growing stock of physical capital. To set this plant and machinery in motion requires a flow of materials, including agricultural raw materials. There also is a need for labor, which in turn requires wage goods, especially food. In a closed economy, this growing flow of commodities - food and raw materials - must be supplied by the domestic agricultural sector.

Purchases of one sector's products by another can be analyzed in terms of trade between the sectors. Imports from agriculture by the nonagricultural sector (purchases of agricultural products by nonagriculture) can be paid for with exports of the nonagricultural sector's products, such as farm machinery, fertilizers and pesticides, and manufactured consumer items. To the extent the value of exports from agriculture exceed its imports, there is a net transfer of resources out of agriculture. This export surplus is the excess of aggregate expenditure by nonagriculture over and above the value added or income originating in that sector. This is partly reflected in the savings surplus, partly in a net flow of factor incomes and other current transfers, partly even in unilateral nonmarket deliveries of, say, food from a farm household to members who have migrated to cities.

This kind of resource contribution is a balance of trade surplus between agriculture and nonagriculture. We refer to this resource flow as the trade surplus, to distinguish it from the savings surplus. The concept of resource transfer in this sense was first articulated in modern development literature by Ishikawa (1967),

though a very similar concept is evident in the classical literature in Preobrazhensky's notion of primitive socialist accumulation (Preobrazhensky 1965). For a full discussion of the concept, and its relationship to the savings surplus, in the context of the intersectoral balance of payments, see Ishikawa (1967), Lee (1971) and Mundle and Ohkawa (1979).

Because peasant households are usually the units of consumption as well as of production, a farm household sector (henceforth, farm sector) is analytically meaningful. Data on disposable income, consumption, and savings can be put together for this sector without much difficulty. On the other hand, data on output, costs of production, value added (income by sector of origin), and capital formation are usually available only by sectors of production; here agriculture appears as a natural boundary. Thus our empirical analysis will be of the farm sector in some places, and of the agricultural sector in others. This procedure is unavoidable, though it does raise some difficult problems of interpretation.

Resource Flows in Japan, 1887-1937

For our purpose, three features of the Japanese growth experience are important. The trend of the rate of growth increased progressively, irrespective of the method used to measure it; there were, however, long alternating phases of upswings and downswings. The trend acceleration in output growth was accompanied by rising growth rates of investment as well as by a larger share of investment in value added; investment also exhibited up- and downswings. Growth was accompanied by a major shift in industrial structure.

The share of agriculture in net product declined from 42 percent in 1887 to 18 percent in 1938. If the nonagricultural sector is divided into industrial and services sectors, only the industrial sector increased its share of NDP (net domestic product) (from 20 percent in 1887 to over 50 percent in 1938); the share of the services sector actually declined marginally. Services were initially dominant in the nonagricultural sector, accounting for nearly two-thirds of value added in the sector, and over a third of total domestic product. Within the industrial sector, it was manufacturing, rather than the construction and the facilitating industries (transportation, communications, public utilities, etc.), that recorded the main thrust of expansion, rising from 13 percent of NDP in 1887 to 35 percent in 1938. (See Ohkawa and Rosovsky 1973; Ohkawa and Shinohara 1979.)

The Trade and Savings Surpluses of Agriculture

For Japan, estimates of the savings surplus are available for both the farm and the agricultural sectors. However, in the case of the trade surplus, reliable estimates for the farm sector are lacking, as crucial data on costs of production, particularly relating to purchased and self-supplied components, are not available

for the nonagricultural activities of farm households. The available estimates of trade surplus are presented in table 13.1.

In the period 1882-92, the estimated market surplus of the agricultural sector was nearly one-half of value added in agriculture; agricultural imports formed an equally high proportion of value added in agriculture, indicating the two sectors were already fairly integrated and interdependent. This also means nonagriculture was by and large paying for its purchases from agriculture with its own sales to the latter, so the net resource contribution - the trade surplus - of the agricultural sector was marginal.

Data on the savings surplus have been summarized in table 13.2 for the agricultural sector and the farm sector. The savings surplus of agriculture (K_a) was positive throughout the period 1888-1938, but, until the turn of the century, it was at the modest level of only about a tenth of gross value added in agriculture.

Table 13.3 relates the trade surplus (B) to income originating in the non-agricultural sector (Y_{na}), and thereby to the size of that sector's market, and also relates the savings surplus (K_a, K_f) to the magnitude of aggregate saving in the agricultural sector as well as to aggregate investment in the nonagricultural sector.

Prior to the turn of the century, agriculture's trade surplus (B) was less than 1 percent of income originating in nonagriculture (Y_{na}); it subsequently rose to a high of 6 percent in the period 1908-17, but then turned negative in the 1920s. This cannot be regarded as a major transfer of resources for industrialization. However, the picture is different when we turn to the savings surplus in agriculture (K_a or K_f). With direct taxes treated as compulsory savings and thus included in the sector's total savings, over 40 percent of agricultural savings were being transferred out of the sector toward the end of the 19th century. At the beginning of the 20th century, this proportion was more than 50 percent and, by World War I, it exceeded 70 percent. In short, less than one-third of agricultural savings was being put back into agriculture; the rest was evidently channeled into industrialization.

The proportions are almost identical for the farm sector up to 1913-17, and differ significantly only in the interwar period, when the transfer was lower, though still substantial. Until the end of the 19th century, 90 percent or more of the transferred savings was through taxation. Thereafter, the proportion of taxes declined significantly, although in 1913-17 it was still 50 percent.

Interpretation of the Japanese Experience

It would not be surprising if the transfer of such a large part of agricultural savings had adverse consequences on agricultural development. This has been suggested as an important factor in the sector's stagnation in the 1920s (see Mundle and Ohkawa 1979). Oshima (1965) has pointed out that the squeeze on agriculture contributed significantly to agrarian unrest during this period, and thus had important political consequences. The focus of this chapter, however,

Table 13.1: Average annual trade surplus of agriculture, Japan, 1888-1937^a

Time period	X_a	C_s	R_s	I_s	E	C_p	R_p	I_p	M	G_a	B	Y_a
1888-92	473	210	51	24	188 (47.0)	104	61	23	188 (47.0)	1	-1	400
1893-97	645	276	66	33	270 (48.8)	147	81	34	262 (47.4)	1	7	553
1898-1902	948	373	94	41	440 (53.7)	249	108	48	405 (49.5)	2	33	819
1903-07	1,237	498	115	49	575 (54.3)	296	144	59	499 (47.2)	2	74	1,058
1909-12	1,544	551	124	53	816 (61.8)	416	190	71	677 (51.3)	5	134	1,320
1913-17	1,850	770	135	55	890 (56.8)	317	249	80	646 (41.3)	6	238	1,566
1918-22	4,205	1,193	275	111	2,626 (73.5)	1,656	567	186	2,409 (67.5)	22	195	3,571
1923-27	4,005	1,002	228	133	2,642 (76.7)	1,901	569	214	2,684 (77.9)	59	-101	3,444
1928-32	2,844	665	174	105	1,900 (79.0)	1,435	454	177	2,066 (85.9)	68	-234	2,404
1933-37	3,331	782	192	86	2,271 (81.6)	1,502	505	177	2,184 (78.5)	62	25	2,782

^a In million yen at current prices; numbers in parentheses are percentages

X_a

Value of agricultural production

subscript s

Components supplied from within the sector

subscript p

Components purchased from outside the sector

C

Consumption

R

Current inputs

I

Investment goods

E

Marketed surplus (exports) of agriculture

M

Total imports (purchases) by agriculture on private account ($M = C_p + R_p + I_p$)

G_a

Central and local government investment expenditure in agriculture (including forestry and fisheries, but the value of these components is so negligible that it makes little difference). Includes items such as riparian public works, agricultural capital formation, and natural disaster reconstruction other than buildings

B

Trade balance (surplus) of agriculture ($B = E - M - G_a$), with any difference due to rounding

Y_a

Gross value added in agriculture

Source: Munde and Ohkawa 1979

is on the impact of savings transferred from agriculture on accumulation outside the sector, and on industrialization. Consequences within the sector are not analyzed, but two will be raised as part of the context.

The financial outflow to the government cannot be interpreted as having played the same role as private savings transfers, and some authors, such as Teranishi (1976), have argued that the net outflow as taxes ought not to be counted at all as part of agriculture's contribution to financing industrial growth. The case for exclusion is essentially that a substantial part of the land tax financed current government expenditure rather than capital expenditure. However, government investment was a substantial part of aggregate investment, and was mainly used for building infrastructure essential for industrialization. Because the land tax provided a large part of revenue, we can regard it as a contribution made by agriculture, even though it was not wholly (or even largely) used directly for industrial investment.

When the tax component is added to Teranishi's estimates in table 13.4 (lines 4 and 5), the results are broadly similar to our estimates in table 13.3. Moreover, as a cross-check against our first set of estimates, two estimates are given in table 13.3 for the proportion of nonagricultural investment financed by agriculture, as explained in the notes to this table. These estimates suggest that after the turn of the century, 20-30 percent of nonagricultural investment was financed by savings transferred from agriculture.

In the case of private savings taken by itself, our estimates show there was actually a net inflow to the farm (agricultural) sector up to the end of the 19th century. However, from the beginning of the 20th century, and especially after the end of the Meiji period (1911), the net outflow was quite substantial until the 1920s, when there was again a net inflow. Teranishi's estimates also show net lending by the farm sector via the capital market was substantial only between 1913 and 1917, when it accounted for nearly 18 percent of the sector's total savings, and during 1918-22, when it was over 31 percent. This decade was the key period in Japan's industrialization drive, prior to World War II.

Net lending, however, is not a full measure of the total private savings flow out of agriculture, as it excludes direct private investment by farm households in nonagricultural activities. Going by the different estimates of net lending and total private savings transfers presented in tables 13.2, 13.3, and 13.4, it appears that such direct investment across sectors, not reflected in transactions through the capital markets, was indeed quite substantial. Most likely, it financed small-scale manufacturing or service activities in the rural or traditional sector. However, we leave this as a hypothesis for further research.

Our entire discussion has been confined so far to flows measured at current prices. In terms of actual purchasing power, we need to look at the index for the terms of trade in the final column of table 13.3 (P_f). It fluctuated around a trend in favor of agriculture at least up to the end of the 1920s. Our estimates of the resource transfer out of agriculture must therefore be interpreted in the context of a secular pattern, where, say, a yen's worth of purchasing power

Table 13.2: Average annual savings surplus of agriculture and farm sector, Japan, 1888-1937^a

Time period	Y_a	T_a	C_a	S_a	I_a	G_a	$S_a - I_a - G_a$	K_a
1888-92	400	59 (155.3)	314	27	47	1 ^b	-21	38
1893-97	553	65 (104.8)	423	65	67	1 ^b	-3 ^b	62 ^b
1898-1902	819	97 (91.5)	622	100	89	2 ^b	9	106
1903-07	1,058	114 (74.0)	794	150	108	2	40	154
1908-12	1,320	154 (68.0)	967	199	124	5	70	224
1913-17	1,566	167 (49.4)	1,087	312	135	6	171	338
1918-22	3,571	288 (41.7)	2,849	722	297	22	403	691
1923-27	3,444	310 (69.7)	2,903	541	347	59	135	445
1928-32	2,404	213 (127.6)	2,100	304	282	68	-46	167
1933-37	2,782	198 (53.4)	2,284	498	263	62	172	371

(a) Agricultural sector

(b) Farm sector

Time period	Y_f	T_f	C_f	S_f	I_f	G_f	$S_f - I_f - G_f$	K_f
1888-92	555	59 (115.7)	478	58	65	1	-8	51
1893-97	724	65 (108.3)	572	87	91	1	-5	60
1898-1902	1,079	97 (68.9)	818	164	118	2	44	141
1903-07	1,390	114 (57.0)	1,046	230	142	2	86	200
1908-12	1,737	154 (52.2)	1,273	310	164	5	141	295
1913-17	2,202	167 (35.2)	1,531	504	191	6	307	471
1918-22	4,843	288 (56.1)	3,904	651	404	22	225	513
1923-27	4,526	310 (164.0)	3,820	396	458	59	-121	189
1928-32	3,203	213 (-407.3)	2,799	191	377	68	-254	-41
1933-37	3,502	198 (127.1)	2,816	488	332	62	94	292

^a In million yen at current prices; figures in parentheses are percentages

^b Correction of misprint in source

subscript a Agricultural sector

subscript f Farm sector

Y Income

T Direct taxes paid, assumed to be the same for both the agriculture and farm sectors, and interpreted as a forced savings transfer

C Consumption

S Savings ($S_a = Y_a - T_a - C_a$ and $S_f = Y_f - T_f - C_f$)

I Private investment

G Government investment

K Savings surplus transferred from the sector ($K_a = T_a + S_a - I_a - G_a$ and $K_f = T_f + S_f - I_f - G_f$)

Sources: For agricultural sector: Mundie and Ohkawa 1979; for farm sector: Ohkawa, Shimizu, and Takamatsu 1978

Table 13.3: Relative size of the trade surplus and the savings surplus of the agricultural and farm sectors, Japan, 1888-1937^a

Time period	Y_a	B/Y_a (%)	Y_{na}	B/Y_{na} (%)	$K_a/(S_a + T_a)$ (%)	$K_f/(S_f + T_f)$ (%)	I_{na}
1888-92	400	0.3	577	0.2	41.9	43.6	100
1893-97	553	1.1	875	0.7	46.9	39.5	201
1898-1902	819	4.0	1,447	2.3	53.8	54.0	290
1903-07	1,058	7.0	1,998	3.7	58.3	58.1	374
1908-12	1,320	10.2	2,673	5.0	63.5	63.6	603
1913-17	1,566	15.2	4,012	5.9	70.6	70.6	920
1918-22	3,571	5.5	9,780	2.0	68.4	54.6	2,692
1923-27	3,444	-2.9	11,259	-0.9	52.3	26.8	2,363
1928-32	2,404	-9.7	10,978	-2.1	32.3	-10.1	2,002
1933-37	2,782	0.9	13,927	0.2	53.3	42.6	3,256

Time period	$F_a(1)$ (%)	$F_a(2)$ (%)	S_{na}	S_{na}/Y_{na} (%)	I_{na}/Y_{na} (%)	K_a/Y_{na} (%)	P_f
1888-92	-14.0	-13.0	114	19.8	17.3	6.6	100.0
1893-97	10.9	-23.9	194	22.2	23.0	7.1	112.1
1898-1902	21.0	6.2	225	15.5	20.0	8.3	124.5
1903-07	26.7	5.3	177	8.9	18.7	7.7	128.7
1908-12	23.5	23.5	393	14.7	22.6	8.4	135.6
1913-17	28.4	9.4	997	24.9	22.9	8.4	124.0
1918-22	30.9	32.0	2,101	21.5	27.5	7.1	148.6
1923-27	14.5	30.2	1,642	14.6	21.0	4.0	148.0
1928-32	7.4	20.2	1,848	16.8	18.2	1.5	118.2
1933-37	25.4	39.5	2,421	17.4	23.4	2.7	133.7

^a In million yen at current prices, except where percentages are noted

- Y_a Income of the agricultural sector
- Y_{na} Income of the nonagricultural sector, Mundle and Ohkawa 1979
- I_{na} Investment in the nonagricultural sector; derived by subtracting ($I_a + G_a$) (given in table 13.2) from gross fixed capital investment for the whole economy (which is inclusive of military investment, and adjusted for duplication of construction estimates) as indicated in PJED: table A-38 col. 28
- S_{na} Savings in the nonagricultural sector; derived by deducting agricultural savings S_a from total savings of the economy, from PJED: table A-5 column 1
- F_a (1) and (2) are alternative estimates of the percentage of nonagricultural investment financed by agriculture; $F_a(1) = I_{na} - S_{na} - \text{net borrowing from abroad}$, from PJED: table A-5 column 2; $F_a(2) = I_{na} - S_{na} - \text{long-term capital inflows from abroad}$, from PJED: table A-31 column 10
- P_f Terms of trade between the farm sector and the nonfarm sector, from Ohkawa, Shimizu, and Takamatsu 1978: Statistical Appendix table 4

Sources: Sources are included with the explanation of variables
Only variables not explained in tables 13.1 and 13.2 are explained here:

Table 13.4: An alternative estimate of financial resource flow from the farm sector, Japan, 1899-1933^a

	1899-1902	1903-07	1908-12	1913-17	1918-22	1923-27	1928-33
(1) Net increase in financial assets of farm sector (K)	1	13	4	43	208	24	-11
(2) Investment in farm sector + $K (= S)$	121	159	105	240	658	524	403
(3) K/S (%)	0.8	8.2	2.3	17.9	31.6	4.6	-2.7
(4) Net outflow through direct tax from agriculture net of subsidies (T)	104	115	154	166	290	291	188
(5) $S + T (= S')$	225	274	259	406	948	815	591
(6) $(T + K)/S'$ (%)	46.7	46.7	61.0	51.5	52.5	38.7	62.1

^a In million yen at current prices, unless a percentage

Source: Teranishi 1976: tables 1 and 6

transferred to the nonagricultural sector in 1916 secured only two-thirds the volume of agricultural commodities it had bought at the end of the Matsukata deflation, 30 years earlier. In other words, the resource transfer in real terms did not increase as dramatically as the current price estimates indicate. Moreover, the generation of a savings surplus in agriculture was itself facilitated by this shift in terms of trade.

Nevertheless, whether measured in real terms or in current prices, the savings transfer out of agriculture forms a considerable part of total investment in non-agriculture. As a proportion of total savings in agriculture itself, it was even higher. Because, according to our estimates in tables 13.1 and 13.3, there was no trade surplus of comparable magnitude, the balance of payments on current and capital account implies there were substantial flows to agriculture in the form of factor payments and other transfer payments on current account. This is another tentative inference which we will leave for further investigation.

Resource Flows in India, 1951-71

Post-Independence in India is the period roughly comparable to the half-century of industrialization following the Meiji Restoration in Japan. First, the rates of growth recorded by the Indian economy during those years were substantially higher than those recorded during the colonial period, and compare favorably to the rates attained in Japan during the late 19th century. Second, the rate of investment rose sharply.¹

However, the pace of structural change appears to have been much slower than in Japan. As a consequence, the weight of the agricultural sector in the total economy, much greater in India even at the outset (about 54 percent of NNP in India in 1951/52, compared to 42 percent of NDP in Japan in 1887), remained considerably larger than during the comparable periods in Japan.

Agriculture's Trade Surplus

The earliest attempt to estimate the intersectoral balance of trade for India was by Ishikawa (1967) for the year 1951/52. Subsequently, Thamarajakshi (1969) computed terms of trade between agriculture and industry, and to compute the base-year weightings, she calculated intersectoral commodity flows in the base

¹ Official estimates of Indian national income prepared on a systematic basis begin with 1948-49. For the earlier period, some estimates of individual researchers are available, and Mukherjee (1969) has collated some of this material to put together a national-income series starting in 1857. We have relied on his estimates for the period before 1948-49, and on the official series for the period thereafter.

Gross capital formation as a proportion of gross domestic product (both valued at current prices) rose from about 10 percent in the early 1950s to more than 20 percent in the late 1970s. However, gross fixed capital formation in real terms did not rise as fast.

year. From these, we get balance of trade estimates for 1951/52 and 1960/61 at 1960/61 prices. The only available time-series of intersectoral commodity flows is that computed by Mundle (1981b) for the period between 1951/52 and 1970/71.

Ishikawa's estimate is not comparable to the other two, as it pertains to the farm households sector rather than to agriculture as a branch of production *vis-à-vis* nonagriculture, which is the demarcation used in the Thamarajakshi and Mundle estimates. Moreover, Ishikawa had to rely on the All India Rural Credit Survey of 1951/52, which (as Ishikawa points out) is a weak data base for his exercise, and in any case quite different from the sources available later to Thamarajakshi and Mundle. Although the two latter exercises are more similar, even they have differences. Both used the same National Sample Survey series of consumer expenditure to measure the consumer goods flows, but their sources of data and methods of estimating the intersectoral flow of producer goods are different. Also, there are some differences in the classification of commodities, agricultural and nonagricultural populations, etc. Thus, none of the three balance-of-trade estimates are fully comparable.

For 1951/52, all the estimates show a net inflow (trade deficit) for agriculture. Ishikawa's estimate is only at current prices and shows a smaller net commodity inflow than Mundle's current price estimate. Thamarajakshi's is only at constant prices, and shows a smaller net inflow than Mundle's constant price estimate. However, for 1960/61, Mundle shows a net commodity outflow (a trade surplus) for agriculture, whereas Thamarajakshi indicates a trade deficit.

We primarily use Mundle's series for analyzing the movement of the balance of trade, and Thamarajakshi's for the movement in sectoral terms of trade, as they are the only time-series so far available. It is important to remember that both the balance of trade and terms of trade series have had to be constructed by putting together different sources of data, of varying reliability, which are sometimes also conceptually incompatible. These problems are discussed by Mody (1979 and 1980) and Mundle (1980a and 1980b).²

The most significant problem for our purposes is the choice of prices. Both Thamarajakshi and Mundle used the NSS series for calculating consumer-goods flows; this series uses purchase prices. However, the intersectoral flow of producer goods is given at producers' prices. The complete balance-of-trade estimate, which puts together these two sets of data, is therefore either an underestimate or an overestimate, depending on which set of prices is considered appropriate.

²The NSS (National Sample Survey) series is the only available time-series on patterns of consumption expenditure. Compiled by the National Sample Survey Organization, the samples are designed to minimize estimation bias, but it has been claimed that the survey underrepresents upper-income consumption brackets. If this is true, the estimates overstate expenditure on necessary items such as food grains, while understating items like manufactured consumer durables. Thus intersectoral commodity-flow estimates based on the NSS overstate agriculture's exports and understate its imports. However, both the fact of the bias as well as its magnitude remain controversial questions.

If, in keeping with the social accounting convention adopted in industrial economies, distribution margins are treated as value added in nonagricultural activities the Thamarajakshi and Mundle estimates of agriculture's exports are overestimates, as they include the trade margin on outflows of consumption goods. If, on the other hand, the traders' margin is treated, along with landlords' rent and moneylenders' interest, as claims on the income originating in agriculture, then these estimates understate agriculture's exports, as they do not include the trade margin in the export of producer goods. The choice depends on how one views the formation of prices and income distribution in agrarian economies like India.

The time-series of the trade surplus of agriculture (taken from Mundle) is given in table 13.5. At current prices, the agricultural sector had an initial trade deficit, but moved to a surplus by the mid-1950s; in absolute terms, the surplus peaked in the mid-1960s, and then declined. At its peak, the trade surplus was a little over 10 percent of value added in agriculture, larger than in Japan at any time in the period 1888-1937, but it declined rapidly, to around 3 percent, by 1970/71. The turn in the balance of trade from the mid-1960s is sharper in the constant-price series.

This raises two questions: first, as to the factors underlying the movements in the trade balance, particularly the upward turn from the mid-1950s, and the downward turn a decade later; and second; whether this indicates a savings flow from agriculture during the earlier phase, more or less as in Japan between 1903 and 1922. We start with an analysis of the underlying factors, and then consider the estimates of the intersectoral savings, before offering an answer to the second question.

Interpretation of Movements in the Trade Balance

Estimates of exports and imports at constant prices (using Thamarajakshi's deflators) are given in table 13.6. The effects of changes in the terms of trade are eliminated when constant prices are used; these are discussed later. It is evident from the sale and purchase ratios in the table that agriculture has been closely linked with the nonagricultural sector since Independence, in terms of commodity flows. In most years, half or more of agriculture's net output (value added) was delivered to nonagriculture as food or raw materials (column 6). This ratio was a little higher than the import (purchase) ratio (final column), except at the beginning and end of the period. Both ratios are lower than for Japan, though not much lower than Japan in the decade 1888-97. The main difference is that in Japan, both the sale and purchase ratios have a clear secular tendency to rise, whereas for India, no uniform trend appears. With regard to commodity composition, in the Indian case, agriculture has throughout been a net importer of consumer goods (columns 2 and 7), whereas it was a net exporter of producer goods (columns 3 and 8).

Table 13.5: Intersectoral balance of trade and the terms of trade, India, 1951-74

Year	Trade surplus of agriculture (in Rupees crore)		Terms of trade	
	At current prices	At constant (1960/61) prices	Thamarajakshi series (1960/61 = 100)	Kahlon-Tyagi series (1970/71 = 100)
1951/52	-926.3 (-22.6)	-787.6	100.7	
1952/53	-789.7 (-18.4)	-952.6	99.1	
1953/54	-205.0 (-4.4)	-353.5	103.7	
1954/55	-7.7 (-0.2)	70.5	97.0	
1955/56	-5.4 (-0.1)	151.6	94.8	
1956/57	488.0 (9.0)	475.7	102.5	
1957/58	289.3 (5.6)	367.9	98.5	
1958/59	334.4 (5.2)	314.1	101.7	
1959/60	533.6 (8.3)	515.1	101.7	
1960/61	695.4 (9.9)	695.4	100.0	
1961/62	775.9 (10.7)	751.8	100.7	
1962/63	816.9 (11.0)	848.7	99.1	
1963/64	902.7 (10.5)	946.1	97.4	
1964/65	816.9 (7.8)	358.6	108.7	
1965/66	1,014.9 (9.9)	256.9	114.5	
1966/67	900.3 (7.4)	-34.9	123.1	
1967/68	662.7 (4.4)	-544.8	125.0	115.6
1968/69	641.0 (4.3)	-524.2	116.3	105.1
1969/70	763.9 (4.6)	-713.9	125.7	101.8
1970/71	602.9 (3.4)	-762.9	127.3	100.0
1971/72			120.1	97.5
1972/73			118.9	103.6
1973/74			136.9	108.3
1974/75			133.9	99.6

The figures for the trade surplus have been reached after adjusting the export and import values of table 13.6 for international trade; for details, see Mundle 1981b

Figures in parentheses denote percentages of net value added in agriculture for the period 1951/52-1959/60, and of gross value added in agriculture for the period 1960/61-1970/71

The constant price estimates are based on the same deflators used by Thamarajakshi for computing her terms of trade series

One crore is ten million

Sources

Trade surplus of agriculture: Mundle 1981b: tables 5.5 and 5.6 respectively

Terms of trade: Thamarajakshi 1977: table 2; Kahlon and Tyagi 1980: table 6

Table 13.6: Commodity exports and imports of agriculture in India, 1951/52-1970/71^a

Year (1)	Export of consumer goods (2)	Export of producer goods (3)	Total exports from agriculture (4) (5)	Import of consumer goods (6)	Import of producer goods (7)	Total imports by agriculture (8) (9)
1951/52	1,518	729	2,248 (42.3)	2,328	408	2,736 (51.5)
1952/53	1,670	762	2,431 (43.6)		356	3,721 (58.6)
1953/54	1,899	818	2,716 (45.2)	2,786	306	3,092 (51.4)
1954/55	1,902	917	2,819 (46.6)	2,512	324	2,836 (46.9)
1955/56	2,061	1,036	3,097 (51.2)	2,715	341	3,056 (50.5)
1956/57	2,115	1,152	3,267 (51.4)	2,603	349	2,952 (46.4)
1957/58	2,063	1,235	3,298 (54.5)	2,700	291	2,992 (44.6)
1958/59	2,130	1,357	3,487 (52.0)	2,857	296	3,153 (47.7)
1959/60	2,157	1,499	3,655 (55.3)	2,871	266	3,137 (47.4)
1960/61	2,303	1,680	3,983 (56.8)	2,933	256	3,189 (45.5)
1961/62	2,381	1,719	4,100 (57.9)	3,024	349	3,373 (47.7)
1962/63	2,398	1,767	4,165 (60.3)	2,968	352	3,320 (48.1)
1963/64	2,517	1,816	4,333 (61.0)	2,965	411	3,376 (47.5)
1964/65	2,487	1,848	4,336 (56.0)	3,382	503	3,885 (50.2)
1965/66	2,453	1,823	4,276 (63.7)	3,412	500	3,912 (58.3)
1966/67	2,480	1,802	4,282 (64.6)	3,491	599	4,050 (61.1)
1967/68	2,703	1,789	4,492 (58.4)	4,180	702	4,882 (63.4)
1968/69	2,729	1,790	4,519 (57.9)	4,187	792	4,979 (63.8)
1969/70	2,826	1,785	4,611 (55.7)	4,381	926	5,307 (64.1)
1970/71	2,943	1,732	4,675 (52.5)	4,387	1,073	5,459 (61.3)

Figures in parentheses denote the sales ratio (middle column) and purchase ratio (right-hand column) expressed as percentages of value added in agriculture

^a In Rupees crore, at 1960/61 prices; one crore is ten million

Source: Mundle 1981b: tables 3.13, 4.7 and 4.8

To explain the changes that produced a sharp turn in the overall balance of trade of the agricultural sector in the mid-1960s, we divide the 20-year reference period into two subperiods at 1964/65, and, in table 13.7, compare growth rates for agricultural imports and exports, and a number of variables that could have affected them.

It was the increase in the growth rate of consumer-goods imports that really accounted for the greater part of the increase in the overall rate of growth of imports into agriculture. The sharp acceleration in imports of producer goods was only a minor factor, as the weight of producer goods was small even toward the end of the period. There is some controversy about whether the agricultural growth rate declined, but there has been no claim the rate increased. The increase in the rate of consumer-demand growth is therefore probably accounted for by the positive income and substitution effects of a shift in the terms of trade in

Table 13.7: Intersectoral community flows and related variables in India, growth rates, 1951-71

<i>Variables</i>	<i>Annual compound rates of growth</i>		<i>Direction of change</i>
	<i>1951/52-1964/65</i>	<i>1964/65-1970/71</i>	
Gross product in agriculture	2.9	2.4	decrease
Input/output ratio (nonagriculture to agriculture)	-1.6	11.3	increase
Agriculture's imports of consumer goods	2.9	4.4	increase
Agriculture's imports of producer goods	2.7	13.5	increase
Total imports by agriculture	2.7	5.8	increase
Gross product in nonagriculture	5.8	3.9	decrease
Input/output ratio (agriculture to nonagriculture)	1.6	-4.8	decrease
Agriculture's export of consumer goods	3.9	2.9	decrease
Agriculture's export of producer goods	7.4	-1.1	decrease
Total exports by agriculture	5.2	1.3	decrease

Annual compound growth rates r have been calculated using the formula $Y_t = Y_0 b^t$ where $b = 1 + r$

All variables are at constant prices

Source: Mundle 1981b: tables 3,7, 3.13, 4.6-4.8

favor of agriculture, as shown by the Thamarajakshi series in table 13.5. But the series constructed by Kahlon and Tyagi (1980), also given in table 13.5, does not show such a sustained shift. Our explanation must thus be treated as tentative. The higher growth rate of imports by agriculture on account of consumer demand was of course reinforced by the increase in the rate of growth of producer-goods imports, which largely reflected the spread of biochemical technology in agriculture, beginning in the mid-1960s, and the consequent increase in the nonagricultural inputs required per unit of agricultural output.

The growth rate of agriculture's exports of both consumer and producer goods declined sharply. The slower growth of consumer-goods exports, which was the larger of the two components, is explained partly by the slower growth of gross value added in nonagriculture in the late 1960s, reflecting, among other things, some deceleration in the industrial growth rate, and partly, if the Thamarajakshi series is accepted, by the negative income and price effects of the shift in terms of trade. In the case of producer goods, an important additional factor explaining the slower growth of exports is the structural change within the non-agricultural sector: the relative share of agro-based industries, and hence of agricultural inputs into nonagricultural production as a whole, declined (see Mundle 1981a and 1981b).

Table 13.7 shows that the values of almost all the variables that could affect agriculture's imports increased between the two periods, whereas values of all the variables affecting agriculture's exports decreased. The net effect is reflected in the overall balance of trade in real terms shown in table 13.5 (trade surplus of agriculture, at constant 1960/61 prices). It should be emphasized that what is important here is not the absolute value or sign of this variable (these could change with a change in the deflator base year), but the direction of change of the balance over time. From the early 1950s until 1963/64, the entire balance appears to have been moving clearly in favor of agricultural exports; then the balance began to move in the opposite direction.

This turn also appears in the estimates of agriculture's trade surplus at current prices (table 13.5). It does not, however, come out so sharply, because of changes in the price level, particularly the rise in the relative price of agricultural commodities after the mid-1960s, reflected in the Thamarajakshi terms of trade series.

Agriculture's Savings Surplus

Was agriculture's trade surplus, particularly between the mid-1950s and the mid-1960a, indicative of a savings flow from agriculture, as in Japan during the first two decades of the 20th century? This is the question we now address. A major difficulty in answering it is that there are no estimates of savings of either agriculture or the farm sector for the period under review (1951-71). The available estimates are for the rural sector as a whole, and thus include savings from nonfarm business.

A series covering 1950/51-73/74 has been constructed by Krishna and Raychaudhuri (1980: 33) for rural savings and private investment in agriculture. These estimates suggest there was a net excess of rural savings over agricultural investment up to 1955/56, and a net deficit thereafter, except in 1966/67, 1967/68, and 1969/70. The excess in the first few years of the 1950s was in the range of 1.5-2.2 percent of the net value added in agriculture but was negligible in the late 1960s (table 13.8).

One has to be careful drawing inferences from these estimates (Desai 1981). The estimates of rural savings are derived from balance sheets for the rural household sector constructed on the basis of surveys conducted by the Reserve Bank of India for 1951/52, 1956/57, and 1961/62. In these surveys, there has been an obvious underestimation of the financial assets of rural households, and consequently of their net savings. In addition, although the estimate of private investment in agriculture includes physical assets created through use of family labor (following the methods used by India's Central Statistical Organization for the purpose), no allowance has been made for this in the estimates of rural saving (see Panikar 1970; Bhalla 1976).

If the underestimation of the financial assets of rural households was confined to currency or gold holdings (which are notoriously difficult to quantify), one could adjust for year-to-year changes in currency holdings and just ignore

Table 13.8: Rural savings and private investment in agriculture in India, 1951-74^a

<i>Year</i>	<i>Rural savings</i>	<i>Private investment in agriculture</i>	<i>Year</i>	<i>Rural savings</i>	<i>Private investment in agriculture</i>
1950/51	166	59	1962/63	248	303
1951/52	171	100	1963/64	284	348
1952/53	164	57	1964/65	327	434
1953/54	181	100	1965/66	468	559
1954/55	148	105	1966/67	650	630
1955/56	154	136	1967/68	629	623
1956/57	188	233	1968/69	603	672
1957/58	180	182	1969/70	834	820
1958/59	212	246	1970/71	865	968
1959/60	213	248	1971/72	869	934
1960/61	225	296	1972/73	1,125	1,152
1961/62	196	265	1973/74	1,279	1,407

^aIn Rupees crore; one crore is ten million

Source: Krishna and Raychaudhuri 1980: 33, table 13

changes in holdings of gold. But the underestimation we have in mind is more difficult to allow for, as what has been largely left out is informal lending between households within the rural sector. Even as late as 1962, informal (in the sense of being noninstitutional and not government-regulated) intrasectoral loans from landlords, agricultural moneylenders, and friends and relatives accounted for over half of rural borrowings (Mody 1981). Borrowing households are more likely to report the liability than lending households are the asset, and the difference gets treated as an inflow of savings from outside the sector.

Rural household savings could therefore have been in excess of private investment in agriculture in the early 1950s by larger margins than indicated by the series in table 13.8. There could also have been such an excess in subsequent years. On the other hand, the savings estimates pertain to all rural households, whereas the estimates of investment relate to agriculture alone. Whether there would be an overall savings surplus for agriculture, or even the farm sector, taken independently after the necessary adjustments in the savings estimates is difficult to say.

However, Mody has made partial estimates of some major components of the net savings flow into agriculture that adjust for the effects of underreported informal lending within the sector, and for savings in the form of currency. The first of two sets of estimates presented by Mody (1981) is based on data from sample surveys of farm households conducted by the NCAER (National Council of Applied Economic Research) for the years 1962, 1968/69, 1969/70, and 1970/71, adjusted to incorporate currency holdings. The adjustment was based on an earlier NCAER estimate that savings in the form of an increase in currency stock constituted about 30 percent of the change in financial assets of the rural sector in 1962. Mody found very large inflows of saving to the farm sector (table 13.9).

Mody's second set of estimates allows for internal transfers of savings that are not fully reported by lending households. These estimates are based on survey data for farm households collected by the RBI (Reserve Bank of India) for 1951/52, 1961/62, and 1971/72, and the annual balance sheets of cooperative and commercial banks. This set represents estimates of changes over a decade, based on comparisons of the stock of assets and liabilities. The estimate for the decade 1952-62 is open to serious question, as the 1952 survey was not based on random sampling. There are also wide differences between the estimates based on NCAER data and those based on RBI data.

The adjusted estimates based on the RBI surveys for 1961/62 and 1971/72 provide as firm a basis as possible for judging the order of magnitude of net borrowing by the farm household sector. This works out to approximately 830 million rupees per annum over the decade 1962-72. Of this, about 800 million rupees is accounted for by an upward adjustment of the survey estimate of household borrowings to cover the discrepancy between this estimate and the figure reported in the accounts of cooperative and commercial banks. Even the unadjusted survey estimate indicates some net borrowing by the farm sector.

Table 13.9: Estimates of net financial lending by the farm sector in India^a

	<i>Period</i>	<i>Change in financial assets</i>	<i>Change in financial liabilities</i>	<i>Miscellaneous capital transfers</i>	<i>Net borrowing by house- holds</i>
	(1)	(2)	(3)	(4)	(5)
Ishikawa (RBI)	1951/52	15	307	—	292
Ishikawa (RBI)	1956/57	17	183	—	166
Mody (NCAER)	1962	102 (39)	172	25	95
Mody (NCAER)	1968/69	49 (20)	699	4	654
Mody (NCAER)	1969/70	682 (220)	792	-41	69
Mody (NCAER)	1970/71	288 (81)	829	-40	561
Mody (RBI)	1952-62	650	1,463	—	813
Mody (RBI)	1962-72	903	1,731	—	828

Figures in parentheses denote net acquisition of currency holdings
Miscellaneous capital transfers refer to acquisition of financial and physical assets such as through gifts not included under change in financial assets (column 2) in the NCAER surveys

RBI Reserve Bank of India

NCAER National Council of Applied Economic Research

^aIn Rupees crore; one crore is ten million

Sources: Ishikawa 1967: table 4.2; Mody 1981: tables 2 and 14

Whichever source we use, and whatever adjustment we make, the farm sector thus appears to have been a net borrower.

A second aspect of the financial transactions is the changing composition of the sources of credit for farm households. Though sources internal to the farm sector still account for a very large part of rural credit, their share came down from 54 to 44 percent over the decade 1962-71. The share of credit from outside the farm sector has gone up substantially, whereas that of traditional external sources, like professional moneylenders and traders, has either not changed much or declined. The increase in external sources during the decade is accounted for by the modern sector doubling its share from 16 to 32 percent. Within the modern sector, the bulk of the expansion is by cooperatives, which raised their share from 10 to 22 percent and have now come to compete with agricultural moneylenders (at 23 percent) as the largest source of rural credit (Mody 1981: table 6). What is significant about these changes is that the modern sector is entirely dependent on the government. All the components, commercial banks, cooperatives, and insurance companies, are either owned or controlled by the government.

There is substantial evidence from RBI data to indicate the bulk of the finance made available to farm households through these agencies is absorbed by the wealthier 10 percent of farm households (Mody 1981). It is possible a high proportion of the loans is used for nonagricultural activities. To that extent, it is doubtful whether there has been a net inflow to finance agricultural investment, particularly as the estimated flow is not large. Moreover, the proportion of cultivators in the RBI survey reporting capital expenditures fell from two-thirds in 1961/62 to one-half in 1971/72. Real investment declined in most states and, in some, even nominal investment fell. Questions have been raised as to the comparability of the surveys, but the relationship between credit flows and the investment behavior of farm households does need to be examined more carefully.

Our effort to judge from partial indicators the direction and magnitude of savings flows into and out of agriculture has so far considered only credit flows on private and public account. The budgetary operation of the government also could be an important channel. Estimates of the resource flows on government account in India *vis-à-vis* the farm sector are available (Shetty 1971; Mody 1981). Unlike data for Japan, however, Indian estimates include indirect tax revenue collected from the sector, and the current and capital expenditures of the government in agriculture. Despite the inclusion of indirect tax revenue in the flow out of agriculture, the estimates indicate a significant overall inflow. Though the annual rate appears to have declined after 1965/66, the flow has nevertheless continued to be into agriculture, not out of agriculture as in Japan (table 3.10).

The evidence we have put together suggests that there is a substantial flow of savings into the farm sector in India, particularly through public credit agencies, though how much actually was invested in agriculture is difficult to say. In any

Table 13.10: Net resource flows on government account into agriculture in India^a

<i>Time period</i>	<i>Annual tax burden on farm sector</i>	<i>Average annual public expenditure in the farm sector</i>	<i>Average annual net flow of funds on government account</i>
1951/52-1955/56	52	99	47
1956/57-1960/61	84	186	103
1961/62-1965/66	161	343	182
1966/67-1968/69	395	470	75

^aIn Rupees crore; one crore is ten million

Sources: Shetty 1971; Mody 1981

case, there is no evidence of a net savings outflow from agriculture during the 1950s and 1960s.

One further problem remains. The large trade surpluses of agriculture, particularly before the mid-1960s, have to be reconciled with the net flow into agriculture suggested by the different partial estimates of savings flows. The most obvious explanation is that a part of the income originating in agriculture was actually accruing outside the sector by way of rent, interest, and trading profits. To that extent, the estimated trade surpluses are offset by the flow of such factor incomes away from the sector, and do not show up as part of the savings surpluses of agriculture. If this explanation is valid, and the Kahlon and Tyagi (1980) terms of trade series in table 13.5 is correct, the proportion of income flowing away from agriculture in the form of trading profits was rising between 1967/68 and 1973/74, as the margin between farm gate and wholesale prices evidently was widening.

Concluding Observations

It is obvious that savings flows from agriculture made a significant contribution to industrial capital accumulation in Japan, particularly in the early decades of the 20th century, but there is no evidence of a similar savings contribution in India during the corresponding period of the 1950s and 1960s. The scale of savings flow to the nonagricultural sector may have had adverse effects on the development of agriculture in Japan. Similarly, it is possible, given the conditions of Indian agriculture in the 1950s that some flow of savings into the sector was essential to promote agricultural growth. Without that growth, industrialization would have strained the economy more severely, and run into serious bottlenecks, including the lack of demand for industrial products, even sooner than it has. This is especially so in view of the evidence that a significant portion of the income originating in agriculture has in fact not accrued to that sector, thereby diminishing its capacity to self-finance needed investment.

Compared to Japan, allowance must also be made in India for the large call on resources made by irrigation, based on construction of extensive reservoirs and canals (Vaidyanathan and Jose 1978); and for a much higher population growth in India, particularly in the rural sector, attributable to the impact of public-health measures on mortality rates. It is thus hazardous to draw any unqualified conclusions about the desirability of what has happened in intersectoral resource flows in either country during the periods under review.

At the same time, it is apparent that institutional factors, such as the size-distribution of operational holding in Japan and India, also contributed significantly to differences in bias in the technology adopted for increasing agricultural output, and thereby to differences in resource requirements. It is well known there was a strong bias toward labor-intensive techniques in Japan and, with the population dependent on agriculture not growing significantly in the 20th

century, a shortage of labor and a rise in wage rates favored a structure of small farms based mainly on the labor of peasant nuclear families. Thus, while ownership holdings were concentrated in a small proportion of agricultural households, operational holdings were relatively evenly distributed, as large holders normally let out their lands in small parcels. This stands in contrast to the size-distribution of operational holdings in India, where, in many regions, the skewness in the distribution is very nearly the same as the distribution of ownership holdings (Raj 1970).

Such contrasts in the conditions of agricultural growth, and consequent differences in the resource requirements of the sector, are reflected in sharply differing savings-allocation policies by the governments. In Japan, the high land tax served as the major instrument of savings transfer from agriculture, especially during the Meiji period (1868-1911).

In India, the national government has also intervened actively in the inter-sectoral transfer of savings, but the thrust has been in the opposite direction. Taxation of land has almost been abandoned since Independence, whereas government expenditure on irrigation and other agricultural projects has been substantial. The bulk of external credit to the farm sector - over half in the early 1980s - has come from government institutions. Indeed, it needs to be emphasized that most of the evidence indicating a net flow of funds into Indian agriculture relates to flows from government sources; relatively little is known about private flows, particularly direct private investment across sectors. It is even possible part of the credit extended from government sources to farm households is used for nonagricultural purposes such as agro-processing factories, warehousing and cold storage, truck fleets, etc.

Ishikawa (1981) has drawn attention to two phases in Japan's agricultural growth before World War II; these are distinguished by differences in technology. In the first phase, up to about 1911, increased output was associated with technological changes centered on conversion of wet paddy fields to dry fields and the associated use of animal power instead of human labor for plowing. The increase in use of purchased manufactured inputs like chemical fertilizers or capital goods such as farm machinery was minimal. In the phase after 1911, a biochemical technology similar to the contemporary Green Revolution, along with some mechanization, increased purchases from nonagriculture. (For a somewhat different view, see Hayami et al. (1975).)

While this change in the role of manufactured inputs in agriculture bears some resemblance to the two phases in Indian agricultural growth before and after the mid-1960s, what is of note in the Japanese case is the element of genuine technological progress in both phases. This made possible a certain degree of balanced expansion of agriculture's export surplus, even with the sector's increased import requirements after 1911. As Ishikawa puts it,

[that] technological progress accounted for more than half the rate of growth of agricultural output is one of the most essential aspects of the

contribution that agriculture made to the success of industrialization. If the rate of technological progress had been very low, the amount of agricultural products which agriculture was able to supply the emerging industrial sector under the given prices would have been much smaller. (Ishikawa 1981: 184)

(Technological progress here refers to an upward shift of the production function, as distinguished from a movement along a production function.)

What perhaps makes Indian agricultural growth since Independence qualitatively different is the absence of genuine technological progress in the phases both before and after the Green Revolution. In the 1950s and early 1960s, there was on the whole no change of technology at all, only the application of old technology on a wider land base. The subsequent technological change, a shift to the new biochemical mix of inputs, has been without technological progress in the sense defined here. The use of fertilizers and pesticides increased, together with the use of high-yield variety seeds. The beginning of mechanization also occurred. But acreage expansion has leveled off, and productivity increased much less than the use of the new inputs. Hence, agricultural output growth did not rise and the growth of the sector's exports actually slowed, which led to the shift in the sector's trade balance.

Genuine technical changes similar to Japan's second phase did not take place in India. Why? A proper exploration of the reasons requires a probe deep into questions not only of the social and political biases of the particular features of land structure and education in the Indian context today, but also the differences in the conditions of international technology transfer experienced by Japan and India. Although this is beyond the scope of this essay, we can suggest one aspect of the answer.

In India, the new technology has been embodied largely in imported fertilizers and pesticides, or in imported technologies for producing these inputs, and partly in the research and development work of universities and research centers set up under the same broad stimulus. The learning-by-doing factor, adaptation of new techniques through the feedback received from farmers' experience, has been relatively weak. In Japan, the leading agents of technological change were the farmers; imports played a relatively minor role (Ishikawa 1981). The initiative in Japan was local and was thus much more responsive to local needs, and the manner of adaptation of the new technology ensured maximum efficiency.

There remain a number of issues, analytical as well as empirical, which must be resolved before we can offer clear answers to questions of agricultural surpluses. At the empirical level, we need, for both India and Japan, estimates that distinguish between flows through government and private channels, as well as between different strata or groups within each sector. Especially important here are the trader's margins and other components of factor income payments or current transfers between sectors. The net-income transfer, conceptually equal to the difference between the trade surplus and the savings surplus, was generally very

large in both countries. Yet no attempt has been made so far to measure this flow, or its components, except as a residual balancing item. If we can learn a little more about these important gaps in data, the contrasting experiences of India and Japan could lead to useful insights into the role of agricultural surpluses under Asian conditions of development.

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