Impact of Rural Industrialization on Village Life and Economy: A Social Accounting Matrix Approach*

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I. Introduction

The effects of decentralization of industries on rural development is one of the neglected topics in the recent development literature of India. The impact of industrialization was studied intensively in the early 1970s when the second and third Five-Year Plans were emphasizing creation of large industrial units, especially basic industries. It was observed that such industrialization did not have much effect on rural development.[1] Industrialization was taking place in a few pockets, having little impact on the surrounding areas.

The industrial scene in the 1990s is quite different. Instead of basic industries, chemical, engineering, and consumer goods industries dominate the scene. Industries are being established outside the megalopolies; many small industrial towns have come into existence, and the process of rural industrial decentralization appears under way. So far there has been little analysis of how such decentralization of industries is affecting rural growth and development. Some indications of the impact do exist in the literature, but they do not take into account important factors such as the development of the service sector around the factory and the changes in the village employment structure and in the socioeconomic fabric of village life.[2]

In this study we attempt to revive the debate on the impact of decentralization of industries on rural development. We compare two relatively similar Indian villages, one close to a factory (Boriya) and another located in a remote area (Aurepalle), to provide insights on the socioeconomic effects of industrial decentralization. Field surveys of socioeconomic characteristics of households were conducted in both villages to understand better how people's outlook, the employ-

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ment structure, and other socioeconomic indicators are affected by proximity to a factory.

To capture the socioeconomic interdependence and structure of the two villages, corresponding village-level Social Accounting Matrices (SAMs) are constructed. As the SAM gives both the sectoral origin and distribution of incomes by socioeconomic household groups in the village, the impact of salaries earned by village workers from a nearby factory on total incomes and income distribution can readily be analyzed. The data required to build the SAMs come mainly from the village-level studies data collected by the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) for the year 1989–90. The institute compiled data on crop production, livestock, maintenance, and taxes specifically for these two villages. The data for nonfarm activities were collected by us in 1991; the figures were deflated to make them comparable with the ICRISAT data. Since village-level consumer expenditure data were not available, state averages for rural consumers from the National Sample Survey consumer expenditure data were used.

The SAM multipliers reflect the strength of the linkages among the different sectors of a village economy. The linkages are shown in the form of increase or decrease in the incomes of different accounts as one rupee is injected into an account. These multipliers are used to compare the effect of factory salaries vis-à-vis other village production activities on the poor. The village SAM multiplier literature has been based so far on fixed price (unconstrained) multipliers, assuming perfectly elastic supply, and constrained multipliers, assuming that some sectors (e.g., agriculture) face totally inelastic supply. In this study, a methodological novelty is introduced in allowing a limited amount of, rather than no, excess capacity to prevail for some sectors. In this sense this approach is a generalization of the results obtained previously by S. Subramanian and E. Sadoulet and by B. Lewis and E. Thorbecke.[3] Following the multiplier analysis of the impact of rural industrial decentralization, we undertook a complete cost and benefit analysis, including the computation of indirect effects of a project with the help of SAM multipliers, for four different development projects to determine which policy intervention might be most effective in generating output growth and poverty alleviation. These projects are industrial decentralization, irrigation, and two forms of the Integrated Rural Development Program (IRDP).

The results of the study are discussed in the following sections. The second section describes the socioeconomic characteristics of the two villages and discusses the impact of decentralization of industries on the attitudes of people as well as on the labor market. The third section presents and compares the two village SAMS. The fourth section is devoted to the multiplier analysis. The fifth section compares

the impact on output and poverty alleviation of the four alternative projects mentioned above. The article ends with some conclusions.

II. The Socioeconomic Characteristics of the Villages

Boriya is located just 3 kilometers away from a margarine-producing factory and 45 kilometers north of Ahmedabad, a major industrial city of India, in the state of Gujarat. Aurepalle, on the other hand, is located in a remote area in Andhra Pradesh, where the nearest industrial establishment is about 40 kilometers away. Both villages are fairly comparable in agroclimatic conditions. But because of the proximity to the factory, the villagers of Boriya have come into close contact with the outside world. The effects of such contact are reflected on the differences that prevail at the social level in the two villages.

The caste system exists in both villages, but in Boriya the dominance of the upper caste is much weaker than it is in Aurepalle. The main reason for this is that, in Boriya, an increasing number of individuals is taking up nontraditional jobs that are not caste-specific. Also, the villagers have realized that educated people stand a better chance of getting a job. Therefore, most of the children, irrespective of their caste and class, are sent to school. Boriya dwellers depend on the market developed around the nearby factory for most of their consumption needs. Even for entertainment, the most popular activity is to watch movies in the theater located next to the factory. Thus Boriya interacts more with the outside world and is also more dependent on it compared to Aurepalle.

Aurepalle is more traditional. Young adults join their traditional caste occupations. The importance of education is not yet recognized by the lower caste people; only about half (43%) of the lower caste children go to school. The village is more inward-looking than Boriya. Its people depend mainly on the village tradesmen for their consumption needs. Their main entertainment comes from drinking toddy (an alcoholic drink) that is tapped from trees by the toddy tappers of the village. Most of the needs of the population are satisfied from within the village.

Significant changes in the labor market are noticeable following the establishment of a factory in close proximity to a village. Closeness to a factory offered alternative sources of employment and credit to the Boriya villagers, thus reducing their dependence on landlords and the need to work as bonded laborers. After the factory came into existence, the market that evolved around the factory provided strong competition to the products made by the Boriya carpenters—the main village artisans. Consequently, their number declined. However, alternative employment opportunities became available in the factory and its surrounding informal sector. The growth of informal-sector activities has been much faster than the decline in the traditional occupa-

tions; hence, the transition was not painful for the villagers. Regression analysis shows that participation in non-farm-sector jobs is determined by the level of education and the sex of the individual. As the factory does not distinguish between castes in its hiring practices, and the jobs are lucrative enough to attract even landlords, caste and the size of landholding are no longer important determining variables.

In Aurepalle's labor market, some traditional exploitative labor arrangements like bonded laborers, who do not have the freedom to choose another employer or to refuse to work, and patron-client relationships, where the upper caste people are served by the lower caste and remuneration is decided by tradition, continue to prevail. Traditional caste occupations flourish in Aurepalle. Many of these occupations do not provide full-time employment, and many artisans live below the poverty line. Participation in the nonfarm sector, as demonstrated by regression analysis, is mainly determined by caste and the size of landholding. The large landholders hardly ever participate in the nonfarm sector. The nonfarm sector consists mainly of traditional caste occupations (e.g., barbers, washermen, toddy tappers, and shepherds). Thus only people from specific castes are engaged in non-farm-sector activities.

Table 1 shows the distribution of incomes among household groups in the two villages.[4] Total village incomes are Rs 2,529,821 and Rs 2,447,653, respectively, for Boriya and Aurepalle.[5] Given population sizes of 1,191 and 1,599, per capita income works out to be Rs 2,124 for Boriya and Rs 1,531 for Aurepalle. A significant part of Boriya's income (50%) comes from outside, 80% of which consists of salaries earned from factories. In Aurepalle, the great bulk of the income (90%) originates within the village.

Mainly because more job opportunities are available to the residents of Boriya than to those of Aurepalle, fewer people live below the poverty line (44% of the population) in the former than in the latter (52% of the population). However, it is interesting to note that the Gini coefficient of inequality calculated from the incomes of the sample households is the same for both villages (.42). The distributionally sensitive J. Foster, J. Greer, and Thorbecke index of poverty is higher for Aurepalle (.15) than for Boriya (.10), reflecting a greater degree of deprivation in Aurepalle.[6] The availability of outside salaries reduces inequality between the household groups but tends to increase the inequality of incomes within the groups. Table 1 reveals that the inequality between household groups is smaller in Boriya than in Aurepalle. The gap in per household income between the highest and lowest landholding class is higher in Aurepalle (Rs 11,151) than in Boriya (Rs 9,460), mainly because the poor have been able to improve their status with the help of factory salaries.[7] At the same time, the variance in incomes has increased within the household groups that have members

TABLE 1

DISTRIBUTION OF INCOMES AMONG HOUSEHOLD GROUPS IN THE VILLAGES

LANDHOLDING CLASS*	NUMBER OF HOUSEHOLDS		POPULATION		TOTAL INCOME (in Rupees)		INCOME PER HOUSEHOLD (in Rupees)		PER CAPITA INCOME (in Rupees)	
	Boriya	Aurepalle	Boriya	Aurepalle	Boriya	Aurepalle	Boriya	Aurepalle	Boriya	Aurepalle
Landless	70	89	326	387	511,483	628,085	7,307	7,057	1,569	1,623
Small farmers	79	197	380	866	708,675	1,045,421	8,971	5,307	1,865	1,207
Medium farmers	49	55	236	262	538,376	444,991	10,987	8,091	2,281	1,698
Large farmers	46	20	249	84	771,287	329,156	16,767	16,458	3,098	3,918
Total	244	361	1,191	1,599	2,529,821	2,447,653	10,368	6,780	2,124	1,531

* In the SAM tables that follow (tables 2, 3, 5 and 6), the four respective landholding classes are represented as follows: landless, small farmers, medium farmers, large farmers.

working in the factory. Thus within-class inequality is higher in Boriya than in Aurepalle but interclass inequality is lower, resulting in a similar total inequality of incomes in both villages, as judged by the Gini coefficient. A more detailed discussion of the structure of the two village economies and the incomes of the villagers follows in the next section.

III. The Social Accounting Matrices of Boriya and Aurepalle for 1989–90

The SAMs for Boriya and Aurepalle are given in tables 2 and 3, respectively. A SAM provides a comprehensive and detailed picture of all transactions taking place in an economy. The major transformations appearing in the SAM are (1) the allocation of value added to factors (labor and capital) by production activities yielding the pattern of factor use and the consequent factorial income distribution; (2) given the household resource endowment and factor ownership (in particular, the amount of land owned and the amount of human capital possessed by households), the factorial income distribution, mapped into the distribution of household income earned by the distinct socioeconomic household groups; and (3) the corresponding expenditure patterns (consumption on different goods and services, savings, direct taxes, and imports) of the various socioeconomic groups. The rows of the SAM show the receipts or incomes of each account, while the columns describe the expenditures made by the accounts. Since the SAM follows the principle of double entry bookkeeping, each row total is the same as its corresponding column total.

In tables 2 and 3, the first eight rows and columns represent production activities (namely, dry agriculture; wet agriculture; livestock; agricultural services; household industries [called village production in the tables]; services such as that of barber, doctor, etc.; trade; and dairy). The next two rows and columns show government activities, that is, grants from the state government and the transactions of the ration shop maintained by the government. Rows 11–17 in table 2 (11–16 in table 3) are commodities accounts and rows 18–21 are factor accounts (17–21 in table 3), which are followed by institutions—the four landholding household classes and the village government. Some other accounts, such as maintenance, stock, capital, and rest of the world (e.g., imports into and exports out of the respective villages), appear in rows and columns 27–30.

The relative importance of different production activities (derived from the SAMs) is given in table 4. Total production in three sectors (dry and wet agriculture and agricultural services) contributes 44% and 21%, respectively, to Boriya's and Aurepalle's village GDP.[8] In addition, livestock's contribution to GDP is 20% in Boriya and 10% in Aurepalle, making the combined farm sector the largest sector in both

villages. However, the nonfarm sectors are also very important for the village economies. The importance of the factory for Boriya becomes clear as the outside income from salaries amounting to Rs 1,016,699 (not shown in table 4 as it is not part of the village GDP but shown in the SAM tables 2 and 3) exceeds the value of crop production, making it the most important source of income for the villagers. Because of its remote location, Aurepalle has developed a different kind of nonfarm sector. The value of production of its household industries is as high as that of crop production, and the volume of trade handled by its trading sector is more than the total crop production of the village.

The first two rows of the two village SAMs show that irrigation is more widespread in Boriya (67% of the sample gross cropped area) compared to Aurepalle (27% of the sample gross cropped area). Except for the large landlords, few farmers can afford to introduce irrigation in Aurepalle, because dry agriculture is not very profitable and few credit sources are available. But in Boriya, people have invested in irrigation from the salaries earned in the factories. Once irrigation is introduced, use of other complementary modern agricultural inputs becomes more profitable. A comparison of the first two columns of the village SAMs reveals that Boriya uses more modern agricultural inputs than does Aurepalle.

The comparison of the fourth columns in the two SAMs reveals that agricultural services are more commercialized in Boriya than in Aurepalle. A water market (for irrigation) exists in the former; tractors and threshers are regularly hired out. In Aurepalle, however, all the water for irrigation comes from owned wells, and there is no market for tractor services.

In contrast, the household industries' sector is much more developed in Aurepalle than in Boriya (col. 5 in table 2 and col. 7 in table 3). With its varied caste mix and traditional economy, Aurepalle has many artisans, such as goldsmiths, basket makers, carpenters, potters, and weavers, as well as shepherds and toddy tappers. As mentioned earlier, the occupation of carpenters has declined in Boriya because of competition from the market close to the factory. Hence, the artisans' and craftmen's contribution to village production is 19% in Aurepalle while it is almost nonexistent in Boriya.

The service sector in both villages (col. 6 in table 2 and col. 8 in table 3) includes flour mill owners as well as some skilled service persons such as doctors and electricians. Proximity to the factory has generated some highly remunerative nontraditional services, such as bicycle repairing (to serve the workers who commute to the factory on bicycles) and labor contracting (the contractor organizes casual daily workers hired by the factory in addition to permanent workers). Similar opportunities do not exist for the Aurepalle service people.

TABLE 2

SOCIAL ACCOUNTING MATRIX FOR BORIYA, 1989 (in Rupees × 10^2)

	PRODUCTION ACTIVITIES										COMMODITIES						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Production activities:																	
1 Dry agriculture	0	0	0	0	0	0	0	0	0	0	61	53	183	84	0	0	0
2 Wet agriculture	0	0	0	0	0	0	0	0	0	0	3,890	0	2,949	1,249	0	0	2
3 Livestock	0	0	0	0	0	0	0	0	0	0	0	0	4,389	0	881	0	36
4 Agricultural services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,746	0	0
5 Village production	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 Services	0	0	0	0	0	0	0	0	0	0	0	0	0	2,065	0	0	0
7 Trade	0	0	0	0	0	0	0	0	0	0	179	155	2,914	833	0	0	0
8 Dairy	0	0	0	0	0	0	0	0	0	0	0	0	4,717	0	0	0	0
9 Government services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 Ration shop	0	0	0	0	0	0	0	0	0	0	1,257	0	265	566	0	0	0
Commodities:																	
11 Cereals	14	303	68	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 Pulses	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 Other food	7	90	0	0	0	0	0	4,389	0	0	0	0	0	0	0	0	0
14 Nonfood	+	2	2,649	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 Agricultural input	204	5,188	0	91	0	0	0	0	0	0	0	0	0	0	0	0	0
16 Houses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17 Durables	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Factors of production:																	
18 Hired male	16	246	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 Hired female	+	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 Salary	0	0	0	0	0	0	0	67	303	37	0	0	0	0	0	0	0
21 Rent	62	369	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Institutions:																	
22 Landless	0	0	394	0	0	351	294	148	0	160	0	0	0	0	0	0	0
23 Small farmers	80	248	652	170	0	892	312	0	0	183	0	0	0	0	0	0	0
24 Medium farmers	2	733	619	633	20	333	116	0	0	113	0	0	0	0	0	0	0
25 Large farmers	−29	742	917	2,624	0	400	58	0	0	117	0	0	0	0	0	0	0
26 Village government	9	63	0	0	0	0	0	0	1,078	0	0	0	0	0	0	1,078	0
Miscellaneous:																	
27 Maintenance	5	83	7	229	0	70	0	0	0	0	0	0	0	0	0	0	0
28 Stock	0	0	0	0	0	0	0	34	0	6	0	0	0	0	0	0	0
29 Capital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30 Rest of India	0	0	0	0	0	20	3,301	79	0	2,046	3,412	1,073	5,694	5,359	856	0	182
31 Total	382	8,090	5,305	3,746	20	2,065	4,080	4,717	1,381	2,661	8,799	1,281	21,111	10,156	5,483	1,078	220

TABLE 2 (*Continued*)

	Factors of Production				Institutions					Miscellaneous				Total
	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Production activities:														
1 Dry agriculture	0	0	0	0	0	0	0	0	0	0	0	0	0	381
2 Wet agriculture	0	0	0	0	0	0	0	0	0	0	0	0	0	8,090
3 Livestock	0	0	0	0	0	0	0	0	0	0	0	0	0	5,306
4 Agricultural services	0	0	0	0	0	0	0	0	0	0	0	0	0	3,746
5 Village production	0	0	0	0	0	0	0	0	0	20	0	0	0	20
6 Services	0	0	0	0	0	0	0	0	0	0	0	0	0	2,065
7 Trade	0	0	0	0	0	0	0	0	0	0	0	0	0	4,081
8 Dairy	0	0	0	0	0	0	0	0	0	0	0	0	0	4,717
9 Government services	0	0	0	0	0	0	0	0	72	0	0	0	1,309	1,381
10 Ration shop	0	0	0	0	0	0	0	0	0	0	0	0	573	2,661
Commodities:														
11 Cereals	0	0	0	0	1,198	1,418	1,019	1,213	0	0	0	0	3,566	8,799
12 Pulses	0	0	0	0	280	355	268	369	0	0	0	0	0	1,283
13 Other food	0	0	0	0	2,391	3,588	2,605	3,762	0	0	0	0	4,278	21,110
14 Nonfood	0	0	0	0	1,098	1,710	1,426	2,204	0	1	0	0	1,067	10,157
15 Agricultural input	0	0	0	0	0	0	0	0	0	0	0	0	0	5,483
16 Houses	0	0	0	0	108	0	0	0	0	0	970	0	0	1,078
17 Durables	0	0	0	0	5	2	5	19	0	0	0	189	0	220
Factors of production:														
18 Hired male	0	0	0	0	0	0	0	0	111	0	0	0	1,244	1,617
19 Hired female	0	0	0	0	0	0	0	0	56	0	0	0	292	371
20 Salary	0	0	0	0	0	0	0	0	44	0	0	0	10,167	10,618
21 Rent	0	0	0	0	0	0	0	0	0	0	0	0	0	431
Institutions:														
22 Landless	1,116	230	2,251	0	0	0	0	0	108	0	0	0	70	5,122
23 Small farmers	421	122	3,850	67	0	0	0	0	0	0	0	0	120	7,117
24 Medium farmers	65	11	2,268	299	0	0	0	0	0	0	0	0	180	5,392
25 Large farmers	16	7	2,250	65	0	0	0	0	0	0	0	0	560	7,727
26 Village government	0	0	0	0	21	23	31	48	0	0	0	0	0	2,351
Miscellaneous:														
27 Maintenance	0	0	0	0	0	0	0	0	0	0	0	0	0	394
28 Stock	0	0	0	0	0	0	0	0	957	0	0	0	0	997
29 Capital	0	0	0	0	20	19	38	111	0	0	27	0	0	215
30 Rest of India	0	0	0	0	0	0	0	0	1,004	373	0	27	0	23,426
31 Total	1,618	370	10,619	431	5,122	7,115	5,392	7,727	2,352	394	997	216	23,426	

NOTE.—Column sums and row sums may differ slightly due to rounding off errors. + indicates a positive number smaller than 50 rupees. Column headings are the same as those of rows with the corresponding numbers.

TABLE 3

SOCIAL ACCOUNTING MATRIX FOR AUREPALLE, 1989 (in Rupees × 10^2)

	Production Activities										Commodities					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Production activities:																
1 Dry agriculture	0	0	0	0	0	0	0	0	0	0	403	134	610	976	0	0
2 Wet agriculture	0	0	0	0	0	0	0	0	0	0	4,120	26	85	1,835	0	+
3 Livestock	0	0	0	0	0	0	0	0	0	0	0	0	2,317	0	1,671	12
4 Agricultural services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	540	0
5 Trade	0	0	0	0	0	0	0	0	0	0	0	0	4,538	4,824	0	0
6 Dairy	0	0	0	0	0	0	0	0	0	0	0	0	928	0	0	0
7 Village production	0	0	0	0	0	0	0	0	0	0	0	0	95	7,447	0	0
8 Services	0	0	0	0	0	0	0	0	0	0	0	0	0	3,575	0	0
9 Government services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 Ration shop	0	0	0	0	0	0	0	0	0	0	1,072	0	1,178	864	0	0
Commodities:																
11 Cereals	20	181	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 Pulses	6	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 Other food	85	2	0	0	621	920	0	0	0	0	0	0	0	0	0	0
14 Nonfood	19	31	1,366	0	0	0	413	0	0	0	0	0	0	0	0	0
15 Agricultural input	1,212	2,189	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 Durables	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Factors of production:																
17 Hired male	126	102	0	0	10	0	0	0	456	0	0	0	0	0	0	0
18 Hired female	59	927	0	0	0	0	0	0	171	0	0	0	0	0	0	0
19 Farm servant	68	276	35	0	0	0	0	0	0	0	0	0	0	0	0	0
20 Salary	0	0	0	0	0	24	0	0	617	5	0	0	0	0	0	0
21 Rent	194	32	0	0	0	0	238	0	0	6	0	0	0	0	0	0
Institutions:																
22 Landless	0	0	260	0	1,536	0	763	1,405	0	598	0	0	0	0	0	0
23 Small farmers	−201	264	707	48	394	0	4,003	1,435	0	1,073	0	0	0	0	0	0
24 Medium farmers	402	576	772	277	67	0	1,144	291	0	148	0	0	0	4	0	0
25 Large farmers	93	1,323	838	215	0	0	53	107	0	48	0	0	0	0	0	0
26 Village government	4	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous:																
27 Capital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28 Maintenance	35	143	23	0	0	0	0	0	0	0	0	0	0	0	0	0
29 Stock	0	0	0	0	0	−16	0	0	411	0	0	0	0	0	0	0
30 Rest of India	0	0	0	0	6,734	0	1,006	337	0	3,055	4,377	908	1,097	1,683	1,189	236
31 Total	2,122	6,064	4,001	540	9,362	928	7,620	3,575	1,655	4,933	9,971	1,067	10,848	21,208	3,400	248

TABLE 3 (*Continued*)

	Factors of Production					Institutions					Miscellaneous				Total
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Production activities:															
1 Dry agriculture	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,123
2 Wet agriculture	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,066
3 Livestock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,001
4 Agricultural services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	540
5 Trade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,362
6 Dairy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	928
7 Village production	0	0	0	0	0	0	0	0	0	0	0	78	0	0	7,621
8 Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,575
9 Government services	0	0	0	0	0	0	0	0	0	0	0	0	0	1,655	1,655
10 Ration shop	0	0	0	0	0	0	0	0	0	0	0	0	0	1,818	4,933
Commodities:															
11 Cereals	0	0	0	0	0	1,947	3,764	1,282	513	0	0	0	0	2,263	9,971
12 Pulses	0	0	0	0	0	295	470	191	99	0	0	0	0	4	1,067
13 Other food	0	0	0	0	0	2,048	3,220	1,411	958	0	0	0	0	1,583	10,848
14 Nonfood	0	0	0	0	0	1,966	2,948	1,526	1,590	7	0	44	0	11,297	21,208
15 Agricultural input	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,400
16 Durables	0	0	0	0	0	3	5	4	13	0	224	0	0	0	249
Factors of production:															
17 Hired male	0	0	0	0	0	0	0	0	0	0	0	14	0	324	1,031
18 Hired female	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,157
19 Farm servant	0	0	0	0	0	0	0	0	0	0	0	0	0	378	756
20 Salary	0	0	0	0	0	0	0	0	0	18	0	0	0	1,478	2,208
21 Rent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	471
Institutions:															
22 Landless	383	299	378	535	61	0	0	0	0	0	0	0	0	62	6,281
23 Small farmers	649	810	379	696	24	0	0	0	0	0	0	0	0	173	10,454
24 Medium farmers	0	49	0	664	26	0	0	0	0	0	0	0	0	30	4,450
25 Large farmers	0	0	0	246	359	0	0	0	0	0	0	0	0	10	3,291
26 Village government	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26
Miscellaneous:															
27 Capital	0	0	0	0	0	23	47	36	119	0	0	0	389	0	613
28 Maintenance	0	0	0	0	0	0	0	0	0	4	0	0	0	0	206
29 Stock	0	0	0	0	0	0	0	0	0	−7	0	0	0	0	389
30 Rest of India	0	0	0	0	0	0	0	0	0	0	389	69	0	0	21,080
31 Total	1,032	1,158	757	2,141	470	6,279	10,454	4,450	3,292	22	613	205	389	21,077	

Note.—Column sums and row sums may differ slightly due to rounding off errors. + indicates a positive number smaller than 50 rupees. Column headings are the same as those of rows with corresponding numbers.

TABLE 4

CONTRIBUTION OF SECTORS TO THE VILLAGE GDP

SECTOR	CONTRIBUTION TO GDP (in %)	
	Boriya	Aurepalle
Dry agriculture	1.36	5.32
Wet agriculture	28.90	15.21
Livestock	20.00	10.45
Agricultural services	13.37	1.00
Household industries	.00	19.11
Services	7.37	8.96
Trade	14.56	23.47
Government service	4.93	4.15
Ration shop	9.51	12.33
GDP	100.00	100.00

Also, most of the services in Aurepalle are rewarded on the basis of tradition rather than market forces; many individuals providing services in Aurepalle are poor. Their counterparts in Boriya are better off, as their services are sold in the nearby market. Dairies (col. 8 in table 2) are more developed in Boriya. This is not surprising because Gujarat has the most successful dairy cooperative movement in India. Village trade is relatively much more important in Aurepalle (col. 5 in table 3) than in Boriya (col. 7 in table 2), as the residents of the former, because of its remote location, have to depend on their trades people to supply practically all their needs. In Boriya, on the other hand, households purchase most of their consumption needs from the market near the factory.

The next account in the SAMs consists of government services, which include maintaining the ration shop (which provides some items at a subsidized price) and executing some government development projects. The treatment of investment transactions in the capital account of the SAMs in tables 2 and 3 is somewhat unorthodox. The usual procedure is to have the capital account record the sectors of origin of investment goods but show neither the sectors of destination of investment nor the consequent increase in production resulting from such investment. Without an explicit link between investment and production, the multipliers are to some extent underestimated. We have used the accounting concept of depreciation to deal with this problem. To derive the amount of depreciation per year, the present value of the producer and consumer durables is divided by the expected life of the durables. Households that enjoy the benefits of these durables are recorded as spending the annual amount of depreciation. The remaining amount of the investment on durables is put under "stock," available for use in future years. The benefits in terms of increased

output derived by activities using producer durables and capital goods (e.g., tractors) are incorporated in the SAMs as annual returns on the initial investment.

Remittances from outside are very small in both villages. But the salaries earned by unskilled laborers from Boriya have the same impact on the village economy as an injection of income through remittances from household members who have migrated to other parts of the country or abroad (as I. Adelman, E. Taylor, and S. Vogel show with respect to Mexican village migrants).[9] However, the important difference is that the commuting laborers from Boriya continue to reside in their own homes and engage in an intersectoral rather than an interregional migration pattern. One important advantage from a societal standpoint of this pattern, compared with seasonal or permanent migration, is that it reduces urban congestion and spares resources that would otherwise have had to be provided for housing and a variety of other urban infrastructural facilities. At the same time, this circular commuting intersectoral migration provides new skills and contributes human capital to the rural residents.

IV. Multiplier Analysis

To convert the SAM into a multiplier framework, the first question to address is which accounts should be considered endogenous and which exogenous sectors. The exogenous sectors in the village SAMs are the rest of the world (i.e., rest of India), the central and state government services, and the ration shop. All other accounts are treated as endogenous. The SAM is converted into a matrix of average expenditure propensities by dividing each endogenous element in the transaction matrix by its respective column sum. This yields a submatrix A_n, which represents the average expenditure propensities of the endogenous accounts. The accounting multiplier matrix can be derived from A_n. However, the accounting multiplier matrix assumes that average expenditure propensities are the same as marginal expenditure propensities, that is, that all income elasticities of demand are unitary. To make the analysis more realistic, the average expenditure propensities for the household groups are replaced with marginal expenditure propensities.[10] The marginal expenditure propensities (MEPs), corresponding to the four household classes, are calculated with the help of the National Sample Survey (NSS) consumer expenditure data.[11] The difference in income between two income classes in the NSS data is generally between Rs 10 per person to a maximum Rs 80 per person for the higher income classes. Thus the next income class gives the marginal increase in income, and the corresponding expenditure pattern provides marginal expenditure propensities.

The calculated MEPs yield a C_n matrix. The fixed price multipliers can be easily derived from the C_n matrix as

$$dy_n = (I - C_n)^{-1}dx = M_c dx,$$

where dy_n is the change in incomes of the endogenous accounts, dx represents the exogenous change in the demand for the village goods and services, and C_n is the coefficient matrix of marginal expenditure propensities. The multiplier matrix is given by M_c. It shows how the incomes of the endogenous sectors would be incrementally affected by a change in exogenous demand.[12]

The above fixed price multipliers assume that all the endogenous sectors have unlimited capacity to supply the goods and services in response to an exogenous change in demand. Such an assumption may not hold true for agricultural activities in most developing countries. Realizing this limitation, mixed multipliers were developed, which assumed that some sectors, like agriculture, have no excess capacity whatsoever, with supply assumed to be completely inelastic.[13] But in reality, supply is rarely completely inelastic. Constrained sectors are likely to possess some excess capacity. Therefore, the actual multipliers lie somewhere between the unconstrained fixed price and mixed multipliers. Hence, a methodological novelty that is introduced in this study is to relax the assumption of completely inelastic supply for some sectors and derive multipliers that allow a limited degree of supply response. In this sense, the present approach is more general than approaches developed by Subramanian and Sadoulet and by Lewis and Thorbecke.[14] The latter become special cases of the methodology developed here.

The logic underlying our modified multipliers analysis is as follows. If some excess capacity is available in the constrained sector, the fixed price multiplier, M_c, holds till the full capacity of such a sector is reached. Once the capacity is reached, the mixed multiplier, M_m, can be used for the remaining demand. Thus the final multiplier would be $M_c + M_m$. The following example illustrates this point. Say the incremental capacity of agriculture is Rs 150,000. Then corresponding to an exogenous increase in demand of Rs 200,000, two different multipliers will have to be calculated, a fixed price multiplier, M_c, up to Rs 150,000 and a mixed multiplier, M_m, for the remaining demand of Rs 50,000.[15] This final multiplier, $M_c + M_m$, can be used for all the exogenous injections that require more goods than can be supplied by the constrained sector, while taking care of the limited excess capacity available in the constrained sector.

The above method can be easily extended to include more than one constrained sector. Say there are two supply constrained sectors, x and y, with different capacity constraints. Then three multipliers have to be calculated. The first one, the fixed price multiplier, M_c, holds as long as some excess capacity prevails in both the sectors. Once full capacity of one of these sectors, (say, x), is reached, x will become an exogenous sector as per the methodology of mixed multipliers. The second multiplier, which is a mixed multiplier, M_{m1}, with x

as an exogenous sector, becomes operative while y still remains an endogenous sector since it has some additional capacity left.[16] Finally, when the exogenous demand exceeds the supply capacity of y, a third multiplier, M_{m2}, can be calculated, which treats both y and x as exogenous sectors. Thus the final total multiplier becomes $M_c + M_{m1} + M_{m2}$.

The direct and indirect effects of exogenous injections on the constrained sector(s) vary from one account (sector) to another. Thus, it is important to determine the point where the capacity of a constrained sector will be reached for each exogenous injection. The point can be easily obtained by dividing the given capacity of the constrained sector by its multiplier with the sector wherein the money is to be injected. For example, if agriculture is constrained (with excess capacity of Rs 15,000) and money is injected in the trade account, the resultant increase in demand for the products of the agricultural sector will be given by the multiplier at the intersection of the trade column and agriculture row. Say the multiplier is .25; then the capacity of the agricultural sector will be reached when the exogenous demand for the products of trade exceeds Rs 60,000 (i.e., Rs 15,000/.25).

The multipliers in this study have been calculated on the assumption that the agricultural sectors (dry and wet agriculture and livestock) are constrained and that their output can increase by not more than 10% above their present levels. The multiplier matrices for Boriya and Aurepalle are given in tables 5 and 6, respectively. The jth column of the multiplier matrix gives the effect of a Re 1.00 increase in demand of the jth account on the total (direct and indirect) incomes of each of the endogenous accounts in the system. Table 5 reveals that the SAM matrix is sparse in Boriya; production activities have weak linkages with each other except among the agricultural activities. Since the Boriya economy is very open and outwardly oriented, it follows that the production activities interact more with the outside world and less with each other, in contrast with the more inward-oriented Aurepalle pattern.

Wet agriculture yields the greatest total output multiplier (2.55) in Boriya, followed by dairy products and dry agriculture (2.48 and 2.45, respectively).[17] Livestock, services, and household industries yield multipliers just above 2. Outside salaries earned from the factory do not contribute much to intravillage output (the output multiplier of outside salaries is just 1.2).

On the other hand, the total income multipliers (total effects on the combined incomes of the four household groups) are much higher when the exogenous injection takes the form of salaries (mainly from the factory jobs) rather than from any of the other production activities. Salaries generate a total income multiplier of 1.52, followed by household industries (1.49) and services (1.45). In contrast, agricultural

TABLE 5

MULTIPLIER MATRIX FOR BORIYA, 1989

	PRODUCTION ACTIVITIES								COMMODITIES					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Dry agriculture	1.01	.01	.01	.01	.02	.02	.00	.02	.02	.04	.02	.01	.01	.00
2 Wet agriculture	.26	1.25	.26	.25	.26	.28	.06	.30	.88	.02	.31	.22	.21	.05
3 Livestock	.25	.27	1.14	.18	.23	.20	.04	.35	.19	.02	.36	.08	.31	.19
4 Agricultural services	.49	.56	.12	1.13	.12	.13	.03	.14	.40	.02	.14	.10	.79	.03
5 Village production	.00	.00	.00	.00	1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
6 Services	.14	.15	.21	.17	.14	1.15	.03	.09	.11	.01	.09	.26	.15	.04
7 Trade	.15	.15	.16	.17	.19	.18	1.04	.25	.14	.13	.26	.14	.14	.03
8 Dairy	.14	.14	.12	.16	.21	.18	.04	1.34	.10	.01	.35	.06	.13	.02
Production multiplier	2.45	2.55	2.03	2.07	2.18	2.14	1.24	2.48	1.84	.24	1.53	.87	1.74	.36
9 Cereals	.12	.10	.08	.07	.06	.12	.02	.05	1.07	.01	.05	.04	.06	.01
10 Pulses	.06	.03	.02	.03	.05	.03	.01	.01	.02	1.00	.01	.01	.03	.00
11 Other food	.64	.64	.54	.70	.93	.79	.17	1.51	.46	.05	1.57	.26	.57	.09
12 Nonfood	.68	.72	1.03	.82	.70	.76	.14	.44	.52	.04	.44	1.26	.73	.17
13 Agricultural input	.72	.82	.18	.19	.18	.19	.04	.20	.58	.03	.21	.15	1.16	.04
14 Durables	.04	.03	.03	.03	.07	.04	.01	.02	.02	.00	.02	.01	.03	1.00
15 Hired male	.05	.04	.01	.01	.01	.01	.00	.01	.03	.00	.01	.01	.00	.00
16 Hired female	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
17 Salary	.01	.00	.00	.00	.00	.00	.00	.02	.00	.00	.01	.00	.00	.00
18 Rent	.18	.06	.01	.01	.01	.02	.00	.02	.04	.01	.02	.01	.01	.00
19 Landless	.10	.09	.14	.07	.07	.24	.09	.11	.07	.01	.08	.07	.07	.02
20 Small farmers	.39	.20	.26	.17	.13	.56	.10	.13	.15	.03	.13	.15	.16	.05
21 Medium farmers	.29	.32	.23	.28	1.11	.28	.05	.13	.23	.02	.13	.10	.23	.04
22 Large farmers	.39	.60	.35	.88	.18	.38	.05	.21	.42	.02	.21	.16	.66	.06
Income multiplier	1.17	1.20	.98	1.41	1.49	1.46	.29	.58	.86	.08	.55	.48	1.12	.17
23 Village government	.03	.01	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00
24 Maintenance	.05	.05	.02	.08	.02	.05	.00	.02	.04	.00	.02	.02	.06	.00
25 Stock	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00
26 Capital	.04	.03	.03	.03	.07	.04	.01	.02	.02	.00	.02	.01	.03	.00
27 Government services	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
28 Ration shop	.07	.07	.08	.07	.06	.08	.02	.05	.28	.00	.05	.08	.06	.01
29 Rest of the world	.92	.92	.92	.93	.94	.92	.98	.95	.72	.99	.95	.92	.94	.99

TABLE 5 (*Continued*)

	Factors of Production				Institutions					Miscellaneous		
	15	16	17	18	19	20	21	22	23	24	25	26
1 Dry agriculture	.02	.02	.02	.02	.02	.02	.02	.02	.00	.00	.00	.00
2 Wet agriculture	.31	.31	.29	.27	.32	.32	.26	.26	.07	.01	.05	.05
3 Livestock	.25	.24	.21	.22	.28	.19	.23	.18	.05	.01	.17	.17
4 Agricultural services	.15	.15	.14	.13	.15	.15	.12	.12	.03	.01	.02	.02
5 Village production	.00	.00	.00	.00	.00	.00	.00	.00	.00	.05	.00	.00
6 Services	.14	.14	.16	.15	.13	.17	.14	.19	.04	.01	.03	.03
7 Trade	.20	.20	.19	.19	.22	.17	.19	.18	.04	.01	.02	.02
8 Dairy	.23	.22	.19	.19	.26	.16	.21	.16	.05	.01	.02	.02
Production multiplier	1.30	1.29	1.20	1.16	1.36	1.17	1.18	1.11	.28	.11	.31	.31
9 Cereals	.13	.13	.11	.08	.12	.17	.06	.07	.03	.00	.01	.01
10 Pulses	.04	.04	.04	.04	.04	.03	.05	.03	.01	.00	.00	.00
11 Other food	1.02	.98	.85	.86	1.15	.70	.93	.71	.20	.05	.08	.08
12 Nonfood	.68	.69	.78	.75	.61	.83	.70	.92	.18	.03	.15	.15
13 Agricultural input	.21	.21	.20	.18	.22	.22	.18	.18	.05	.01	.03	.03
14 Durables	.03	.03	.04	.06	.02	.06	.07	.03	.01	.00	.88	.88
15 Hired male	1.01	.01	.01	.01	.01	.01	.01	.01	.01	.00	.00	.00
16 Hired female	.00	1.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00
17 Salary	.00	.00	1.00	.00	.00	.00	.00	.00	.21	.00	.00	.00
18 Rent	.02	.02	.02	1.01	.02	.02	.01	.01	.00	.00	.00	.00
19 Landless	.76	.69	.28	.07	1.07	.07	.07	.07	.08	.00	.02	.02
20 Small farmers	.39	.46	.50	.29	.13	1.14	.13	.14	.11	.01	.04	.04
21 Medium farmers	.16	.15	.33	.81	.13	.12	1.11	.11	.07	.06	.04	.04
22 Large farmers	.22	.23	.41	.33	.21	.20	.18	1.18	.09	.01	.05	.05
Income multiplier	1.54	1.53	1.52	1.50	1.54	1.53	1.49	1.50	.36	.08	.15	.15
23 Village government	.00	.00	.00	.00	.00	.00	.00	.00	1.00	.00	.00	.00
24 Maintenance	.02	.02	.02	.02	.02	.02	.02	.02	.00	1.00	.00	.00
25 Stock	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.00	.00
26 Capital	.03	.03	.04	.06	.02	.06	.07	.03	.01	.00	1.00	1.00
27 Government services	.00	.00	.00	.00	.00	.00	.00	.00	.35	.00	.00	.00
28 Ration shop	.08	.08	.08	.07	.07	.09	.06	.08	.02	.00	.01	.01
29 Rest of the world	.92	.92	.92	.93	.92	.91	.94	.92	.63	1.00	.99	.99

Note.—Column headings are the same as those of rows with corresponding numbers.

TABLE 6

MULTIPLIER MATRIX FOR AUREPALLE, 1989

	PRODUCTION ACTIVITIES								COMMODITIES					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Dry agriculture	1.07	.08	.09	.09	.03	.10	.08	.08	.07	.13	.10	.10	.06	.00
2 Wet agriculture	.14	1.18	.20	.16	.06	.10	.20	.21	.49	.05	.09	.23	.12	.01
3 Livestock	.45	.35	1.20	.21	.07	.35	.19	.20	.16	.06	.35	.17	.62	.06
4 Agricultural services	.11	.07	.02	1.02	.01	.02	.02	.02	.03	.01	.01	.02	.17	.00
5 Trade	.38	.38	.47	.46	1.14	.67	.40	.40	.17	.06	.66	.52	.30	.02
6 Dairy	.05	.05	.05	.06	.02	1.12	.05	.06	.02	.01	.12	.04	.04	.00
7 Village production	.23	.24	.34	.26	.06	.14	1.21	.21	.11	.03	.13	.50	.21	.02
8 Services	.10	.11	.16	.12	.03	.06	.10	1.10	.05	.02	.06	.24	.10	.01
Production multiplier	2.52	2.45	2.53	2.36	1.41	2.55	2.25	2.29	1.11	.38	1.53	1.82	1.62	.13
9 Cereals	.19	.29	.28	.21	.10	.14	.35	.38	1.12	.03	.13	.24	.17	.01
10 Pulses	.04	.04	.05	.05	.01	.02	.05	.05	.02	1.01	.02	.03	.03	.00
11 Other food	.56	.56	.61	.70	.25	1.40	.62	.66	.25	.08	1.40	.46	.41	.03
12 Nonfood	.62	.63	.93	.71	.16	.36	.58	.57	.28	.09	.34	1.42	.57	.05
13 Agricultural input	.66	.47	.13	.11	.04	.09	.12	.12	.22	.09	.09	.14	1.08	.01
14 Durables	.05	.06	.05	.08	.01	.02	.03	.03	.03	.01	.02	.03	.04	1.00
15 Hired male	.07	.03	.01	.01	.00	.01	.01	.01	.01	.01	.01	.01	.01	.00
16 Hired female	.05	.18	.03	.03	.01	.02	.03	.03	.08	.01	.02	.04	.02	.00
17 Farm services	.04	.06	.02	.01	.00	.01	.01	.01	.03	.01	.01	.02	.01	.00
18 Salary	.00	.00	.00	.00	.00	.03	.00	.00	.00	.00	.00	.00	.00	.00
19 Rent	.11	.02	.02	.02	.00	.01	.05	.02	.01	.01	.01	.03	.01	.00
20 Landless	.23	.24	.28	.18	.21	.19	.26	.55	.11	.03	.18	.27	.16	.01
21 Small farmers	.28	.47	.52	.36	.11	.22	.77	.64	.20	.05	.20	.46	.31	.03
22 Medium farmers	.41	.29	.35	.65	.05	.14	.28	.21	.14	.06	.13	.19	.27	.02
23 Large farmers	.30	.38	.33	.50	.04	.12	.14	.15	.17	.05	.12	.13	.24	.02
Income multipliers	1.22	1.39	1.47	1.69	.41	.68	1.45	1.56	.62	.19	.64	1.04	.99	.08
24 Village government	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25 Capital	.11	.12	.12	.18	.02	.03	.07	.07	.06	.02	.04	.05	.09	.01
26 Maintenance	.02	.31	.01	.01	.00	.01	.01	.01	.01	.00	.01	.01	.01	.00
27 Stock	−.00	−.00	−.00	−.00	−.00	−.02	−.00	−.00	−.00	−.00	−.00	−.00	−.00	−.00
28 Government services	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
29 Ration shop	.13	.16	.17	.16	.06	.20	.18	.19	.32	.02	.20	.17	.11	.01
30 Rest of the world	1.04	1.11	1.08	1.03	1.03	.93	1.14	1.16	1.71	1.01	.92	1.05	1.05	1.00

TABLE 6 (*Continued*)

	Factors of Production					Institutions					Miscellaneous		
	15	16	17	18	19	20	21	22	23	24	25	26	27
1 Dry agriculture	.09	.09	.09	.09	.08	.09	.09	.09	.08	.12	.00	.06	.00
2 Wet agriculture	.25	.25	.25	.20	.17	.24	.26	.14	.16	.26	.00	.14	.00
3 Livestock	.23	.23	.23	.22	.18	.22	.23	.24	.16	.25	.02	.13	.02
4 Agricultural services	.02	.02	.02	.02	.02	.02	.02	.02	.02	.03	.00	.01	.00
5 Trade	.44	.44	.44	.46	.40	.45	.43	.52	.38	.58	.01	.29	.01
6 Dairy	.06	.06	.06	.06	.05	.06	.06	.07	.04	.07	.00	.03	.00
7 Village production	.22	.22	.23	.24	.26	.24	.21	.26	.26	.47	.01	.59	.01
8 Services	.10	.10	.10	.11	.12	.11	.10	.12	.12	.18	.00	.10	.00
Production multiplier	1.42	1.42	1.42	1.41	1.28	1.43	1.41	1.46	1.23	1.96	.05	1.35	.05
9 Cereals	.46	.46	.45	.34	.25	.42	.49	.16	.22	.39	.01	.22	.01
10 Pulses	.06	.06	.06	.06	.04	.05	.06	.05	.04	.06	.00	.03	.00
11 Other food	.72	.73	.72	.74	.57	.72	.72	.85	.51	.80	.01	.39	.01
12 Nonfood	.61	.61	.62	.66	.72	.65	.58	.72	.73	1.09	.02	.57	.02
13 Agricultural input	.14	.14	.14	.13	.11	.14	.15	.10	.10	.16	.00	.09	.00
14 Durables	.03	.03	.03	.05	.11	.03	.02	.06	.13	−.06	.37	.02	.37
15 Hired male	1.01	.01	.01	.01	.01	.01	.01	.01	.01	.03	.00	.07	.00
16 Hired female	.04	1.04	.04	.03	.03	.04	.04	.02	.03	.04	.00	.02	.00
17 Farm services	.02	.02	1.02	.01	.01	.02	.02	.01	.01	.02	.00	.01	.00
18 Salary	.00	.00	.00	1.00	.00	.00	.00	.00	.00	.79	.00	.00	.00
19 Rent	.02	.02	.02	.02	1.02	.02	.02	.02	.02	.03	.00	.02	.00
20 Landless	.55	.43	.68	.43	.30	1.18	.17	.19	.17	.46	.01	.19	.01
21 Small farmers	.90	.97	.77	.60	.32	.27	1.26	.28	.26	.70	.01	.45	.01
22 Medium farmers	.15	.19	.15	.45	.19	.15	.15	1.14	.12	.45	.01	.16	.01
23 Large farmers	.13	.13	.13	.24	.87	.13	.14	.11	1.10	.24	.01	.09	.01
Income multipliers	1.72	1.72	1.72	1.71	1.67	1.73	1.71	1.72	1.65	1.85	.03	.89	.03
24 Village government	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.00	.00	.00	.00
25 Capital	.06	.06	.06	.11	.23	.08	.05	.13	.28	−.20	1.00	.04	1.00
26 Maintenance	.01	.01	.01	.01	.01	.01	.01	.01	.01	.21	.00	1.01	.00
27 Stock	−.00	−.00	−.00	−.00	−.00	−.00	−.00	−.00	−.00	−.31	.00	−.00	1.00
28 Government services	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
29 Ration shop	.22	.22	.22	.19	.15	.21	.23	.16	.14	.23	.00	.12	.00
30 Rest of the world	1.21	1.20	1.20	1.12	1.08	1.17	1.23	.98	1.06	1.13	1.00	1.08	1.00

Note.—Column headings are the same as those of rows with the corresponding numbers.

activities display significantly lower total income multipliers of between 1.0 and 1.2. It is important to note here that the incomes of the poorest household group (the landless) are most favorably affected by the changes in hired labor's account. Since in Boriya a significant part of the hired labor income comes from outside the village, provision of nonfarm work for the casual laborers or agricultural development of the whole region would improve the incomes of the landless considerably.[18] After hired labor, salaries are the most important means of increasing the incomes of the poor. This confirms our earlier finding that poverty decreases when the availability of nonfarm jobs increases.

Aurepalle, as would be expected for an inward-looking village, reveals strong intravillage linkages among production activities. Agriculture is closely interrelated not only with livestock but also with trade and household industry production. Structural path analysis (SPA), which provides the complete network of paths through which influence travels in a socioeconomic system given by a SAM, shows that agriculture is strongly linked with livestock because of the use of bullocks in Aurepalle.[19] The linkages of trade and household industries' production with other activities are strong mainly through the income and consumption linkages. Most of the consumption expenditures go toward "other food" and "nonfood" items.

While the total output multiplier is highest for agriculture in Aurepalle, the magnitude of multipliers of household industries production, dairies, and services is almost as high as that for agriculture. As far as income generation is concerned, agricultural services, livestock, and nonagricultural activities such as household industries and village services have much higher total income multipliers than does agriculture.[20] The fact that the income multipliers for nonagricultural activities are higher than for agriculture needs to be explained. In both villages, the proportion of value added to gross output is very low for most of the crop production activities. It is not uncommon to find that in an average year some farmers suffer losses in their farm enterprises. In fact, labor value added accruing to larger farmers from dry agriculture in the Aurepalle SAM (table 2) was negative in 1989–90. Low profitability in crop production activities might be the general characteristic of villages located in the semiarid tropics. However, the losses to these farmers are offset by gains in the livestock sector, which supplies bullock labor to agriculture and which consumes fodder from the crop production. Thus farmers survive with low returns and high costs in crop production with the help of livestock.

However, unlike crop production, where the production process requires many inputs, the services and household industries' sectors require very few intermediate inputs. For example, the bulk of the value of the services provided by barbers goes directly to them as

value added (labor and capital income). Hence the income multipliers generated by service and household industries are higher compared with those of agriculture. For converse reasons, the production multipliers are higher for agricultural activities, as they require intermediate inputs from many sectors in contrast with the nonagricultural sectors.

The above section shows that if maximizing the village output is the goal, then in both villages, agriculture is the best activity to promote, at least if there is some excess capacity. But if the goal is to increase the total household incomes earned, then encouragement of nonagricultural activities is the most effective way. However, the above analysis does not answer the question of the impact of a factory on village incomes as opposed to other development projects and policies. The impact of a factory is felt through its effects on villagers' salaries. As factor income multipliers tend to be definitionally higher than income multipliers generated by production activities, a more detailed comparative cost-benefit analysis of alternative interventions affecting the demand for factors (mainly labor) is required to evaluate these interventions.

V. Comparison of the Impact of Industrial Decentralization, Irrigation, and IRDPs on Output and Income Distribution in Boriya

Table 7 compares the total benefits and distributional consequences of different development projects. Four alternative development schemes are compared: (i) industrial decentralization; (ii) irrigation; (iii) IRDP scheme providing buffaloes; and (iv) IRDP self-employment and training scheme. The costs and benefits of each of these schemes, which

TABLE 7

Comparison of Different Development Policies Given Same Expenditure of Rs 220,000

Scheme	Increase in Village Production	Increase in Incomes (in Rupees)			
		Landless Laborers	Small Farmers	Medium Farmers	Large Farmers
Boriya:					
Industrial decentralization	303,974	68,508	122,936	80,456	100,144
Irrigation	111,772	3,788	6,378	14,266	28,062
IRDP: Buffalo	242,831	63,181	16,155	13,200	21,315
IRDP: Self-employment	578,090	251,177	30,725	29,405	48,841
Aurepalle:					
Irrigation	259,588	25,645	52,402	29,297	41,426
IRDP: Buffalo	294,838	98,630	39,342	18,485	14,736
IRDP: Self-employment	570,358	238,744	62,890	32,942	34,071

we assume to be implemented in Boriya, are calculated as follows. First we examine the rural industrialization scheme, under which the Indian government provides a variety of subsidies to industries for establishing a factory in a backward region. From the sparse figures given in the government reports, we can reasonably assume such subsidy to be equivalent to 20% of the total cost incurred by the firm. It is also realistic to assume that the firm spends 20% of its total cost on salaries. Thus, to encourage a firm with a turnover of Rs 10 million to get established in a rural area, the government will have to spend Rs 2 million on subsidies. Considering the fact that people from many villages will be employed, we assume that the same proportion of Boriya workers (11% of the total workforce) would be employed in the new factory. Thus Rs 220,000 would be injected into Boriya's economy through salaries. But the effect of the new factory would also be felt on trade, services, and the unorganized sector that employs workers. Again, retaining the same structure as given by the SAM, the gains to, respectively, trade, services, and unorganized sector salaries would be Rs 4,400, 6,600, and 17,600.

Inserting these injections in the multiplier matrix, we obtain the total increase in the village incomes including indirect effects. Total production in Boriya would grow by Rs 303,974. The increase in the incomes of the landless would be Rs 68,508. The small farmers' class benefits the most, the incomes of this class go up by Rs 122,936, while the medium and large farmers benefit by Rs 80,456 and Rs 100,144, respectively.

A second alternative scheme would be for the government to invest the same amount (Rs 220,000) on irrigation instead of spending these funds on subsidies. The mean cost of a dug well in Boriya is Rs 44,226.[21] Thus approximately five wells can be dug with Rs 220,000. On average, a dug well can irrigate approximately 16 acres per year. Therefore 80 more acres can be irrigated. The average value of output per acre per year on dry lands is Rs 152 and on wet lands it is Rs 695. So the income for the wet agriculture sector rises by Rs 55,600. At the same time, 80 acres of dry land get converted into wet land, and the income of dry agriculture falls by Rs 12,160. The multiplier matrix shows that the total effects of such changes on the production in the village is a rise in output of Rs 111,772. The incomes of the landless go up by Rs 3,788, while those of small, medium, and large farmers increase by Rs 6,378, Rs 14,266, and Rs 28,062, respectively. Obviously, the gains in incomes are much less compared with the establishment of a factory.

Next, we examine the likely impact of the IRDP. Traditionally, in India the IRDP takes two major forms: the poor are provided a buffalo at a much lower price than the market price or they are given some equipment to start a household cottage industry, such as weaving

and tailoring. For the buffalo scheme, the data regarding the price charged by the government for the buffaloes are not available, so for the sake of simplicity we assume that the buffaloes are given to the families without charge. The ICRISAT data on livestock show that the average price for a she buffalo is Rs 3,800. If the government spends Rs 220,000 on buying buffaloes for poor families instead of providing subsidies to attract a factory, 58 buffaloes can be bought. While the field survey was being conducted, some families mentioned getting 2 liters of milk per day from a buffalo. Our estimates are confirmed by Harold Alderman's study of cooperative dairy development in Karnataka, which reports the milk output to be 1.85 liters per day per buffalo.[22] One liter of milk sells for Rs 5–6. Thus the increase in the incomes of the poor would be Rs 114,840.

After making adjustments in the SAM to ensure that all the direct benefits of the scheme go to the landless, the following multipliers were obtained: the total increase in production activities would be Rs 242,830, the increase in the incomes of the landless would be Rs 63,181, and the increase in the incomes of the small, medium, and large farmers would be Rs 16,155, Rs 13,200, and Rs 21,315, respectively. Consequently, the benefits derived from investing in IRDP (buffalo scheme) are much less compared with those of industrial decentralization. Even the landless, who are the major beneficiaries of the program, benefit slightly more from industrial decentralization than from the IRDP program.

The second type of IRDP scheme aims to provide self-employment opportunities to the rural poor. The cost of a loom is taken as Rs 4,000–5,000 and of a sewing machine as Rs 8,000. Also, training costs per person can be estimated at Rs 500. Say the government spends Rs 220,000 on buying two sewing machines and 39 looms and training the workers. The Boriya SAM gives us the income of a tailor (Rs 7,700) and the Aurepalle SAM records the income of a weaver (Rs 6,307). The overall impact of such changes is very favorable. The total production in the economy increases by Rs 578,909. The increase in the incomes of the landless is also very high, Rs 251,177. The incomes of other classes do not increase as much (the increase is Rs 30,725, 29,405, and 48,841 for small, medium, and large farmers, respectively). Thus giving the opportunity for self-employment to the poor appears to be the most efficient way of alleviating poverty.

Our analysis assumes that marketing outlets exist for the products made by local producers. But in the real world, finding suitable outlets can become a very serious obstacle, because often training does not consider the effective demand side. Insufficient attention to quality control reduces the possibility of exporting the products outside the village, thus effectively limiting the market to village resi-

dents. When this limitation of the IRDP scheme and, conversely, the more intangible social benefits that industrialization brings (such as learning by doing and awareness of the advantages of education) are taken into account, then decentralization of industries may turn out to be the best option among the four alternative schemes. It certainly generates greater externalities than the IRDP self-employment scheme does.

The above comparison cannot be made for Aurepalle because decentralization changes all the production and consumption relationships in a village. In other words, the present C_n matrix of Aurepalle would no longer remain valid. Therefore, we did not attempt to estimate the impact of industrial decentralization in Aurepalle. We did, however, estimate the likely impact of the three other development schemes given the existing socioeconomic structure of Aurepalle as reflected by the C_n matrix. But given the socioeconomic similarity of the villages, the establishment of a factory could prove to be equally beneficial to Aurepalle. Returns on irrigation and on the IRDP-buffalo scheme would likely be greater in Aurepalle compared with Boriya (table 7), since the interlinkages among the sectors are stronger in Aurepalle. The success of the IRDP-self-employment scheme would depend on the occupations chosen for promotion. Many of the traditional occupations in Aurepalle face very limited effective demand for their products or services and hence limited scope to grow. We have assumed in table 7 that only handlooms are given to the landless laborers. Sewing machines are not considered because there are already too many tailors in Aurepalle; there is not enough demand for even the existing tailors' services. Other artisanal occupations appear likewise to be in excess supply. The results show that providing the opportunity for self-employment might be the best way to achieve rural development in Aurepalle as well. Thus the results of the cost-benefit analysis of three development schemes in Boriya are comparable to those of Aurepalle. It can also safely be assumed that the favorable results of industrial decentralization in Boriya are most likely to hold true for Aurepalle as well.

If establishment of rural industries is going to be equally beneficial for Aurepalle as it already has proven to be for Boriya, it is natural to ask why no factories have yet been established in Aurepalle. The main reason appears to be the lack of a paved road joining Aurepalle with the state highway. The government will be able to attract industries to Aurepalle only if it invests in building the required infrastructure first. This, of course, raises the issue of the social rate of return on the cost of building such a road. Without hard facts, we can only venture the opinion—shared by many villagers—that the social rate of return on such a road would be high enough to more than warrant going ahead with this project.

VI. Conclusions

The main purpose of this study was to revive the debate relating to the impact of decentralization of industries on rural development. The study relied on a comparison of two relatively similar villages. The main difference between them is that one village (Aurepalle) is located in a remote area and the other (Boriya) is in close proximity to a factory. By building SAMs of these villages and comparing them, some important structural and socioeconomic differences are highlighted. This study contradicts the view expressed in the literature that the impact of decentralization on rural development is very limited. Our results show that rural decentralization of industries has, in fact, contributed considerably to rural development and poverty alleviation in Boriya. People have become more aware of the advantages of education, investment in agriculture has increased, the exploitation of labor has been significantly reduced, and the factory salaries have reduced poverty and lowered income inequality between household classes. Village life has been significantly altered by the increasing outward-orientation of Boriya. A cost-benefit-cum-SAM multiplier analysis of four development schemes indicated that industrial decentralization comes out to be the most effective policy in bringing about overall rural development compared with irrigation and two different IRDP alternatives.

The two villages we selected that were subjected to detailed surveys and case studies can be claimed to be representative of some semiarid tropical regions, as pointed out by T. Walker and G. Ryan.[23] Therefore, the results obtained here appear applicable to most villages located in such regions. In fact, the results should be applicable to all those villages in India that are characterized by poor soils, irregular rainfall, and, hence, little potential for agricultural development. The nature of the industry should also be taken into account. The present analysis deals with a factory that produces very little pollution; hence, the costs of pollution are not considered in the study. The industries that create significant air or water pollution can cause considerable harm and thus impair rural development rather than further it. Thus the results hold for any industry that does not create extensive pollution. Likewise, the results apply only for large-scale and medium-scale industrial units and not for small-scale (cottage industry) units. The latter cannot create the scale of demand for services or transport comparable to that generated by the margarine-producing factory in our study.

Appendix

TABLE A1

DEFINITION OF LANDHOLDING CLASSES

CLASS	OWNERSHIP OF LAND IN ACRES	
	Boriya	Aurepalle
Landless	<.50	<.50
Small farmers	.51–2.40	.51–6.20
Medium farmers	2.41–4.90	6.21–13.00
Large farmers	>4.91	>13.01

Notes

* In revising this article, we benefited greatly from the referees' useful comments and suggestions.

1. R. P. Misra, K. V. Sundaram, and V. L. S. P. Rao, *Regional Development Planning in India: A New Strategy* (Delhi: V. Rao, 1974).

2. See Sudhir Wanmali, *Geography of Rural Service System in India* (Delhi: B. R. Publishing, 1987); and R. L. Sanghavi, *Role of Industrial Estates in a Developing Economy* (Bombay: Multi-Tech, 1979).

3. S. Subramanian and E. Sadoulet, "The Transmission of Production Fluctuations and Technical Change in a Village Economy: A Social Accounting Matrix Approach," *Economic Development and Cultural Change* 39, no. 1 (1990): 131–73; and B. Lewis and E. Thorbecke, "District-Level Economic Linkages in Kenya: Evidence Based on a Small Regional SAM," *World Development* 20, no. 6 (1992): 881–97.

4. Throughout the article, the population of the two villages is divided into four groups according to the ownership of land. The definition of such groups comes from the ICRISAT landownership scale, which is given in the Appendix (table A1).

5. Total incomes are the sum of the total incomes earned by each income class in the village. The incomes are calculated from the SAMs, which are presented in tables 2 and 3. The concept of total village income is similar to the concept of national income in the national accounts.

6. J. Foster, J. Greer, and E. Thorbecke, "A Class of Decomposable Poverty Measures," *Econometrica* 52, no. 3 (1984): 761–66. The index is defined as

$$P(\mathbf{y}; z) = \frac{1}{nz^2} \sum_{1}^{q} g_i^2,$$

where P is the poverty measure, n is the number of households, z is the predetermined poverty line, q is the number of poor households living below the poverty line, and $g_i = z - \mathbf{y}_i$ ($\mathbf{y}$ being the vector of household incomes), g_i is the income shortfall of the ith household.

7. One anomaly that needs to be clarified is that the average income of the landless in Aurepalle, as reported in table 1, appears higher than the average income of the small farmers. The reason is that the category of landless households is, in fact, highly bimodal. It includes the *vaisyas,* who are a

prosperous business community but do not hold land by tradition. Therefore, the average income of the Aurepalle "landless" reported in table 1 and in the two SAMS (tables 2 and 3) is much higher than that of the typical poor landless. Hence to compare the incomes of the rich and the poor, we use the average income of the small farmers' class, which is very poor in Aurepalle and so can be treated as representative of the poor including the "true" landless in the village.

8. The GDP for the village is calculated in the same way the GDP is calculated for a country. It is the sum of value added of the production activities in the SAMs.

9. I. Adelman, E. Taylor, and S. Vogel, "Life in a Mexican Village: A SAM Perspective," *Journal of Development Studies* 1 (1988): 5–24.

10. Substituting average expenditure propensities with marginal expenditure propensities would not violate the consistency of the underlying SAM because, while calculating the multiplier, only the endogenous accounts are considered (i.e., the first 26 rows and columns of tables 2 and 3, respectively). The matrix of average expenditure propensities A_n (a 26 $\times$ 26 matrix) is replaced by the corresponding matrix of marginal expenditure propensities, C_n. As long as the sums of the column totals of endogenous marginal expenditure propensities and exogenous expenditure propensities add up to unity, consistency is maintained.

11. National Sample Survey, in *Sarvekshana* (April–June 1989), pp. S15–S60.

12. See G. Pyatt and J. Round, "Accounting and Fixed Price Multipliers in a Social Accounting Matrix Framework," *Economic Journal* 89 (December 1979): 850–73.

13. Subramanian and Sadoulet (n. 3 above); Lewis and Thorbecke (n. 3 above).

14. Ibid.

15. See Lewis and Thorbecke.

16. Ibid.

17. The total output multiplier for any account can be obtained by summing up the first eight rows of the multiplier matrix for the concerned account's column in tables 5 and 6, respectively. Likewise the total income multipliers are obtained by summing up the four landholding classes' respective multipliers. Total output and income multipliers are shown explicitly in tables 5 and 6, respectively.

18. Hired labor consists of agricultural and casual laborers.

19. Jacques Defourny and Erik Thorbecke, "Structural Path Analysis and Multiplier Decomposition within a Social Accounting Matrix Framework," *Economic Journal* 94 (March 1984): 111–36.

20. The highest income multipliers obtain for the factors but they are not considered because factor income multipliers are definitionally higher than production activities' multipliers. The factor income multipliers are considered only when the production activity generating the income is located outside the village, which is not the case with Aurepalle.

21. See J. L. Pender and M. Asoka, *Farmers' Irrigation Investment in South India* (International Crop Research Institute for the Semi-Arid Tropics, 1993).

22. Harold Alderman, "Cooperative Dairy Development in Karnataka, India: An Assessment," Research Report 64 (International Food Policy Research Institute, Hyderabad, India, December 1987).

23. T. Walker and G. Ryan, *Village and Household Economies in India's Semi-Arid Tropics* (Baltimore: Johns Hopkins University Press, 1990).