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VILLAGES AS INTEREST GROUPS:

THE DEMAND FOR AGRICULTURAL EXTENSION SERVICES IN INDIA*

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ABSTRACT

The allocation of agricultural extension services in India is analyzed in terms of a model of villages as political interest groups. The level of collective action in a village is hypothesized to be positively related to the existence of a "dependency structure" in which large land-owning farmers have economic and political leverage over smaller, landless farmers. Data on the allocation of agricultural extension services in India in 1970-71 support this model more strongly than the alternative, "efficiency" hypothesis that such services are allocated strictly according to economic incentives.

INTRODUCTION

In recent years, considerable work has been directed to estimating the effects of agricultural research and extension services on agricultural productivity and on the distribution of income.[1] Considerably less attention has been given to the causes of public investment in these types of information. This neglect has been encouraged by the traditional assumption that government behavior is exogenous to the economic system.

By dropping this assumption, it is possible to obtain new insights into economic development and the distribution of income. If public investment in agricultural research is the result of pressures by interest groups, the ability of these groups to act collectively becomes an important constraint on agricultural development. Similarily, if the distribution of extension services in a country is governed by political forces, which, in turn, are determined by social and economic variables, then these variables become determinants of the distribution of income.

This paper attempts to analyze allocations of agricultural extension services in India in terms of a political-economic framework. The empirical evidence is viewed in the light of two competing models of the distribution and level of public goods provision. One of these, the "efficiency" model, is based on the work of Hayami and Ruttan (1971). This model postulates that government agencies act as if they were maximizing economic efficiency, responding to product and input prices just as the market does. The alternative hypothesis, which draws on the literature on economic regulation (summarized by Posner, 1974), is that government behavior is motivated by the desire of politicians

to remain in office. It is shown in Section 2 that this "interest group" theory has implications for the distribution of public goods not suggested by the "efficiency" theory. These empirical implications are tested in Sections 3, using data on the provision of agricultural extension services in Indian villages.

Before beginning the analysis, however, it is useful to examine the evidence on the economic payoff to agricultural extension services. If extension services have no significant economic impact, an economic theory of the distribution of extension services would be inappropriate. The few studies that have concentrated on estimating the payoff to extension services, however, do reveal a positive impact on productivity:

1. In the United States, despite the puzzling fact that the Southern states have relatively high extension "intensity" and low productivity, Huffman (1976) and Welch (1973) have estimated a positive effect of extension on productivity. Both studies were based on cross-sections of American agricultural production data, Huffman's data being on the county level and Welch's on the state level. Welch found a complementarity between agricultural research and extension; both studies found that extension and education are substitutes.

2. For India, Evenson and Kislev (1975) found a positive relationship between the maturity of the extension program, in 15 Indian states, and agricultural productivity. Their data were pooled time series and cross sections. Here, again, a complementarity between research and extension was found. As in the Huffman and Welch studies, quantities of conventional inputs were controlled in estimating these positive relationships.

3. For the Philippines, Halim (1977) found that two specific extension "treatments" (consisting of "generalist" extension workers assigned to specific barrios) had positive effects on agricultural output, in individual-level data from 20 barrios. Halim, like Huffman and Welch, found that schooling and extension are substitutes (p. 41).

These studies, then, provide evidence that extension services have a significant impact, often comparable to the payoff to agricultural research. In addition, I have conducted interviews with village leaders in 16 Indian villages in 1977, and have found that this payoff to extension services is widely recognized on the village level.[2] In all but a few of the villages, there appeared to be a strong demand for extension services.

1. MODELS OF THE DISTRIBUTION OF PUBLIC GOODS

There are two competing models of the distribution of public goods. One of these, which we call the "efficiency model," holds that the quantity and distribution of public goods is determined by considerations of economic efficiency -- i.e., by a comparison of aggregate economic costs and benefits. According to this model, for example, if Village A is chosen as a location for a school rather than Village B, it is because Village A has more children of the appropriate ages, or because Village A is more densely populated, or because the adults in Village A place a higher valuation on education, etc. The second model, which we call the "interest group" model, postulates that public goods are allocated so as to maximize political support for the government. Thus the interest group model would add to the considerations mentioned above, that Village A may be more "cohesive" politically, in a sense to be clarified below.

There is clearly a large common ground between these two models. Any variable, to begin with, that determines an individual's demand for the collective good belongs in both models. Secondly, the efficiency model is, in many respects, indistinguishable from an interest group model which views consumers as the most powerful and important interest group (cf Posner, 1974).

For these reasons, interest group models tend to include the same variables as are included in efficiency models. But the interest group model's emphasis on special interests rather than general welfare (the latter is, strictly speaking, irrelevant in an interest group model), together with the interest group model's focus on capability of collective

action, lead additional variables to be considered which have no role in efficiency considerations. One such set of variables, relating to the system of land tenure in villages in developing countries, will be examined in detail in the next section.

2. TYPES OF INTEREST GROUP MODELS

The interest group model usually postulates the existence of a political market, in which a set of demanders, individually or in some organized fashion, demand collective goods in return for "votes," or, more generally, political support. Actors are generally assumed to act independently and voluntarily, just as they do in ordinary markets. This type of model, which we call the "independent actor" model, has been applied to the study of economic regulation,[3] as well as to the analysis of the demand for agricultural research in the United States.[4]

Such studies have not resolved a fundamental difficulty of the "independent actor" assumption -- the free-rider problem. Since the policies or collective goods which are the subject of the analysis are generally non-excludable, i.e., actors cannot be excluded from benefiting from them, why should anyone participate in the lobbying effort to provide them? A number of answers have been offered, postulating (a) the tying of private by-products to the provision of the collective good (Olson, 1965), (b) the asserted positive effect of asymmetries of interest within the group of demanders on collective action (Stigler, 1975), and (c) "matching behavior" among demanders which provides private incentives to act collectively (Guttman, 1978b). While none of these approaches is a complete solution of the free-rider problem, each provides a basis for expecting collective action, albeit at a collectively suboptimal level. Each of these approaches, moreover, suggests that group lobbying effort will increase absolutely, if not proportionately, with group numbers (size).[5]

In the context of traditional agricultural communities, however, the "independent-actor" assumption becomes suspect. In order for actors to be autonomous in the political market, they must also be independent actors in the purely "economic" market -- otherwise, one actor or a small group of actors (e.g., monopsonists in the labor market) can exert leverage on the others. Precisely this sort of market imperfection is likely to characterize small, relatively isolated agricultural communities in developing countries.

Taking account of this "leverage" leads to a different version of the interest group model, which predicts a higher level of collective action, and thus a greater probability of provision of collective goods, where a small group of actors at least partially controls the actions of the other actors. A classic example of this situation would be where one landowner hires a large fraction of the agricultural laborers in a village, and where a relatively large proportion of the village households are dependent on agricultural labor for a significant proportion of their income. In this situation, the landowner is in a position to induce his workers to vote for candidates of his choice, as a condition of employment. Such leverage would be one way of "solving" the free-rider problem discussed above. The monopsonistic demander of labor can extract such "lump-sum payments" in the same way as a price-discriminating monopolist appropriates consumer surplus. Indeed, a second situation in which leverage can be exerted is where capital markets are imperfect and farmers are dependent on others for credit.

In these sorts of settings, we may say that a "dependency structure" exists. Political scientists (e.g. Scott 1972) call this structure a

"patron-client relationship." In effect, the maintenance of an economic relationship (e.g., employment) is tied as a by-product to the provision of a collective good. The good, of course, need not be demanded jointly by the "patron" and "client" in order for the leverage to exist. Since, however, the market power of the patron is always limited -- by the costs of migration, if nothing else -- one would expect that the dependency structure will be more able to solve the free-rider problem, the more the client demands the relevant collective good. The specific collective good whose demand is analyzed in this study (agricultural extension services) is one for which this community of interest is likely to exist. Descriptions by political scientists, sociologists, and anthropologists of dependency structures are quite common (see, e.g., Alavi 1971 and Beteille 1974). Scott (1972) summarizes this work as follows:

> A locally dominant landlord...is frequently the major source of protection, of security, of employment, of access to arable land or to education, and of food in bad times. Such services could hardly be called more vital, and hence the demand for them tend, to be highly inelastic... Being a monopolist, or at least an oligopolist, for critical needs, the patron is in an ideal position to demand compliance from those who wish to share in these scarce commodities (p. 93).

One way to identify this dependency structure empirically is to focus on villages that are relatively isolated from the market -- a proxy being distance to the nearest bus stand -- and to look for a positive relationship between the proportion of village households which are landless, and the provision of specific collective goods. Landless households are

particularly likely to be dependent on others for employment and credit, because land is the main basis of self-employment in rural areas and the most important form of collateral for loans. The smaller the proportion of landed households, the more likely each landed household (particularly the larger ones) will have monopsony power in the labor market and monopoly power in the capital market. Thus, the larger the proportion of landless households, the greater will be the ability of the village to overcome the free-rider problem and to obtain collective goods from the government. In addition to the proportion of landless households, the proportion of small farmers in the village is likely to measure the existence of a dependency structure. If a farm is too small to support a typical family, the farmer becomes an agricultural laborer and, given monopsony power in the labor market, he will be subject to the kind of political leverage described above.

3. APPLICATION TO THE DEMAND FOR AGRICULTURAL EXTENSION SERVICES

a. Analytical Framework

According to the interest group theory, two sets of variables determine the distribution of a collective good such as agricultural extension services: (a) "economic" variables which determine the demand for such services by individual farmers, and (b) "political" variables which determine the ability of the village to satisfy these individual demands. The efficiency theory would replace the second set of variables with a simple measure of the size of the agricultural sector of the village, which, together with the first set of variables, would determine the aggregate economic benefit of selecting a particular village for provision of extension services.

"ECONOMIC" VARIABLES

The economic function of extension services is to improve the information farmers have of technological innovations. Previous studies (e.g., Huffman, 1972 and Welch, 1970) indicate that the value of such information depends on (a) the rate of technological change, and (b) the education of farmers.

Several proxies are available for the rate of technological change, which varies within a country primarily because of variation in the suitability of soil and climatic conditions to the innovations generated at agricultural experiment stations. In India, programs have been instituted which selected certain villages throughout the country for their suitability to technical change. The most successful of these was the Intensive Agricultural Development Program (IADP). Thus, it is expected that villages selected for this program will have been provided with more

extension services than those which were not selected.[6]

Second, the percentage of land that is irrigated will be positively related to the likelihood that the village is suitable to technological change. The water requirements of the new high-yielding varieties are well-known. To the extent that irrigation is present in the village, one would expect the probability of adoption of the new varieties to be relatively high, and thus more extension services to be provided.

Third, the quality of land affects its suitability for new varieties. One measure of land quality is its price. Thus, we hypothesize that the price of land should be positively related to the provision of extension services.[7]

Fourth, ready access to credit facilitates adoption, though concrete evidence of imperfect capital markets is rather scanty. Thus, the existence of a bank and other credit facilities is expected to be positively related to the demand for information and extension services.

Fifth, there are economies of scale in the use and dissemination of information. Larger farms will have greater demands for a given "bit" of information than smaller farms (see Huffman, 1972), though the resulting percentage increase in, say, yields may be the same on large and small farms.

Sixth, as noted earlier, the education of farmers is positively related to their rate of adoption of new techniques. As indicated in Section 2, education seems to be a substitute for the type of knowledge provided by extension agents. If education and extension are substitutes, then more highly educated villages would demand relatively little extension services, ceteris paribus. Since, however, education is highly correlated with two

variables which are difficult to control (wealth and access to political information), a positive relationship between education and provision of extension services is equally possible.

"POLITICAL" VARIABLES

As indicated in section 2, a central "political" variable is the proportion of village households which are landless or who own relative little land. The hypothesis of the existence of a "dependency structure" in remote villages implies a positive relationship between the percentage of farmers which are landless and the provision of extension services. This relationship, moreover, is expected to be stronger, the more remote the village is from regional markets. Empirically, the "distance to the market" is closely related to the distance to the nearest bus stand, since buses, where available, provide a cheap link to nearby towns where jobs and credit are available. Thus, the distance to the bus stand is used as a proxy for "distance to the market."[8] The absence of a factory in the village may also serve as a proxy for the "distance to the market."

There are alternative explanations for a positive correlation between the proportion of landless and provision of extension services. These are examined in an appendix to this paper. It is shown that either these alternative explanations assume the validity of the interest group theory, or they cannot explain the interaction between distance to the market and the proportion of landless farmers predicted by the dependency structure hypothesis.

There is one alternative hypothesis however, that does predict this interaction and does not rely on the interest group approach. It may be argued that small, tenant farmers have worse information of new technology than landowning farmers, making the economic return to extension services greater where there is a large fraction of tenant farmers. Moreover, it may be argued that closeness to the market (or bus stand) is a substitute for extension services: the relevant information may be obtained in the market simply through informal market contacts. In this case, the effect of the proportion of landless farmers on the provision of extension services would be stronger in the more remote villages, because in such villages the differential in access to information between landowning and tenant farmers would be relatively large.

This alternative hypothesis has two testable implications which differentiate it from the dependency structure hypothesis. First, a positive direct effect of distance to the market (or bus stand) on provision of extension services is predicted. Second, not only the proportion of landless variable, but all the other explanatory variables should also interact with distance to the market, since a similar argument would hold for all other determinants of the return to extension services. As will be indicated below, neither implication is supported by the evidence.

An additional variable which probably reflects political forces more than purely economic ones is the presence of a cooperative in the village. The main type of cooperative documented in our data source is the credit cooperative. While credit cooperatives in India were often set up by the government, they have been found to serve as focal points of political

action (Baviskar, 1968). The very existence of a credit cooperative, moreover, may reflect relatively high capability for collective action by the village, and thus may "pick up" unexplained variance in such capability. This variable is also included in the analysis in order to reflect the degree of "access to credit" of the village, mentioned above under the heading of "economic" variables.

A final variable, important in both the interest group and interest group theories, is the size of the village, or, more precisely, the size of the group of farmers demanding extension services. Empirically, this enters the analysis through a variable measuring the number of households in the village, and through a second variable estimating the proportion of households that are cultivators. Both variables should be positively related to the provision of extension services, according to either theory.[9]

SUMMARY

Table 1 summarizes the implications of the two models. Among the "economic" variables it can be seen that the two models produce the same predictions, except in the cases of the last three variables listed: (a) Regarding farm size, the scale effect on the demand for information argues for a positive coefficient for farm size in both models. But, in the interest group model, there is the opposing effect of the dependency structure: this structure would be relatively weak where the "large" farms are relatively numerous. (b) Regarding education, the previously observed substitution between education and extension argues for a negative effect in the efficiency model. The opposing effects

TABLE 1 - IMPLICATIONS OF THE INTEREST GROUP AND EFFICIENCY MODELS

Direction of Effect on Provision of Extension Services

	Interest Group Model	Efficiency Model
I. "Economic" variables		
IADP village	+	+
Percentage of land irrigated	+	+
Price of land	+	+
Credit facilities	+	+
Farm size	?	+
Education	?	-
Distance to market	?	?
II. "Political" variables		
Proportion landless	+	?
Cooperative in village	+	?
Village size	+	+
Proportion landless x distance to market	+	?
Proportion of cultivators in village	+	+

resulting from education being correlated with wealth and access to political information are political in nature, leading to an ambiguity regarding the effect of education in the interest group model. (c) Finally, the direct effect of distance to the market is unclear in both models, depending on whether information obtained in the marketplace is a substitute or a complement to agricultural extension services.[10] This variable is included to test the efficiency related alternative explanation of the interaction of the proportion of landless households and distance to the market, which was presented above.

b. The Data

The data are from a survey conducted in India in 1970-71 by the National Council of Applied Economic Research of India (NCAER), as part of a three-year panel survey of households in rural India. Village-level variables were constructed from individual-level data, where necessary, by forming weighted averages of the observations in the village. The weights were calculated from the weights constructed by the NCAER, which were based on the frequency of the household's income group in the village. (Such weighting was necessitated by the over-sampling of higher-income households.) Specifically, the weight for household is simply the weight assigned by NCAER to that household, divided by the sum of the weights for the households in the village. The precision of these weighted averages is severely limited by the small number of households sampled in each village -- approximately twenty, on the average, for a mean village population of approximately 2,000.

The definitions of most of the variables appearing in Table 2 are obvious, but for a few variables a more detailed explanation is necessary:

Education: This is a weighted average of the (weighted) frequencies of cultivators at various levels of completed schooling. The weights are taken from a study of the relationship between urban wages and schooling levels in Bombay by Panchamukhi (1969, p. 331). Where the schooling levels in Panchamukhi's regressions did not correspond to the levels in the NCAER study, a simple average of the relevant regression coefficients was used. The weights chosen were:

(a) illiterate: -15.81

(b) primary education or below: -2.49

(c) below matriculation but above primary: 12.69

(d) matriculation or equivalent: 27.86

(e) above matriculation: 36.9 [11]

After multiplying these weights by the weighted frequencies at their respective schooling levels, 15.81 was added to the sum, to eliminate the possibility of a negative result (since logarithms were taken of this and other variables).

The proportions of cultivators, of landholders in two size classes, and of landless households in the village are weighted frequencies based on individual observations. In order to avoid problems caused by zero values, .1 was added to each proportion before taking its logarithm.

Number of households is the ratio of village population to (weighted) average family size among sample households.

c. Empirical Results

Table 2 shows the results of four probit regressions, in which the dependent variable is a dummy which takes the value of unity if the village had an "organized extension program." Such programs might include group instruction by extension workers, seed package programs, etc.

TABLE 2 - PROBIT REGRESSIONS OF EXTENSION SERVICES DUMMY[a]

	(1)	(2)	(3)	(4)
Proportion of villagers:				
With no owned land	-.249 (1.12)	-.267 (-1.23)	-.178 (-.778)	
Owning land, but < 2.5 ha.				-.480* (-2.26)
Owning > 2.5 ha.				-.606** (-2.95)
Who are cultivators	.549* (1.79)	.514* (1.72)	.637* (1.98)	1.02** (3.43)
With no owned land x D1[b]	.499** (2.61)	.494** (2.62)	.458* (2.30)	
With no owned land x D2[c]			-1.74 (-1.07)	
Education of Cultivators	.252* (1.99)	.307** (2.44)	.352** (2.41)	.300** (2.38)
Distance to Bus Stand	.069 (.544)	.079 (.641)	.098 (.749)	-.137 (-1.56)
Price of Irrigated Land	-.189 (-1.43)	-.141 (-1.07)	-.200 (1.48)	-.200 (-1.38)
Percentage of Land Irrigated	.061* (1.70)	.078* (1.99)	.057 (1.55)	.082* (2.28)
ADP village	.626** (2.80)		.612** (2.69)	
Credit coop in village	1.11** (3.25)	1.17** (3.40)	1.05** (3.03)	1.16** (3.40)
Credit bank in village	-.120 (-.650	-.155 (-.855)	-.153 (-.804)	-.217 (1.19)
Factory in Village (D2)			-.213 (-.291)	

(Cont'd)

TABLE 2 - PROBIT REGRESSIONS OF EXTENSION SERVICES DUMMY[a] (Cont'd.)

	(1)	(2)	(3)	(4)
Number of households	.220 (2.20)*	.244 (2.47)**	.208 (2.05)*	.218 (2.16)*
Constant	-1.39	-1.98	-1.43	-2.13
-2 Log L[d]	57.5	49.4	63.3	51.0
(d.f.)	(11)	(10)	(13)	(10)
Number of observations	252	252	250	252

Notes:

[a] T-statistics are in parentheses. All variables in log form except dummy variables.

[b] D1 = 1 if distance to bus stand > median.

[c] D2 = 2 if factory exists in village; D2 = 1 if factory exists in nearby village.

[d] Distributed as chi-square with (d.f.) degrees of freedom.

* Significant at .05 level, one-failed test.

** Significant at .01 level, one-failed test

About half of the villages in the sample had such programs, whereas only 26 percent had a "village level worker" living in the village.

The results support the interest group model and its "dependency structure" variant. Turning first to regressions (1) and (2), we find that the proportion of villagers owning no land is not significantly related to the provision of extension services in villages that are relatively close to the bus stand (i.e., well-integrated into local markets), but that the relationship is significant and positive in the relative remote villages, where the dependency structure would be expected to operate. The interaction, moreover, is highly significant.

As indicated earlier, the "efficiency theory" has no prediction on this interaction, unless one assumed that (a) proximity to markets was a substitute for extension services in providing technological information, and (b) tenant farmers had a greater demand for extension services than owner farmers. If assumption (a) were correct, we should observe a positive and significant direct effect of distance to the bus stand on the provision of extension services. This positive direct effect, however, is not observed in the data. In regressions (1) through (3), no significant effect is observed; in regression (4), the coefficient of this variable is negative and marginally significant. The efficiency-related alternative hypothesis for this interaction, moreover, implies that all other economic determinants of the provision of extension services should also interact with distance to the market. This hypothesis was tested, and it was found that the only variables which interacted significantly with distance to the bus stand were the land-holding variables, as predicted by the dependency structure hypothesis.

The education of cultivators is a second variable for which the implications of the interest group theory and those of the efficiency diverge. If, as previous studies indicate, education is a substitute for extension, this variable should receive a negative coefficient, according to the efficiency theory. More highly educated farmers "need" extension less, and thus should receive less extension services. The interest group theory, on the other hand, is consistent with a positive coefficent, because of the effects of education on political participation (see Zagoria, 1972) and on wealth. A positive and significant coefficient is, in fact, what is observed, and this coefficient, like the interaction discussed above, is quite robust to changes in the specification of the model.

A third pair of coefficients supporting the interest group theory over the efficiency theory are those related to credit facilities. The efficiency theory predicts positive and significant coefficients for both the "credit bank" and "credit coop" variables, and does not suggest that one variable should be stronger than the other. The interest group theory suggests that the credit coop variable should be stronger, because it reflects not only the availability of credit, but also the level of political organization, as mentioned above (see Baviskar 1968). This is what is observed in the data: The credit bank variable receives negative but insignificant coefficients, while the credit coop variable receives positive and significant coefficients, supporting the interest group theory.[12]

In regression (2), unlike regression (1), the "IADP" variable is omitted, because of a concern that this variable should be considered endogenous, i.e., determined by the other variables in the analysis. Dropping this variable, which receives positive and significant coefficients, has little effect on the coefficients of the other variables.

Regression (3) is like regression (1), but includes "the factory in village" variable and its interaction term with the proportion of villagers owning no land. The rationale for including this variable, indicated above, is that "isolation" from competitive labor markets can be measured not only by distances to transportation facilities, but also by the absence of large industrial employment sources.[13] While there is no prediction regarding the direct effect of the factory-in-village variable, this direct effect is also included for completeness in regression (3). It is found that neither coefficient is statistically significant, but the sign of the interaction term is negative, as predicted by the dependency structure hypothesis. When the direct effect is omitted, the t-statistic of the interaction term increases in absolute value to 1.5. When, in addition, the interaction term of proportion-landless with distance to the bus stand is omitted (distance to the bus stand and the existence of the factory are negatively correlated), this t-statistic rises in absolute value to 1.7.

In regression (4), the proportion of landless villagers is omitted, and the proportions of landowners in two size classes are inserted instead. As expected by our version of the interest group theory, both receive negative and significant coefficients. The coefficients of the two size classes, moreover, are of almost equal magnitude, contrary to the expectation of the efficiency theory that the greater the proportion of large farmers (highly correlated with large landowners), the greater should be the provision of extension services. The roughly identical sizes of these two coefficients are consistent with the dependency structure hypothesis, because two, conflicting effects are working here, according to this hypothesis: increased form size increases the demand for information, making it more productive to inform a few, large farmers than many, small farmers, but the smaller the percentage of large forms, the greater the dependence of small

farmers on them, mitigating the free-rider problem in political lobbying.

The price of irrigated land, a proxy for land quality, receives unexpected (but insignificant) negative coefficients. A possible explanation might be that the elasticity of demand for farm products on the village level is sufficiently low to make the long-run effect of new technology on producer surplus negative, depressing land values. There is little independent evidence of such an effect, however.

The coefficients of the percentage of land that is irrigated are positive, as expected, but not always significant. The positive coefficients are consistent with either theory. The number of households in the village and the proportion of cultivators also receive positive and significant coefficients, which are consistent with either theory.

4. CONCLUDING REMARKS

This paper has analyzed the allocation of agricultural extension services in India in terms of a political-economic model. The data are consistent with the hypothesis that extension services are allocated to the villages which most effectively lobby for them. The lobbying effectiveness of a village, moreover, appears to be related to the existence of political leverage or a "dependency structure," as we have called it, in the village: where large, landed farmers have monopoly and monopsony power over smaller, landless farmers, the provision of extension services is relatively probable. The data, moreover, seem to favor this interest group theory over the alternative, efficiency-related hypothesis that extension services are allocated solely in response to economic incentives.

These results have implications for further research in income distribution and technical change in developing countries. The results suggest that models of income distribution and of technical change which ignore political-economic interactions are of limited relevance to LDCs. It appears, moreover, that systematic empirical studies of such interactions are feasible, despite the limitations of data from developing countries.

NOTES

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[1] Much of this work is summarized in Evenson and Kislev (1975).

[2] The villages were located in Andhra Pradesh, Delhi, Kashmir, Maharashtra, and Punjab. An attempt was made to visit both "backward" and "progressive" villages in each area. I am indebted to numerous individuals at ICRISAT (Hyderabad), the Indian Agricultural Research Institute (Delhi), the Universities of Bombay and Kashmir, Gokhale Institute (Poona), Ahmednagar College, and Punjab Agricultural University, for arranging these visits.

[3] See Posner (1974) for a useful review of this literature.

[4] Guttman (1978a).

[5] Information costs, or income effects combined with a price-inelastic demand for the public good, tend to make even this relationship ambiguous, however (Guttman, 1978b).

[6] To some extent, the selection of villages for such programs is itself a reflection of purely political considerations. If so, this variable will measure "unobserved" political variables, as well.

[7] Here, as with other "economic" variables, the causality runs in both directions: extension services, to the extent that they increase adoption, will increase the price of land.

[8] I am indebted to Mrs. V. Rukhmini of the National Council of Applied Economic Research New Delhi, for suggesting the use of this proxy. Distance to the "market" (mandi) is also specified in the data, but this variable is less satisfactory because of the ambiguity in the term "market" and because sheer distance appears less important than quality of available transportation.

[9] Regarding the interest group theory, the relationship between numbers and group lobbying activity is somewhat ambiguous. As indicated in Section 2, however, a number of models suggest a positive relationship, as does the possibility of a "dependency structure" discussed here. Regarding the efficiency theory, the hypothesized positive relationship assumes the existence of economies of scale in extension delivery. While direct empirical evidence of such economies of scale is lacking, it seems likely that word-of-mouth communication is less costly within a village than between villages (cf. Mayfield and Yapa, 1974) so that a subset of farmers contacted in a large village will lead to a greater number of farmers eventually informed by word of mouth than would result from contacting the same number of farmers in a smaller village. See Rogers (1969) for discussion of the role of "opinion leadership" in traditional agriculture.

[10] Some writers have argued that proximity to markets and, more generally, to population centers increases political information, which would improve a village's ability to act collectively. In this case, the direct effect of distance to the market on provision of extension services should be negative.

[11] A single figure was used for "above matriculation" because of the statistically insignificant coefficients for most above-matriculation categories in Panchamukhi's regressions. The 36.9 figure is the coefficient in the linear model for "undergraduate diploma."

[12] Dropping the credit coop variable from the regression, on the ground that it should be considered endogenous, does not significantly affect the other coefficients.

[13] It is conceivable, of course, that the factory and largest farms are owned by the same individuals, but this will not always be the case.

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APPENDIX

This appendix examines three alternative explanations of a positive relationship between the proportion of landless farmers in a village and the provision of extension services to the village. The first and third of these alternative explanations, as will be seen, cannot provide a simple explanation for the observed interaction of the proportion of landless farmers and distance to the bus stand. Moreover, the second and third alternative explanations assume the validity of the interest group model, and only challenge the relevance of the dependency structure hypothesis.

The first alternative explanation argues that new agriculture technology, to the extent that it is adopted, increases the demand for agricultural labor and thus draws (landless) agricultural laborers from neighboring areas where new technology is not being adopted as rapidly.[1] Moreover, the new technology may convert small landed farmers into landless laborers, if such farms adopt the technology relatively slowly. Both of these sources of "reverse causation," however, would be expected to be equally strong in villages which are near or far from bus stands. Evidence of such an interaction, then, would tend to support our hypothesis of a dependency structure rather than the alternative, reverse causation hypothesis, though the latter would not be positiviely refuted.

A second alternative explanation would run in terms of differing demands by land-owning and landless farmers for new agricultural technology. Since land is usually viewed as a relatively inelastically supplied factor,

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[1] I am indebted to Professor Hanumantha Rao for emphasizing this point.

landowners would be the main long-run beneficiaries or victims of new technology, depending on whether the demand for the relevant products is elastic or inelastic. In villages that are relatively isolated from regional markets, this demand would be relatively inelastic, so that landowning farmers would have a relatively small, and perhaps a negative demand for new technology -- assuming that the village can be successfully "insulated" from such technology.[2] But the assumption that the village can be insulated from new technology is naive. The presence of an extension agent can speed the process of adoption, but there is virtually no evidence that his absence will prevent adoption. As long as this is the case, landowning and tenant farmers alike will demand extension services, simply in order not to lose in competition to their counterparts in other villages.

The third alternative explanation asserts that if the proportion of farmers who are landless is relatively large, the farmland in the village will be concentrated in the hands of relatively few farmers whose individual stakes in obtaining new technology will be relatively large. In this case, the village may lobby relatively intensively for extension services, even if there was no dependency structure. Aside from the fact that this alternative interpretation cannot easily explain the interaction of the proportion of landless with the distance to the bus stand, it also implies that the coefficient of the proportion relatively small landholders in the village should be positive, or less negative than the coefficient of the proportion of relatively large landholders. But no significant difference between these coefficients is observed.

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[2]See Guttman (1978a) for additional caveats to this hypothesis.