

INTEREST GROUPS AND DEMAND FOR AGRICULTURAL EXTENSION SERVICES: An Experience from Southern Pakistan

Qazi Masood AHMED and Noor-ul-HASSAN*

An attempt has been made to explore the determinants of public investment in agricultural extension services in Pakistan. We find empirical support for the efficiency model as against the interest group model in agricultural extension services. The study concludes that medium size farmers demand more agricultural extension services as against large and small farmers. Moreover, owner operators also demand more agricultural extension services as compared with tenants. We also find that education in Pakistan can complement agricultural extension services due to low education level of the farmer.

I. Introduction

While considerable work has been done on the effects of agricultural research on productivity, nothing has been done to probe the determinants of public investment in this area. This may partly be due to the perception that government behavior is exogenous to the economic system. Notwithstanding such an untenable assumption we now go on to obtain new insights on this topic. If public investment in agricultural research is the result of interest group pressure, then the ability of this group would be an important constraint on agricultural development. Similarly, if the expenditure on agricultural extension is determined by this interest

* Authors are Economists at the Applied Economics Research Centre, University of Karachi. They are thankful to Haroon Jamal and Husaini Jagirdar for their valuable suggestions. However, remaining errors are sole responsibility of the authors.

group, it will be one of the important determinants of the distribution of income. The allocation of agricultural extension services has been discussed in the literature in two competing models. According to the efficiency model the quantity and distribution of public goods is determined by economic efficiency i.e., by a comparison of aggregate economic cost and benefit. The interest group model, on the other hand, postulates that public goods are allocated so as to maximize political support for the government.

Guttman (1980) analysed allocation of agricultural extension services in India in terms of these two models. The author concluded that due to a dependent structure, large landlords and landless farmers support the provision of extension services. Guttman found that highly educated farmers demand more extension services, which is contrary to earlier evidence that education and extension services are substitutes for each other. The author therefore found the interest group model more appropriate as compared with efficiency model. Guttman (1978) also applied a model of demand for public goods to explain Cross-sectional differences in public allocations to agricultural research in the United States. The model postulated that those who demand agricultural research at the state level are farmers and firms producing agricultural inputs and contributing voluntarily to the lobbying activity either by voting or supporting the campaigns to induce research allocation. Griliches (1964) introduced the level of public expenditure on agricultural research and extension as a variable in the aggregate production function and concluded that these expenditures affect the level of agricultural output significantly, and their social rate of return is quite high. Khan and Akbari (1986) estimated the (marginal) internal rate of return to agricultural extension services in Pakistan and found it to be 36 per cent which is quite comparable with other countries. Bhaduri (1973) argued that landlords may discourage innovations which would increase the tenant's income. Innovations may also reduce the demand for borrowing, leading to a decline in landlord's income from lending.

The purpose of this paper is to explore the determinants of public investment in agricultural extension services in Pakistan in terms of a socio-economic framework by using the two models discussed earlier. It might also shed some light on the transitional process of the agrarian structure. The paper is organized as follows: The introduction in section I is followed by the analytical framework in section II. In sections III and IV data collection and its estimation, and the empirical findings are respectively presented. Section V contains the conclusions of the study.

II. The Models and the Hypothesis

In this section we describe each variable that will be used in the estimation of demand for agricultural extension in Southern part of Pakistan. The data and estimation techniques will be discussed in the next section.

1. *Percentage of Land Irrigated (PLANDI)*

This variable is constructed as the ratio of the area irrigated either by canal, tubewell or any other local method, to the total area under management of the respondent. In the efficiency model, as the supply of water to the farmers is increased, they will be inclined towards the use of new high yielding varieties, which in turn increase the demand for agricultural extension (DEPV2). According to the interest group model, large landlords will be in a better position to enjoy water facilities due to their close links with bureaucrats and politicians, they will therefore demand more agricultural extension services, i.e.,

$$\frac{\delta \text{DEPV2}}{\delta \text{PLANDI}} > 0$$

2. *Price of Land (LANDPA)*

In our model we assume that the price of land is a proxy for its quality. We hypothesize that farmers who own better land will demand more agricultural extension due to its greater suitability for new high yielding varieties. The price of land is a better proxy than yield per acre in the context of absenteeism particularly in Sindh, due to which yield per acre is quite low, i.e.,

$$\frac{\delta \text{DEPV2}}{\delta \text{LANDPA}} > 0$$

3. *Credit Facilities (CREDITD)*

This is a dummy variable and has a value of one if the farmer obtains credit from a bank or a cooperative, and zero otherwise. We hypothesize that credit facility is positively related to agricultural extension services because disbursement of loan to farmers by any institution enables them to purchase more seeds and fertilizer. In the interest group model these credit facilities are also positively related to agricultural extension as in Sindh and Balochistan only large landlords get loans from banks and fi-

nancial institutions, i.e.,

$$\frac{\delta \text{DEPV2}}{\delta \text{CREDITD}} > 0$$

4. Farm Size (AREAUM)

Large farms own complimentary factors of production like tractors, threshers, etc., and make more use of seeds and fertilizer. They therefore demand more agricultural extension services. In the interest group model, due to their links with government officials, large landlords demand agricultural extension services. In this paper we have constructed four equations. Equation (1) uses farm size as a continuous variable whereas the remaining three equations use it as a dummy variable. For the estimation of these alternative equations [(2), (3) and (4)], we will use the square of this variable, (AREAUMSQ), and three dummies of farm area AREAUMD1, AREAUMD2 and AREAUMD3 which describe small, medium and large farmers respectively. The expected signs of AREAUM, AREAUMSQ and AREAUMD3 are positive, whereas the AREAUMD1 and AREAUMD2 (dummies for small and medium) are expected to be negative, i.e.,

$$\frac{\delta \text{DEPV2}}{\delta \text{AREAUM}} > 0 \quad \frac{\delta \text{DEPV2}}{\delta \text{AREAUMSQ}} > 0 \quad \frac{\delta \text{DEPV2}}{\delta \text{AREAUMD3}} > 0$$

$$\frac{\delta \text{DEPV2}}{\delta \text{AREAUMD1}} < 0 \quad \frac{\delta \text{DEPV2}}{\delta \text{AREAUMD2}} < 0$$

5. Farmer Education (FEDUC)

This variable is constructed on the basis of number of years the farmers spent in school and indicate the substitutability or complementarity of farmer's education to the demand for agricultural extension services. The sign on this variable is ambiguous as it can be substitute or complement to the agricultural extension. In the former case, the demand for agricultural extension decreases if a farmer is highly educated, the sign of this variable would be negative. In the latter case, it can be justified to assume that the standard of education in the rural areas is very low, and insufficient to replace agricultural extension. In this case, it can be at best complement to agriculture extension service, i.e.,

$$\frac{\delta \text{DEPV2}}{\delta \text{FEDUC}} \lesssim 0$$

6. *Distance from Office of Agricultural Extension Services (DISAEO)*

This variable is the actual distance of the farm from the office of the agricultural extension services with a negative expected sign in the efficiency model. This is because farmers generally do not travel for extension services. They would pay a visit only if the office is near to their farms. However in interest group model the sign is ambiguous since the distance plays trivial role compared to the links of the landlord to the officers responsible for agricultural extension services, i.e.,

$$\frac{\partial \text{DEPV2}}{\partial \text{DISAEO}} < 0 \quad \frac{\partial \text{DEPV2}}{\partial \text{DISAEO}} \leq 0$$

7. *Proportion of Landless Labour (LLD)*

In this study we have introduced a dummy for tenant farmers which is a proxy for landless labour. The dummy has a value of one for the tenant and zero otherwise. This variable is included in the study to explore the tenurial status of farmers who demand agricultural extension services. For this purpose we assume that in the interest group model the tenant will demand the agricultural extension through his landlord, and therefore will have positive sign, while in the efficiency model, either the tenant or the owner may demand agricultural extension depending upon its efficiency and therefore expected sign is ambiguous, i.e.,

$$\frac{\partial \text{DEPV2}}{\partial \text{LLD}} \leq 0 \quad \frac{\partial \text{DEPV2}}{\partial \text{LLD}} > 0$$

8. *Interactive dummy of Proportion of Landless Labour and Credit Dummy (LLDCRD)*

This dummy variable is obtained by multiplying the dummy on landless labour and the credit dummy. This variable is designed to assess whether tenants who get loan demand more agricultural extension services. We hypothesize a positive sign since we assume that an increase in credit will be spent on seeds and fertilizer, for which these farmers will demand agricultural extension services, i.e.,

$$\frac{\partial \text{DEPV2}}{\partial \text{LLDCRD}} > 0$$

9. Dummy for Provinces (*PROVD*)

To know the differences in the provinces, a dummy has been introduced with a value of one for Sindh and zero for Balochistan. The expected sign of the coefficient is ambiguous, i.e.,

$$\frac{\delta \text{DEPV2}}{\delta \text{PROVD}} \leq 0$$

Table 1 presents the summary of the expected signs of various coefficients in the two models.

TABLE 1

Variables	Interest Group Model	Efficiency Model
<i>ECONOMIC VARIABLES</i>		
Percentage of land irrigated	+	+
Price of land (yield)	+	+
Credit facilities	+	+
Farm size	+	+
Education	?	?
Distance from agricultural extension Service office	?	-
<i>POLITICAL VARIABLES</i>		
Proportion landless labour	+	?
Interaction dummy (credit in proportion of landless)	+	+
Province dummy	?	?

III. Data and Estimation

a) Data

The data come from a survey undertaken for the study "specific constraints facing small farmer" [AERC, (1985)]. The area covered in the study was Southern Pakistan which includes the two provinces of the country, i.e., Sindh and Balochistan. The survey was conducted on 400 farms

which included 126 small farms having less than 5 acres, 191 medium farms between 5 to 12.5 acres, and 83 large farms. Of the total farms, 302 were from Sindh and 98 from Balochistan. 234 farms were owner-operated while 166 were tenant-operated.

As far as the sampling design and questionnaire are concerned, complete and proper sampling of the entire population of operational holdings located in Southern Pakistan was not available. Therefore a purposive multi-stage cluster sampling technique was designed to select the study area focusing mainly on the differences in ecology and irrigation systems across regions or farms. On the basis of an agro-climatic ecological zone survey, all the five ecological zones of Sindh i.e. Northern, Central, Southern, Deserts and Kohistan and district Kalat, Khuzdar and Lasbela in Balochistan were covered.

The questionnaire was designed to provide data not only for standard econometric techniques but also on different socio-economic and institutional variables. This information relates to farm and family profile, income and consumption patterns, output and productivity levels, prices of inputs and outputs and sources of these inputs including agricultural extension services.

The basic unit of study was the farm operator irrespective of his legal status. The survey was conducted by a continuous method and respondents were interviewed on recall basis, [see, AERC, (1985)].

b) *Model*

$$\text{DEPV2} = \alpha_0 + \alpha_1 \text{PLANDI} + \alpha_2 \text{LANDPA} + \alpha_3 \text{AREAUM} + \alpha_4 \text{AREAUMSQ} + \alpha_5 \text{AREAUMD1} + \alpha_6 \text{AREAUMD2} + \alpha_7 \text{AREAUMD3} + \alpha_8 \text{FEDUC} + \alpha_9 \text{DISAEO} + \alpha_{10} \text{LLD} + \alpha_{11} \text{CREDITD} + \alpha_{12} \text{LLDCRD} + \alpha_{13} \text{PROVD} + \epsilon_i$$

DEPV2 = Demand for agricultural extension services. It is a dummy variable taking a value one if the farmer demands extension services, zero otherwise.

PLANDI = Percentage of land irrigated.

LANDPA = Price of land per acre.

AREAUM = Area under management.

AREAUMSQ = Square of the area under management.

AREAUMD1 = Dummy for small farmer who owns less than five acres.

AREAUMD2 = Dummy for medium farmer who owns more than five acres but less than 12.5 acres.

AREAUMD3 = Dummy for large farmer who owns more than 12.5 acres.

FEDUC = Farmer's education.

DISAEO	= Distance from agricultural extension services office.
LLD	= Dummy for proportion of landless labour taking a value of one for tenants and zero otherwise.
CREDITD	= Dummy for credit facilities taking a value of one if the farmer receives credit and zero otherwise.
LLDCRD	= Interactive dummy of proportion of landless labour and credit dummy.
PROVD	= Dummy for provinces, taking a value of one for Sindh and zero for Balochistan.

We have used probit regression with the dependent variable, [For detail discussion see Amemiya (1981), Maddala (1984) p. 23], taking a value of one if the respondent had an organized extension programme and zero if the respondent does not have extension services. However, the data does not provide the extent of extension services in each case and leads us to assume that the level of agricultural extension services are if at all, equally provided.

IV. Empirical Results

In Table 1 equations (1) through (4) are relevant to the southern part of Pakistan. In equation (1) the variable on area squared shows a negative sign and in equations (2) to (4), the dummy for medium farmers is positive and significant, whereas the dummy for small and large farmers is negative, but significant only in equation (3). These results show that medium farmers demand agricultural extension services, whereas small and large farmers do not, which contradicts the interest group theory which postulates that due to their political links large farmers demand more agricultural extension services. These results support the efficiency theory which postulates that the demand for agricultural extension services will be greater among the more efficient farmers. Our finding is corroborated by studies on farm size and productivity [see Mukhtar and Mukhtar (1985)] which show that medium farmers are more efficient than small and large farmers, implying that they demand more agricultural extension services.

The variables capturing the distance of the farm from the agricultural extension office, has a negative sign which is significant implying that the distance of the office of agricultural extension services from the farm plays a very significant role reflecting that farmers who are not very far from these offices contact for the agricultural extension services. This result also underlines the importance of large landlords highlighted in the interest group theory. The third variable, the percentage of irrigated land, has a

TABLE 2

Variables	SOUTHERN PAKISTAN			
	Equation (1)	Equation (2)	Equation (3)	Equation (4)
ONE	-1.269 (-3.41)	-1.525 (-6.08)	-1.022 (-4.28)	-1.331 (-4.57)
PLANDI	0.021 (0.17)	0.0233 (0.19)	-0.025 (-0.21)	0.019 (0.16)
LANDPA	0.00009 (1.41)*	-0.00009 (-1.51)*	0.00009 (1.44)*	0.00009 (1.46)*
AREAUM	0.039 (0.79)			
AREAUMSQ	-0.0021 (-1.35)*			
AREAUMD1		0.149 (0.53)	-0.0092 (-1.34)*	
AREAUMD2		0.504 (2.56)***		0.335 (1.61)**
AREAUMD3			-0.0073 (-2.42)***	-0.249 (-0.92)
FEDUC	0.010 (1.35)*	0.0091 (0.70)	0.0092 (0.71)	0.009 (0.69)
DISAEO	-0.0072 (-0.84)	-0.0067 (-1.99)**	-0.0073 (-2.14)***	-0.006 (-2.01)**
LLD	-0.162 (-0.91)	-0.1224 (-0.68)	-0.172 (-1.41)*	-0.143 (-0.79)
CREDITD	0.324 (0.85)	0.4061 (1.06)	0.430 (1.32)*	0.424 (1.31)*
LLDCRD	-0.4501 (-0.01)	-0.4726 (-0.01)	-0.4686 (-0.01)	-0.4728 (-0.01)
PROVD	0.137 (0.62)	0.144 (0.64)	0.146 (0.65)	0.135 (0.60)
Log-Likelihood	-147.20	-145.98	-146.10	-145.70
Restricted	-158.31	-158.31	-158.31	-158.31
Chi-Squared	22.22	24.66	24.42	25.22
Sig. Level	0.014	0.0060	0.0065	0.0049

The values in the parenthesis are the t values.

* Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

positive sign in all the four equations but insignificant implying that water availability enables farmers to use pesticides and seeds, thus enhancing their demand for agricultural extension services. The other variable, price of land, which is a proxy for yield, has the correct sign and significant implies that those who own better quality land will demand more agricultural extension service, as they are more likely to use seeds and pesticides.

The dummy variable on tenant farmers has a negative sign which implies that owner farmers demand more agricultural extension services than tenant farmers. To some extent this supports our previous result that large farmers, most of whom are share croppers, do not demand agricultural extension services, however, this variable is significant at a relatively low level. Coefficients of the dummy of credit facilities (CREDIT) and the interactive dummy of credit facility and tenants (LLDCRD) support the efficiency theory. The positive sign on credit facility (CREDITD) shows that those farmers who get loans from banks and/or cooperatives also demand agricultural extension services. The coefficient on the interactive dummy variable (LLDCRD), has a negative sign implying that tenants who get loans do not demand agricultural extension services. This reflects that to some extent only owner farmers who get loans demand agriculture extension services. Whereas when tenants get loans from these sources, it is used for consumption purposes and does not affect the demand for agricultural extension services. However, insignificance of most of the variables in the equations should make us cautious about placing too much confidence in the results.

The variable on farmer's education tests whether education and agricultural extension services are complementary or substitutes. The efficiency theory predicts that education and agricultural extension services are substitutes, suggesting a negative sign on this variable. However, our results do not support this version of the efficiency theory. On the contrary the sign on this variable is positive implying the complementary nature of the relationship between education and agriculture extension services. The dummy on provinces is insignificant and reflects that there is not much variation in the provinces with regard to demand for agricultural extension services.

V. Conclusions

In this paper we have tested the efficiency and the interest group models of public investment in the case of agricultural extension services. The study concludes that public investment for agricultural extension services in southern Pakistan is more influenced by efficiency related variables. The more efficient the farmer the greater his agricul-

tural extension services. We conclude that being more efficient medium size farmers demand more agricultural extension services. Also, farmers who own better and irrigated land can absorb pesticides and seeds better, have a higher demand for agricultural extension services. As far as tenurial arrangements are concerned, owner-operators demand more agricultural extension services compared to tenants. Also, farmers who receive credit from banks or cooperatives, demand more agricultural extension. However, our study fails to support the argument of the efficiency theory that education and agricultural extension services are substitutes. We find that in the southern part of the country, due to low educational levels, education can at best complement agricultural extension services. The more educated the farmer the greater his demand for agricultural extension services. In the southern part of the country, where the supremacy of landlords and tribal leaders is unquestionable, the results of the study reveal the beginning of a transition process. However, results of this study are somewhat inconclusive in this regards and warrant further research on the subject.

Applied Economics Research Centre
University of Karachi

References

- Amemiya, T., 1981, Qualitative response model: A survey, *Journal of Economic Literature*, 19(4).
- Bhaduri, A., 1973, Agricultural backwardness under semi-feudalism, *Economic Journal*, 83(329).
- Brook, William A., and Stephen P. Magee, 1978, The economics of special interest politics: The case of tariff, *American Economic Review*, 68(2).
- Griliches, Zvi, 1964, Reserach expenditures, education and the aggregate agricultural production function, *American Economic Review*, 54(5).
- Guttman, Joel M., 1980, Village as interest groups: The demand for agricultural extension services in India, *Kyklos*, 33(1).
- Guttman, Joel M., 1978, Interest group and the demand for agricultural research, *Journal of Political Economy*, 86(3).
- Khan, Mahmood Hasan and Ather Hussain Akbari, 1986, Impact of agricultural research and extension on crop productivity in Pakistan: A production approach, *World Development* 14(6).
- Maddala, G.S., 1984, *Limited-dependent and qualitative variables in econometrics*, Cambridge: Cambridge University Press.
- Mukhtar, Eshya-Mujahid, and Hanid Mukhtar, 1985, Input use and productivity across farm size: A comparision of two Punjabs, *Pakistan Development Review*, 27(4).
- Applied Economics Research Centre, 1985, A study of specific constraints facing small farmers in Pakistan, Research Report No. 56, Karachi: University of Karachi.