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INSTITUTIONAL CREDIT, UNCERTAINTY AND ADOPTION OF HYV TECHNOLOGY: A COMPARISON OF EAST U.P. WITH WEST U.P.

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Several recent studies have shown that small farmers have lagged in the adoption of HYV technology.¹ Of the many explanations offered for the slow rate of adoption of small farmers, inadequate flow of institutional credit, uncertainty, and unfavourable tenurial conditions may be regarded as the more important. These studies have also revealed two striking features in the relationship between credit and adoption of HYV technology: (a) the high proportion of owned funds for financing *current* farm expenditure on HYV; and (b) the failure of the borrowers, especially small farmers, to lift the entire credit per hectare made available to them by the co-operative institutions, especially in the eastern India.

The above two features, apart from reflecting the impact of asset-based loan policies which render access to institutional credit difficult for tenants, small and marginal farmers,² also are suggestive of the possible constraints on the demand side: the demand for credit was low because either the (sample) farmers were resourceful enough to bear a large part of the additional expenditure from owned funds, or they were unwilling to borrow for other reasons.

The objective of the present study is to analyse the nature of constraints on the demand for short-term production credit from institutional (co-opera-

* Reader, Institute of Economic Growth, University of Delhi, Delhi-7. This is a part of a wider inter-disciplinary study on "Economic Development and Distribution of Gains for Poor in East Uttar Pradesh", currently under way at the Institute of Economic Growth. I am indebted to Professors C.H. Hanumantha Rao and S.D. Tendulkar for comments and suggestions on an earlier version. Personal discussions with Professor M. L. Dantwala were very helpful in clarifying the issues raised in this paper. I have also benefited from discussions at a staff workshop of the Institute of Economic Growth where preliminary findings of this paper were presented. I am also grateful to Dr. B. N. Asthana and Dr. R. P. Singh of the Agro-Economic Research Centre, Allahabad, for sending the field data on Gorakhpur farms. Shri S. S. Yadav rendered statistical assistance. I am alone responsible for any errors in the paper.

1. See the papers published in the Conference Number of *Indian Journal of Agricultural Economics*, Vol. XXVI, No. 4, October-December 1971; C. Muthiah, "The Green Revolution: Participation by Small and Large Farmers", Seminar on Rural Development for Weaker Sections, Indian Society of Agricultural Economics, October 1972; M.G.G. Schluter and G.O. Parikh, "The Interaction of Co-operative Credit and Uncertainty in Small Farmer Adoption of the New Cereal Varieties", *Artha Vikas*, Vol. 10, No. 2, July 1974; and G. Parthasarathy and D. S. Prasad, "Response to the Impact of the New Rice Technology by Farm Size and Tenure—Andhra Pradesh", in *Interpretive Analysis of Selected Papers from Changes in Rice Farming in Selected Areas of Asia*, International Rice Research Institute, Los Banos, Philippines, 1978.

2. This aspect on the supply side has received considerable attention in the literature on rural credit. See in particular, C.H. Hanumantha Rao, "Farm Size and Credit Policy", *Economic and Political Weekly*, Vol. V, No. 52, December 26, 1970, and N. S. Jodha, "Land-based Credit Policies and Investment Prospects for Small Farmers", *Economic and Political Weekly*, Vol. VI, No. 39, September 25, 1971. For a good critique of the view that (on the supply side) high interest rates reflect the considerable risk that farmers without collateral will default on their loans, see M. Lipton, "Agricultural Finance and Rural Credit in Poor Countries", *World Development*, Vol. 4, No. 7, 1976. See also M. L. Dantwala, "Future of Institutional Reform and Technological Change in Indian Agricultural Development", *Economic and Political Weekly*, Vol. XIII, Nos. 31, 32 & 33, Special Number, August 1978.

tive) sources in eastern Uttar Pradesh, where small farmers predominate. In particular, we wish to test the hypothesis that the short-term production credit through co-operative agencies is less important than investment (term) credit; and that the demand for the former (production credit) may be limited by the supply of the latter (investment credit) in the high risk, rainfed, small farm dominated agricultural tracts of East Uttar Pradesh. It is hoped that an understanding of the nature of such constraints on the demand side will enable us to suggest necessary policy reformulations in respect of dovetailing of co-operative credit so that it is availed of by the weaker sections, *viz.*, small and marginal farmers and tenants. In section I we discuss the factors affecting the demand for production and investment credit, and test the above hypothesis at the macro level using the data thrown up by the All India Rural Debt and Investment Survey, 1971-72 (AIRDIS) and other recent publications of the Reserve Bank of India (RBI), and at the farm level with the survey data on 100 sample farmers in the Gorakhpur district made available by the Agro-Economic Research Centre, Allahabad. In this section we also examine the inter-district variations in the absorption of *short-term* co-operative credit per hectare using district level unpublished data on credit which we obtained from different offices of the State Government. In section II we evaluate the special schemes recently introduced for the benefit of small and marginal farmers. In section III we discuss some aspects of long-term credit supplied by the primary land mortgage societies, and the direct and indirect assistance made available by scheduled commercial banks. In section IV, we estimate the *potential* demand for current production credit, in order to arrive at credit gaps separately for small and large farmers. The conclusions and policy implications are summarised in the last section.

I

FACTORS AFFECTING THE DEMAND FOR PRODUCTION AND INVESTMENT CREDIT

The demand for long-term as well as short-term credit is a derived demand. The demand for long-term finance (per hectare) for small and marginal farmers may be expected to be greater than what is permissible with their prevailing asset endowments owing to (a) their continuous efforts to expand their asset base in order to make it economically viable through investment in irrigation equipment and/or purchase of additional land; (b) the necessity to replenish assets lost or sold during flood, drought years; and (c) the virtual absence of owned funds for this purpose. By contrast, for large farmers, the demand for long-term finance may be expected to be lower than what is permissible by their asset endowments owing to the prevalence of scale economies in the utilization of non-land agricultural assets such as irrigation equipment and tractors.³

3. Both the All India Debt and Investment Survey, 1971-72, Reserve Bank of India and the National Sample Survey 26th Round on Census of Land Holdings (1971-72) confirm that the per hectare value of non-land agricultural assets decreases with the increase in the size of holdings.

The demand for short-term production credit for both small and large farmers is directly related to the current level of input requirements and inversely with the self-financing ability of the farmers, given risk and uncertainty.

Rate of interest is considered as another significant variable affecting short-term as well as long-term demand for credit.⁴ Indeed, official policies centred on (a) gradual replacement of moneylenders by co-operatives, and (b) lowering of interest rates, in the hope that demand for production credit will rise, apart from serving as an income-transfer mechanism.

The supply of long-term institutional (co-operative as well as commercial bank) credit is a direct function of asset (land) endowments.

A substantial proportion of short-term institutional finance, however, is provided on 'personal security'. Crop loans for the purchase of fertilizers and seeds also do not involve security of fixed assets. However, it is well documented in the literature on rural credit that small farmers, especially in the eastern India, are denied access to short-term co-operative credit because these societies are dominated by local power structure. In order to counteract this problem, special agencies (SFDA and MFAL) have been created, and now scales of finance per hectare for the purchase of fertilizers and seeds are objectively determined, and funds so determined are *reserved* for small and marginal farmers. Thus efforts have been made in the recent past to loosen the grip of large farmers over the co-operative societies, delink the supply of short-term finance from ownership of land asset, and relate the same to the level of input requirements.

Despite the relaxing of some of the constraints on the supply side, and the lower cost of loans from co-operatives, why is the short-term borrowing from co-operatives *per household* much lower in East Uttar Pradesh as compared to the western region? (see Table I). Why even the short-term credit *reserved* for disbursement to small and marginal farmers through the small and marginal farmer development agencies was not lifted in full?⁵

The structural differences between the eastern and western Uttar Pradesh, as relevant to the rural credit problem, are clearly brought out in Tables I and II. Borrowing *per household* for capital and current farm business expenditure in East Uttar Pradesh is about half of the amount in West Uttar Pradesh. Further, capital expenditure as a proportion of total expenditure is much lower in the eastern region. While the proportion spent on household expenditure (80 per cent of which comprise consumption expenditure) is higher in the eastern region, the absolute level of expenditure on this account is much lower (see Table II). Again, while the proportion of credit borrowed from moneylenders as well as co-operatives is the same in both regions, the *absolute amount* borrowed in the eastern region is about half of the amount borrowed in the western region, from *both* sources (institutional as well as non-institutional) (see Table I), despite relaxation of constraints on the supply of credit from the co-operatives.

4. See P. K. Pani, "Cultivators' Demand for Credit: A Cross-Section Analysis", *International Economic Review*, Vol. 7, No. 2, May 1966.

5. Official records of MFAL agency at Ballia bear testimony for this phenomenon. Interested readers may write to the author for relevant data.

TABLE I—AVERAGE AMOUNT OF CASH DUES OUTSTANDING PER HOUSEHOLD BY CREDIT AGENCY

	East U.P.	Per cent distribu- tion	West U.P.	Per cent distribu- tion	All-India	Per cent
	Amount (Rs.)		Amount (Rs.)		Amount (Rs.)	
1. Government	31.04	11.62	38.35	7.72	42.0	7.1
2. Co-operative	37.22	13.94	83.52	16.82	130.0	22.0
3. Commercial bank ..	1.80	0.67	12.95	2.61	14.0	2.4
4. Non-institutional agencies (moneylenders, traders, landlords)	163.14	61.08	299.43	60.29	389.0	65.9
5. Others	33.88	12.69	62.44	12.57	15.0	2.5
Total	267.08	100.00	496.69	100.00	590.0	100.0

TABLE II—AVERAGE AMOUNT OF BORROWINGS (PER HOUSEHOLD) BY PURPOSE

Purpose	East U.P.	Per cent distribu- tion	West U.P.	Per cent distribu- tion	All-India	Per cent
	Amount (Rs.)		Amount (Rs.)		Amount (Rs.)	
Farm business						
(a) Capital expenditure ..	72.72	27.23	194.98	39.26	205	34.7
(b) Current expenditure ..	21.52	8.06	44.17	8.89	89	15.1
Non-farm business						
(a) Capital expenditure ..	9.98	3.74	6.57	1.32	19	3.2
(b) Current expenditure ..	1.60	0.60	4.82	0.97	7	1.1
Household expenditure ..	131.38	49.19	203.91	41.06	223	37.8
Others	29.88	11.19	42.21	8.50	47	8.0
Total	267.00	100.00	496.66	100.00	590	100.0

Source: For Tables I and II: All India Rural Debt and Investment Survey, 1971-72, Reserve Bank of India.

An analysis of data pertaining to co-operative credit disbursed in the eastern and western regions by size class of holdings also reveals interesting differences in the offtake of credit as between the two regions (see Table III). The proportion of short-term credit borrowed to the total short-term credit was lower than the proportion of cultivated area, *both* for smallest and largest size-groups in the eastern region. The proportion of credit borrowed by medium holding (2.01-4.00 hectare size-group) to the total credit disbursed was as high as 51 per cent, although this size-group accounted for only about 23 per cent of the cultivated area. Interestingly, the proportion of long-term credit borrowed by medium size holdings is also higher than the smallest and the largest size holdings (see Table IV).⁶ In the predominantly irrigated western region where the average size of holding is much larger, the proportion of credit borrowed is roughly in correspondence with the proportion of cultivated area.

6. The reasons for this phenomenon as well as the inter-dependence of short-term finance on long-term finance are examined in later sections.

TABLE III—PERCENTAGE OF SHORT-TERM CO-OPERATIVE CREDIT BORROWED AND THE PROPORTION OF CULTIVATED AREA ACCORDING TO SIZE CLASS OF HOLDINGS IN EAST AND WEST UTTAR PRADESH: 1975-76

Size class (hectares)	East Uttar Pradesh		West Uttar Pradesh		Credit per hectare	
	Proportion of short-term credit (per cent)	Proportion of cultivated area (per cent)	Proportion of short-term credit (per cent)	Proportion of cultivated area (per cent)	East U.P. (Rs.)	West U.P. (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
0-1.00	..	13.20	28.35	17.22	19.48	72.77
1.01-2.00	..	23.85	22.12	20.63	45.11	64.32
2.01-4.00	..	50.85	22.83	28.29	93.12	77.24
4.01 and above	..	12.10	26.70	33.85	18.97	54.96
		100.00	100.00	100.00	41.82	66.27

TABLE IV—PERCENTAGE SHARE IN CULTIVATED AREA AND LONG-TERM CO-OPERATIVE CREDIT IN EAST AND WEST UTTAR PRADESH: 1973-74-1976-77

Size class (hectares)	East Uttar Pradesh				West Uttar Pradesh			
	Per cent share in cultivated area		Percentage share of		Per cent share in cultivated area		Percentage share of	
	1973-74	1974-75	1974-75	1975-76	1973-74	1974-75	1975-76	1975-76
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0-1.0	..	28.35	10	18	17.22	9	8	13
1.01-2.0	..	22.12	41	36	20.63	30	32	35
2.01-4.0	..	22.83	36	34	28.29	41	41	40
4.01 and above	..	26.70	14	12	33.85	20	19	12
Long-term credit per hectare of gross cropped area averaged for all size-groups (Rs.)		100.00	100	100	100.00	100	100	100
			7.85	9.43	9.49	13.81	20.07	13.03

Source: From the Records of the Office of Registrar of Co-operative Societies, Lucknow.

The amount borrowed (per hectare) by the farmers in the size-group 0-1.0 hectare in the eastern Uttar Pradesh is about one-fourth of the amount borrowed by the corresponding size-group in West Uttar Pradesh. Within East Uttar Pradesh, the amount borrowed by 0-1.0 hectare size-group is about one-half of the next immediate size-group, and about one-fifth of the size-group 2-4 hectares. Inter-group differences in the amount borrowed per hectare appear to be greater in the eastern than in West Uttar Pradesh. Such a vast difference in the amount borrowed by the small holdings in the eastern region may not have been *entirely* due to supply bottlenecks (*i.e.*, large farmers cornering a lion's share of the co-operative credit), especially in view of the fact that in the neighbouring western region the same co-operative institutions seemed to have served the small farmers reasonably well. Thus it is possible that small farmers (0-1.0 size-group) in the eastern region suffer from certain constraints which inhibit them from taking full advantage of the production credit made available through the co-operative institutions. However, it would be empirically difficult to disentangle the 'demand constraint' effect and the 'supply bottleneck' effect, both of which may have contributed in some measure to lower offtake of co-operative credit by small farmers in the eastern region.

It is argued in this section that the factors on the demand side contributing to the lower offtake of co-operative credit per hectare in East Uttar Pradesh can be empirically identified in terms of the smaller resource base (size of holding), and the higher weather uncertainty faced by farmers in this region.

(a) *Credit and Size of Holding*

The magnitude of borrowing from all sources is low in East Uttar Pradesh because the overall cash requirements for current farm expenditure for the vast majority of (small) farmers in the eastern region may be expected to be small. Although the cash requirements for HYV wheat are larger than for HYV paddy for farmers of all size classes, the absolute *additional* amount of borrowing (credit) needed for shifting from local to HYV varieties of wheat is low for small farmers owing primarily to lower expenditure on wage payment to hired labour, unlike in the case of large farmers.⁷

Analysis of farm level data pertaining to 100 sample farmers in Gorakhpur for the year 1975-76 seems to lend support to our argument, *viz.*, the lack of significance of co-operative credit for adoption of HYV wheat in East Uttar Pradesh. The proportion of area under HYV wheat was high and roughly of the same magnitude both among borrowers and non-borrowers (see Table V). The main reason for this appears to be that the proportion of area irrigated was roughly the same for both borrowing and non-borrowing farms during the *rabi* season. For the same reason there does not appear to be significant variation as between borrowing and non-borrowing households in respect of fertilizer use in this (*rabi*) season.

7. This is evident from an analysis of cost data reported in Farm Management Studies, Deoria (Uttar Pradesh) (Combined Report), 1966-69, not given here for saving journal space. Interested readers may write to the author for relevant data.

TABLE V.—PERCENTAGE AREA UNDER HYV PADDY AND WHEAT, PROPORTION OF IRRIGATED AREA AND FERTILIZER USE PER ACRE FOR BORROWING AND NON-BORROWING FARMERS* IN GORAKHPUR DISTRICT: 1975-76

Area operated (acres)	Number of		Average size of holding		Area under HYV paddy as per cent of total operated area		Area under HYV wheat as per cent of total operated area	
	Borrowers (2)	Non-borrowers (3)	Borrowers (4)	Non-borrowers (5)	Borrowers (6)	Non-borrowers (7)	Borrowers (8)	Non-borrowers (9)
0-2.50	4	16	1.68	1.62	36.30	34.68	76.30	69.05
2.50-5.00	11	24	4.03	4.03	43.74	33.32	52.69	50.06
5.00-10.00	3	14	9.33	7.21	51.79	29.21	44.86	45.35
10.00 and above	16	14	17.67	16.29	37.04	27.62	48.85	47.77
All sizes	34	66	10.64	6.39	38.99	29.78	49.52	49.04

Area operated (acres)	Irrigated area as per cent of total operated area (kharif season)		Irrigated area as per cent of total operated area (rabi season)		Fertilizer intake in kg. per acre of operated area (paddy)		Fertilizer intake in kg. per acre of operated area (wheat)	
	Borrowers (10)	Non-borrowers (11)	Borrowers (12)	Non-borrowers (13)	Borrowers (14)	Non-borrowers (15)	Borrowers (16)	Non-borrowers (17)
0-2.50	18.51	29.98	91.11	86.60	7.26	6.00	17.19	11.12
2.50-5.00	52.31	33.09	61.48	69.45	9.92	4.46	17.70	13.03
5.00-10.00	69.14	53.71	66.60	58.00	9.57	4.80	12.14	9.66
10.00 and above	74.36	59.27	63.88	61.80	8.51	7.11	12.68	9.40
All sizes	70.21	49.96	64.30	64.22	8.74	5.87	13.34	10.43

Source: Farm level data made available by the Agro-Economic Research Centre, Allahabad.
* Short-term co-operative credit.

As far as adoption of HYV paddy (during the *kharif* season) is concerned, the role of co-operative short-term credit does not appear to be decisive. The proportion of area under HYV paddy was no doubt higher among borrowers than among non-borrowers for all size classes except in the smallest size class (see Table V, cols. 6 and 7). However, it is interesting that the irrigated area as a proportion of operated area was consistently higher among borrowing than among non-borrowing families, except in the first size class. This suggests that owing to relatively higher variability of weather in the *kharif* season, the availability of assured irrigation plays an important role in the adoption of HYV paddy.⁸ This explains for the relatively higher fertilizer use per hectare for HYV paddy among borrowers (whose irrigated area as a per cent of area operated is higher) than among non-borrowers.⁹

To summarise, the role of short-term co-operative credit in the *rabi* season is limited inasmuch as the adoption levels attained by borrowers as well as non-borrowers are similar owing to (a) smaller size of holding for a vast majority of farmers, (b) roughly identical proportions of area irrigated (and hence lower weather risk) for both borrowers and non-borrowers, and (c) the importance of owned funds for large farmers. During the *kharif* season, co-operative credit may be expected to play a positive role and help in the attainment of higher levels of fertilizer use, but only under conditions of assured irrigation.

(b) *Co-operative Credit, Uncertainty and Overdues*

Another reason for the lower absorption of co-operative credit in the eastern region can be related to the consequences of production uncertainty. When farmers in a drought or flood-affected region fail to repay their dues to co-operatives, the possibility of getting a fresh loan from this source is nil. It is precisely at this time that moneylender credit provides a flexible source to fall back upon. It is for this reason that the small farmer does not want to "snap his ties" with the moneylender, for he is unsure of the attitude of the co-operatives in the years when weather-induced shortfalls in production occur.¹⁰

8. Schuler and Parikh, *op. cit.*, find that only those small farmers who had access to co-operative credit had adopted HYV during the *kharif* season when weather is highly uncertain and variable. They have not, however, directly tested whether those small farmers who borrowed from co-operative agencies and adopted HYV had a higher proportion of irrigated area, as compared to non-adopters.

9. Variations in production credit per farm may be explained by differential levels of fertilizer use and irrigation. Since the levels of fertilizer use and irrigation are significantly correlated, we regressed short-term production credit per farm (Y), only on fertilizer use per farm (X), for all farmers (n=100) and separately for borrowing farmers (n=34):

$$(1) \text{ Y (co-operative credit) } = -55.92 + 5.43 * X_1 \quad R^2 = 0.23$$

Short-term per farm (5.50)
n = 100

$$(2) \text{ Y (co-operative credit) } = 267.39 + 4.74 * X_1 \quad R^2 = 0.25$$

Short-term per farm (3.29)
n = 34

$$Y_1 = -7.024 + 0.197 * X_1 \quad R^2 = 0.41$$

(2.99)

10. Baker and Bhargava argue that the widespread failure of co-operative institutions is because farmers perceive them as temporary and unreliable, whereas informal lenders are regarded as a dependable source of liquidity. See C. Baker and Vinay K. Bhargava, "Financing Small Farm Development in India", *Australian Journal of Agricultural Economics*, Vol. 18, No. 2, August 1974.

We have empirically tested the above reasoning with the districtwise data on the performance of co-operative credit agencies *meant for the supply of credit to small and marginal farmers* in the eastern region. Correlation coefficients relating the districtwise per cent distribution of short-term credit through such agencies to districtwise per cent distribution of small and marginal farmer households, or their cultivated area, suggested no dependency. However, inter-district per cent distribution of short-term loans (Y_1) exhibits a significant and positive relationship with the rate of recovery of loans (X_1):

$$Y_1 = -7.024 + 0.197 * X_1 \quad R^2 = 0.41$$

(2.99)

Since the area cultivated may be expected to exercise a significant influence on the inter-district distribution of *long-term* credit (Y_2), we have tried per cent distribution of cultivated area (X_2) of small and marginal farmers to whom the credit was directly aimed, in addition to recovery rate (X_1):

$$Y_2 = -13.23 + 0.17 * X_1 + 1.02 * X_2 \quad R^2 = 0.53$$

(2.64) (2.88) (n=15)

(Figures in brackets denote t-values throughout the paper).

* Coefficient significant at 5 per cent level.

These results suggest that whenever a district is affected by flood or drought, and overdues rise and recovery rate¹¹ falls, co-operatives, instead of extending further short-term credit, withdraw from the scene. The distribution of long-term credit is again explained by the recovery rate and the asset distribution. The refusal of co-operatives to extend credit in difficult times may be one of the important reasons why the small farmers consider the disadvantages of shifting to institutional credit (in terms of losing a dependable source of liquidity, *viz.*, moneylender) greater than the advantages (lower interest rates).

(c) *Uncertainty, Asset Composition and Credit*

In order to counteract uncertainty in production, and provide for adverse outcomes in consumption, small farmers place a high value on liquidity—ability to generate cash on demand.¹² Acquisition of assets during good crop years and their disposal to meet consumption expenditure in drought years is a well-known device to protect against unpredictable shortfalls in consumption.¹³ Small farmers tend to sell those assets which typically have high carrying costs, and whose disposal does not significantly affect production. Livestock is a good example of such an asset, which is sold during bad years (substituting human labour for bullock labour) and repurchased in good years.¹⁴ The costs of fodder rise in drought and flood situation rendering maintenance of livestock uneconomic for small farmers.

11. Recovery rate is defined as the loan amount recovered as a per cent of loan advanced.

12. The argument that small farmers attempt to maintain a reserve credit to meet unforeseen shortfalls in consumption was advanced by Baker and Bhargava, *op. cit.*

13. See N. S. Jodha, "Risk Attitudes of Rural Households in Semi-Arid Tropical India", *Economic and Political Weekly*, Vol. XIII, No. 25, June 24, 1978.

14. According to the RBI study on small farmers, of the net income loss of about Rs. 900 per family sustained on account of various factors, the loss due to drought and floods accounted for about 97 per cent in Faizabad district. Of the total assets sold to prevent drop in consumption, receipts from sale of livestock accounted for over 90 per cent of the receipts from sale of assets. See *The Small Farmers (1967-69)—A Field Survey*, Reserve Bank of India, 1975.

Available evidence indicates the overwhelming importance of capital expenditure on livestock among small farmers in Uttar Pradesh.¹⁵ Since the purchase of livestock requires not short-term, but medium-term borrowing, small farmers' medium and long-term credit needs may be expected to be much larger than short-term credit. Analysis of borrowing for capital and current expenditures of small and large farmers (see Table VI) suggests that in respect of small farmers, while a major part of *current* farm expenditure is met by owned funds, *capital* expenditure (mainly on livestock) is met by borrowed funds, chiefly from moneylenders due to non-availability of funds from institutional sources. Co-operatives have been found to be relatively more active in the provision of short-term finance (which is not of great significance to small farmers) than medium and long-term finance, which is provided strictly in proportion to the land asset offered as security.

TABLE VI—SOURCES OF FINANCE FOR CAPITAL AND CURRENT EXPENDITURE IN AGRICULTURE (IN CASH) REPORTED BY SMALL AND LARGE FARMERS, FAIZABAD DISTRICT: 1967-69

(Rs.)

Size-group	Average expenditure	Owned funds	Sale of assets	Subsidies and gifts	Total borrowing	Institutional borrowing	Private borrowing
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Small farmers							
(a) Capital expenditure (in cash) in agriculture ..	96	35 (36.5)	15 (15.6)	3 (3.1)	43 (44.8)	5 (11.6)	38 (88.4)
(b) Current farm expenditure (in cash)	118	80 (67.8)	—	—	38 (32.2)	35 (92.1)	3 (7.9)
Large farmers							
(a) Capital expenditure (in cash) in agriculture ..	1,045	736 (70.4)	18 (1.7)	—	291 (27.8)	205 (70.4)	86 (29.6)
(b) Current farm expenditure (in cash)	1,348	1,004 (74.5)	—	—	344 (25.5)	344 (100.0)	—

Note:—Figures in brackets under cols. 3 to 6 are percentages to col. 2, and under cols. 7 to 8 are percentages to col. 6.

Source: Compiled from The Small Farmers (1967-69)—A Field Survey, *op cit.*

(d) *Inter-district Variations in Short-term Credit Per Hectare*

The short-term credit per hectare in the western region, averaged for all districts, is roughly twice the amount for the eastern region. However, there are inter-district variations in the western as well as in the eastern region, although the coefficient of variation of credit per hectare was lower in the former region than in the latter.

15. See AIRDIS, 1971-72, *op. cit.*

Absorption of short-term credit per hectare in each district may be expected to depend on (a) consumption of fertilizers per hectare, which in turn may be expected to vary directly with the percentage of irrigated area to net sown area, (b) percentage of area under sugarcane to total cultivated area, (c) percentage of area under HYV to gross area sown, (d) the proportion of holdings below one hectare, or the proportion of cultivated area under the size-group below one hectare, and (e) the availability of power. Since consumption of fertilizers per hectare itself may be expected to depend on a number of other variables listed above, it would not be possible to use all the explanatory variables together owing to multicollinearity. We have tested alternative combinations, and found that fertilizer use per hectare and the cultivated area under one hectare emerge as satisfactory explanatory variables as shown below.

Short-term credit per hectare in the eastern districts: 1974-75 (Y) n=13

$$Y = 7.08 + 0.87 * X_1 \quad R^2 = 0.60$$

(4.03)

$$Y = 18.14 + 1.11 * X_1 - 0.439 * X_2 \quad R^2 = 0.66$$

(4.33) (-1.83)

Short-term credit per hectare in the western districts: 1974-75 (Y) n=18

$$Y = 12.74 + 0.96 * X_1 \quad R^2 = 0.25$$

(2.58)

$$Y = 32.89 + 0.84 * X_1 - 0.95 X_2 \quad R^2 = 0.28$$

(2.23) (-1.31)

where X_1 = fertilizer use per hectare,

X_2 = percentage of cultivated area under one hectare.

* Coefficient significant at 5 per cent level.

It is interesting that while the coefficients of per hectare fertilizer use are significant in both the regions and are of the same magnitude, the coefficient of area under one hectare is significant only in the eastern region. This reinforces our earlier finding based on farm level data, *viz.*, smallness of the size of holding as one of the factors exercising restraint on the borrowing per hectare in the eastern region.

II

EVALUATION OF SPECIAL SCHEMES FOR SMALL AND MARGINAL FARMERS

In view of the widespread phenomenon of the large farmers' control over the functioning of co-operative credit societies in India, two key programmes aimed at *only* small and marginal farmers have been launched during 1971: the Small Farmers' Development Agency (SFDA) and the Marginal Farmers' and the Agricultural Labourers' Agency (MFAL), which are now merged into a single agency. These agencies have been in operation in East Uttar Pradesh for over seven years. In this section, we shall examine the functioning of these agencies in East Uttar Pradesh.

As pointed out earlier, the amount allocated year after year for these projects in East Uttar Pradesh does not seem to have been fully utilized by these agencies, indicating the reluctance of small and marginal farmers in this region to take advantage of the scheme. Further, the performance of SFDA agencies show considerable inter-district variation. Firstly, even after six years of the inception of the scheme, not all identified small farmers have been motivated to join the credit co-operatives. Interestingly, the proportion of small farmers enrolled as members of co-operatives was low in some of the eastern as well as western districts of Uttar Pradesh. The proportion of small farmers enrolled as members of co-operatives, the short, medium and long-term credit disbursed as also the credit per hectare—all exhibit considerable inter-district variation.¹⁶

In view of the fact that the credit flows through the medium of SFDAs are solely reserved for small and marginal farmers, and in view of the relative adequacy of these funds evidenced by the prevailing levels of under-utilization, it would be reasonable to expect that the inter-district variation in such disbursements to be directly related to the number of small farmers in these districts. We have regressed the short-term credit disbursed by these agencies (annual average of three recent years, *i.e.*, 1973-74 to 1975-76 for which data were readily available), against (i) the number of farmers, (ii) proportion of farmers below 2 hectares to total number of farmers, (iii) proportion of area operated of holdings below 2 hectares to total area operated, (iv) normal rainfall of each district, and (v) per cent of villages electrified, and found no statistically significant relationship. However, when gross irrigated area as a proportion of gross sown area of small farmers was used as an independent variable the following result was obtained:

$$\begin{array}{ll} \text{Log Y} = -6.26 + 4.43* \text{ log X} & R^2 = 0.43 \\ (2.62) & \text{FV} = 6.87 \end{array}$$

where Y = short-term credit (Rs. lakhs), annual average, 1973-74 to 1975-76,

X = per cent of gross irrigated area to gross sown area of farms below 2 hectares.

* Coefficient significant at 5 per cent level.

The above result suggests that even when special institutions (such as SFDAs) are introduced to help small farmers in availing of co-operative credit, it would not result in any tangible benefits to small farmers under unirrigated (high risk) conditions which tend not only to depress profitability but also contribute to higher variance of profits from the adoption of modern varieties.

Investment on irrigation equipment would require adequate supply of long-term credit. Since the absorption of short-term credit appears to be high in the irrigated areas, provision of long-term finance for buying irrigation equipment and/or public investment in irrigation appears to be the pre-requisite for stimulating the demand for production credit. The complementarity between absorption of short-term and long-term credit provided by SFDAs is well brought by the following result:

16. Interested readers may write to the author for relevant data.

$$Y = -2.90 + 1.698 * X \quad R^2 = 0.503$$

(n=11) (4.67) (3.02) $FV = 9.10$

where Y = short-term credit per hectare of gross cropped area (annual average, 1973-74 to 1975-76),

X = long-term credit per hectare of gross cropped area (annual average, 1973-74 to 1975-76).

* Coefficient significant at 5 per cent level.

Although the SFDA scheme provides a substantial subsidy (for risk) to the long-term loaning institutions, commercial banks and land development banks did not show any enthusiasm in extending long-term credit to small farm households under this scheme. Ownership of land continues to determine the flow of long-term finance even for the term credit provided by SFDA, as is clear from the high correlation (+0.77)* between long-term credit per hectare provided by SFDA and the percentage of cultivated area owned by size class 0-2 hectares.

III

SUPPLY OF LONG-TERM CREDIT

We argued in the previous sections that the availability of assured irrigation plays an important role in the adoption of HYV paddy. Since the availability of long-term institutional credit is crucial for the purchase of owned irrigation equipment (pumpset or tubewell) especially for small farmers, it is hypothesized that the adoption level attained by small farm households borrowing term credit may be higher than for non-borrowing households. The adoption levels attained by medium and large farmers may not significantly differ as between borrowing and non-borrowing households owing to the larger availability of owned funds for them. Analysis of data for 100 sample farmers from Gorakhpur district reveals that the area under HYV paddy (*kharif* season) as a per cent of total operated area was very high for borrowing households below 2.5 acres, whereas it was very low for non-borrowers (see Table VII).

An expected, the irrigated area as a per cent of operated area was also much higher for borrowing households as contrasted with non-borrowing households. Interestingly, while the adoption levels of HYV paddy attained by medium and large farmers are similar for borrowing and non-borrowing households, the adoption levels of borrowing for small holdings remained relatively higher than non-borrowing households. This is because term credit enabled the small farmers to purchase irrigation equipment (as can be seen by the percentage of irrigated area to net sown area, which was substantially higher for the borrowing households). The adoption levels of HYV wheat are similar for all size classes; the proportions of area irrigated for *rabi* are also similar for all holdings—borrowing as well as non-borrowing.

Despite the crucial role played by investment loans for the purchase of irrigation equipment, the long-term loan supplying institutions seem to

* Significant at 5 per cent level.

TABLE VII—LONG-TERM CO-OPERATIVE CREDIT AND ADOPTION OF HYV TECHNOLOGY: DETAILS RELATING TO BORROWING AND NON-BORROWING FARMERS IN GORAKHPUR DISTRICT: 1975-76

Area operated (acres)	Borrowers as a per cent to total of each size class		Average size of holding		Area under HYV paddy as a per cent of total operated area		Area under HYV wheat as a per cent of total operated area		Irrigated area as a per cent of total irrigated area	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0-2.50	..	5.00	1.50	1.64	93.33	32.28	66.67	70.89	100.00	24.20
2.51-5.50	..	11.43	4.43	4.12	36.91	31.52	48.00	50.01	49.66	76.19
5.51-10.50	..	29.41	77.72	11.78	20.59	21.38	40.80	29.94	66.87	33.81
10.51 and above	..	57.14	16.35	16.04	34.01	32.34	47.61	54.45	77.19	64.52
All size-groups	..		12.29	6.66	32.81	28.98	46.91	47.30	74.49	46.04

Area operated (acres)	Investment in fixed capital per hectare (Rs.)											
	Irrigated area as a per cent of total operated area		Total excluding land				Farm equipment				Irrigation equipment	
	Borrowers	Non-borrowers	Borrowers	Non-borrowers	Borrowers	Non-borrowers	Borrowers	Non-borrowers	Borrowers	Non-borrowers	Borrowers	Non-borrowers
(1)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)				
0-2.50	..	83.33	87.93	6,461.00	996.29	61.00	77.68	6,010.00	112.11			
2.51-5.50	..	76.19	65.66	5,157.13	3,469.65	345.13	647.94	2,879.00	1,137.58			
5.51-10.50	..	62.10	37.67	11,699.75	9,447.79	1,107.75	1,527.63	7,246.00	4,817.33			
10.51 and above	..	61.99	72.33	23,137.56	22,202.75	11,049.25	12,331.00	7,184.38	4,754.16			
All size-groups	..	62.87	61.64	46,455.44	36,115.98	12,584.13	14,584.25	23,319.38	10,821.18			

Source: Farm level data made available by the Agro-Economic Research Centre, Allahabad.

be biased against the small farm households as is clear from the low proportion of borrowing households in the small farmer size class in the Gorakhpur sample. This farm level finding is confirmed by the secondary data on the share of long-term credit and in the cultivated area by size class of holdings, for the eastern region (see Table IV). During the recent three-year period, 1973-74 to 1975-76, the per cent share in long-term co-operative credit of the smallest size class (households below one hectare) and the largest size class was much lower than their share in the cultivated area in both the eastern and western regions; whereas medium-sized households (1.01-4.0 hectares) accounted for a much higher share in long-term credit than their share in the cultivated area. One reason for the medium-sized holdings accounting for a higher share of long-term credit appears to be the viability of their farm size for the purchase of a tubewell.¹⁷

The share of the smallest size-group in the long-term credit was lower than their share of cultivated area presumably because, on the demand side, the size of their holdings is so small that it would not be a viable proposition to go in for investment in irrigation equipment. On the supply side, it is possible that insistence of land asset as security may have restrained the access for small owners and owner-cum-tenants to long-term finance. The share of large farmers remained somewhat lower than their share in the cultivated area. This is understandable since the demand for long-term finance per hectare (for the purchase of fixed assets) may be expected to be a decreasing function of the size of holding due to economies of scale (as argued in section I). Also the availability of owned funds may be an important factor accounting for the lower demand for long-term finance by the large farmers. The long-term credit per hectare of gross cropped area was much lower in the eastern region as compared to the western region, during all the three recent years.

We now turn to an analysis of inter-district variations in the long-term credit per hectare made available by the land mortgage societies during the years 1973-74 to 1976-77. Inter-district variation in credit per hectare appears to be considerable, although the coefficient of variation declined from 55.84 per cent in 1973-74 to 40.72 per cent in 1976-77.

The demand for long-term finance is a derived demand and is, therefore, directly related to the decisions to invest in capital equipment, chiefly for irrigation. The decision to invest in irrigation equipment is influenced by the *willingness* and *ability* to adopt HYV technology which demands *adequate* and *assured* water supply. In high rainfall areas such as the districts in eastern Uttar Pradesh, private investment in tubewells and pumpsets continues to be relatively unattractive owing to lower return on investment because of limited demand for irrigation during the *kharif* season, predominance of small farms and problems of drainage caused by high

17. According to B. D. Dhawan, the minimum viable size of holding for the installation of a tubewell in East Uttar Pradesh is 1.6 hectares. See B. D. Dhawan, "Tubewell Irrigation in the Gangetic Plains", *Economic and Political Weekly*, Vol. XII, No. 39, September 24, 1977.

rainfall and floods, and low level of rural electrification.¹⁸ However, those farmers who are keen (and able) to adopt the new technology may be expected to invest in owned irrigation equipment even in high rainfall areas, in order to counteract risks associated with rainfall. In the absence of field data relating to various factors that enter into the decision to invest in irrigation equipment, we are making use of the data on pumpsets and tubewells per thousand hectares in different districts, as a surrogate for all the demand factors mentioned above.

Size of holding is another important factor influencing the decision to invest in capital equipment.¹⁹ In East Uttar Pradesh, there does not appear to be significant inter-district variation in the average size of holding. However, the percentage of cultivated area above a critical minimum holding, say 2 hectares, varies significantly across different districts. We have, however, not used this separately as another independent variable, for the irrigation equipment variable (*i.e.*, pumpsets + tubewells per thousand hectares of cultivated area) itself may be expected to move directly with the percentage of cropped area above 2 hectares. As such, we have regressed districtwise long-term credit per hectare (averaged for three recent years) only against one independent variable, *viz.*, pumpsets and tubewells per thousand hectares, which also takes care of the effect of size of holding. We have obtained the following result, which is in conformity with our argument:

$$Y = -0.294 + 0.255 * X_1 \quad R^2 = 0.38$$

(2.807) FV = 7.88

where Y = per hectare long-term finance—districtwise (averaged for four years, 1973-74 to 1976-77),

X₁ = pumpsets and tubewells per thousand hectares of cultivated area of a district (source for this data: Dhawan, *op. cit.*, 1977).

* Coefficient significant at 5 per cent level.

Finally, we have also made use of the available data on direct and indirect finance provided by the scheduled commercial banks during the recent three-year period, *viz.*, 1973-74 to 1975-76 in East and West Uttar Pradesh. Like the credit provided by other institutions, the credit per hectare supplied by scheduled commercial banks also is much higher in the western districts than in the eastern region. However, it has not been possible to test all the hypotheses relating to short and long-term credit in the case of commercial bank credit owing to non-availability of break-up of total credit (districtwise) according to duration of loans or size of holdings. However, the importance of irrigation in the absorption of commercial bank credit per hectare in the eastern region is clearly evident from the following results:

18. See R. K. Sharma: Impact of Irrigation in High Rainfall Areas—A Study of East Uttar Pradesh, 1978 (mimeo.) and B. D. Dhawan: Development of Tubewell Irrigation in India, Institute of Economic Growth, Delhi, August 1979.

19. It needs to be pointed out that size of holding, apart from exercising influence on the demand side, is also important from the supply side. Most of the long-term loan supplying institutions (co-operatives as well as commercial banks) insist on land owned as security, and have always preferred to serve large landowners to small farmers.

Direct finance

$$\text{Log } Y = -0.16 + 0.893^{**}X_1 \quad R^2 = 0.35$$

(2.70)

FV = 7.3

Indirect finance

$$Y = -2.798 + 0.442^{**}X_1 \quad R^2 = 0.47$$

(3.39)

FV = 11.49

Where Y = credit supplied by scheduled commercial banks per hectare of gross cropped area (annual average, 1973-74 to 1975-76),

X₁ = irrigated area as a per cent of net cultivated area.

* Coefficient significant at 1 per cent level.

** Coefficient significant at 5 per cent level.

IV

ESTIMATES OF POTENTIAL DEMAND FOR CURRENT PRODUCTION CREDIT

In this section, we estimate the *potential* demand for production credit, separately for small and large farms, allowing for improvement in the levels of adoption of new technology over the prevailing low adoption levels. Recent field studies²⁰ of the Agro-Economic Research Centre, Allahabad, indicate that while most farmers—small and large—devoted nearly 100 per cent of *rabi* area to HYV wheat, the proportion of area devoted to HYV paddy ranged from about 35 per cent for small farms to about 55 per cent for large farms. It needs to be stressed here that the *additional* financial costs involved in shifting from local to HYV variety are much higher for paddy and for wheat (see footnote 7). As argued in the earlier sections, under the prevailing low levels of adoption of HYV paddy, and lower levels of current farm expenditure per hectare, small farmers' *prevailing* demand for farm production credit from institutional sources may be much lower than the *potential* demand when a substantial area is devoted to modern varieties. In this section we assume that 75 per cent and 100 per cent of area is devoted to modern varieties for paddy and wheat respectively, both for small and large farms.²¹

We further assume that of the total paid-out costs needed for realising the above-mentioned adoption levels, the demand potential for production (short-term) credit will be *at least* 50 per cent and 25 per cent of the total paid-out costs incurred per hectare of gross cropped area by the small and large farmers respectively. On the basis of the above-mentioned assumptions, we estimate the potential demand for production credit, and compare the same with the production credit *actually* supplied, separately for small and large farmers.

20. Impact of New Technology on Economic Conditions of the Farmers in Gorakhpur District, Ad hoc Study No. 29, Agro-Economic Research Centre, Allahabad, 1977, and Study of Change in Offtake of Fertilisers in Eastern Uttar Pradesh, Ad hoc Study No. 25, Agro-Economic Research Centre, Allahabad, 1977.

21. As argued elsewhere, such an expansion of area under modern varieties of paddy is possible only if public and/or private investment in irrigation is significantly increased.

Our districtwise estimates of the demand potential are based on the cost of production data for the districts of Gorakhpur, Ballia and Varanasi thrown up by the recent studies of the Agro-Economic Research Centre, Allahabad, mentioned above. The paid-out costs per hectare of gross cropped area, averaged for the above three districts are given below:

	Irrigated	Unirrigated	Irrigated	Unirrigated
Paid-out costs per hectare of gross cropped area minimum potential (Rs.)	550	450	600	500
Potential demand per hectare for production credit, assuming 50 per cent and 75 per cent of the costs for small and large farmers are met from owned funds (Rs.) ..	275	225	150	125

We assume that the above averages hold good for the entire eastern region comprising 15 districts, in the absence of similar data pertaining to the rest of the districts.

The RBI Study Team on agricultural credit institutions in Uttar Pradesh²² estimated the districtwise credit potential for Uttar Pradesh on the basis of *expected credit supply* of Rs. 250 per irrigated hectare, and Rs. 125 per hectare of unirrigated land,²³ with suitable adjustments for those districts where crops requiring larger/lower outlay are predominant. The Study Team compares the districtwise 'credit requirements' thus derived with the credit made available through co-operative institutions, in order to derive at districtwise credit gaps. No attempt was made in this Report to estimate such gaps separately for small and large farms.

The districtwise estimates of potential demand for current production credit derived by us are given in Table VIII. Although the overall credit potential (for all size-groups) estimated by the RBI Study Team comes very close to our estimates, the differences in the credit requirements of small and large farms met by institutional sources are interesting. A comparison of the potential demand with the credit made available reveals that whereas the co-operatives *alone* supplied as much as 71 per cent of the potential demand of *large* farms, hardly 21 per cent of the potential demand of *small* farms was met by such institutions (see cols. 4 and 9). In order to know whether the inclusion of the credit provided by 'other institutions' such as Commercial Banks, Regional Rural Banks (RRBs), and SFDA's substantially reduces the prevailing difference in the credit requirements met (or credit gaps left) as between small and large farms, we have studied the credit requirements met

22. Report of the Study Team on Agricultural Credit Institutions in Uttar Pradesh, Reserve Bank of India, 1978 (Chairman: C. D. Datey).

23. This is also the norm adopted by the Fifth Plan Working Group on Co-operation.

TABLE VIII—ESTIMATED POTENTIAL DEMAND OF SMALL AND LARGE FARMS IN EAST U.P. FOR PRODUCTION CREDIT AND THE PROPORTION OF DEMAND MET BY (i) CO-OPERATIVE INSTITUTIONS AND (ii) ALL INSTITUTIONS INCLUDING CO-OPERATIVES

(Rs. lakhs)

District	Small farms				
	Estimated credit requirements of small farms	Credit requirements of small farms met			
		Through co-operative institutions	Col. 3 as a per cent of col. 2	Through co-operatives + other institutions*	Col. 5 as a per cent of col. 2
(1)	(2)	(3)	(4)	(5)	(6)
1. Allahabad	626.8	176.31	28.13	199.39	31.80
2. Pratapgarh	426.7	80.10	18.77	180.56	42.30
3. Jaunpur	641.5	168.02	26.19	215.63	33.60
4. Ghazipur	451.6	78.90	17.47	101.87	22.56
5. Ballia	357.3	71.52	20.02	101.09	28.30
6. Gorakhpur	929.8	229.92	24.73	307.70	33.09
7. Deoria	826.6	413.04	49.97	453.91	54.90
8. Basti	1,009.4	197.57	19.57	262.05	25.96
9. Azamgarh	804.1	115.35	14.35	145.68	18.12
10. Faizabad	635.0	60.15	9.47	71.05	11.19
11. Gonda	809.6	97.55	12.05	110.93	13.70
12. Bahraich	679.3	64.96	9.56	86.52	12.74
13. Sultanpur	546.0	65.81	12.05	96.64	17.70
14. Varanasi	587.3	129.15	22.00	178.75	30.43
15. Mirzapur	352.2	89.52	25.42	96.38	27.36
16. Eastern region	9,683.2	2,037.87	21.04	2,608.15	26.90

* Other institutions include SFDAs, RRBs and Scheduled Commercial Banks.

(Contd.)

(Rs. lakhs)

TABLE VIII(Concl'd.)

District	Estimated potential demand for large farms				Large farms			Total estimated potential demand (small and large farms)	Total demand as estimated by RBI Study Team	Total credit requirements met		Col. 14 as a per cent of col. 12	Col. 15 as a per cent of col. 12	
	Credit requirements of large farms met			Col. 10 as a per cent of col. 7	Col. 8 as a per cent of col. 7	Col. 9 as a per cent of col. 7	Col. 10 as a per cent of col. 7			Through co-operative institutions	Through co-operative institutions			Through co-operative + other institutions
	Through co-operative institutions	Through co-operative and other institutions†	Col. 7											
(1)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)			
1. Allahabad ..	421.2	302.79	71.89	317.76	75.4	1,048.0	955.08	479.10	517.15	45.7	43.9			
2. Pratapgarh ..	159.9	137.57	86.0	141.24	88.3	586.6	507.62	217.67	321.80	37.1	54.9			
3. Jaunpur ..	191.2	288.56	150.9	307.81	160.99	832.7	705.59	456.58	523.44	54.8	62.9			
4. Ghazipur ..	284.8	135.51	47.6	155.45	54.6	736.4	547.63	214.41	257.32	29.1	34.9			
5. Ballia ..	202.3	122.84	60.7	134.69	66.6	559.6	519.23	194.36	235.78	34.7	42.1			
6. Gorakhpur ..	404.1	394.86	97.7	459.37	113.7	1,333.9	1,112.49	624.78	767.07	46.8	57.5			
7. Deoria ..	378.6	709.35	187.4	742.01	195.98	1,205.2	1,249.41	1,122.39	1,195.92	93.1	99.2			
8. Basti ..	503.4	389.30	67.4	364.24	72.3	1,512.8	1,393.99	536.87	626.29	35.5	41.4			
9. Azamgarh ..	320.8	198.10	61.8	240.73	75.0	1,124.9	985.22	313.45	386.41	27.9	34.3			
10. Faizabad ..	216.8	103.31	47.6	121.72	56.1	851.8	648.10	163.46	192.77	19.2	22.6			
11. Gonda ..	473.8	167.53	35.4	257.87	54.4	1,283.4	1,079.34	265.08	368.80	20.7	28.7			
12. Bahraich ..	371.6	111.57	30.0	119.74	32.2	1,050.9	834.74	176.53	206.26	16.8	19.9			
13. Sultanpur ..	220.2	113.03	51.3	128.68	58.5	766.2	686.62	178.84	225.32	23.3	29.4			
14. Varanasi ..	298.7	221.81	74.3	249.90	83.7	886.0	793.81	350.96	428.65	39.6	48.4			
15. Mirzapur ..	491.3	153.74	31.3	165.17	33.6	843.5	604.85	243.26	261.26	28.8	31.0			
16. Eastern region ..	4,938.7	3,499.87	70.9	3,906.38	79.1	14,621.9	12,623.78	5,537.74	6,514.53	37.9	44.6			

† Other institutions include RRBs and Scheduled Commercial Banks.

by all institutions—co-operatives plus ‘other institutions’ (see cols. 5 and 10). While the other institutions helped to move the small farmers’ position (*i.e.*, requirements met) by 6 percentage points, *i.e.*, from about 21 per cent to 27 per cent, the large farmers’ position improved by 8 percentage points, *i.e.*, from 71 per cent to 79 per cent, thus accentuating the prevailing inequality as between small and large farms in meeting their credit requirements.

It is also interesting to know whether the credit distributed by ‘other institutions’ moved into those districts where the co-operative institutions were already relatively strong (in which case their role should be regarded as ‘additive’ rather than ‘substitutive’), or to those areas where co-operative institutions were dormant.

Rank correlation coefficients between (a) total credit and (b) credit per hectare disbursed by (i) co-operatives, and (ii) all other institutions, separately for small and large farmers (see Table IX) support the view expressed by the Review Committee on Regional Rural Banks that new agencies have played an additive role, and have not helped in providing credit in those regions where the co-operatives failed.²⁴

TABLE IX—RANK CORRELATION COEFFICIENTS BETWEEN CREDIT MADE AVAILABLE (DISTRICTWISE) BY CO-OPERATIVES AND ALL OTHER INSTITUTIONS

					Small farms	Large farms	Overall	
(a)	Total credit	..	..	..	..	+0.54* (2.748)	+0.52* (2.57)	+0.56* (2.942)
(b)	Credit per hectare	..	..	..	..	0.33 Ns	0.35 Ns	+0.48** (2.249)

Notes:—Figures in brackets denote t-values.
 * Coefficient significant at 5 per cent level.
 ** Coefficient significant at 10 per cent level.
 NS=Coefficient not significant.

V

CONCLUSIONS AND POLICY IMPLICATIONS

The above analysis suggests that in the prevailing institutional and agro-climatic environment of eastern Uttar Pradesh characterized by predominance of small and tenanted holdings and weather uncertainty, *short-term* institutional (co-operative) credit appears to be unattractive. This is because of (a) prevail-

24. The Review Committee on Regional Rural Banks (Chairman: Professor M. L. Dantwala) found the rank correlation coefficient between agricultural loan business of commercial banks and co-operatives with *State-level* data, to be very high (+0.8). The Committee concluded that “commercial banks’ agricultural credit has been additive and has not helped to fill the geographical gap in the availability of credit not covered by co-operatives”. See Report of the Review Committee on Regional Rural Banks, Reserve Bank of India, 1978, p. 32. The rank correlation coefficients derived by us are not so impressive, although statistically significant, partly because we examined the issue at a disaggregated (district) level, and more importantly because we examined the role played not only by commercial banks but by all institutions other than co-operatives (*i.e.*, commercial banks, SFDAs Regional Rural Banks, etc.). It appears that SFDAs and RRBs at least partly filled the gaps left by co-operatives, thus neutralising the negative role played by commercial banks which continue to favour better endowed regions and better off farmers.

ing low levels of adoption of HYV paddy and limited current farm expenditures of small farmers, and the ability to meet current farm expenditure from owned funds in the case of large farmers; and (b) the uncertain production conditions and the necessity to generate cash on demand dictating dependence on a more flexible and dependable source of finance such as the moneylender rather than the co-operatives which are not well-adapted to deal efficiently with risk.

The adoption levels currently reached by small farmers are lower, particularly for HYV paddy, owing to the much higher *additional* financial costs in shifting from local to HYV paddy (unlike in the case of HYV wheat), and the highly uncertain weather conditions in the *kharif* season rendering such high additional financial investment risky in the absence of assured irrigation (again, unlike in the case of HYV wheat which is grown under irrigated conditions). Thus the small size of farms and lack of assured irrigation emerge as important constraints for the lifting of production credit made available to small farmers through the new (SFDA) agencies.

In the small farm dominated high rainfall areas such as East Uttar Pradesh, *private* investment for owned irrigation equipment appears to be unattractive owing to lower returns on investment because of limited demand for irrigation during the *kharif* season, and the indivisible nature of irrigation equipment placing the small farmers at a disadvantage. Thus, the prevailing small size of holdings may restrict the demand even for *term* credit for the purchase of irrigation equipment. Nonetheless, relaxing the constraints on the *supply* of term credit by liberalising the collateral conditions (and extending the benefit to tenants and owner-cum-tenants) may be helpful in stimulating the *demand* for production credit as well as term credit. More important than the above, *public* investment in irrigation may have a significant effect on stimulating the demand for production credit from institutional sources through the extension of area under HYV paddy by the small farms, and reducing their dependence on moneylenders owing to lower uncertainty.

The experience of the functioning of the new institutions such as SFDAs, Regional Rural Banks, Scheduled Commercial Banks, suggests that mere multiplication of new institutions is no solution for the intractable problem of serving the small farmer. The fact that these new institutions so far helped only in *increasing* the inequality in the distribution of available credit as between small and large farmers suggests that indirect assistance in the form of basic infrastructure (such as provision of irrigation through public investment) whose benefits may be expected to percolate to farmers in proportion to the area held by them, should receive greater priority than direct financial assistance in the form of loans through new and specialised agencies which, however carefully tailored, seem to benefit the large farmers proportionately more than the small farmers. Finally, if measures to improve investment and output on the small farms through publicly sponsored credit programmes are to succeed, these measures must be intertwined with institutional reforms to improve their resource base.