

FARM SIZE AND PRODUCTIVITY RELATIONSHIP IN DRYLAND AGRICULTURE IN NAGOUR DISTRICT (RAJASTHAN)

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ABSTRACT

Farm-size productivity relationship in dryland agriculture in Nagaur district of Rajasthan State was examined for three successive years (1977-78 to 1979-80) by employing correlation and regression methods. Return to scale in dryland agriculture was positive but predominantly of very low order. There is a scope for soil conservation and irrigation facilities for further enhancing the per hectare productivity particularly, on small farms.

INTRODUCTION

Farm size and productivity relationship in Indian agriculture has been the subject of continuous attention by the agricultural economists for the last three decades. It is still debated whether or not the productivity per hectare declines with an increase in the size of holdings (Rajkrishna, 1962; Hanumantha Rao, 1966; Rao, 1967; Rudra, 1968 a; Saini, 1971; Usha Rani, 1971; Chattopadhyay and Rudra, 1976) despite substantial variations in natural resource endowments, cropping pattern and socio-economic conditions. The validity of the inverse relationship between farm size and productivity per hectare becomes further questionable since the recent developments in agricultural technology and its application have reversed the trend and indicated positive relationship, implying that the production increases more than proportionately with increase in farm size (Kahlon and Kapoor, 1968; Singh and Patel, 1973; Grewal and Kahlon, 1973; Saini, 1979 and Chadha, 1979). Still, some other studies (Bandopadhyay 1981 : Bhagat, 1981; and Sharma, 1981) support the inverse relationship. All of these reports pertain to the regions well endowed with irrigation facilities. There is hardly any study for such relationship in arid region of Rajasthan. The present study was, therefore, attempted to examine the farm size-productivity relationship in dryland agriculture in a typical arid district of Rajasthan.

MATERIAL AND METHODS

Data were collected through cost accounting method for 113, 82 and 83 sample dryland farms of three size - categories viz., small (upto 4 ha), medium (4-8 ha) and large (above 8 ha) distributed over six selected villages viz., Inana, Bhadana, Kharda, Palri Jodha of Nagaur tehsil and Lamba jatan and Rinya syamdas of Merta tehsil in

Table 2. Per hectare farm income (Rs/ha) for farms of different sizes in Nagaur district, 1977-80

Farm size and years	Gross	Farm business	Family labour	Net income	Farm investment
Small					
1977-78	576.28	390.94	327.92	231.49	294.51
1978-79	551.00	375.52	312.27	197.78	260.73
1979-80	332.08	150.74	92.97	17.99	75.76
1977-80	498.38	316.73	255.26	160.32	221.79
Medium					
1977-78	481.60	298.57	221.34	134.96	214.18
1978-79	506.83	307.21	243.85	147.20	210.56
1979-80	441.21	243.48	171.06	93.01	165.43
1977-80	476.14	283.49	211.90	125.92	197.51
Large					
1977-78	653.58	443.80	373.59	282.12	352.33
1978-79	485.91	279.63	215.79	122.59	186.43
1979-80	465.35	253.32	178.35	99.98	174.95
1977-80	544.30	334.88	265.21	177.18	246.85
Over All					
1977-78	591.40	393.45	322.53	232.18	503.10
1978-79	500.95	303.81	237.24	140.09	203.66
1979-80	438.13	235.01	163.38	85.62	157.25
1977-80	517.32	317.13	248.19	159.67	228.61

comparatively more profoundly marked for the aggregated data on time, only small farms were characterised by negative exponential and rank correlation. Similarly, when aggregated on all sizes, the degree of association between value productivity per hectare and farm size turned out to be positive nevertheless non-significant. Only exception for a significant relationship was revealed for large farm-size group in drought year (1979-80) when aggregated on both time and size, the degree of association despite positive magnitude turned out to be non-significant. It can 'thus' be inferred that the dryland agriculture is marked, in general, by positive degree of association but the same is not strong enough to make any significant dent in scale economies of dryland crops. The results analysed for different crops in general confirms this trend (Table 3).

The results of functional relationship between farm size and value productivity per hectare revealed that in good (1977-78) year the size of farm contributed significantly to the per hectare value productivity in all farm size groups excepting small farms. However, in average year (1978-79) all farms sizes turned out to be positive contributors nevertheless of non-significant relationship. Same situation was discernible in case of drought (1979-80) year except small farms. Further, it is revealed that out

FARM SIZE-PRODUCTIVITY RELATIONSHIP : 33

Table 3. Correlations between farm size and value productivity per hectare in Nagaur district

Farm size/ Type of correlation	Correlation coefficients			
	1977-78	1978-79	1979-80	Aggregate (1977-80)
Small				
Simple	0.1513	0.1906	-0.2094	0.0567
Exponential	0.0527	-0.0853	-0.2873	-0.1168
Rank	0.1077	-0.0165	-0.1625	-0.0182
Medium				
Simple	0.4269	0.3921	0.3133	0.3747
Exponential	0.3607	0.3516	0.2669	0.2637
Rank	0.3434	0.4072	0.2579	0.3244
Large				
Simple	0.4370	0.0416	-0.1373	0.0725
Exponential	0.4996	0.1311	-0.1709	0.1618
Rank	0.4286	0.3144	-0.1583	0.1154
Over All				
Simple	0.2568	0.0470	0.5108	0.1552
Exponential	0.1784	-0.0182	0.6793	0.0988
Rank	0.2491	0.0354	0.1724	0.1997

of 12 estimated equations, 11 registered positive regression coefficients, thereby indicating the positive relationship between farm size and productivity per hectare. The significance of regression coefficients as evident by magnitudes of 't' values in 6 out of 12 cases further supported the hypothesis of positive relationship between farm size and productivity per hectare (Table 4).

Table 4 : Farm size and productivity per hectare relationship in Nagaur district, 1977-80

Year/farm size	Intercept	Regression coefficient 'b'	SE of 'b'	't' value.
1977-78				
Small	2.6053	0.0998	0.2850	0.350
Medium	1.8188	1.0396	0.4909	2.118*
Large	1.1926	0.8711	0.2629	3.313**
All sized	2.5254	0.1856	0.0967	1.918
1978-79				
Small	2.7110	0.0859	0.1864	0.461
Medium	2.4601	0.3069	0.1704	1.801
Large	2.5446	0.1279	0.1976	0.607
All sized	2.6819	0.0091	0.0559	0.163
1979-80				
Small	2.6991	-0.3200	0.1981	1.615
Medium	2.2591	0.4078	0.3005	1.357
Large	2.8859	0.2758	0.3246	0.850
All sized	2.4896	0.0818	0.1594	0.513

** Significant at 1 per cent level

* Significant at 5 per cent level

Conclusively, return to scale in dryland agriculture was broadly positive. The existence of positive relationship of very low order confirms the scope of enhancing land quality variable viz., soil conservation and provision of water for further enhancement of productivity per hectare, particularly on small farms. These findings are in line with most of the farm level studies concluded after green revolution in other parts of the country, rejecting the hypothesis of inverse relationship between farm size and productivity per hectare.

ACKNOWLEDGEMENTS

Grateful thanks are due to the Director, CAZRI, and Dr. Jagdesh C. Kalla, Head, Division of Agricultural Economics and Statistics, Central Arid Zone Research Institute, Jodhpur for providing necessary facilities and useful suggestions in the preparation of this paper.

REFERENCES

- Bandopadhyay, S. 1981. Changes in structural Distribution of land holding and occupational structure of the farmers of the selected farms in west Bengal. *Indian Journal of Agricultural Economics*. 36(4): 194.
- Bhagat, L.N. 1981. Changes in agrarian structure—A study of an evaluation of land reform measures adopted in Bihar. *Indian Journal of Agricultural Economics*. 36(4) 193.
- Chadha, G.K., 1979. Production gains of new Agricultural technology (A farm-size wise analysis of Punjab Experience). Publication Bureau, Punjab University, Chandigarh, 130pp.
- Chattopadhyay, M. and Ashok Rudra, 1976. Size productivity revisited. *Economic and Political Weekly*. 11(39): A/104/A/116.
- Driver, P.N. and Desai, D.K. 1959. Studies in economics of farm management in Bombay state. Directorate of Economics and statistics, Government of India. Ministry of food and Agriculture, New Delhi : 386 pp.
- Grewal, S.S. and Kahlon, A.S., 1973. Farm size and productivity relationship. *Financing Agriculture*. 4(4): 47-48.
- Hanumantha Rao, C.H. 1966. Alternative explanations of the inverse relationship between size and output per acre. *Indian Economic Review (New series)* 1(2): 1-12.
- Kahlon, A.S. and Kapoor, T.D. 1968. Differences in the farm size and productivity of input-mix and yield levels on small and large farms in the IADP District Ludhiana— A case study— *Indian Journal of Agricultural Economics*. 19(1): 79-83.
- Rajkrishna, 1962. The optimum firm and the optimum farm, I and II. *Economic and Political Weekly* 14(40): 1557-81 and 14(4) : 1529-31.

- ao, A.P. 1967. Size of holding and productivity. Economic and political Weekly. 2(44) : 1989-1999.
- udra, A. 1968(a) Farm size and yield per acre. Economic and Political Weekly, 3(26 & 28) : 1041-1044.
- udra, A. 1968(b) More on returns to scale in Indian agriculture, Economic and Political Weekly. 3(43) : 33-38.
- ini, G.R. 1971. Holding size, productivity, and some related aspects of Indian agriculture. Economic and Political Weekly. 6(26) : A/79-A/85.
- ini, G.R. 1979. Farm size, Resource use efficiency and income distribution. Allied Publishers Pvt. Ltd. New Delhi. 218 pp.
- stri, A.S. and Rama Krishna, Y.S. 1980. A modified scheme of drought classification applicable to arid zone of western Rajasthan. Annals of Arid Zone. 19(1&2): 65-72.
- arma, J.L. 1981. Structure of land holdings in various regions of the Punjab. Indian Journal of Agricultural Economics. 36(4): 184.
- gh, Rajveer and Patel, R.K., 1973. Returns to scale, farm size and productivity in Meerut district. Indian Journal of Agricultural Economics. 28(2): 43-49.
- sha Rani, 1971. Size of farm and productivity. Economic and Political Weekly. 6(20): A/85-A/89.