DIVERSIFICATION OF REGIONAL MARKETING COOPERATIVES*

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Several definitions of diversification exist. Typically, the concept is dynamic and refers to the relationship among various activities or enterprises in which the firm is engaged. As new activities are acquired by a firm from some existing base of activities, complementarity of the newly acquired activity relative to the existing base is subjectively determined. Judgment is rendered on whether the result represents diversification or conglomeration.

Conventional wisdom has not succinctly differentiated between diversification and conglomeration. Some writers have considered conglomeration a special case of diversification [2, 7]. For purposes of this paper, this taxonomic argument need not be settled.

Motives for diversification over time are traditionally regarded as risk reduction, gaining monopoly power, and/or attainment of economies of size. Risk reduction may motivate diversification over spatial or product markets. As Arnould indicates [2, p. 73]:

"... firms would be expected to diversify first into related areas. The marginal cost of information would, in most cases, be less if the moves were in this form rather than of a more conglomerate nature. The move would also be into an area in which there is a relationship between the existing product and the product new to the firm at the procurement, production, or distribution and promotion levels. This is a necessary condition if potential economies of scale are to be realized by diversification."

Such motivation for diversification could apply equally to proprietary or cooperative forms of business.

The purpose of this paper is to quantitatively document trends in diversification of regional marketing cooperatives.[1] Several diversification measures are compared. In addition, using regional marketing cooperative fiscal year sales data from 1960 through 1973, diversification measures are compared across major commodity categories. Because of their limited geographic scope, local marketing cooperatives are ignored.

The extent of diversification and/or conglomeration has been documented for the proprietary food sector. Review of several quantitative studies reveals that diversification/conglomeration in general manufacturing industries, as well as food industries, has increased markedly over time [3, 4, 5, 6]. However, diversification of cooperatives has not been studied.

THE DATA

Fiscal year sales data for all regional marketing cooperatives were obtained from Farmer Cooperative Service, United States Department of Agriculture for 1960-61 through 1973-74. Included are all regional cooperatives having any marketing sales during this period (thus, some cooperatives included are primarily supply cooperatives but with some marketing sales). Sales were recorded by major commodity category for each cooperative and deflated by

[1] The definition of local and regional is defined by Farmer Cooperative Service, U.S.D.A. as [1, p. 15]: "The operations of local cooperatives are usually confined within a county area or less. Areas served by regional cooperatives range in scope from several counties within a state or within bordering states to regionalized groupings of states or to many states widely scattered throughout the United States."

appropriate farm prices received indices (e.g. grain prices received index was utilized for the grain category).[2] For each cooperative, categories were aggregated to obtain annual marketing sales in real dollars. Also available were total sales (including supply and/or service) for each cooperative. Non-marketing sales were deflated by the prices paid by farmers index since these were almost exclusively sales of inputs to farmers.

ALTERNATIVE DIVERSIFICATION MEASURES

Aggregate Index

Diversification in the present context was measured by calculating two types of indices. An "aggregate index" would reflect both: (1) proportion of marketing sales to total sales and (2) dispersion of marketing sales across the 13 possible major commodity categories. Thus, if a cooperative had sales only in the marketing category and all of these sales occured in (say) the dairy category, the diversification measure would be zero, or complete specialization. The opposite extreme would be a cooperative with a small proportion of marketing sales relative to total sales but with the marketing sales spread over all 13 categories. Such a cooperative would be highly diversified with respect to marketing. Size in terms of sales is not reflected in the diversification index since the diversification concept is independent of firm size.

Two alternative aggregate indices were computed. Let S_i represent the share of marketing sales to total sales for firm i and P_{ij} the proportion of marketing sales in commodity category j for firm i. Thus, $\sum_j P_{ij} = 1.0$ for each i. The aggregate indices were defined as:

$$1) \quad A_{1_i} = 1-[[S_i^2 + \sum_j P_{ij}^2]/2]$$

and

$$2) \quad A_{2_i} = [(a \cdot b)^{1/2} - 1]/[(39)^{1/2} - 1]$$

where

a = 1 if the cooperative is exclusively marketing
a = 2 if marketing and service or marketing and supply
a = 3 if marketing, supply and service and

b = number of commodity categories in which sales appeared.

Thus, b is 2 if the cooperative had sales in 2 categories, etc.

The first aggregate index is essentially the well-known Herfindahl [8, pp. 43-45] concentration index modified to reflect both the relative importance of total marketing sales and the dispersion within marketing sales on a weighted basis. The second index reflects the same factors but on an unweighted basis (it disregards, for example, amount of sales in one commodity category compared to another).[3]

Marketing Index

A second type of index calculated was a "marketing index" which reflects solely the dispersion of marketing sales across the 13 possible commodity categories without regard to what proportion marketing sales were of total sales. Again, size is not reflected in the index.

Three marketing indices were defined using both the concepts of Herfindahl and entropy concentration indices [8, pp. 70-73]. Using the above definition of P_{ij}, the measures are:

$$1) \quad M_{1_i} = 1-\sum_j P_{ij}^2,$$

$$2) \quad M_{2_i} = 1-\prod_j P_{ij}^{P_{ij}},$$

$$3) \quad M_{3_i} = \sum_j (P_{ij} \log P_{ij}^{-1})/\log 13.$$

All three measures reflect only the weighted sales dispersion across commodity categories within marketing sales and are product diversification measures. The first measure is a Herfindahl index applied exclusively to marketing sales, the latter two are similar to two alternative entropy measures of concentration adapted to measure product diversification. The last index, M_3, is relative entropy. The numerator is divided by the log of the maximum possible number of commodity categories simply so that it will range from zero to 1.0. M_1 and M_2 have similar properties where zero represents complete specialization and 1.0 represents one-thirteenth of marketing sales in each category.

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[2] FCS records sales by each marketing cooperative in 13 commodity categories: dairy products; grain; soybean and soybean products; livestock and livestock products; fruits and vegetables; sugar products; poultry products; cotton and cotton products; tobacco; rice; beans and peas; wool and mohair; nuts; and miscellaneous.

[3] Both indices range from zero to 1.0. The denominator of A_2 is the maximum value of the numerator so that A_2 will be constrained from zero to 1.0.

DIVERSIFICATION TRENDS

Overall

Each index was computed for each regional marketing cooperative and averaged annually for all cooperatives (Table 1). Simple correlation coefficients indicate that the indices are significantly positively correlated with one another (Table 1). This means that whichever alternative index is chosen for analysis, roughly the same statistical results would be obtained.

Time trend regression on the alternative indices indicate no strong linear trend. A cubic function of time is statistically superior ($\bar{R}^2 > 0.85$ for each index except A_1) to other forms since the indices exhibit little trend from 1960-61 through 1966-67, increase from 1967-68 through 1970-71, and decline from 1971-72 through 1973-74. Because of this, no overall trend during the 14 year data base seems to exist. That is, diversification trended neither up nor down over the entire 14 year period. Some annual variation in the overall indices can be explained simply by changing annual rate of decline in the total number of cooperatives. As a consequence, little can be said about expected future values of the diversification indices averaged for all cooperatives.

TABLE 1. ALTERNATIVE DIVERSIFICATION MEASURES FOR REGIONAL MARKETING COOPERATIVES, UNITED STATES, 1960-61 THROUGH 1973-74

Fiscal Year	Mean Index for All Cooperatives [a]				
	A_1	A_2	M_1	M_2	M_3
1960-61	.0616	.0604	.0151	.0186	.0098
1961-62	.0639	.0608	.0162	.0200	.0106
1962-63	.0594	.0600	.0156	.0195	.0103
1963-64	.0603	.0607	.0160	.0201	.0107
1964-65	.0631	.0609	.0167	.0207	.0111
1965-66	.0613	.0627	.0157	.0228	.0105
1966-67	.0609	.0646	.0166	.0202	.0110
1967-68	.0632	.0674	.0191	.0235	.0127
1968-69	.0694	.0705	.0226	.0275	.0150
1969-70	.0690	.0710	.0239	.0286	.0156
1970-71	.0848	.0799	.0314	.0384	.0203
1971-72	.0733	.0754	.0284	.0348	.0184
1972-73	.0726	.0672	.0289	.0344	.0186
1973-74	.0700	.0644	.0264	.0328	.0172

SOURCE: Computed.
NOTE: Simple correlation coefficient between A_1 and A_2 is .885; simple correlation between M_1-M_2 = .990; M_1-M_3 = .999, and M_2-M_3 = .991.
[a] See text for definition.

By Commodity Category

To examine how regional marketing cooperatives are diversified relative to each other, each cooperative was classified exclusively into one category of the possible thirteen in which it had greatest proportion of sales (i.e. largest P_{ij} for all j) for each fiscal year of the data period. The marketing index (M_1) was chosen for diversification analysis by commodity category because of its simplicity relative to the other marketing indices. Index M_1 was averaged over all cooperatives in each category for each fiscal year from 1960 through 1973. Linear time trend regression for each commodity category indicated that average annual change in the index was greatest for poultry and grain cooperatives (0.005 and 0.004, respectively). These trends were significantly different from zero (at 5 percent). All other commodity category average annual rates of change were either not statistically different from zero or less than 0.001.

Averaging the diversification index over all cooperatives in a commodity category does indicate general tendencies for the entire category. However, such averaging trends to mask significant information since many cooperatives in each category have no sales in other categories (hence, $M_1 = 0$ for that cooperative). To gain further insight into the extent of specialization by commodity category, the mean average M_1 was computed for each category over only those cooperatives with some diversification (hence, a non-zero M_1).

Bean and pea, poultry and grain categories had the greatest proportion of total cooperatives which were diversified (Table 2). The category with the least number of diversified cooperatives as a percent of the total was dairy. The bean and pea category not only had the highest percentage of diversified cooperatives, but this category had the largest diversification index. In general, of diversified cooperatives, grain, fruit and vegetable, poultry, and bean and pea cooperatives are most diversified and all at roughly the same level.

The mean M_1 is erratic over time for commodity categories where there are few cooperatives in that category. For example, the cotton diversification index changes from 0.39 to 0.08 from 1960-61 to 1964-65 because one cooperative exited this category when only three were in it initially. For categories with larger numbers of diversified cooperatives, the index appears more stable over time and no dramatic change in diversification of diversified cooperatives seems apparent except perhaps for the beans and peas category. A substantial increase in the diversification index is noted for that category while the number of diversified cooperatives declined over time.

TABLE 2. MARKETING DIVERSIFICATION BY COMMODITY CATEGORY, REGIONAL MARKETING COOPERATIVES, UNITED STATES, SELECTED YEARS

Commodity Category and Fiscal Year [a]	Number Coops in this Category	Coops with $M_1 > 0$		
		Number	Percent	Mean M_1
Dairy				
1960-61	293	5	1.7	.0513
1964-65	267	5	1.9	.1395
1969-70	190	5	2.6	.1045
1973-74	93	3	3.2	.1300
Grain				
1960-61	43	11	25.6	.2674
1964-65	42	10	23.8	.2823
1969-70	35	12	34.3	.3267
1973-74	30	10	33.3	.2734
Livestock				
1960-61	43	3	7.0	.0224
1964-65	38	2	5.3	.0023
1969-70	32	4	12.5	.1531
1973-74	29	1	3.4	.0362
Fruits & Vegetables				
1960-61	64	2	3.1	.3580
1964-65	65	3	4.6	.4158
1969-70	66	5	7.6	.3313
1973-74	62	6	9.7	.3031
Poultry				
1960-61	30	9	30.0	.2942
1964-65	24	6	25.0	.3275
1969-70	20	6	30.0	.3890
1973-74	15	5	33.3	.3938
Cotton				
1960-61	31	3	9.7	.3923
1964-65	28	2	7.1	.0755
1969-70	22	2	9.1	.1484
1973-74	20	4	20.0	.1547
Beans & Peas				
1960-61	7	4	57.1	.3031
1964-65	6	3	50.0	.3915
1969-70	6	3	50.0	.4364
1973-74	6	2	33.3	.4653
Nuts				
1960-61	6	1	16.7	.3589
1964-65	8	2	25.0	.3613
1969-70	6	1	16.7	.0110
1973-74	6	0	0	0
Tobacco				
1960-61	30	1	3.3	.0891
1964-65	32	2	6.3	.2526
1969-70	27	1	3.7	.0723
1973-74	28	1	3.6	.1231
All Categories				
1960-61	625	39	6.2	.2427
1964-65	587	36	6.1	.2723
1969-70	476	40	8.4	.2848
1973-74	345	33	9.6	.2755

SOURCE: Computed.

[a] Cooperatives in the rice, wool and mohair, sugar and miscellaneous categories had no marketing sales diversification (i.e. $M_1 = 0$) for these years.

The number of diversified cooperatives tended to decline over the data period but so did the total, thus the percentage of diversified cooperatives increased ("All categories" item of Table 2). The level of diversification for diversified cooperatives increased by about 14 percent from fiscal year 1960-61 to 1973-74.

DIVERSIFICATION AND SIZE

Since diversification is a dynamic concept, significant differences might be expected in both level of and change in diversification over time for various sales size categories of cooperatives. To test such association, all regional marketing cooperatives were classified into one of three size categories, using 1960-61 fiscal year marketing sales as a base. Size category one consisted of cooperatives with marketing sales in constant dollars (1967 = 100) of less than 5 million, category two from 5 to less than 25 million, and category three 25 million or over. Of the 625 regional marketing cooperatives in fiscal year 1960-61, 174 were in category one, 365 in category two, and 86 in category three. For each category, an average diversification index (M_1) was computed over all cooperatives in this category.

Linear time trend regression on these average indices indicate a tendency existed for slight but statistically significant increases in diversification in the largest two categories. These trends were 0.0013 for category two and 0.0015 for category three from 1960-61 through 1973-74. Both are significantly different from zero (at 5 percent). Over time, the level of diversification was always greatest for the largest sales category and least for the smallest sales category, as expected. For example, the 1960-61 diversification index for category one was 0.0040, category two was 0.0158 and category three was 0.0346. For 1973-74 comparable indices were 0.0030, 0.0261 and 0.0488, respectively.

SUMMARY AND IMPLICATIONS

Empirical measurement of regional marketing cooperative diversification was accomplished by computing several alternative indices. The two aggregate indices and three marketing indices were highly positively correlated. Thus, either aggregate index or any of the marketing indices would produce comparable results over time. A Herfindahl type diversification index was chosen for the analysis. The marketing index measures diversification over commodity categories.

The number of diversified regional marketing cooperatives is small (less than 10 percent) and declining absolutely but increasing as a percent of total regional marketing cooperatives. The level of diversification increased slightly over the data period but no strong linear trend existed. Substantial differences existed in diversification by primary commodity category of cooperatives. Some trend toward diversification was evident by initial size of regional marketing cooperatives. However, the difference in rate of change in diversification for small, medium and large sales size categories was not as large as expected.

Although regional marketing cooperatives are

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decreasing in number and increasing in size, a substantial trend toward product diversification is not apparent over the data period. For example, one might expect regional marketing cooperatives to be strongly motivated toward product diver- sification in an effort to reduce risk or achieve economies of size. This analysis does not indicate whether such motives are present but does indicate that no general trend toward rapid diversification exists.

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