DIVERSIFICATION OF REGIONAL MARKETING COOPERATIVES*

Thomas L. Sporleder and Robert A. Skinner

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 conglomerate.

Conventional wisdom has not succinctly differentiated between diversification and conglomerate. Some writers have considered conglomerate 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. 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 conglomerate has been documented for the proprietary food sector. Review of several quantitative studies reveals that diversification/conglomerate 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 Thomas L. Sporleder is Associate Professor and Robert A. Skinner is Graduate Assistant, Department of Agricultural Economics, Texas A & M University. *Technical Article No. 13077 of the Texas Agricultural Experiment Station. The authors gratefully acknowledge partial financial support from Farmer Cooperative Service, U.S. Department of Agriculture, Washington, D.C. for this research.

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). 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 occurred 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) $A_1 = 1 - \left[ S_i^2 + \sum_j P_{ij}^2 \right]/2$

2) $A_2 = \frac{(a \cdot b)^{1/3} - 1}{\left(\frac{39}{3} \right)^{1/3} - 1}$

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).

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) $M_1 = 1 - \sum_j P_{ij}^2$

2) $M_2 = 1 - \prod_j P_{ij}$

3) $M_3 = \sum_j \left( P_{ij} \log P_{ij}^{-1} \right)/\log 13$.

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.

---

2FCS 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.

3Both 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.

192
**TABLE 1. ALTERNATIVE DIVERSIFICATION MEASURES FOR REGIONAL MARKETING COOPERATIVES, UNITED STATES, 1960-61 THROUGH 1973-74**

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Mean Index for All Cooperatives</th>
<th>( A_1 )</th>
<th>( A_2 )</th>
<th>( M_1 )</th>
<th>( M_2 )</th>
<th>( M_3 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960-61</td>
<td>0.0616</td>
<td>0.0604</td>
<td>0.0151</td>
<td>0.0186</td>
<td>0.0098</td>
<td></td>
</tr>
<tr>
<td>1961-62</td>
<td>0.0639</td>
<td>0.0608</td>
<td>0.0162</td>
<td>0.0200</td>
<td>0.0106</td>
<td></td>
</tr>
<tr>
<td>1962-63</td>
<td>0.0594</td>
<td>0.0600</td>
<td>0.0156</td>
<td>0.0195</td>
<td>0.0103</td>
<td></td>
</tr>
<tr>
<td>1963-64</td>
<td>0.0603</td>
<td>0.0607</td>
<td>0.0160</td>
<td>0.0201</td>
<td>0.0107</td>
<td></td>
</tr>
<tr>
<td>1964-65</td>
<td>0.0631</td>
<td>0.0609</td>
<td>0.0167</td>
<td>0.0207</td>
<td>0.0111</td>
<td></td>
</tr>
<tr>
<td>1965-66</td>
<td>0.0613</td>
<td>0.0627</td>
<td>0.0157</td>
<td>0.0228</td>
<td>0.0105</td>
<td></td>
</tr>
<tr>
<td>1966-67</td>
<td>0.0609</td>
<td>0.0646</td>
<td>0.0166</td>
<td>0.0232</td>
<td>0.0110</td>
<td></td>
</tr>
<tr>
<td>1967-68</td>
<td>0.0632</td>
<td>0.0674</td>
<td>0.0191</td>
<td>0.0235</td>
<td>0.0127</td>
<td></td>
</tr>
<tr>
<td>1968-69</td>
<td>0.0694</td>
<td>0.0705</td>
<td>0.0226</td>
<td>0.0275</td>
<td>0.0150</td>
<td></td>
</tr>
<tr>
<td>1969-70</td>
<td>0.0690</td>
<td>0.0710</td>
<td>0.0239</td>
<td>0.0286</td>
<td>0.0156</td>
<td></td>
</tr>
<tr>
<td>1970-71</td>
<td>0.0648</td>
<td>0.0799</td>
<td>0.0314</td>
<td>0.0384</td>
<td>0.0203</td>
<td></td>
</tr>
<tr>
<td>1971-72</td>
<td>0.0733</td>
<td>0.0754</td>
<td>0.0264</td>
<td>0.0348</td>
<td>0.0184</td>
<td></td>
</tr>
<tr>
<td>1972-73</td>
<td>0.0726</td>
<td>0.0672</td>
<td>0.0269</td>
<td>0.0344</td>
<td>0.0186</td>
<td></td>
</tr>
<tr>
<td>1973-74</td>
<td>0.0700</td>
<td>0.0644</td>
<td>0.0264</td>
<td>0.0328</td>
<td>0.0172</td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** Computed.

**NOTE:** Simple correlation coefficient between \( A_1 \) and \( A_2 \) is .885; simple correlation between \( M_1 \) and \( M_2 \) is .990; \( M_1 \) and \( M_3 \) is .991, and \( M_2 \) and \( M_3 \) is .991.

\[ a \text{See text for definition.}\]

---

**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 (\( R^2 > 0.85 \) 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.

**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.
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 ($M_i$) 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
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 diversification 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.

REFERENCES
