Few of the regions or States have size distributions that conform exactly to the theoretical negative exponential distribution. This is as expected, since the distribution for most States reflects unique characteristics of the State, such as geographic conditions, types of agriculture, and institutional constraints (for example, large number of small tobacco farms in North Carolina). 7/ It is also expected that long-established, traditional farming areas (with few physical, economic, or institutional constraints) which have undergone fragmentation and reconsolidation of farming units from original settlement patterns would tend to more nearly approximate the inverse exponential distribution.

While the usefulness of estimated equations of this form for projection depends upon the magnitude of deviation from the theoretical distributions, it is also dependent upon the stability of the farm size distribution over time. To determine statistically the stability of the estimated equations, an analysis of the covariance was conducted (3, 4). This involves comparison of the sum of squared residuals from the individual equations and the equation estimated for all groups. The hypothesis tested is that the data used in estimating the parameters of each equation belong to the same regression equation, that is, the data are subsamples of the same population--no significant shifts occur in the distribution over time. The F ratio calculated was expressed as:

$$F = \frac{(A - B - C - D - E) / P (k - 1)}{(B + C + D + E) / (n_1 + n_2 + n_3 + n_4 - 4P)}$$

Where n_i = the number of observations (7) ($i = 1, \ldots, 4$)
p = number of parameters estimated (1 - slope)
k = number of classes (4 - 1959, 1964, 1969, 1974)
A = total group sum of squares of $n_1 + n_2 + n_3 + n_4$ observations with $n_1 + n_2 + n_3 + n_4 - P$ degrees of freedom

B, C, D, E, = individual group sum of squares on n_i deviations of the dependent variable from the regression estimated by n_i observations with $n_i - P$ degrees of freedom.

A comparison of the calculated F (table 17) with tabular F at the 0.05 level of significance indicates the null hypothesis is rejected for only one State, Rhode Island, in the New England region. Thus, the distributions appear stable over time and, if adequately portrayed by the estimated equations, projections may be made with some confidence.

Projections

To maintain the consistency of our data series for projection purposes, it was necessary for us to adjust the Census of Agriculture data for underenumeration and reestimate the negative exponential functions for the United States by using the adjusted census data, as shown in table 2.

7/ For further discussion of why deviations occur, see Dovring (7).