

Continuing this process, we have shown that a number of farm movement matrix elements can be constructed. Starting from the size category of 260 to 499 acres and continuing on to the smallest size class, this process breaks down, however; it begins to yield nonpositive diagonal elements. ^{13/} A trial-and-error iterative procedure is thus employed to identify the remaining matrix elements that minimize the residual sum of squares, computed from the projected and actual number of farms by size class. The off-diagonal elements, again, reflect the number of farms moving to the upper classes. As a result, the diagonal elements are all positive--with the numerical value ranging from about 82 percent to 93 percent of the number of farms in 1969.

Following the same procedure, we constructed a movement matrix by sales class between 1969 and 1974 (table 22). The transition probability matrices, obtained by dividing the number of farms in the farm movement matrix by the 1969 number of farms in each size class, are shown in tables 23 and 24.

The transition probability matrix is the crux of the Markov process; therefore, its stability over time will contribute to the accuracy of projections. The probabilities were so stable that there were virtually no differences between the two transition matrices, one for the 1969 to 1974 period and another for the 1964 to 1969 period. In this way, the transition probability matrix used for projections actually represents the synthesis of the two periods: 1964 to 1969 and 1969 to 1974.

Acreage Distribution

The number of farms is projected to decline to 2.1 million in 1990 and 1.7 million in 2000. Of the projected 1.7 million farms in 2000, large farms (those with 1,000 acres or more) will account for about 10 percent, an increase from 5 percent in 1974. By contrast, the proportion of small farms (those with less than 220 acres) is projected to remain high, 68 percent, as compared to 70 percent in 1974 (table 25).

Historically, the number of farms with less than 500 acres has been declining since 1945. Projected acreage distributions based on the Markov process show that this trend is likely to continue into the year 2000. In addition, the decline of the number of farms with 400 to 999 acres, beginning in 1969, is projected to continue. About 90 percent of all farms in 2000 will likely have less than 1,000 acres.

Sales Distribution

The transition probability matrix by sales class was intended to reflect the physical change in farm structure, discounting any effects of price inflation. Thus, multiplying the transition probability matrix by the base period (say 1969) number of farms does not result in the projected number of farms in 1974. Instead, the projection is derived by adding the effects of price infla-

^{13/} This finding appears to have economic meaning. It could suggest that the farm growth and consolidation process may not start from the very small size classes as is implied in the traditional Markov process. Rather, consolidation may actually begin from a larger, more economically viable size level, such as 500 acres or larger.