Additional Answers with Explanation

I have attached my log file and a do file of STATA for answering the questions that were asked. I have answered most of the questions through my codes and added my comments whenever relevant. I am attaching my answers of number 10 here as it will require significant description.

Interpretation of the simple regression [Number 8]

Since the tractors and farms are in numbers hence the interpretation will be,
If farmland in corn increases by 10%, the number of tractors per farm increases by 0.018. This also means 1 additional tractor per 55 farms. If 55 farms increase their corn land by 10%, they collectively gain about 1 additional tractor.

Again, if wheat farmland increases by 10%, tractors per farm increase by 0.047 which also means 1 additional tractor per 21 farms. If 21 farms increase their wheat land by 10%, they collectively gain about 1 additional tractor.

The wheat variable has a larger impact than corn in this case. Both variables are statistically significant as p value is less than 0.001 ($p<0.001$) which means these two independent variables affect tractors per farm. However, the R-square value shows 24.62% of the variation in the number of tractors per farm is explained by the percentage of farmland of corn and wheat. As 75.38% of the variation is unexplained, it means there are other important factors influencing the number of tractors per farm.

Interpretation of the regression with state fixed effects [Number 9]

If farmland in corn increases by 10%, the number of tractors per farm increases by 0.024. This also means 1 additional tractor per 42 farms. If 42 farms increase their corn land by 10%, they collectively gain about 1 additional tractor.

Again, If wheat farmland increases by 10%, tractors per farm increase by 0.045 which also means 1 additional tractor per 22 farms. If 22 farms increase their wheat land by 10%, they collectively gain about 1 additional tractor.

Both variables are statistically significant as ($p<0.001$). As the R-square value increases from 24.62% to 44.42%, it means that including state-level differences can explain the variations better than the previous results.

State fixed effects

The negative coefficient means tractors per farm is lower in that state compared to the reference state. On another note , if it is positive that means tractors per farm is higher in that state compared to the reference state. The positive coefficients are likely due to larger farm sizes, more subsidies, machines and less labour intensive farming whereas the negative coefficients mean smaller farm sizes, less subsidies, machines and higher labour intensive farming. The specialization type can be a huge factor as well.

From the results of state coefficients we find that Iowa, Kansas, Minnesota and North Dakota have no significant difference in tractors per farm as ($p<0.001$). Tractors per farm in these four states are close to the reference state.

Among the states, Indiana, Michigan and Missouri have less tractors per farm, while South Dakota and Wisconsin have higher. South Dakota has the highest number of tractors per farm than the reference state and Missouri has the lowest. South Dakota Farms own around 1 more tractor for every 20 farms and Missouri Farms own around 1 lesser tractor for every 9 farms, compared to the reference state.

Farms in Michigan own around 1 lesser tractor for every 29 farms, Farms in Indiana own around 1 lesser tractor for every 18 farms, Farms in Nebraska own around 1 lesser tractor for every 24 farms, Farms in Ohio own around 1 lesser tractor for every 27 farms, Farms in Wisconsin own around 1 more tractor for every 27 farms. All are compared to the reference state.
