NTIFYING LONG RUN AGRICULTURAL RISKS AND EVALUATING FARMER RESPONSES TO RISK

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Wheat Yield Risk Measures and Aggregation: A Meta-Analysis Approach - Discussion

by

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Meta-analysis, or the analysis of analyses, is a relatively new area of activity for economists. Michele and Bryan are to be commended for their first step on the application of meta-analysis to yield variability questions. Their analysis of the farm size-yield variability issue is useful in itself and also highlights some of the problems which will be associated with the use of meta-analysis for yield variability.

Turning first to the farm level analysis of yield variability, I would encourage you to attempt to isolate a "pure size effect" in the analysis. Location within the state, number of tracts in a farm operation, geographic distribution (NW to SE) and dispersion of tracts, and other risk management responses are variables which should be taken into account, if possible. As a minimum, you may want to test whether an "east-west" dummy has an impact. Alternatively, you might want to use the coefficient of variation, instead of the standard deviation, as your dependent variable to account for some of the effects of differences in yield level.

The paper indicates several methods of detrending were explored, but only the individual and group results are discussed. Doesn't the "proper" detrending procedure reflect the ends of the analysis? If something like trend can be "anticipated," then it is not really part of the variability. On the other hand, methods like the variate difference method may remove more systematic variation than is perceived by the decision-maker. The linear detrending procedure used in this analysis seems appropriate.

The relatively small effect of detrending on variability was somewhat surprising. This could be related to the size of the trend effect. The larger the trend, the larger the reduction in variability. Your analysis with a trend of .70 to .85% per year found a reduction of about 10 percent in variability. In contrast, Indiana data analyzed with trends of 1.4 to 1.7% per year had variability reductions of about 40 percent from linear detrending (Table 1).

Table 1. Coefficients of Variation and Yield Trends for Selected Crops in Indiana and Tippecanoe County 1960-85.

	Coefficient of Variation		Yield Trend % per Year
Indiana	Actual	Detrended	
Corn	18.1	10.6	1.6
Soybeans	15.7	8.8	1.5
Wheat	14.9	8.7	1.4
Tippecanoe			
Corn	20.6	14.4	1.5
Soybeans	17.6	9.9	1.7
Wheat	17.5	10.6	1.6

Source: Patrick, G.F., "Variability and Risk in Indiana Agriculture, Purdue University Cooperative Extension Service, EC-648, 1986.

I'd suggest including the minimum and maximum values of standard deviations and coefficients of variation in Tables 1, 2 and 3 as you did in Table 5. I find information like that "interesting," although the values may not be too useful.

The area variable in the analysis is the average acreage of wheat over period of analysis for each producer. I'd expect there would be a fairly strong upward trend in the average acreage, but it would be interesting to explore. Do farmers with a faster than average increase in size have lower variability? Do farmers with a relatively high variability tend to move away from wheat production (or increase wheat acreage more slowly)? You may have a selection basis in your sample of farmers. Presumably there may have been some change in management of the farm over time (father, father-son, son), but they survived for the 17 year period. How does the mean and standard deviation of wheat yield of these farms compare with others in the recordkeeping project? It would be relatively easy to develop and test some hypotheses using this data.

There are probably some econometric problems associated with the data which you will probably need to be concerned about in future analysis. Maybe the GLS approach would take care of everything.

Turning now to your meta-analysis, I am concerned about the functional forms you assume. Figure 1 suggests that there are fairly substantial reductions in variability up to 500 acres or so. However, when you shift to the analysis which results in Figure 2, your units are very large. The variability derived from the estimated equations will blow up near zero acres. Depending on your objectives, that may be a major drawback. It may not make sense to include regional and state yields in the analysis and they tend to weight the estimation rather heavily. Perhaps another functional form would behave better, at least within the range of the data.

In looking to your near-term future objectives, it may be difficult to do a "true" meta-analysis because of the lack of farm level data. An analysis of historical county level wheat yield data across counties and states is not likely to give the results that you would like. Indiana will have a smaller standard deviation of wheat yields than Kansas, not because of the area in wheat, but because of differences in climatic conditions. Data available does not let you answer the question of whether the correction factor is similar in Indiana and Kansas. What would you hypothesize? Is the correction factor likely to be the same across crops within an area and/or across geographic areas for a given crop? A brief discussion might be helpful.

There have been relatively few farm/county yield comparison studies. You referred to some in your oral presentation. There may be a number of other analyses, perhaps in theses, but they would be hard to locate. Your initial analysis also provides some data points. Ideally you would like to get a reasonable number of empirical studies and do a true meta-analysis.

This presentation is an interesting start on a problem which has been of concern in risk analysis for some time. The methodology has potential in a number of areas. Perhaps a meta-analysis of risk attitudes would make an useful study. We look forward to your further meta-analysis of yield variability.