AGRICULTURAL ECONOMICS RESEARCH VOL. 22, NO. 3, JULY 1970

Squared Versus Unsquared Deviations for Lines of Best Fit: A Reply

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We appreciate David M. Bell's comments since one of the main objectives of our paper was to stimulate additional interest in squared versus unsquared deviations. It is only through such interchanges that progress will be made in discovering other and hopefully more useful techniques.

We want to make two points clear at the start: (1) We are not advocating absolute deviations as a panacea for all estimating problems, and (2) we do not deny that least squares is a legitimate and highly useful technique. However, in view of the apparent wide differences in results that could be obtained from the two methods, obviously a choice must be made when formulating a research problem. The real issue is whether least absolute deviations might be an even more useful method than least squares if properly developed. This is the main thrust of our original article.

At the beginning of his discussion (in the third paragraph), Bell states that "statistical techniques provide only probability statements that the researcher must then interpret." He then says that this sheds no light on the choice of estimation technique. It should be obvious, however, that statistical measures state certain facts and relationships of a nonprobability nature also. Probability statements are only one segment of the science of statistics. Furthermore, the implication that choice of statistical techniques is not related to the interpretation of results cannot be substantiated. We contend that the two processes cannot be entirely separated. The choice of technique will certainly affect the interpretation of results. Statistics cannot be practiced in a vacuum. From a research standpoint, the key to solving a problem successfully is the choice of a relevant method. This particular point and a number of other issues discussed at the beginning of our original paper (that Mr. Bell believes are not closely related to the primary issue) were presented to lay the groundwork for what we proposed as a possible alternative for traditional least squares.

Given the fact that least squares is only a method of approximation and that it is "best" only in the sense of least squares, then the issue is whether there is some other approximation that would be more appropriate. This point is worth examining in more detail. Deviations can be measured by any one of a number of possible methods. Mr. Bell states this point very well in his general equation where he concludes that α could have a wide range of possible values. However, it is our contention that if any other value but $\alpha = 1$ is used there should be some logical basis or criteria that would justify this use.

The loss function could be one useful type of decision criterion, but since we seldom, if ever, know the true nature of this function we have very little basis for making such a decision without including some arbitrary assumptions. It is seldom that anyone knows the real cost of making a wrong decision. Moreover, the loss function concept ignores one of the crucial points in our paper—that historically observed facts are one thing but predicting future events is another. A wrong decision in choice of method is just as important as a wrong decision in the assumptions that justify the use of a particular method. As a result, Bell's statement that the researcher should (or does) assume a quadratic loss function in the belief that it is the best approximation has no logical foundation. He is correct, however, in stating that if the researcher knew the loss function to be approximately linear, it would not be unwise to use absolute deviations.

Even if the relationship was not considered "absolute" in a probability sense, this fact alone would still be no basis for a choice criterion. Whatever method might be most appropriate for fitting a line representing the entire population would be equally valid for fitting a line from a sampled population as long as the objective of the analysis remained the same. In the sampled distributions you want to eliminate the possibility that the relationship is due to chance, but this does not mean that you can ignore the possible cause and effect relationship. One cannot be substituted for the other

over the entire range of possible relationships. Similarly, one cannot be used as a choice criterion at the expense of the other.

Methods of performing tests on statistical estimates based on absolute deviations are within the realm of possibility, and they should provide some interesting research areas for those willing to accept the challenge of unorthodox methods. The ease of calculation when using standard techniques cannot be overemphasized, as Mr. Bell states. However, the issue revolves around the complexity of calculating versus the complexity of the concept itself. Conceptually, the use of absolute deviations is simpler than any other basis for fitting a regression line. Do you sacrifice what could possibly be a more accurate or logical method for a less accurate or less logical method simply because the former is harder to calculate given the present state of knowledge? Since there appears to be a considerable difference in the results obtained from the two methods, the burden of choice rests on those who have to live with their research results.