A reply to Zhu

How useful or accurate is this alternative?

Zhu gives an alternative approach for setting the scale-efficient targets for which he claims slight superiority and finds a different target for DMU3 as shown in our example. While his approach is definitely an alternative to the one we published, it is not accurate and its superiority is a moot point.

Firstly the inaccuracy: applying his alternative approach to our 9 DMU example, he comes up with an $MPSS_{\max}$ target of (30, 30, 20). But this so-called target value is not in T_{VRS} —the production possibility set for the variable returns to scale model. This can be checked by trying to solve the relevant constraints given by (2) on page 61 of Appa and Yue.¹ It is a valid target under the assumption of CRS, but how absurd to set a target for achieving scale efficiency on the assumption of constant returns to scale.

The reason for this inaccuracy is that in setting scale-efficient targets Zhu does not confine himself to our set J_{CRS} . DMU3 is weakly efficient and therefore must not be in J_{CRS} . The largest or smallest MPSS giving target must be based on efficient and not weakly efficient DMUs.

But even after removing this minor glitch, what is gained by the alternative approach? Whether we use Zhu's method or ours, the number of LPs that have to be solved to set minimum or maximum MPSS targets is the same. Compared to Zhu our approach requires one more constraint and two more variables in the final LP. So what? In fact having explicit extra variables to represent the change in scale and savings in inputs given by the target makes our model more informative and transparent.

If the main concern of Zhu's comment is to point out that there is a mathematically equivalent way of obtaining the same targets, that is a fair point except for the slight inaccuracy mentioned earlier.

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References

- 1 Appa G and Yue M (1999). On setting scale efficient targets in DEA. *J Opl Res Sol* **50**: 60–69.

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