

tions we have provided for the existence of such balanced solution.

We have demonstrated our case (existence of a non-empty set Q_s and its intersection with set E_s) based on our own numerical example. The fact that RTJ's example produces a balanced solution under one set of parameters and an unbalanced solution under another is a secondary issue. It would be interesting to examine RTJ's conjecture for validity and proof under all possible conditions. Our response to this conjecture is that the shape and the location of set Q_s in the decision space is a function of the parameters of equations $(W_i/K_i)[b_i^* - f_i(x)] = D \quad \forall i \in I$. If parameters K_i change (from the anchor values to the range values) logically one can expect some change in set Q_s . How such changes occur, what general rules apply, and how sensitive is the final outcome to such changes can be the material for another paper.

Finally, we consider the discussion of the required conditions to obtain a balanced solution to be the main contribution of our paper.

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Final reply to the comments of Professors Ganjavi *et al*

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Our original paper¹ is designed to show linkages and equivalence between various multi-objective programming techniques. As part of this discussion we discuss techniques

that use the Chebyshev metric and link this to the concept of perfectly balanced solutions. Our premise for the existence of perfectly equilibrated solutions is limited to the cases in which the conditions given by Ballestero and Romero hold.² Clearly, as we mentioned in our reply, our wording was poor in places and this has led to discussions with Professors Ogryczak^{3–6} and Ganjavi *et al* (hereafter GWA). These discussions are welcomed by us as they have given clarification in places and led to further developments and enhancements. It is obvious that some models will not have a perfectly balanced solution and in this case we think the aim should be to find the ‘most balanced solution’ that is also efficient. Model (7) in our original paper is our attempt to find such a solution.

We welcome any corrections and improvements upon our model. The issues raised by GWA are a good development in this area as they give the required conditions needed to obtain a balanced solution. Our example as given in the paper did indeed provide a balanced solution. Under different normalisation constants it does not, as shown by GWA. We never intended to conjecture that this model produced perfectly equilibrated solutions under all possible sets of normalisation constants.

The issue of sensitivity that GWA raise is an interesting one and worthy of further research and investigation.

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