

CALCULATING PROBABILITIES WITH RANGE OR MID-POINT INPUTS

Warren R Hughes of *hugheseconomics.com*

Probabilities can be calculated using first a ranking of events from least to most likely and secondly an assessment using low/high values on how much “more likely” the more likely (ML) event is in the sequential pairwise comparisons as the decision-maker (DM) moves through the ranking. The mid-point procedure calculates one distribution using the mid-point values for the respective ranges. Detailed explanations of the procedures can be found in Hughes (2022).

Calculations are illustrated using a 5-event example with event A the least likely outcome and E the most likely event. Pairwise ranges for events are shown below with event D assessed as equally likely with C. Event E is two to three times more likely than D. Mid-points of the ranges are then used in that procedure. Probabilities are rounded to three decimals and percentages as appropriate.

CALCULATION OF PROBABILITIES FOR BOTH PROCEDURES

Events	Pairwise Range Procedure				More Likely Values	Mid-Point Range Procedure			
	Pairwise ML Range		Probabilities			Mid-Point	Probabilities		More Likely Values
	Low	High	P(·)	%			P(·)	%	
A	1.00	1.00	0.051	5	Base	1.00	0.041	4	Base
B	2.00	4.00	0.127	13	2.49	3.00	0.124	12	3.02
C	1.25	1.75	0.184	18	1.45	1.50	0.186	19	1.50
D	1.00	1.00	0.184	18	1.00	1.00	0.186	19	1.00
E	2.00	3.00	0.455	46	2.47	2.50	0.464	46	2.49
			1.001	100			1.001	100	

Examination of the results shows that the procedures produce probabilities within $\pm 1\%$ of each other. This should suffice for routine decision-making. The range methodology produces three distributions (low end, high end and average) versus one for the mid-point procedure which of course is quicker. The range method may trigger reassessment by the DM with the subsequent spread in the probabilities estimated from low end to high end (not shown above).

References

Hughes, W.R. (2022). A New Approach to Probability Assessment. *Chinese Business Review*. 21 (1), 16 – 18. (doi: 10.17265/1537-1506/2022.01.003)

Hughes, W.R. (2022). Probability Assessment. *Management Studies*. 10 (5), 331 – 334. (doi: 10.17265/2328-2185/2022.05.006)

Word count 346, 18.6.24