

STRATEGIES FOR PAIRWISE ASSESSMENT OF “MORE LIKELY” RANGES – JUNE 2024

In making pairwise comparisons, various shortcuts could be employed. First, three broad categories of probabilities could be highlighted:

- Very unlikely events at say around 1% probability.
- Moderately likely events at say 15% - 20% probability.
- Very likely events at say 40% - 60% probability.

Corresponding “more likely” ranges here would be respectively: Base, 15/1 or say 15 to 20, and 50/15 or say 3 to 4 times “more likely”.

Using a four event problem as an example, let the events in order of likelihood be A, B, C and D. Probabilities are derived as in the following table.

CALCULATION OF PROBABILITIES

Scenarios		Pairwise Range		Probabilities				More Likely Values	
Events	Ratios	Low	High	Low End	High End	Average	%	Average	%
A	Base = 1	1.00	1.00	0.005	0.003	0.004	1	Base	Base
B	B/A	14.00	16.00	0.076	0.047	0.062	6	15.50	6.00
C	C/B	3.00	4.00	0.230	0.190	0.210	21	3.39	3.50
D	D/C	3.00	4.00	0.689	0.760	0.724	72	3.45	3.43
				1.000	1.000	1.000	100		

The decision-maker (DM) here could decide that the increase in likelihood for D over C is approximately the same as for C over B as in 3 – 4 times “more likely” as above. That is, gains in likelihood may be assessed *relatively* as the DM proceeds through the ranking of events. Equal likelihood requires 1 – 1 for the current event over its predecessor in the ranking of events. In practice for percentage probabilities, anything in the zero to 1% range is recorded as 1% as in the table above.

Sensitivities to pairwise ranges for resulting probabilities are shown in the following table..

PROBABILITIES FOR VARIOUS D/C MORE LIKELY PAIRWISE RANGES

Scenarios		Probabilities by Pairwise Range for D/C			
Events	Ratios	2 - 3	3 - 4	3.5 - 4.5	4 - 5
A	Base	0.005	0.004	0.004	0.003
B	B/A	0.079	0.062	0.056	0.051
C	C/B	0.266	0.210	0.190	0.173
D	D/C	0.650	0.724	0.750	0.772
		1.000	1.000	1.000	0.999

When assessing the D/C pairwise range, the DM could judge that it is the same as the C/B judgment or a 3 – 4 times “more likely” gain. Slightly less likely could mean a 2 – 3 range and 4 – 5 for a slightly greater likelihood gain. Or possibly 3.5 – 4.5 depending on how much greater. The ease of spreadsheet calculation makes deriving resulting probabilities routine. And subsequent alterations to the distribution may be easier to make with an axiomatically correct distribution already available. That is, increasing the probability of one event necessarily requires another event to have a lower probability than currently calculated. When assessing these changes, the DM is essentially comparing the two events affected (not necessarily adjacent events) with their current probabilities in the background.