
Index Value Calculation

The external review of the regional socio-economic indicator methodology resulted in a number of recommendations, one of which was to modify the method used to derive the index values. The current method measures the dispersion relative to the best observation and normalizes the result by the range of the observations. This index has a number of desirable properties such as being bounded between 0 and 100, which protects against extreme observations unduly influencing the construction of the composite index. The index was defined as:

Current Index

$$I_j = 100 * (D_j - D_{\text{Best}}) / \underbrace{(D_{\text{Worst}} - D_{\text{Best}})}_{\text{Range}}$$

Where:

I_j is the index value for region j

D_j is the data observation for region j

D_{Best} is the “best” observation for data variable D

D_{Worst} is the “worst” observation for data variable D

The alternative index recommended by Michael Wolfson of Statistics Canada measures the dispersion relative to the median value and normalizes the result according to the inter-quartile range. The advantage of this method is that it is more robust, statistically (i.e. is efficient for any distribution of observations), and preserves the possibility of “cardinal” interpretations. Specifically, the index is defined as:

“Revised” Index

$$I_j = (D_j - D_m) / (\text{inter-quartile range})$$

Where:

I_j is the index value for region j

D_j is the data observation for region j

D_m is the median observation for data variable D

Inter-quartile range is the difference between the smallest and largest observation of data variable D after removing the first and last quartile observations.

The advantage, or disadvantage, of the revised index is largely related to the properties displayed when summing individual index variables to create a composite. Due to the fact that the inter-quartile range is used as the denominator, extreme observations (e.g. the best and the worst

observations) are given greater prominence when combined to form a composite. Alternatively, the current index would reduce the significance of regions that had extremely bad or extremely good observations.

Results

Overall Index of Stress

Little change to the ranking of the twenty-six regions within the Overall Stress Index occurred with the revised index relative to the current index. The only notable exception was Mount Waddington, which moved from a rank of seven under the old index to a rank of three under the revised index. A closer examination of the seven composite indices that make up the overall index revealed that there was very little change in the rankings of Mount Waddington. Rather, the change was driven largely by relative changes in the index values for the Health and Impending Change in Economic Hardship composite indicators. In both cases extreme observations for one or more of the variables composing the composite resulted in a relatively larger index value being assigned to Mount Waddington. Hence, even though the rank order of six of the seven sub indices did not change significantly, the overall ranking did.

	Weight	Current Rank	Revised Rank	Current Index Value	Revised Index Value
Mt. Waddington		7	3	59	0.65
Econ. Hardship	0.25	24	24	33	-0.58
Δ in Econ Hard	0.05	1	1	100	2.53
Crime	0.20	5	4	58	0.73
Health	0.20	1	1	77	2.09
Education	0.20	7	7	72	0.48
Children	0.05	16	12	42	0.13
Youth	0.05	14	12	42	0.06

Composite Indicators

The scatter plots comparing the current index ranking to the revised for each of the seven component indices indicates that very little change resulted from the introduction of the revised methodology. The only exception was the Impending Change in Economic Hardship Index where 7 out of the 26 regions had a change in the rank order of three or greater. As noted earlier, the revised index allots greater prominence to regions with extreme observations. The Impending Change in Economic Hardship Index has a tendency to display extreme values, a characteristic that has caused concern even under the current index methodology. This revised methodology may further intensify this concern.