

## How the Model Works

The model has 4 sequential steps:

- 1) Each riding is adjusted proportionally to provincial poll data.
- 2) Each riding is adjusted to account for sub-provincial regions.
- 3) Each riding within sub-provincial regions is adjusted to account for party variations.
- 4) Each riding is then adjusted to account for candidates.

A detailed explanation of these steps is below.

1) **Adjusts Support Change Based on Provincial Poll Data:** First, the model takes the last known result in each riding (from the 2004 Election) and adjusts the support for each party in that riding based on the latest provincial poll data (Note: for Nova Scotia, New Brunswick, P.E.I. and Newfoundland/Labrador, the poll data is across Atlantic Canada and for Saskatchewan and Manitoba, the poll data is across both provinces - each province in these two areas is treated as a distinct region). For example, if Liberals drop 4 points in Ontario from the 2004 election to the latest poll, the Liberal support in each riding across the province is reduced by 4. This process is repeated for all parties in all ridings.

2) **Sub-Regional Adjustments:** It is not sufficient to simply compute the change in support uniformly across provinces, because we know that there are variations within provinces, in terms of both absolute support for a given party, but also the percentage change in support. So, the second step is to adjust each riding to account for these sub-provincial regions (Northern Ontario, Eastern Ontario, Southwestern Ontario, etc), based on historic voting patterns (Note: for the Maritimes, each province is treated as a sub-region and for Saskatchewan and Manitoba, each province has two sub-regions). To compute this adjustment, I compare the change in support provincially with the change in support in every riding between the 2000 and 2004 elections. This gives me a sense of what percentage of the provincial change in support was witnessed in every riding. For example, if the Liberals fell by 4 pts in a province, but only fell by 2 pts in a given riding, we can say that riding experienced 50% of the Liberal change in support, for a factor of 0.50. This sub-regional average is calculated by averaging all ridings in a sub-region for each party, taking out the highest and lowest in each sub-region to reduce the amount of skew.

Let's illustrate how this is done with an example. The comparison of 2000 and 2004 results in Ontario are as follows:

	ONTARIO		
	LIB	CPC*	NDP
2000	51.5%	38.0%	8.3%
2004	44.7%	31.5%	18.1%
CHANGE	-6.8%	-6.5%	9.8%

\*Note: CPC totals for 2000 are the combined totals of the Alliance and PC Parties.

Therefore, if the change of support was uniform across the province, the Liberals would lose 6.8 points in every riding, the Conservatives would lose 6.5 points in every riding and the NDP would gain 9.8 points in every riding. Of course, such uniformity is impossible. We know there will be differences not only the absolute support level across different sub-regions, but in the change in support from one election to another as well.

So let's take the Ontario sub-region of Greater Ottawa. First, we do step #1, adjusting the level of support in each riding by the change in support for each party across Ontario (6.8 pts down for the Liberals, 6.5 pts down for the Conservatives and 9.8 pts up for the NDP) -- this gives us a first-order 'projected support'. Then we record the actual 2004 election results. The results are below:

		GREATER OTTAWA		
		LIB	CPC*	NDP
OTTAWA CENTRE	ACTUAL	31.1%	19.1%	41.0%
	PROJECTED	33.1%	24.6%	33.7%
OTTAWA-VANIER	ACTUAL	49.2%	24.1%	18.5%
	PROJECTED	48.7%	24.7%	18.5%
OTTAWA SOUTH	ACTUAL	43.9%	34.7%	13.7%
	PROJECTED	44.5%	33.6%	16.5%
OTTAWA-ORLEANS	ACTUAL	45.0%	40.3%	10.1%
	PROJECTED	45.0%	34.9%	14.0%
NEPEAN-CARLETON	ACTUAL	40.0%	45.7%	9.1%
	PROJECTED	35.5%	45.5%	13.6%
OTTAWA WEST-NEPEAN	ACTUAL	41.8%	39.2%	13.1%
	PROJECTED	36.5%	41.8%	15.0%

Note: 'Projected' here means what step #1 alone would project for 2004 based on province-wide shifts in support between 2000 and 2004, before any adjustments.

We then compute the percentage difference between actual and projected and express each riding as a factor for each party, as below:

		GREATER OTTAWA		
		LIB	CPC*	NDP
OTTAWA CENTRE		1.18	1.85	1.74
OTTAWA-VANIER		0.93	1.09	1.02
OTTAWA SOUTH		1.09	0.83	0.71
OTTAWA-ORLEANS		1.00	0.17	0.60
NEPEAN-CARLETON		0.34	0.97	0.54
OTTAWA WEST-NEPEAN		0.22	1.40	0.81
	AVERAGE	0.85	1.05	0.80

From the above results, we note that in Ottawa Centre, the Liberal candidate saw 118% of the change in provincial support – so the factor for the Liberals in that riding is 1.18. This means that, while the Liberals dropped 6.8 points in Ontario, the Liberals dropped 1.18 times that amount (or 8.0 points) in Ottawa Centre. The Conservative candidate in Ottawa Centre dropped 185% what the Conservatives dropped across the province. So, while the Conservatives dropped 6.5 points in Ontario, they dropped 12.0 points in Ottawa Centre. Likewise, the NDP candidate gained 174% as much as the NDP gained across the province (probably reflecting the popularity of the candidate,

Ed Broadbent). So, while the NDP gained 9.8 points provincially, the NDP candidate in Ottawa Centre gained 17.1 points over the previous election result in the riding.

By averaging the results (taking out the highest and lowest value - these are shaded), we get some sense of how each party fairs in each sub-region (note: Greater Ottawa is one of the smallest regions, most are about 9-12 ridings). In Greater Ottawa, then, the average for the Liberals (taking out 0.22 and 1.18) is ~ 0.85, for the Conservatives (taking out 1.85 and 0.17) it is ~1.05 and for the NDP (taking out 1.74 and 0.54) it is ~ 0.80. This means that Liberals in Ottawa, on average, lost only 85% of the provincial loss (5.8 points instead of 6.8 points), demonstrating slightly more "loyalty" to the Liberals among Ottawa voters than across the Province as a whole. Conservatives, on average, lost 105% of the provincial loss (6.8 points instead of 6.5 points), demonstrating marginally less "loyalty" to the Conservatives among Ottawa voters than across the Province as a whole. NDPers, on average, gained only 80% of the provincial gain (7.8 points instead of 9.8 points), demonstrating less "loyalty" to the NDP among Ottawa voters than across the Province as a whole.

3) **Accounting for Party Variations within Sub-Regions:** Looking at the factor from the Ottawa ridings, it is clear that Ottawa Centre performed considerably better than average for the NDP while it performed considerably worse for the Conservatives. There are always ridings that, because of historic patterns or specific candidates, depart from the sub-regional trend. To account for these, standard deviations are calculated for ridings in a given sub-region (removing the highest and lowest value to eliminate skew). The 'average' factors for each party are applied to all ridings that are within +/- one standard deviation from the average (mean) -- by definition (assuming normal distribution), this means that 68% of the ridings will fall within this 'average' range. That means that 16% are above average and 16% are below average -- these are ridings that do not follow the sub-regional pattern. I then calculate the average factor for all those above the upper limit and I calculate the average factor for all those below the lower limit, again for each party. This generates a 3x3 matrix for all parties in each sub-region of ridings that perform on average, above-average and below-average for that sub-region (Note: it is a 4x3 matrix in Quebec). An example of that matrix for West Montreal (a 4x3 matrix) is below:

Example: West Montreal sub-regional factor

		LPC	CPC	NDP	BQ	
WEST MONTREAL	< AVG	1.25	1.60	1.05	1.70	-
	AVG	0.90	0.75	0.50	1.45	
	> AVG	0.60	0.40	-0.50	0.65	
	< AVG	0.75	0.40	0.95	0.30	+
	AVG	1.10	1.25	1.50	0.55	
	> AVG	1.40	1.60	2.50	1.35	

Note: these numbers represent the factor times the provincial change in support. i.e. 1 = 100%, 0.5 = 50%.

The 'West Montreal' sub-region consists of the 9 ridings:

LAC SAINT-LOUIS  
 PIERREFONDS-DOLLARD  
 NOTRE-DAME-DE-GRACE-LACHINE  
 SAINT LAURENT-CARTIERVILLE  
 MONT-ROYAL

OUTREMONT  
 LASALLE-EMARD  
 JEANNE-LE BER  
 WESTMOUNT-VILLE MARIE

Applying the method described in #2 above, I determined the following breakdown of the 8 ridings for each of the parties:

	BELOW AVERAGE	AVERAGE	ABOVE AVERAGE
LIBERAL	OUTREMONT	LAC SAINT-LOUIS PIERREFONDS-DOLLARD NDG-LACHINE LASALLE-EMARD JEANNE-LE BER	SAINT LAURENT-CARTIERVILLE MONT-ROYAL WESTMOUNT-VILLE MARIE
CONSERVATIVE	SAINT LAURENT-CARTIERVILLE JEANNE-LE BER	OUTREMONT NDG-LACHINE LAC SAINT-LOUIS MONT-ROYAL WESTMOUNT-VILLE MARIE	LASALLE-EMARD PIERREFONDS-DOLLARD
NDP	LASALLE-EMARD MONT-ROYAL	JEANNE-LE BER SAINT LAURENT-CARTIERVILLE LAC SAINT-LOUIS NDG-LACHINE PIERREFONDS-DOLLARD	OUTREMONT WESTMOUNT-VILLE MARIE
BLOC QUEBECOIS	WESTMOUNT-VILLE MARIE MONT-ROYAL	LASALLE-EMARD SAINT LAURENT-CARTIERVILLE LAC SAINT-LOUIS NDG-LACHINE PIERREFONDS-DOLLARD OUTREMONT	JEANNE-LE BER

Let me translate the above matrix, using the Liberals as an example. When the Liberals gain in Quebec (+), the Liberals would gain by 1.1 times the provincial gain, on average, in West Montreal (for example, if the Liberals gained 3 pts in Quebec since 2004, they would gain 3.3 pts in West Montreal for those ridings that perform on average. For the ridings that perform below average (i.e. Outremont), the Liberals would gain only 75% of the provincial gain (they would gain only 2.25 pts if the Liberals went up 3 pts in Quebec). And for those ridings that perform above average (i.e. Saint Laurent-Cartierville, Mont-Royal, Westmount-Ville Marie), the Liberals would gain 1.4 times the provincial gain (they would gain 4.2 pts if the Liberals went up 3 pts in Quebec). This illustrates that for a gain of 3 pts, the actual gain in West Montreal ranges from 2.25 to 4.2 pts. Likewise, when the Liberals fall in Quebec (-), the Liberals would fall by 0.9 times the provincial fall, which a corresponding differentiation between the 3 groups of ridings. This represents the 'inverse' of their gain and is calculated using the formula:

**Negative Factor, x' = (1-x) + 1** where x is the positive factor  
 (i.e. the Liberals in West Montreal average factor is 1.1, then 1 minus 1.1 plus 1 = 0.9)

You can similarly apply the same logic to each of the parties, whether they gain (+) or lose (-) across the Province. Using this matrix, you can conclude that on average, Liberals in West Montreal perform slightly better (10% better) than Liberals across the province as a whole, Conservatives

perform better (25% better) than Conservatives across the province, NPDers perform considerably better (50% better) than NDPers across the province, and Bloc Quebecois members perform considerably worse (45% worse) than Bloc members across the province. However, the matrix also picks up exceptions to these rules. Jeanne-Le Ber, for example, performs better than average (35% better) for the Bloc, while Outremont performs worse (25% worse) for the Liberals, and similar anomalies exist for the Conservatives and NDP.

(Note: the above matrix applies to the change in support, not the absolute support. This allows me to differentiate between the base of support already present and the likelihood of vote shifts -- for example, it may be possible for the Liberals to have won a riding in 2004, yet to have underperformed relative to the province. This indicates potential weakness for the party in that riding, even though it might on the surface look like the party won it comfortably).

One caveat must be noted in the model: since the 2000 results for the Green Party were so low (i.e. < 1%), the data is not reliable to use in computing factors, thus change in support is assumed to be uniform across all ridings.

4) **Candidate Adjustments:** Finally, the model takes into account new candidates who have the ability to sway public opinion, or adjustments due to the loss of prominent incumbents. Clearly, this process involves some subjectivity on my part. However, past results have indicated that the effect of a particularly strong candidate is surprisingly quite small. Past experience suggests that the maximum "swing" is 10 pts (that is, a strong candidate for the Bloc Quebecois, for example, could gain an additional 5 pts, at the expense of the Liberals). In exceptional cases, this could be higher. This maximum of 5 pts could also occur with the loss of a popular incumbent or cabinet minister. In the case of backbenchers or candidates who are not popular incumbents, this shift might 2 or 3 pts. In ridings where multiple parties are competitive, the "swing" is split proportionally to vote share. These adjustments are made after steps 1 to 3 are computed. It is clear that the impact of specific candidates, then, is mostly felt in closely contested ridings.

### Summary of Sub-Regional Matrices

The summary of factors for all the sub-regions is given in the following pages.

**ONTARIO**

		LPC	CPC	NDP				LPC	CPC	NDP	
NORTHERN ONTARIO	< AVG	2.60	1.60	1.15	-	GOLDEN HORSESHOE	< AVG	2.60	2.10	1.50	-
	AVG	1.60	0.80	0.75			AVG	1.15	1.60	0.60	
	> AVG	0.05	-0.10	0.20			> AVG	-0.05	0.90	-0.80	
	< AVG	-0.60	0.40	0.85	+		< AVG	-0.60	-0.10	0.50	+
	AVG	0.40	1.20	1.25			AVG	0.85	0.40	1.40	
	> AVG	1.95	2.10	1.80			> AVG	1.05	1.10	2.80	
GREATER OTTAWA	< AVG	1.20	1.65	1.45	-	905 EAST	< AVG	1.70	1.50	1.40	-
	AVG	0.85	1.05	1.20			AVG	1.00	1.00	1.25	
	> AVG	0.30	0.15	0.60			> AVG	0.20	0.50	0.45	
	< AVG	0.80	0.35	0.55	+		< AVG	0.30	0.50	0.60	+
	AVG	1.15	0.95	0.80			AVG	1.00	1.00	0.75	
	> AVG	1.70	1.85	1.40			> AVG	1.80	1.50	1.55	
EASTERN ONTARIO	< AVG	2.30	1.95	1.75	-	905 WEST	< AVG	1.90	1.40	1.45	-
	AVG	0.80	1.05	1.10			AVG	1.25	0.50	1.25	
	> AVG	-0.20	-0.35	0.85			> AVG	0.50	-0.20	0.75	
	< AVG	-0.30	0.05	0.25	+		< AVG	0.10	0.60	0.55	+
	AVG	1.20	0.95	0.90			AVG	0.75	1.50	0.75	
	> AVG	2.20	2.35	1.15			> AVG	1.50	2.20	1.25	
CENTRAL ONTARIO	< AVG	1.35	1.85	1.25	-	TORONTO WEST	< AVG	2.40	1.60	1.65	-
	AVG	0.75	1.45	1.05			AVG	1.05	0.65	1.20	
	> AVG	0.20	1.10	0.80			> AVG	-0.25	-0.45	0.40	
	< AVG	0.65	0.15	0.75	+		< AVG	-0.40	0.40	0.35	+
	AVG	1.25	0.55	0.95			AVG	0.95	1.35	0.80	
	> AVG	1.80	0.90	1.20			> AVG	2.25	2.45	1.60	
SOUTHWESTERN ONTARIO	< AVG	2.00	2.00	1.70	-	TORONTO WEST	< AVG	2.05	1.75	1.55	-
	AVG	1.05	1.05	1.00			AVG	0.85	0.95	1.15	
	> AVG	0.65	-0.10	0.25			> AVG	-0.30	0.00	0.75	
	< AVG	0.00	0.00	0.30	+		< AVG	-0.05	0.25	0.45	+
	AVG	0.95	0.95	1.00			AVG	1.15	1.05	0.85	
	> AVG	1.35	2.10	1.75			> AVG	2.30	2.00	1.25	

**QUEBEC**

		LPC	CPC	NDP	BQ	
WEST MONTREAL	< AVG	1.25	1.60	1.05	1.70	-
	AVG	0.90	0.75	0.50	1.45	
	> AVG	0.60	0.40	-0.50	0.65	
	< AVG	0.75	0.40	0.95	0.30	+
	AVG	1.10	1.25	1.50	0.55	
	> AVG	1.40	1.60	2.50	1.35	
EAST MONTREAL	< AVG	1.35	1.15	1.10	1.30	-
	AVG	1.10	0.75	0.65	0.95	
	> AVG	0.95	0.15	-0.10	0.60	
	< AVG	0.65	0.85	0.90	0.70	+
	AVG	0.90	1.25	1.35	1.05	
	> AVG	1.05	1.85	2.10	1.40	
NORTH MONTREAL SUBURBS	< AVG	1.25	2.35	1.55	1.15	-
	AVG	0.85	1.60	1.30	0.80	
	> AVG	0.55	0.80	1.00	0.45	
	< AVG	0.75	-0.35	0.45	0.85	+
	AVG	1.15	0.40	0.70	1.20	
	> AVG	1.45	1.20	1.00	1.55	
SOUTH MONTREAL SUBURBS	< AVG	1.20	2.40	1.45	1.40	-
	AVG	0.90	1.30	1.20	0.95	
	> AVG	0.65	-0.40	0.65	0.60	
	< AVG	0.80	-0.40	0.55	0.60	+
	AVG	1.10	0.70	0.80	1.05	
	> AVG	1.35	2.40	1.35	1.40	
NORTHERN QUEBEC	< AVG	1.70	2.65	1.50	1.60	-
	AVG	1.05	0.70	1.25	0.95	
	> AVG	0.65	-1.00	0.50	0.25	
	< AVG	0.30	-0.65	0.50	0.40	+
	AVG	0.95	1.30	0.75	1.05	
	> AVG	1.35	3.00	1.50	1.75	
ST. LAWRENCE NORTH	< AVG	1.40	1.65	1.70	1.90	-
	AVG	0.95	0.50	1.25	1.30	
	> AVG	0.20	-0.85	0.75	0.85	
	< AVG	0.60	0.35	0.30	0.10	+
	AVG	1.05	1.50	0.75	0.70	
	> AVG	1.80	2.85	1.25	1.15	
ST. LAWRENCE SOUTH	< AVG	1.70	2.00	1.75	2.10	-
	AVG	0.95	0.70	1.25	1.30	
	> AVG	0.60	-0.90	0.35	0.65	
	< AVG	0.30	0.00	0.25	-0.10	+
	AVG	1.05	1.30	0.75	0.70	
	> AVG	1.40	2.90	1.65	1.35	

### BRITISH COLUMBIA

		LPC	CPC	NDP	
VANCOUVER ISLAND	< AVG	1.75	0.60	1.10	-
	AVG	1.50	0.50	0.75	
	> AVG	1.25	0.40	0.35	
	< AVG	0.25	1.40	0.90	+
	AVG	0.50	1.50	1.25	
	> AVG	0.75	1.60	1.65	
B.C. INTERIOR / NORTH	< AVG	1.75	0.60	1.55	-
	AVG	1.50	0.50	1.00	
	> AVG	1.25	0.40	0.55	
	< AVG	0.25	1.40	0.45	+
	AVG	0.50	1.50	1.00	
	> AVG	0.75	1.60	1.45	

		LPC	CPC	NDP	
CENTRAL VANCOUVER	< AVG	1.20	0.95	1.75	-
	AVG	1.00	0.85	0.95	
	> AVG	0.80	0.75	0.65	
	< AVG	0.80	1.05	0.25	+
	AVG	1.00	1.15	1.05	
	> AVG	1.20	1.25	1.35	
SUBURBAN VANCOUVER	< AVG	0.95	1.35	1.40	-
	AVG	0.85	1.05	1.10	
	> AVG	0.75	0.75	0.50	
	< AVG	1.05	0.65	0.60	+
	AVG	1.15	0.95	0.90	
	> AVG	1.25	1.25	1.50	

### ALBERTA

		LPC	CPC	NDP	
GREATER CALGARY	< AVG	1.00	2.55	1.45	-
	AVG	0.90	1.30	0.95	
	> AVG	0.80	1.00	0.40	
	< AVG	1.00	-0.55	0.55	+
	AVG	1.10	0.70	1.05	
	> AVG	1.20	1.00	1.60	
GREATER EDMONTON	< AVG	1.20	0.95	1.75	-
	AVG	1.10	0.60	1.00	
	> AVG	1.00	0.35	0.75	
	< AVG	0.80	1.05	0.25	+
	AVG	0.90	1.40	1.00	
	> AVG	1.00	1.65	1.25	
RURAL ALBERTA	< AVG	1.10	1.00	1.75	-
	AVG	1.00	0.75	1.05	
	> AVG	0.90	0.50	0.50	
	< AVG	0.90	1.00	0.25	+
	AVG	1.00	1.25	0.95	
	> AVG	1.10	1.50	1.50	

### MANITOBA

		LPC	CPC	NDP	
GREATER WINNIPEG	< AVG	2.25	1.25	1.50	-
	AVG	1.35	0.75	0.90	
	> AVG	0.35	0.20	0.80	
	< AVG	-0.25	0.75	0.50	+
	AVG	0.65	1.25	1.10	
	> AVG	1.65	1.80	1.20	

		LPC	CPC	NDP	
RURAL MANITOBA	< AVG	2.50	1.60	1.80	-
	AVG	1.80	0.60	0.75	
	> AVG	0.35	-0.30	0.50	
	< AVG	-0.50	0.40	0.20	+
	AVG	0.20	1.40	1.25	
	> AVG	1.65	2.30	1.50	

### SASKATCHEWAN

		LPC	CPC	NDP	
SOUTHERN SASKATCHEWAN	< AVG	1.50	1.95	1.30	-
	AVG	-0.70	1.00	1.10	
	> AVG	-1.00	0.60	0.90	
	< AVG	0.50	0.05	0.70	+
	AVG	2.70	1.00	0.90	
	> AVG	3.00	1.40	1.10	

		LPC	CPC	NDP	
NORTHERN SASKATCHEWAN	< AVG	3.00	1.80	1.50	-
	AVG	0.75	0.90	1.00	
	> AVG	-1.00	-0.25	0.50	
	< AVG	-1.00	0.20	0.50	+
	AVG	1.25	1.10	1.00	
	> AVG	3.00	2.25	1.50	

### NOVA SCOTIA

		LPC	CPC	NDP	
NOVA SCOTIA	< AVG	3.00	1.50	3.00	-
	AVG	1.60	0.80	1.15	
	> AVG	0.00	-0.05	-0.10	
	< AVG	-1.00	0.50	-1.00	+
	AVG	0.40	1.20	0.85	
	> AVG	2.00	2.05	2.10	

### NEW BRUNSWICK

		LPC	CPC	NDP	
NEW BRUNSWICK	< AVG	3.00	1.55	1.05	-
	AVG	1.25	1.30	0.50	
	> AVG	-1.00	0.50	-0.70	
	< AVG	-2.10	0.45	0.95	+
	AVG	0.75	0.70	1.50	
	> AVG	3.00	1.50	2.70	

### NEWFOUNDLAND & LABRADOR

		LPC	CPC	NDP	
NEWFOUNDLAND/ LABRADOR	< AVG	3.00	1.45	3.00	-
	AVG	0.70	0.75	1.40	
	> AVG	-1.00	0.30	-1.00	
	< AVG	-1.00	0.55	-1.00	+
	AVG	1.30	1.25	0.60	
	> AVG	3.00	1.70	3.00	

### PRINCE EDWARD ISLAND

		LPC	CPC	NDP	
P.E.I.	< AVG	1.05	1.35	2.50	-
	AVG	0.40	1.30	1.05	
	> AVG	0.20	0.70	0.90	
	< AVG	0.95	0.65	-0.50	+
	AVG	1.60	0.70	0.95	
	> AVG	1.80	1.30	1.10	