

# Use and abuse of voter migration models in an election year

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## Overview

- What is a voter migration model?
- How are they estimated?
- Their use in forecasting election results from early declared results
  - Description
  - Evaluation
- Analytical uses of voter migration models

## Voter transition models - how they work

- A voter migration model is a Markov-transition matrix, linking two „states“ of an electorate by way of transition probabilities.
- E. g. 79% of SP-Voters in 2003 voted SP again in 2007, the remaining 20% voted for the green party.
- Matrix multiplication gives new results.
- Where do these transition probabilities come from?
- Official election results yield only marginal distributions

Voters 2007

	SVP	SP	FDP	GP	CVP	EVP	Übrige	GLP
Voters 2003	SVP	99	0	0	0	1	0	0
SP	0	79	0	20	0	0	0	1
FDP	0	0	82	1	7	1	0	9
GP	0	0	0	45	0	0	0	55
CVP	0	0	0	0	97	0	0	3
EVP	6	0	0	0	13	81	0	0
EDU	19	0	0	0	9	1	66	5
Übrige	0	0	0	41	0	0	55	3

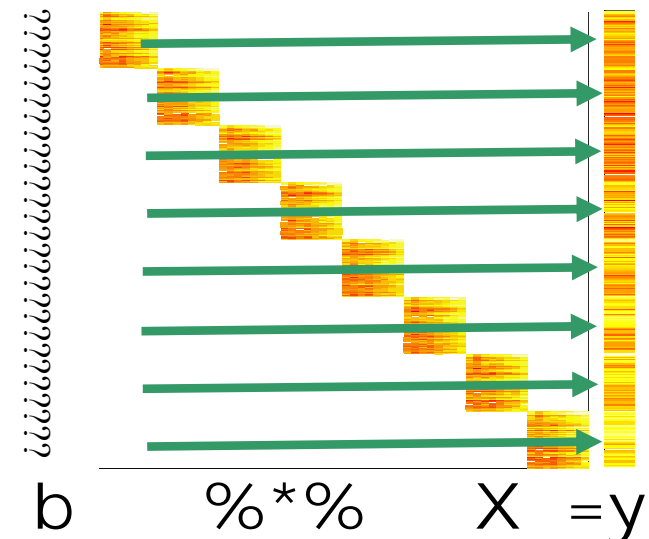
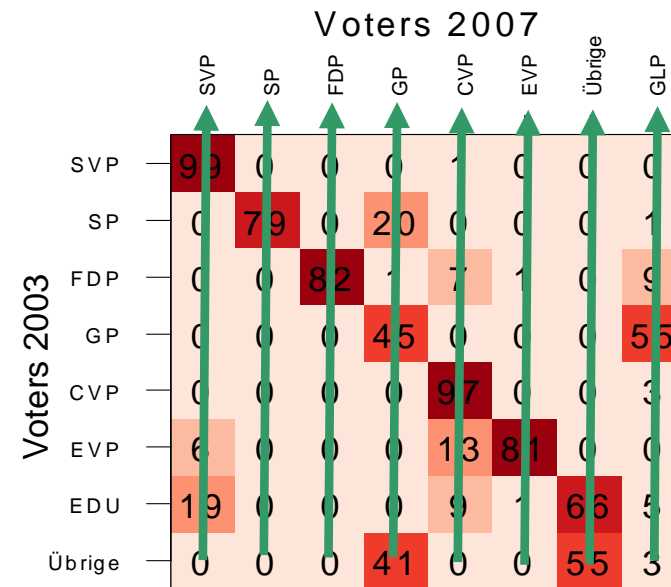
# Estimating voter transition models and ecological inference

- Ecological inference = Inferring individual behaviour from aggregate data
- Lively debated topic in social science circles and political science in particular
- Because **aggregate** data (e.g. election results), differentiated by spatial units (municipalities) is often available, while **individual** data isn't (see Wakefield 2004 for a recent summary).
- Methodological Challenge, as the aggregation process implies an information loss (ecological fallacy)
- Ample variety of available methods for ecological inference
- modelling assumptions strongly influence results

## Our estimation method

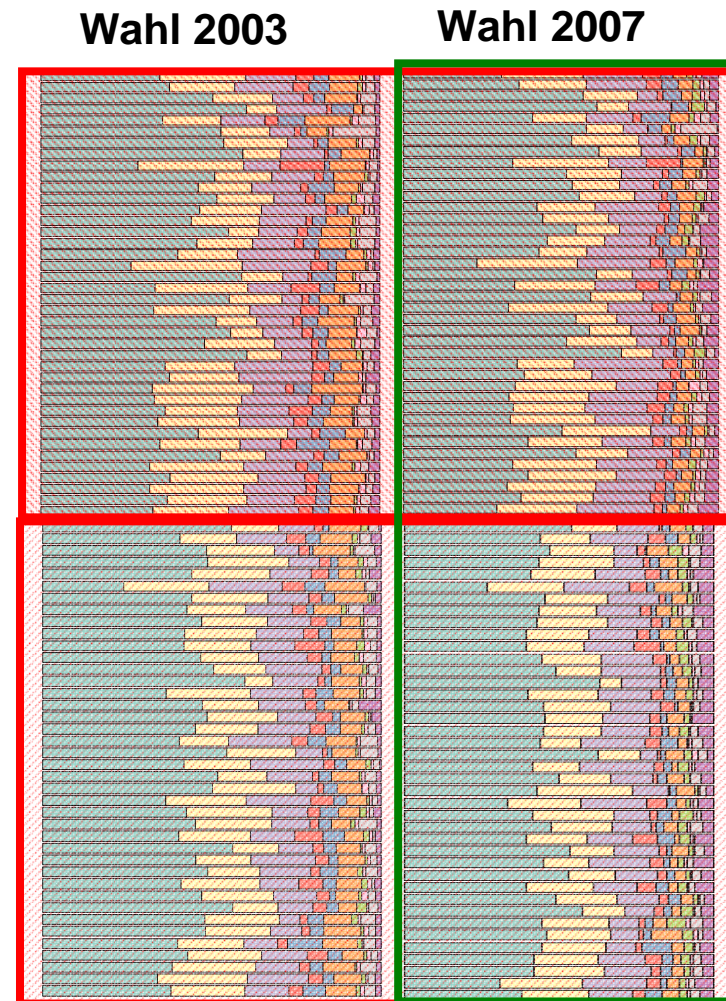
- We optimize a system of n “stacked” **columnwise regressions** where:
  - Y’s= Results of Party A in 2007
  - X’s= Results of Parties A-Z in 2003
  - Cases = Municipalities
- with constraints on the parameters typical of a Markov-matrix:
  - row-probabilities sum to 1
  - all the probabilities lie between [0,1]
- Results in a constrained quadratic optimization problem
 
$$-(\mathbf{y}^T \mathbf{X})^T \mathbf{b} + \frac{1}{2} \mathbf{b}^T \mathbf{X}^T \mathbf{X} \mathbf{b} = \min$$

In words: we want to find a vector **b** of n\*n Parameters (transition probabilities) which minimizes the sum of squared differences between actual results **y** and **bX** (X being the design matrix), under the above constraints.



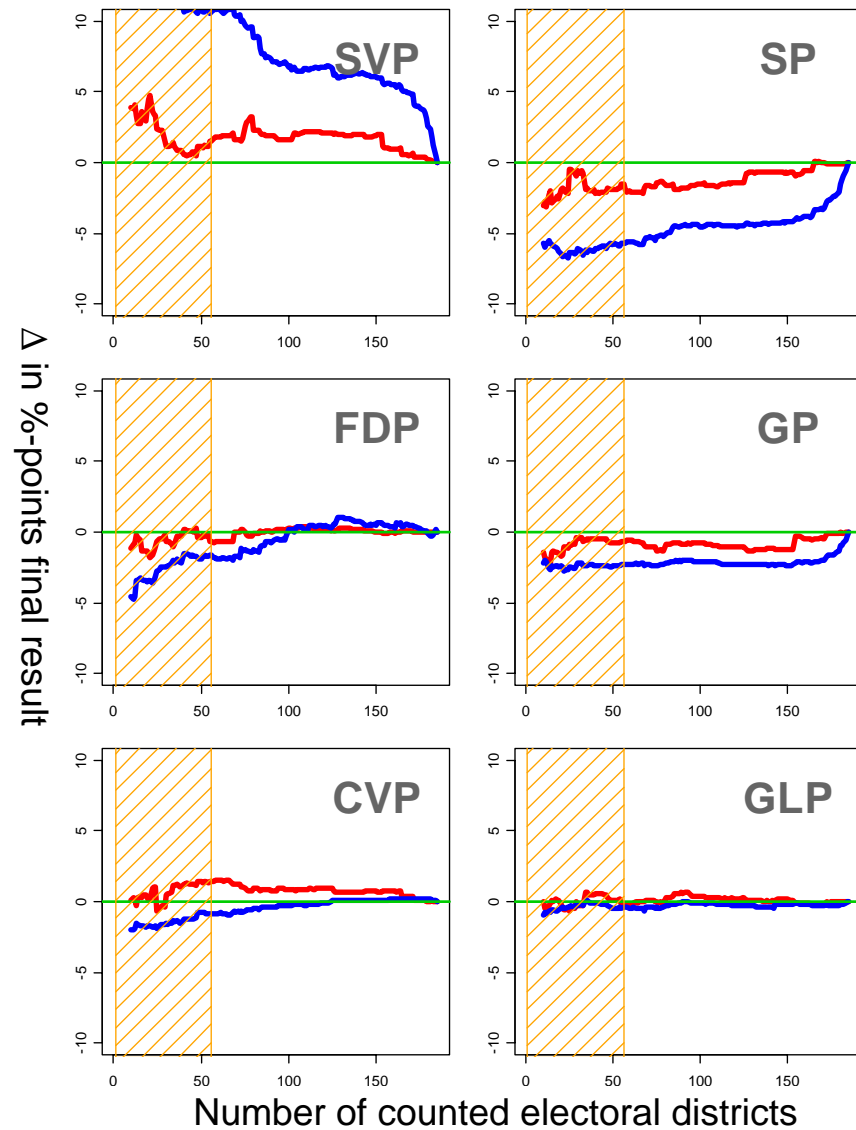
## Prediction I: the principle

- The forecast is based on early declared results from a few voting districts.
- We combine them with those of an earlier election ....
- .. By estimating a voter transition model as described...
- .... which model is „fed“ known results from the anterior election...
- ...to estimate results for those voting districts still uncounted...
- ... and finally a forecast of the cantonal result (Voters and after the application of the allocation algorithm also seats)



## Prediction II: an evaluation of the performance

- Forecast based on the voter transition model
- Real results
- Final result
- The prediction is for all parties significantly better than naïve counts of available results and for most parties quite close to the final tally
- While our first seat forecast at around 5pm still got one of them wrong, the only change we made was in the right direction
- My conclusion: Voter transition models seem to work quite well for predictive purposes ...



... but is there more to it?

- Immediately after an election, there is strong demand by the media and the politicians for quick explanations
- while there is still a lack of adequate (individual-level) data
- with exceptions, such as the gfs-Wahltagsbefragung, which, however doesn't permit regional break-downs
- In this situation, voter transition models come in handy. They seem to answer many of the immediate questions, about who lost to whom etc.
- But do they? Does the predictive power of a voter transition model automatically imply it's analytical, explanatory value?



## A few questions:

- What about the realism of the assumptions, eg. homogeneity of the transitions in the whole canton?
- What about the other possible states of an electorate? Our simple predictive model takes only voters into account.
- What to do with the abstainers? (and the new and the dead and the migrant voters, etc.)? They are by far Switzerland's biggest party!
- A really complete Markov-transition model for the electorate gets complicated very quickly
- and in the end, there is no data to support it
- There is the trap of increasing sophistication in model building with data of limited explanatory power to begin with
- This is especially true for models based on aggregate data

## My answer: qualified qualitative conclusions

- The transition probabilities for the bigger parties are quite robust with respect to different model specifications and different sets of included cases (municipalities).
- The inclusion of non-voters makes no substantial difference
- They are politically plausible, and supported by other evidence
- We draw only qualitative conclusions, and don't suggest a precision, which isn't there
- We try to make the methodological challenges transparent.
- In the end this is an empirical question, which can only be answered by the comparison with matching results from individual data.

	SVP	SP	FDP	GP	CVP	EVP	Übrige	GLP	Nichtwähler
SVP	94	0	0	0	1	1	0	2	2
SP	0	73	0	21	2	0	1	3	0
FDP	0	0	87	0	6	0	0	7	0
GP	0	0	0	55	0	0	0	45	0
CVP	0	3	2	0	92	0	0	0	3
EVP	14	0	0	1	0	86	0	0	0
EDU	0	0	0	3	1	1	95	0	0
Übrige	0	20	1	18	0	0	24	3	33
Nichtwähler	5	1	0	0	1	0	1	1	91

# Thanks for your attention

More information:

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# Slightly different model specifications

- Unweighted percentages
- Absolute values (voters)
- Percentages/ voters

