Data Analysis

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6 Sources **50**

1 List of Models

Poland

Models using Ratios

Ratios in Election Year
- Without Interaction Terms: Table 3
- With Interaction Terms: Table 4

Average Ratio Change between Elections
- Without Interaction Terms: Table 5
- With Interaction Terms: Table 6

Models using Number of Institutions

Number of Institutions in Election Year
- Without Interaction Terms: Table 7
- With Interaction Terms: Table 8

Average Change of Institutions between Elections
- Without Interaction Terms: Table 9
- With Interaction Terms: Table 10

Romania

Models using Ratios

Ratios in Election Year
- Without Interaction Terms: Table 11
- With Interaction Terms: Table 12

Average Ratio Change between Elections
- Without Interaction Terms: Table 13
- With Interaction Terms: Table 14

Models using Number of Institutions

Number of Institutions in Election Year
- Without Interaction Terms: Table 15
- With Interaction Terms: Table 16

Average Change of Institutions between Elections
- Without Interaction Terms: Table 17
- With Interaction Terms: Table 18

2 Summary

This document provides an overview of my current data analysis. It starts with an overview of all eleven CEE EU member states. Descriptive statistics display insights into the available data on anti-incumbent voting and emigration rates. I then continue by modelling emigration on incumbent vote change using a fixed effects model. Results show that an increase in emigration is associated with a decrease in incumbent vote share.

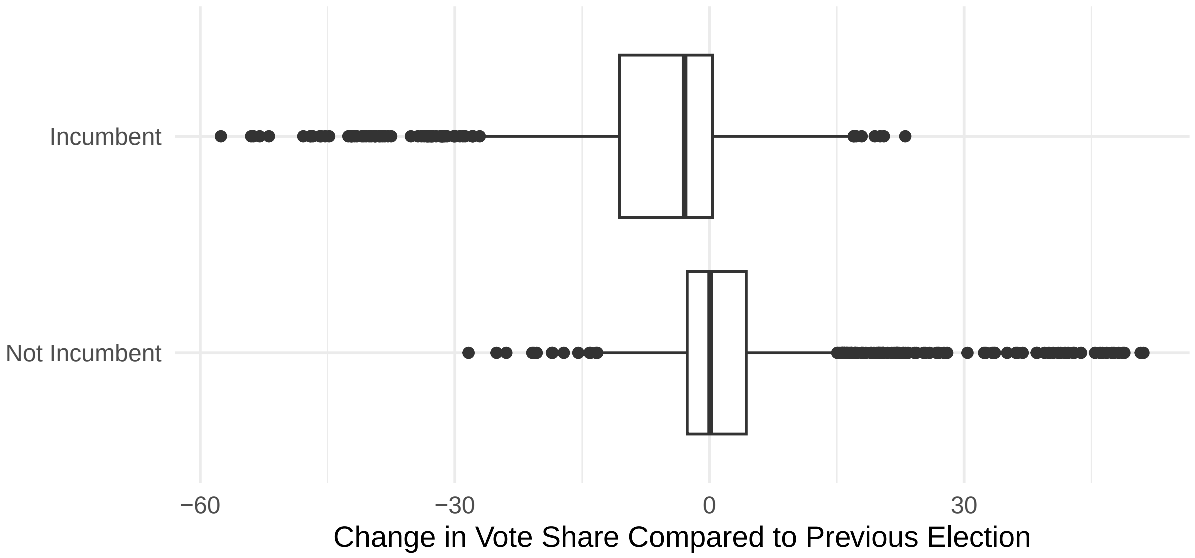
I then focus on the effects of service cuts in Poland and Romania. I examine these two CEE EU member states separately. I again begin with descriptive statistics that provide an overview of the available data: population numbers, emigration rates, number of institutions per region and calculated ratios, e.g., number of children per school. Then I model the effects of service cuts on incumbent vote change, again using fixed effects models. I combine different independent variables in order to measure their combined effects. I also use the actual number of institutions instead of the ratio as independent variables, to see if results change. I also calculate the average change of the independent variables between elections in order to see if these changes over time influence incumbent vote share. Finally, I also add interaction terms between the independent variables and emigration rates.

Results partially align with what my theory predicts. Romania displays the most promising results. The average change of children per school and people per hospital have a negative effect on incumbent vote share when dependent on the level of emigration (see Table 14). For example, an increase of children per school, when moderated by the level of emigration, has a negative impact on incumbent vote change. Also a decrease in the average number of schools, when moderated by emigration, has a negative effect on incumbent vote share (see Table 18).

3 Overview of all CEE EU Member States

3.1 Anti-Incumbent Voting in all CEE EU Member States

Is there a difference in vote share change between incumbent and non-incumbent parties? Overview of 11 CEE EU Member States, NUTS2/3 regions, 1994–2019 ($N = 3240$).



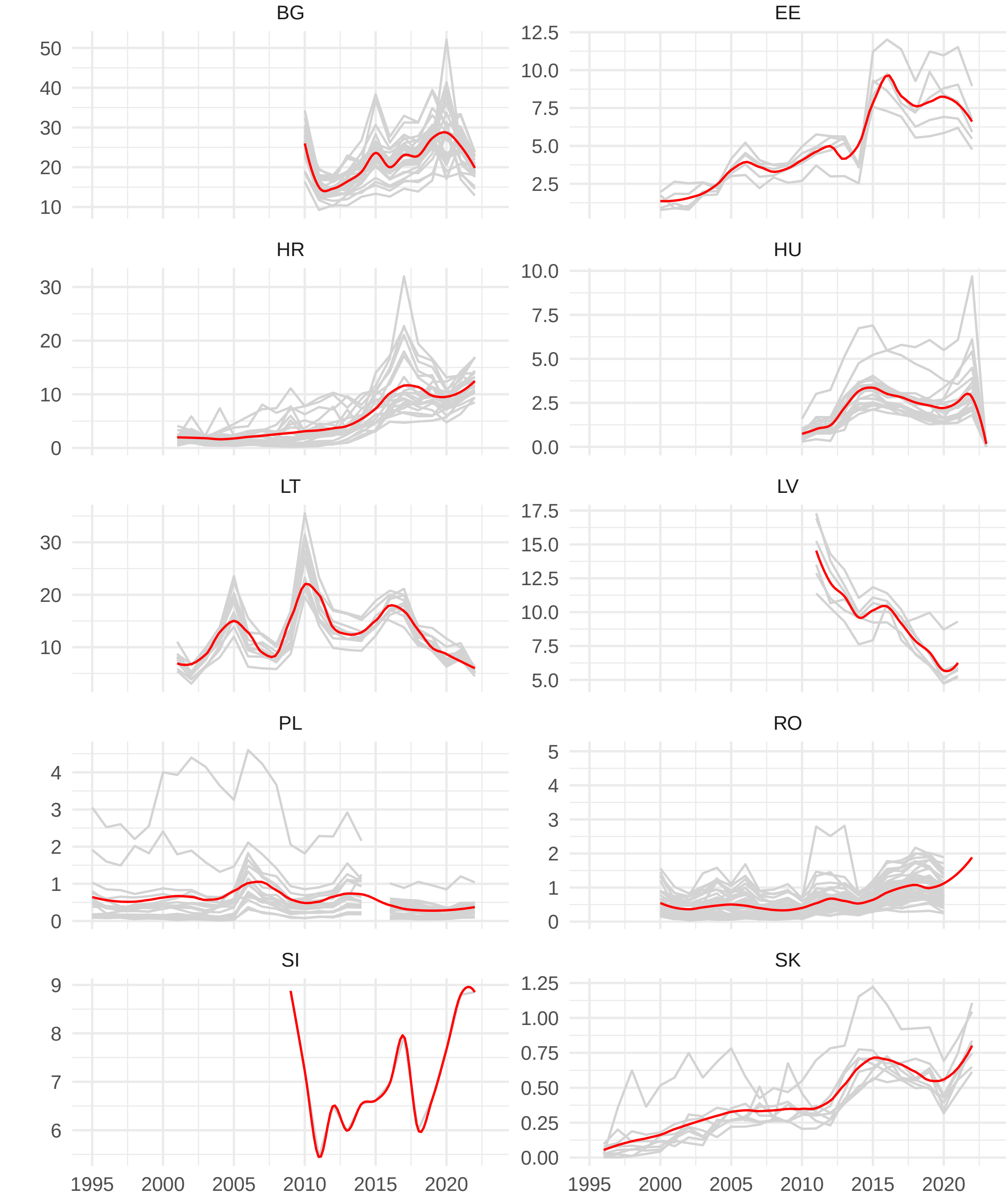
Based on this box plot, we can observe that non-incumbent parties tend to increase their vote share compared to the previous election. On the other hand, incumbent parties seem to get punished by the electorate and more often see a decrease in their vote share. This assumption is supported by a t-test, performed below. The t-test displays a statistically significant result for the difference in means.

```
##
##  Welch Two Sample t-test
##
## data:  group_true and group_false
## t = -19.586, df = 2539.2, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -8.082278 -6.611203
## sample estimates:
## mean of x mean of y
## -5.432212  1.914528
```

3.2 External Emigration

3.2.1 Crude Emigration per 1000 Population at NUTS3 Level in all CEE EU Member States

This is an overview of the available external emigration data at NUTS3 level (Poland: NUTS2; Slovenia: NUTS1). Please note that the y-axis varies by country, the x-axis however is the same for all countries. This makes a comparison of available data across different countries easier. Of the eleven CEE EU member states, only ten are displayed as Czechia does not provide data solely on external emigration. Each grey line represents a NUTS region. The red line, which applies smoothing to enhance readability, displays the overall trend over all available years and regions within a country.



3.2.2 Emigration and Incumbent Vote Change in all CEE EU Member States

I examine if there is a relationship between emigration rates and an incumbent's change in vote share across all NUTS3 regions in CEE EU member states. First, I calculate a region's rolling emigration rate average, taking the average from two consecutive years. E.g., a region's average emigration rate in the year 2010 is the average of the year 2008 and 2009. I do this to smooth out potential outliers and attempt to model a person's perception of emigration in a region.

This plot provides a basic overview of the relationship between the average emigration rate and the incumbent's change in vote share. There generally seems to be a positive correlation between the two: An increase in average emigration is associated with higher levels of vote change for incumbent parties. This indicates that incumbent parties achieve better results when emigration increases.

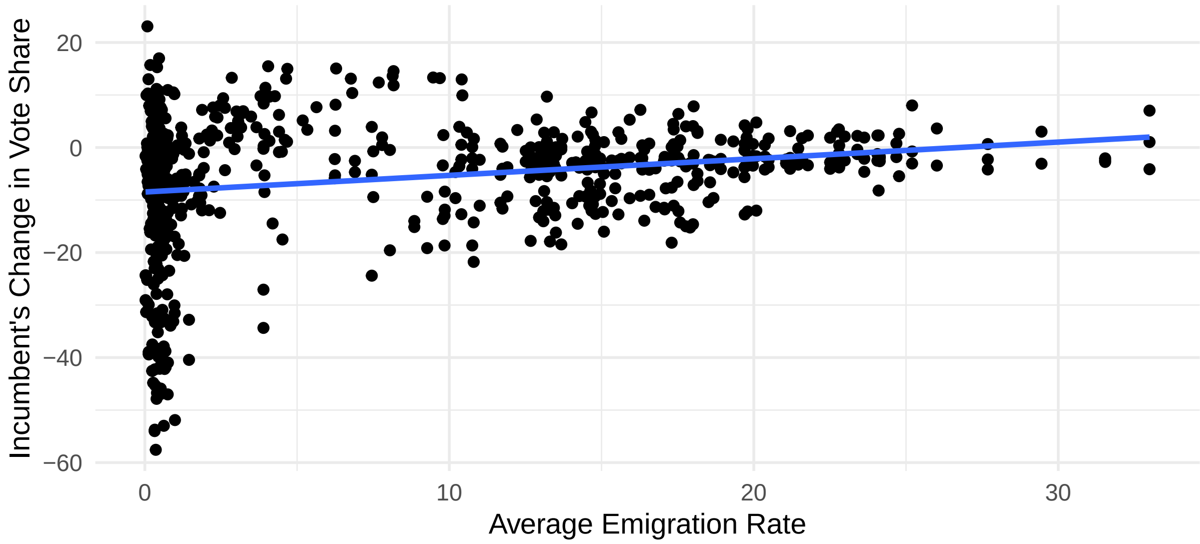


Table 1: DV: Incumbent's Change in Vote Share (all CEE EU MS)

	(1)
Average Emigration	$-0.311+$
Num.Obs.	740
R2 Adj.	0.534
R2 Within Adj.	0.001
FE: nuts2016	X
FE: year	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In a next step, I build a model using NUTS3 regions and years as fixed effects, accounting for region- and time-specific factors that may confound the results. Results are displayed in Table 1. The average emigration coefficient is negative, which shows that an increase in the average emigration rate in a NUTS3 region is associated with a decrease in the change of vote share for the incumbent party. This aligns with my theory. The result is statistically significant. The standard errors are clustered at the NUTS3 level, as observations within a region are more similar to each other than to observations in other regions. The overall model fit is 53.34%. However, the "within" model fit is very low (0.1%), which indicates that average emigration does not explain variation in the dependent variable within each fixed-effects group.

Table 2: DV: Incumbent's Change in Vote Share (all CEE EU MS)

	(1)
Average Emigration	−0.250
Left Party	−14.360***
Centre Left Party	−3.251**
Centre Right Party	−3.155**
Right Party	−3.411*
Num.Obs.	740
R2 Adj.	0.553
R2 Within Adj.	0.042
FE: nuts2016	X
FE: year	X

+ p $<$ 0.1, * p $<$ 0.05, ** p $<$ 0.01, *** p $<$ 0.001
Reference Category: Centre Party

3.2.3 Emigration, Incumbent Vote Change and Party Orientation in all CEE EU Member States

As a small excursion, I use data from the Chapel Hill Expert survey to categorise parties by their overall ideological stance: Left, Centre Left, Centre, Centre Right and Right. I add this new information to the model, which uses Centre as the reference category.

As Table 2 displays, average emigration still shows a negative coefficient and is borderline statistically significant ($p = 0.14$). All party coefficients are statistically significant and the overall model fit as well as the "within" model fit have increased compared to the previous model. We can observe that, compared to Centre parties, all other parties suffer a decrease in vote share when emigration increases. Incumbent Left parties see the largest decrease in vote share.

4 Service Cuts in Poland

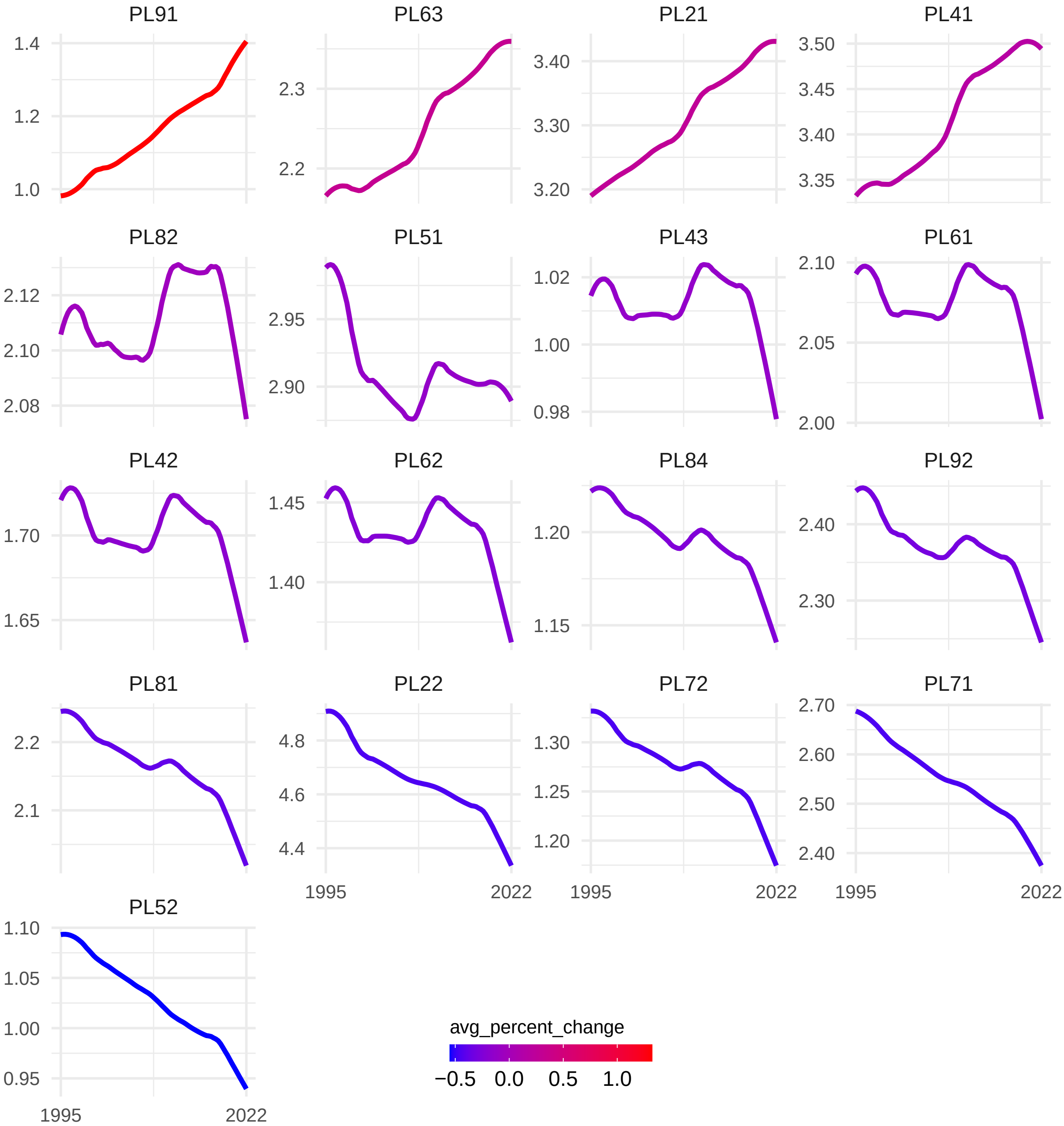
4.1 Population and Emigration

NUTS2 data is used, because Poland only provides data at this level.

4.1.1 Population in Millions in Poland at NUTS2 Level

The population has decreased in a majority of Polish NUTS2 regions. The four regions that have seen the largest increase are regions that include major metropolitan areas, such as the Warsaw Metropolitan Area (PL91), the Pomeranian Voivodeship (PL63, which includes the city of Gdańsk), Lesser Poland Voivodeship (PL21, including Kraków) and Greater Poland Voivodeship (PL41, including Poznań).

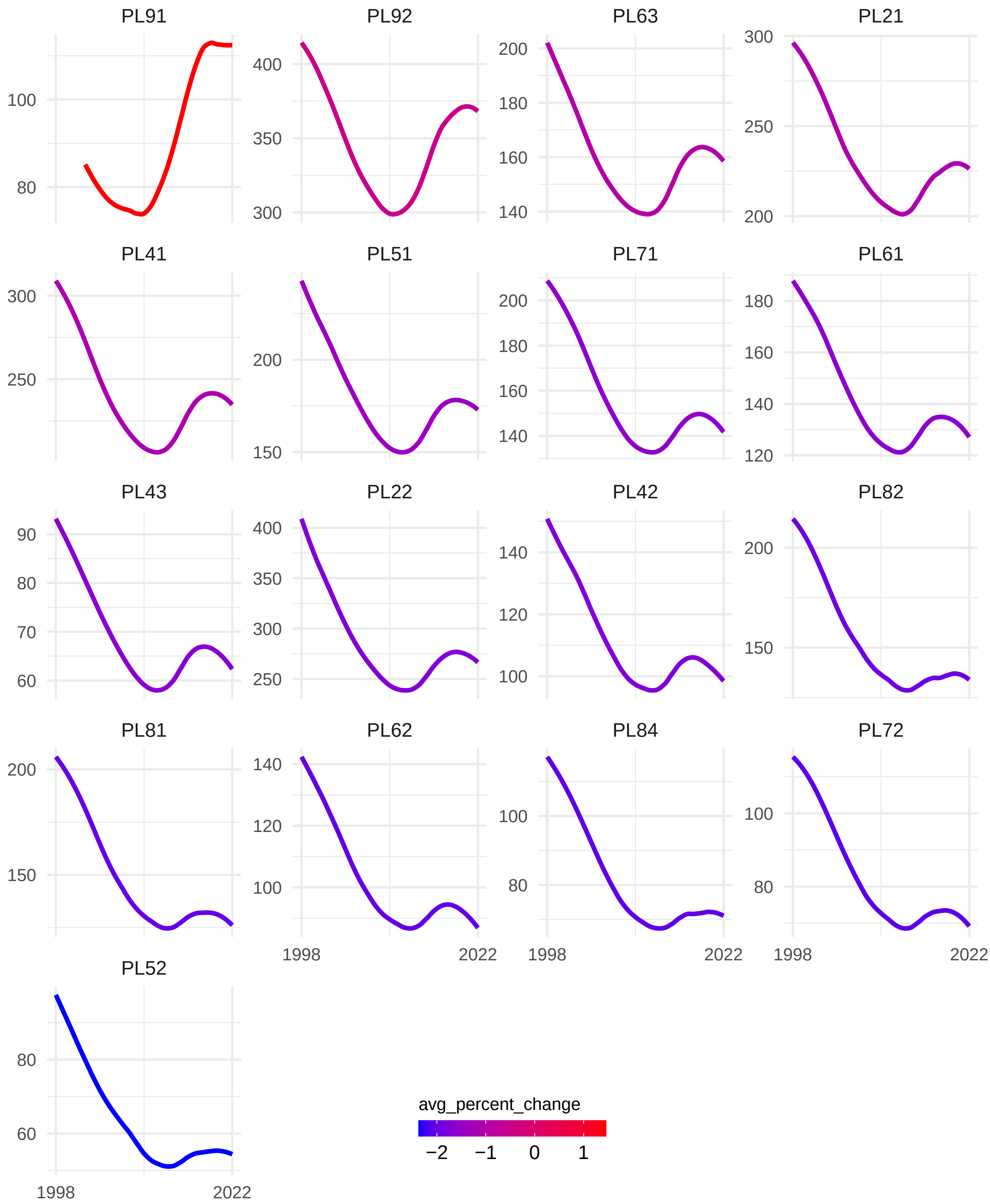
Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



4.1.2 Primary Age Population in 1000s in Poland at NUTS2 Level

The primary age population, i.e., children aged seven to twelve, has seen a very similar development across regions apart from Warsaw Metropolitan Area (PL91). This segment of the population decreased steadily until around the year 2010–2012, after which an uptick is visible.

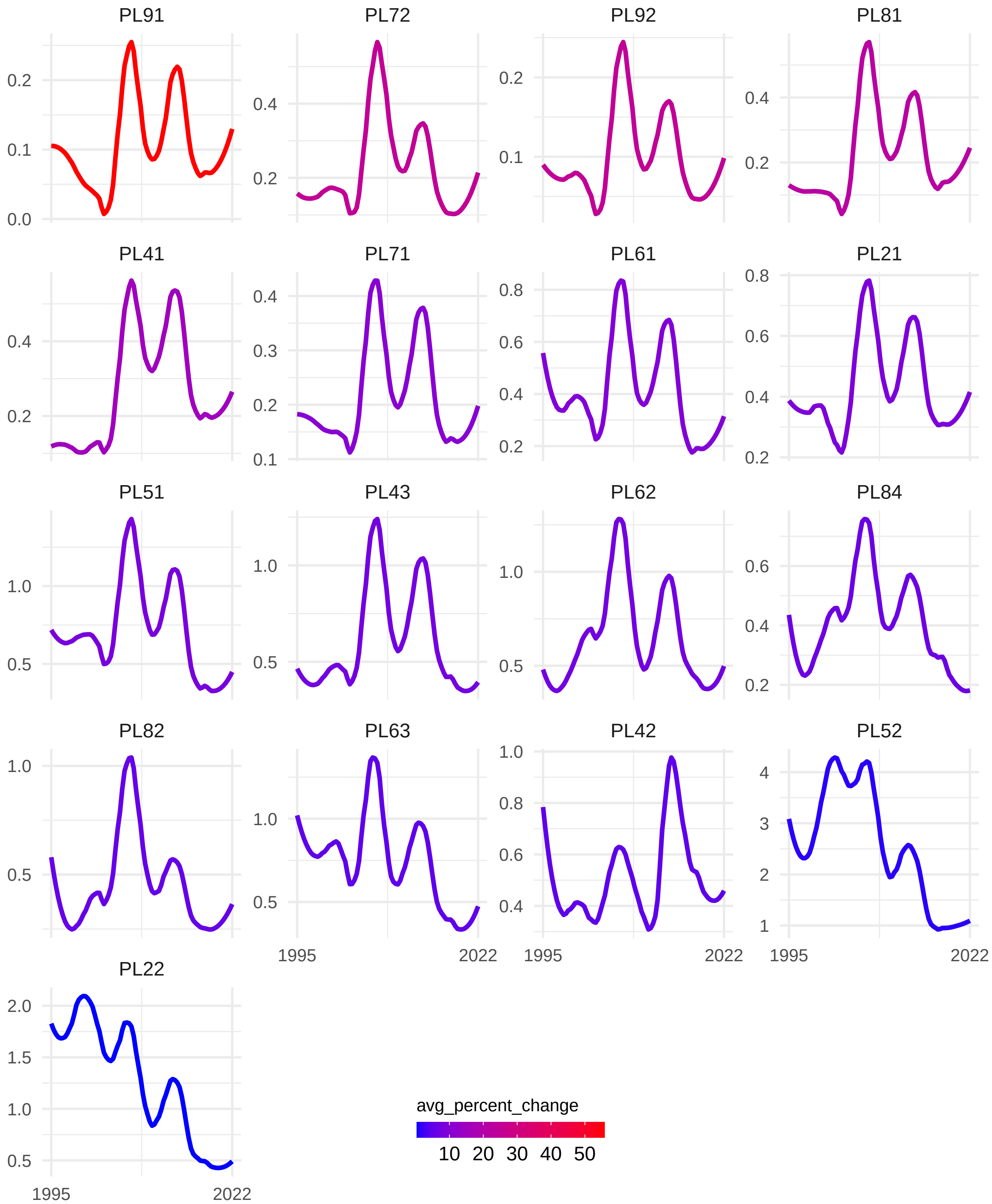
Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



4.1.3 External Emigration per 1000 Population from Poland at NUTS2 Level

Most regions display two peaks in external emigration around the years 2006 and 2013/2014. The first peak may be due to Poland's accession to the EU in the year 2004. The reason for the second peak is unclear.

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



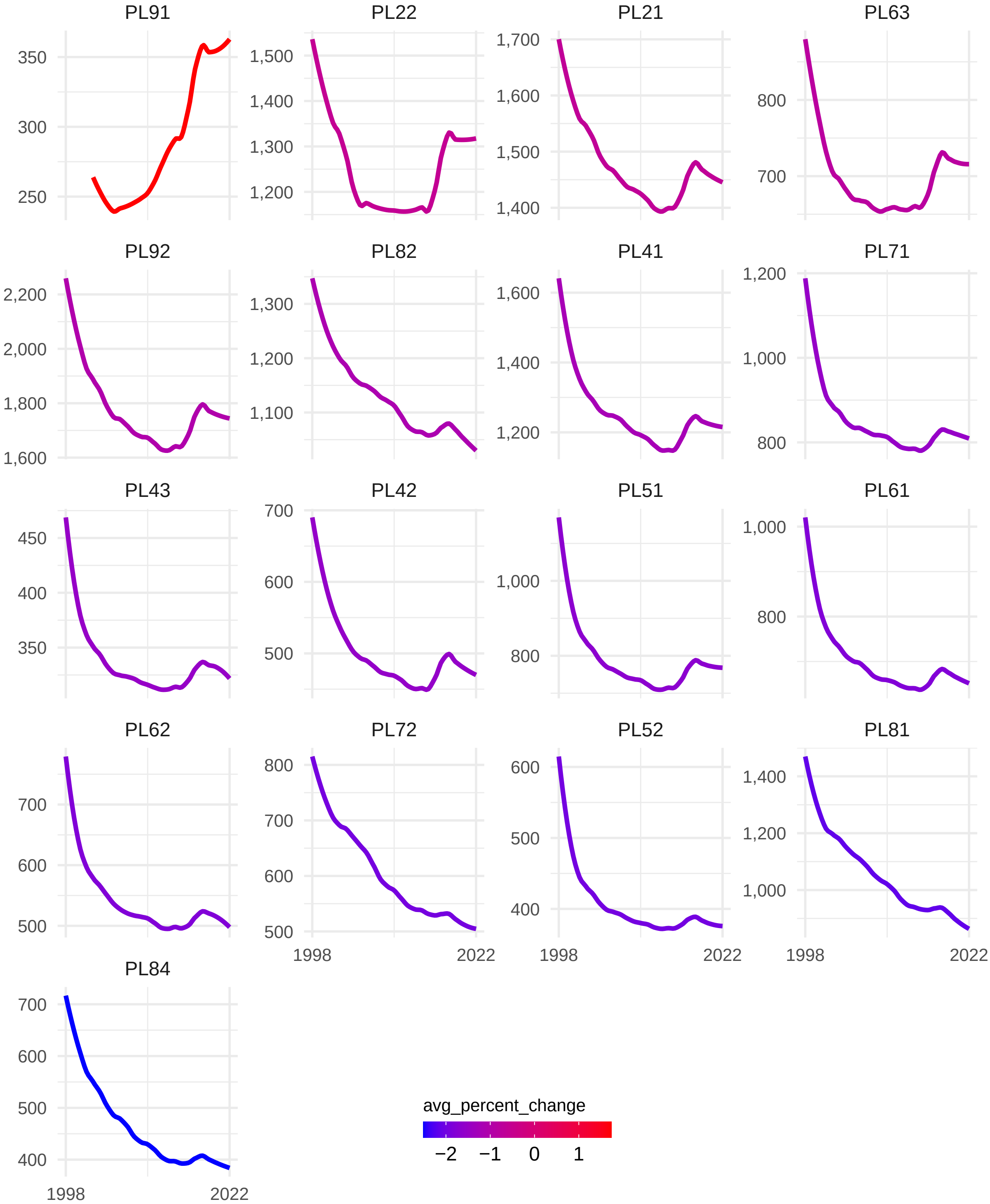
4.2 Number of Institutions

I provide separate overviews of the number of schools, hospitals and third places in Polish NUTS2 regions over time. My thesis assumes that emigration causes these numbers to decrease over time. The following graphs show that in fact only the number of schools decrease and the number of hospitals and third places tend to increase.

4.2.1 Number of Schools in Poland at NUTS2 Level

Apart from Warsaw Metropolitan Area (PL91), all Polish NUTS2 regions see an overall decrease in the number of schools, with some regions displaying an uptick between the years 2015 and 2017. This overall decrease aligns with my assumption that the number of schools decreases over time.

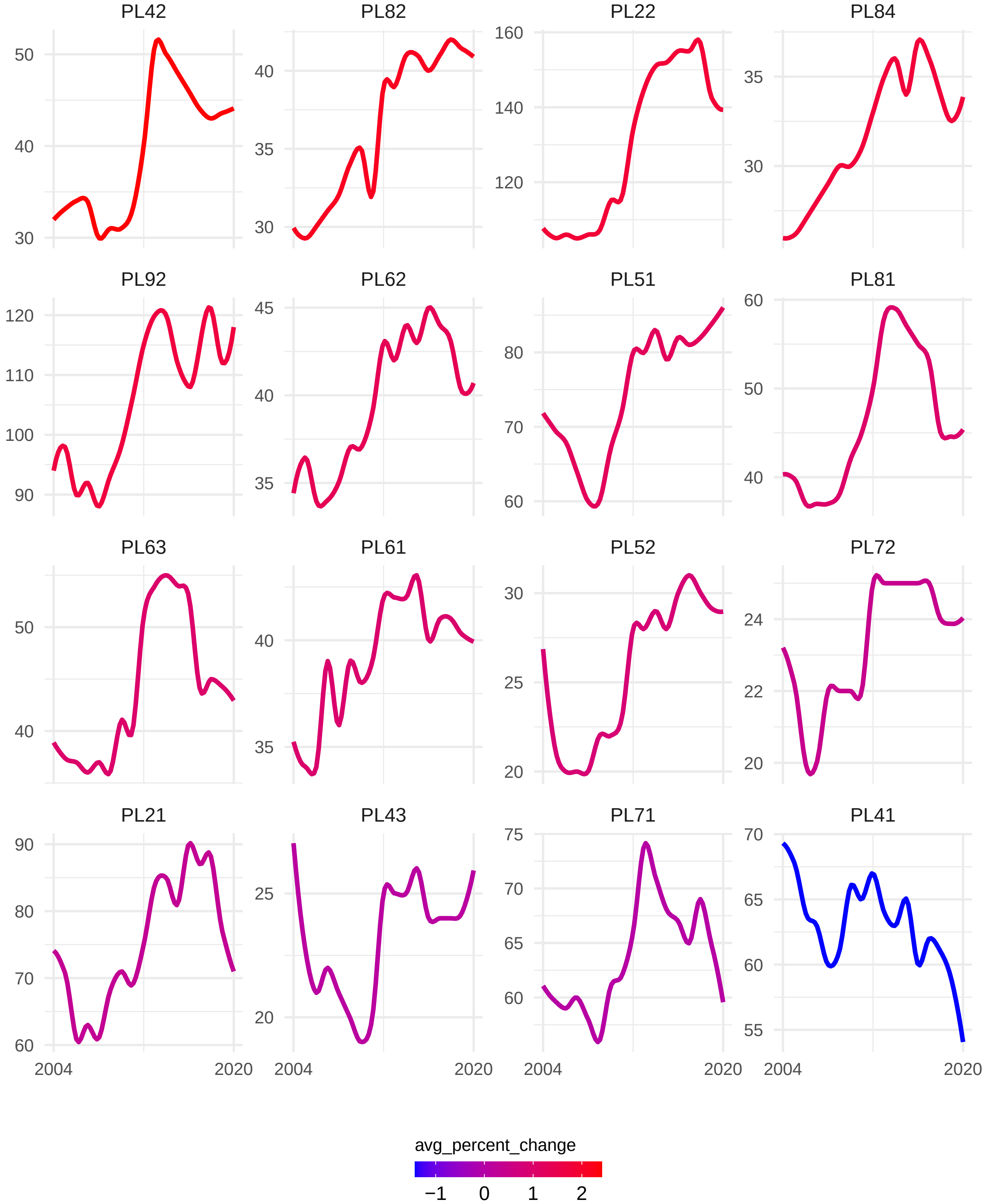
Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



4.2.2 Number of Hospitals in Poland at NUTS2 Level

Overall, the number of hospitals increases across Poland, which one exception being Greater Poland Voivodeship (PL41). This goes against my general assumption that the number of hospitals decreases due to emigration.

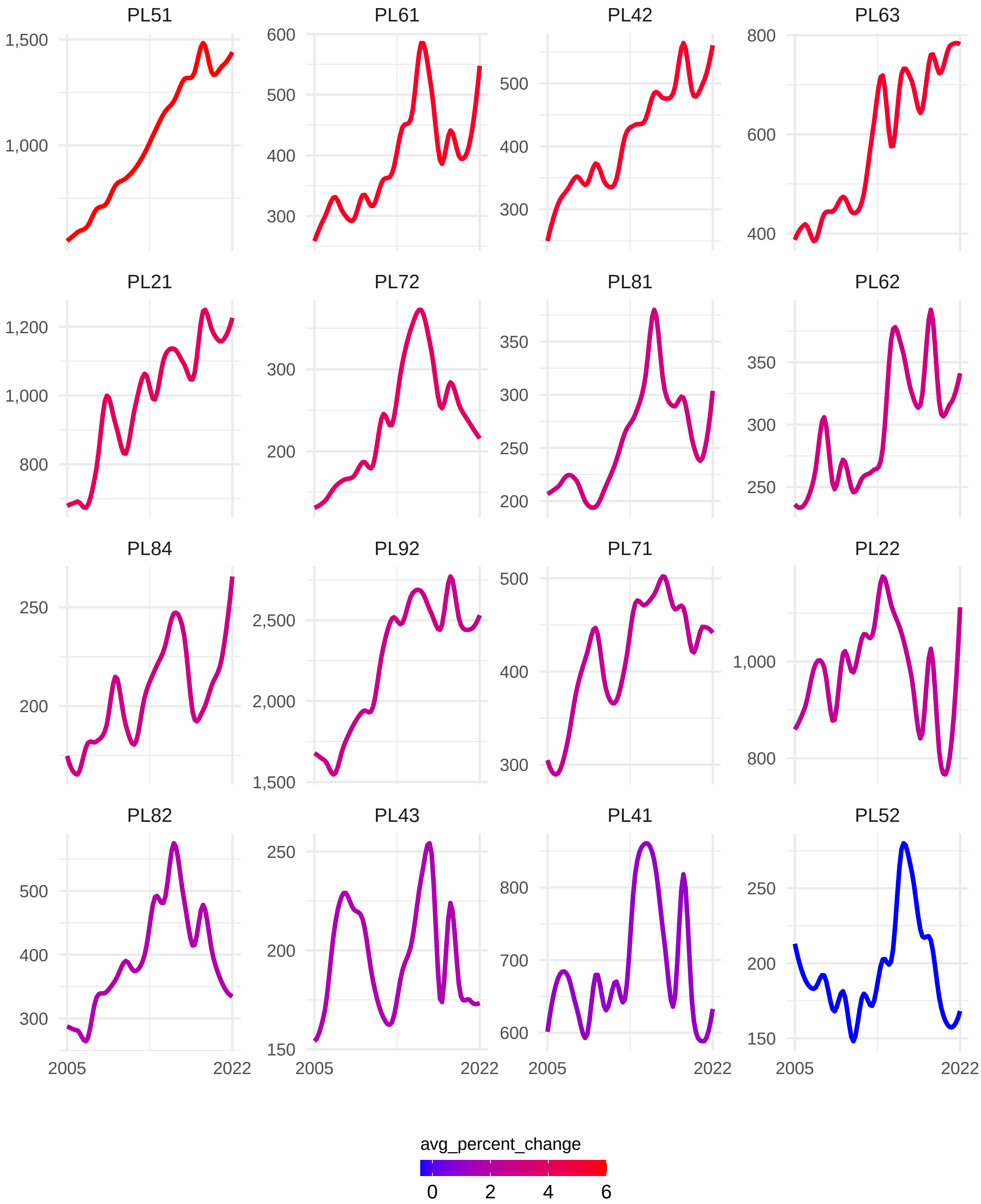
Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



4.2.3 Number of Third Places in Poland at NUTS2 Level

There is no consistent trend across all regions when it comes to number of third places in Polish NUTS2 regions. Seen over all regions, the number of third places does not decrease or stays approximately the same.

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



4.3 Ratios of People per Institution

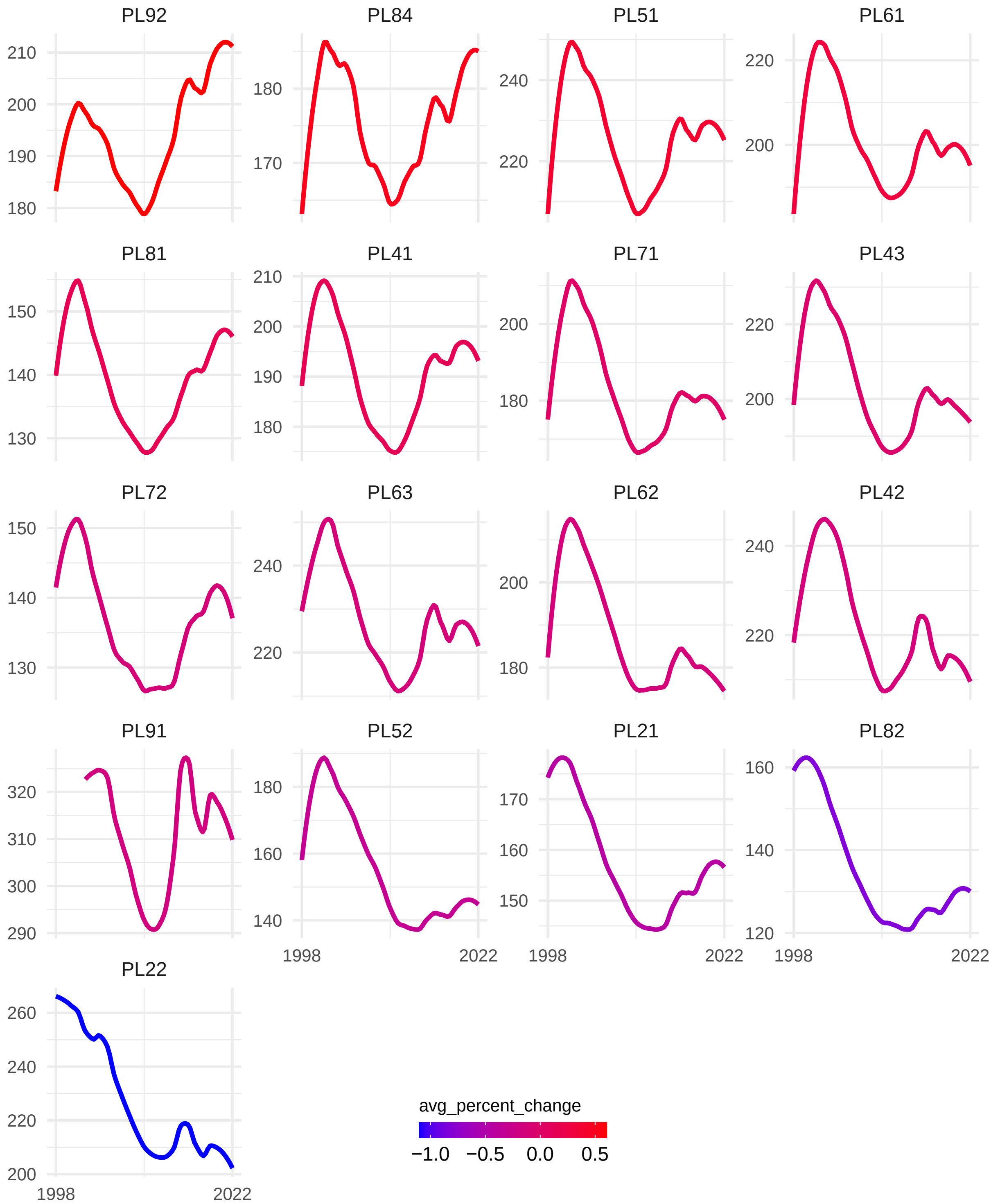
In a next step, I look at the number of people per institution within a region. For example, I count the number of primary school children per school on average, or the number of a region's inhabitants per hospital.

Contrary to my expectations, all services that I investigate generally see a decrease in their ratios. This means that over time, there are less people per institution in a NUTS2 region. E.g., less children in a school or less inhabitants per hospital.

4.3.1 Number of Primary School Children per School in Poland at NUTS2 Level

The number of primary school children per school sees a dip across regions around the years 2010/2011, after which most regions see an increase. Only the Silesian Voivodeship (PL22) shows a constant decrease.

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



4.3.2 Number of People per Hospital in Poland at NUTS2 Level

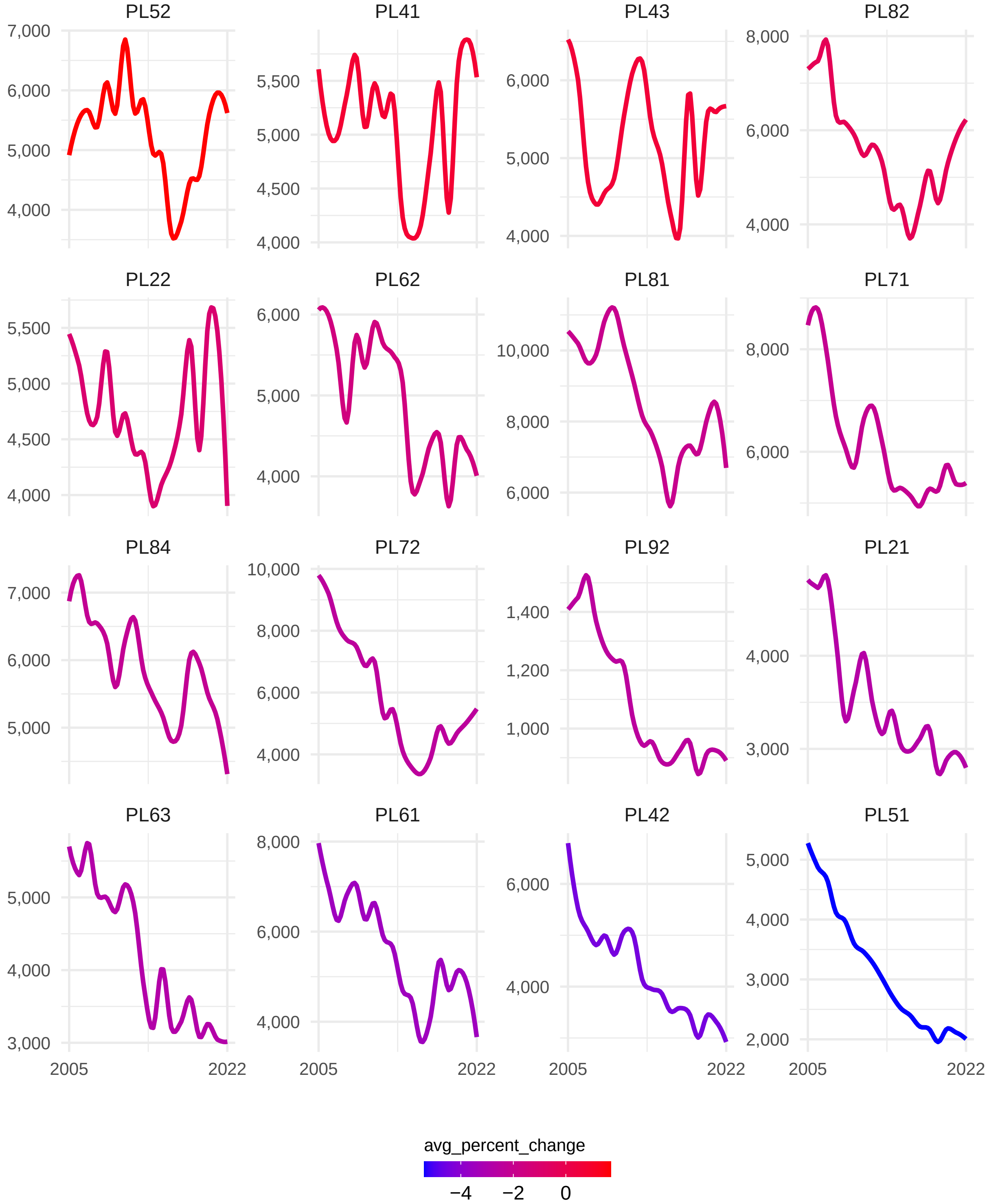
A general trend across all regions cannot be observed. Only the Greater Poland Voivodeship (PL41) shows a clear increase in number of people per hospital, while all other regions show a decrease.

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.

4.3.3 Number of People per Third Place in Poland at NUTS2 Level

A clear trend is not visible when taking all regions into account. Generally, when observing the average annual growth rate, we can see that the number of people per third place decreases over time.

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



4.4 Control Variables

GDP shows an increase over time. I use these data as a control variable in my models.

4.4.1 GDP at Current Market Prices in Poland at NUTS2 Level (Euros per Inhabitant)

Each line represents a NUTS2 region in Poland. The Warsaw Metropolitan Area (PL91) displays a consistently higher GDP than all other regions.

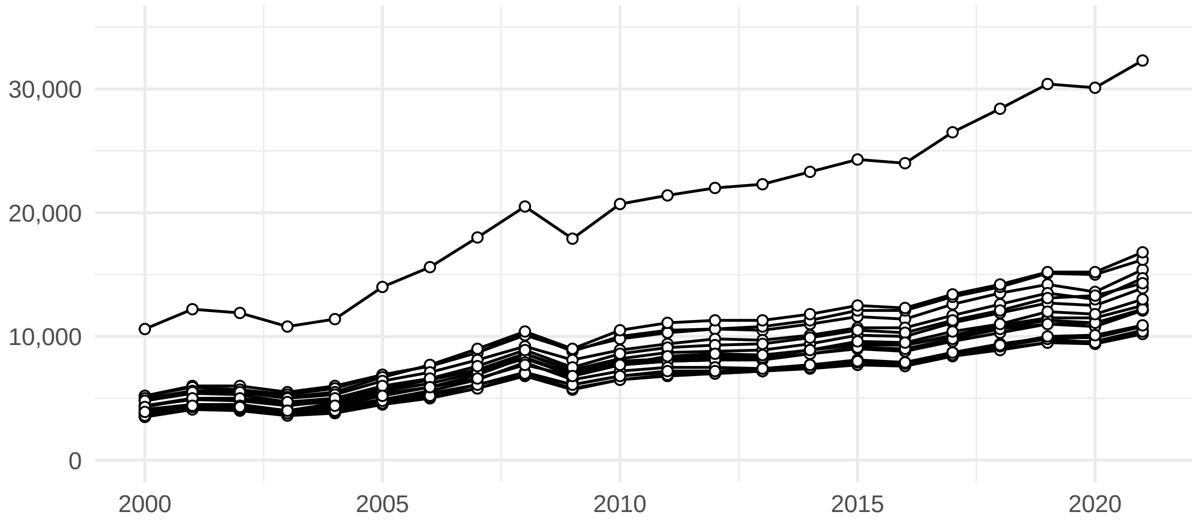


Table 3: DV: Incumbent's Change in Vote Share in Poland

	(1)	(2)	(3)	(4)
Children per School	−0.033			−0.063+
People per Hospital		0.000		0.000
People per Third Place			−0.001*	−0.001**
Avg. Emigration between Elections	0.157	0.081	0.030	0.045
Volatility	−0.095+	−0.105+	−0.109*	−0.105*
GDP	−0.001**	0.000	0.000	0.000
Num.Obs.	187	176	176	176
R2	0.506	0.507	0.508	0.508
R2 Adj.	0.433	0.433	0.433	0.426
R2 Within	0.007	0.002	0.003	0.004
R2 Within Adj.	−0.018	−0.024	−0.023	−0.036
AIC	1417.9	1339.6	1339.5	1343.2
BIC	1498.7	1415.7	1415.6	1425.7
RMSE	9.38	9.49	9.49	9.48
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X	X
FE: year	X	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.5 Modelling Anti-Incumbent Voting in Poland at NUTS2 Level using Ratios

I model separate ratios on incumbent vote change while controlling for emigration, volatility and GDP. Models 1, 2 and 3 in Table 3 each use a ratio separately, Model 4 combines all ratios. NUTS2 regions and years are used as fixed effects in all models. The emigration rate is the rolling emigration average between two national parliamentary elections per 1000 inhabitants.

Model 4 displays independent variable coefficients with statistical significance at conventional levels. The ratio of children per school and the ratio of people per third place are statistically significant and their signs support my theory. An increase in the ratio, e.g., more children per school, is associated with a decrease in the incumbent vote share. The ratio of people per hospital displays no effect on incumbent vote share change.

Table 4: DV: Incumbent's Change in Vote Share in Poland

	(1)	(2)	(3)
Children per School × Avg. Emigration	0.005		
People per Hospital × Avg. Emigration		0.000	
People per Third Place × Avg. Emigration			0.000
Avg. Emigration between Elections	−0.807	−0.688	0.343
Volatility	−0.106+	−0.110*	−0.112*
GDP	−0.001*	0.000	0.000
Num.Obs.	187	176	176
R2	0.506	0.507	0.508
R2 Adj.	0.429	0.429	0.429
R2 Within	0.007	0.002	0.003
R2 Within Adj.	−0.023	−0.031	−0.030
AIC	1419.8	1341.6	1341.4
BIC	1503.8	1420.8	1420.7
RMSE	9.38	9.49	9.49
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X
FE: year	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

I add a separate interaction term between every ratio and average emigration. No results are statistically significant.

Table 5: DV: Incumbent's Change in Vote Share in Poland

	(1)	(2)	(3)	(4)
Avg. Change of Children per School	−0.150			0.294+
Avg. Change of People per Hospital		0.000		0.000
Avg. Change of People per Third Place			0.000	0.000
Avg. Emigration between Elections	0.114	−0.186	−0.212	−0.144
Volatility	−0.083	−0.073*	−0.078*	−0.081*
GDP	−0.001**	−0.001	−0.001	−0.001+
Num.Obs.	187	128	128	128
R2	0.506	0.398	0.398	0.400
R2 Adj.	0.433	0.272	0.272	0.260
R2 Within	0.007	0.005	0.005	0.007
R2 Within Adj.	−0.018	−0.033	−0.033	−0.051
AIC	1417.9	860.1	860.1	863.8
BIC	1498.6	925.7	925.7	935.1
RMSE	9.38	5.82	5.82	5.81
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X	X
FE: year	X	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5 uses different independent variables compared to Table 3. Instead of using the ratio in an election year, I calculate the average ratio *change* between two national parliamentary elections. As an example, let us assume there to be an election in the year 2004 and 2008. Let us also assume that the ratio of children per school decreases by 10 every year from 2004 to 2008. This leads the average change of children per school between two election to equal 10. I calculate the average change for all three independent variables and for all elections that data is available for.

Table 5 shows no effect and no statistical significance for any independent variables, apart from Model 4, where all ratios are combined. Here an increase in the average change of children per school is associated with an increase in incumbent vote share, which goes against my assumptions.

Table 6: DV: Incumbent's Change in Vote Share in Poland

	(1)	(2)	(3)
Avg. Change of Children per School × Avg. Emigration	−0.004		
Avg. Change of People per Hospital × Avg. Emigration		0.000	
Avg. Change of People per Third Place × Avg. Emigration			0.000
Avg. Emigration between Elections	0.109	−0.166	−0.205
Volatility	−0.081	−0.075*	−0.078*
GDP	−0.001**	−0.001	−0.001
Num.Obs.	187	128	128
R2	0.506	0.398	0.398
R2 Adj.	0.429	0.265	0.265
R2 Within	0.007	0.005	0.005
R2 Within Adj.	−0.024	−0.043	−0.043
AIC	1419.9	862.1	862.1
BIC	1503.9	930.5	930.6
RMSE	9.38	5.82	5.82
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X
FE: year	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

I add a separate interaction term between every average change in ratio and average emigration. No results are statistically significant.

Table 7: DV: Incumbent's Change in Vote Share in Poland

	(1)	(2)	(3)	(4)
Number of Schools	0.008			0.005
Number of Hospitals		−0.011		−0.007
Number of Third Places			−0.002+	−0.002
Avg. Emigration between Elections	0.141	0.111	0.146	0.156
Volatility	−0.106+	−0.105+	−0.116+	−0.119+
GDP	−0.001**	0.000	0.000	0.000
Num.Obs.	187	176	176	176
R2	0.506	0.507	0.507	0.507
R2 Adj.	0.433	0.432	0.433	0.425
R2 Within	0.007	0.002	0.002	0.002
R2 Within Adj.	−0.018	−0.025	−0.024	−0.038
AIC	1417.9	1339.7	1339.6	1343.6
BIC	1498.7	1415.8	1415.7	1426.0
RMSE	9.38	9.49	9.49	9.49
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X	X
FE: year	X	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.6 Modelling Anti-Incumbent Voting in Poland at NUTS2 Level using Number of Institutions

As an alternative to using number of people per institution as the independent variable, I instead use the actual number of institutions. I do this to examine if the closing of an institution has an effect on the incumbent's vote share, regardless of the number of people who then use the institution.

In contrast to using ratios as independent variables, using actual numbers should result in positive coefficients in order to align with my theory. This is because an increase in the number of, e.g., schools, should be associated with an increase in the incumbent's change in vote share – and reversely – a decrease in schools should be associated with a decrease in vote share.

A single result is statistically significant (Model 3 in Table 7), but its sign does not comply with my theory. The coefficient implies a decrease in incumbent vote share if the number of third places increases.

Table 8: DV: Incumbent's Change in Vote Share in Poland

	(1)	(2)	(3)
Children per School × Avg. Emigration	−0.001		
People per Hospital × Avg. Emigration		−0.007*	
People per Third Place × Avg. Emigration			0.000
Avg. Emigration between Elections	0.595*	0.296*	0.221
Volatility	−0.070	−0.091	−0.111+
GDP	−0.001**	0.000	0.000
Num.Obs.	187	176	176
R2	0.506	0.507	0.507
R2 Adj.	0.429	0.429	0.429
R2 Within	0.008	0.002	0.002
R2 Within Adj.	−0.023	−0.031	−0.031
AIC	1419.8	1341.6	1341.6
BIC	1503.8	1420.8	1420.9
RMSE	9.38	9.49	9.49
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X
FE: year	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

I add a separate interaction term between every ratio and average emigration. Model 2 shows a negative and statistically significant coefficient. This indicates that the negative impact of numbers of hospitals on the incumbent's vote share is moderated by the level of emigration.

Table 9: DV: Incumbent's Change in Vote Share in Poland

	(1)	(2)	(3)	(4)
Avg. Change of Schools	0.021			−0.020
Avg. Change of Hospitals		−0.132*		−0.144*
Avg. Change of Third Places			0.000	0.000
Avg. Emigration between Elections	0.114	−0.202	−0.204	−0.189
Volatility	−0.091+	−0.063+	−0.075*	−0.064
GDP	−0.001***	0.000	−0.001	0.000
Num.Obs.	187	128	128	128
R2	0.506	0.399	0.398	0.399
R2 Adj.	0.433	0.273	0.272	0.259
R2 Within	0.007	0.006	0.004	0.006
R2 Within Adj.	−0.018	−0.032	−0.033	−0.052
AIC	1417.9	859.9	860.1	863.9
BIC	1498.7	925.5	925.7	935.2
RMSE	9.38	5.82	5.82	5.82
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X	X
FE: year	X	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Analogue to Table 5, I calculate the average change of institutions between two parliamentary elections and use this as the independent variable. As in Table 7, I expect the coefficients to be positive. However, the only statistically significant coefficients are the average change of number of hospitals (Models 2 and 4 in Table 9), and these are both negative. The negative coefficient implies a decrease in incumbent vote share when the number of hospitals increases since the last election. This goes against my theory.

Table 10: DV: Incumbent's Change in Vote Share in Poland

	(1)	(2)	(3)
Avg. Change of Schools × Avg. Emigration	0.005		
Avg. Change Hospitals × Avg. Emigration		−0.005	
Avg. Change of Third Places × Avg. Emigration			0.000
Avg. Emigration between Elections	0.265	−0.189	−0.195
Volatility	−0.080	−0.063	−0.078*
GDP	−0.001***	0.000	0.000
Num.Obs.	187	128	128
R2	0.506	0.399	0.399
R2 Adj.	0.429	0.266	0.266
R2 Within	0.007	0.006	0.005
R2 Within Adj.	−0.024	−0.042	−0.043
AIC	1419.9	861.9	862.1
BIC	1503.9	930.4	930.5
RMSE	9.38	5.82	5.82
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X
FE: year	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

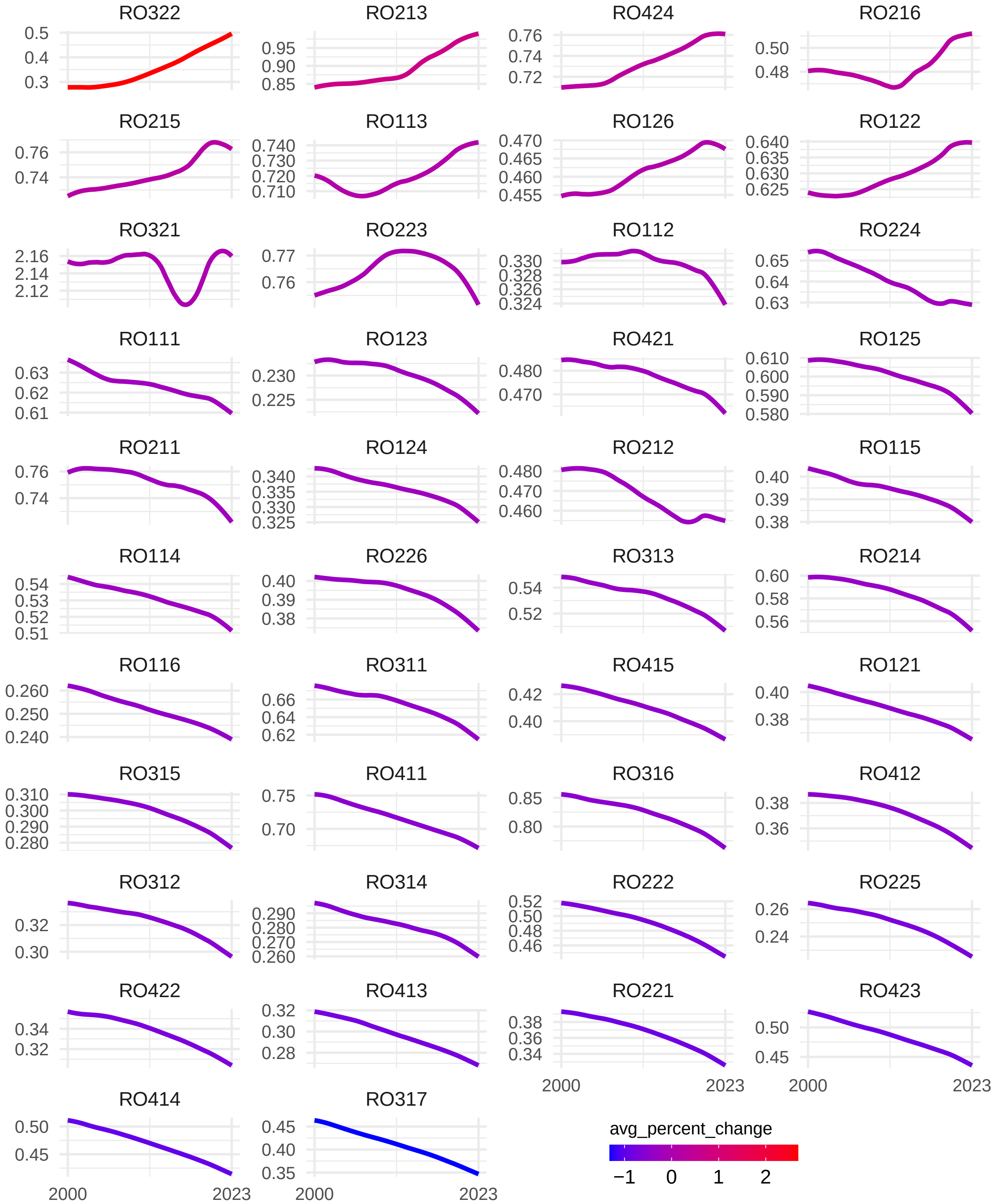
Analogue to Table 6, I add a separate interaction term between every average change in ratio and average emigration. No results are statistically significant.

5 Service Cuts in Romania

5.1 Population and Emigration

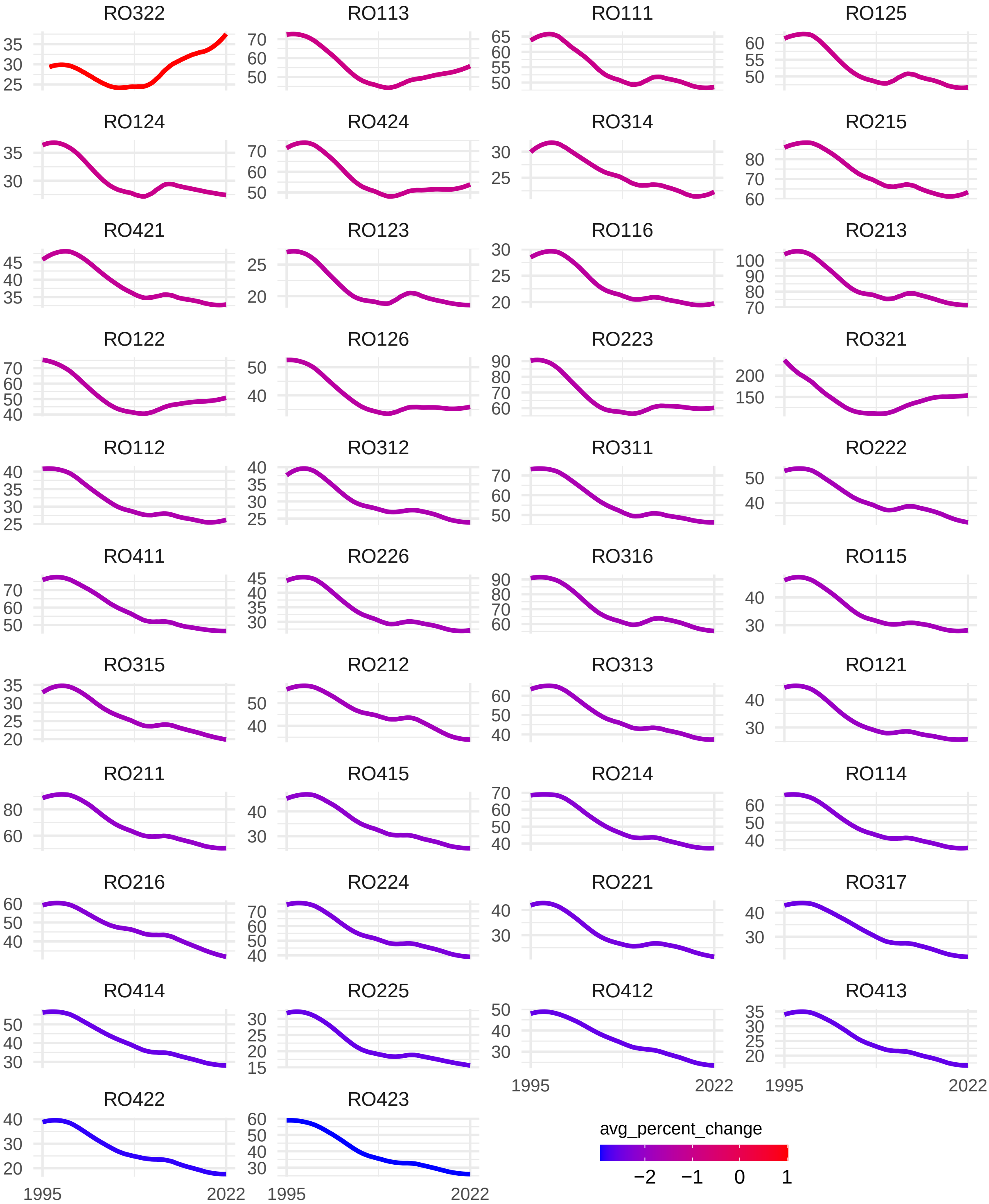
5.1.1 Population in Millions in Romania at NUTS3 Level

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



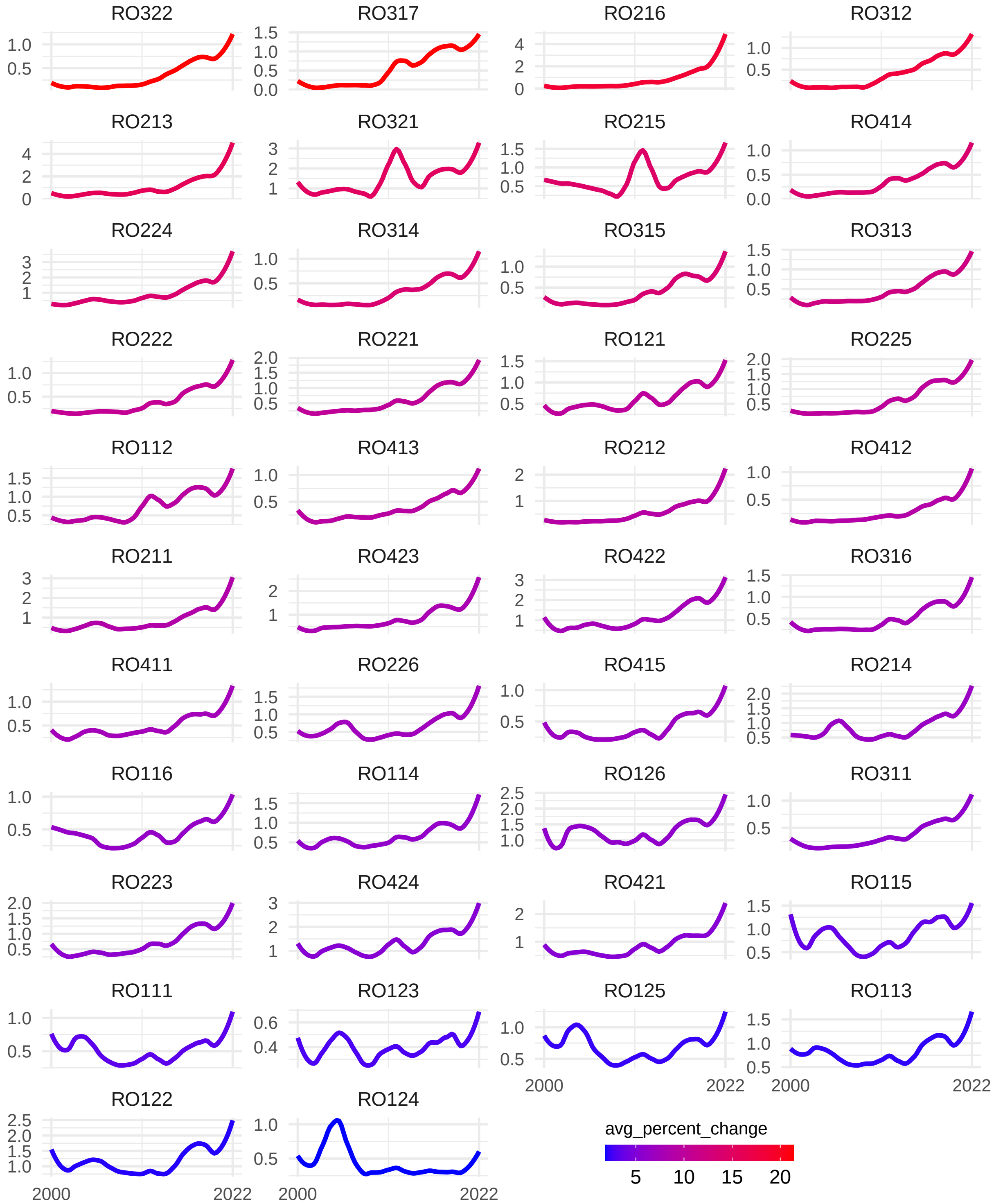
5.1.2 Primary Age Population in 1000s in Romania at NUTS3 Level

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



5.1.3 Emigration per 1000 Inhabitants from Romania at NUTS3 Level

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.

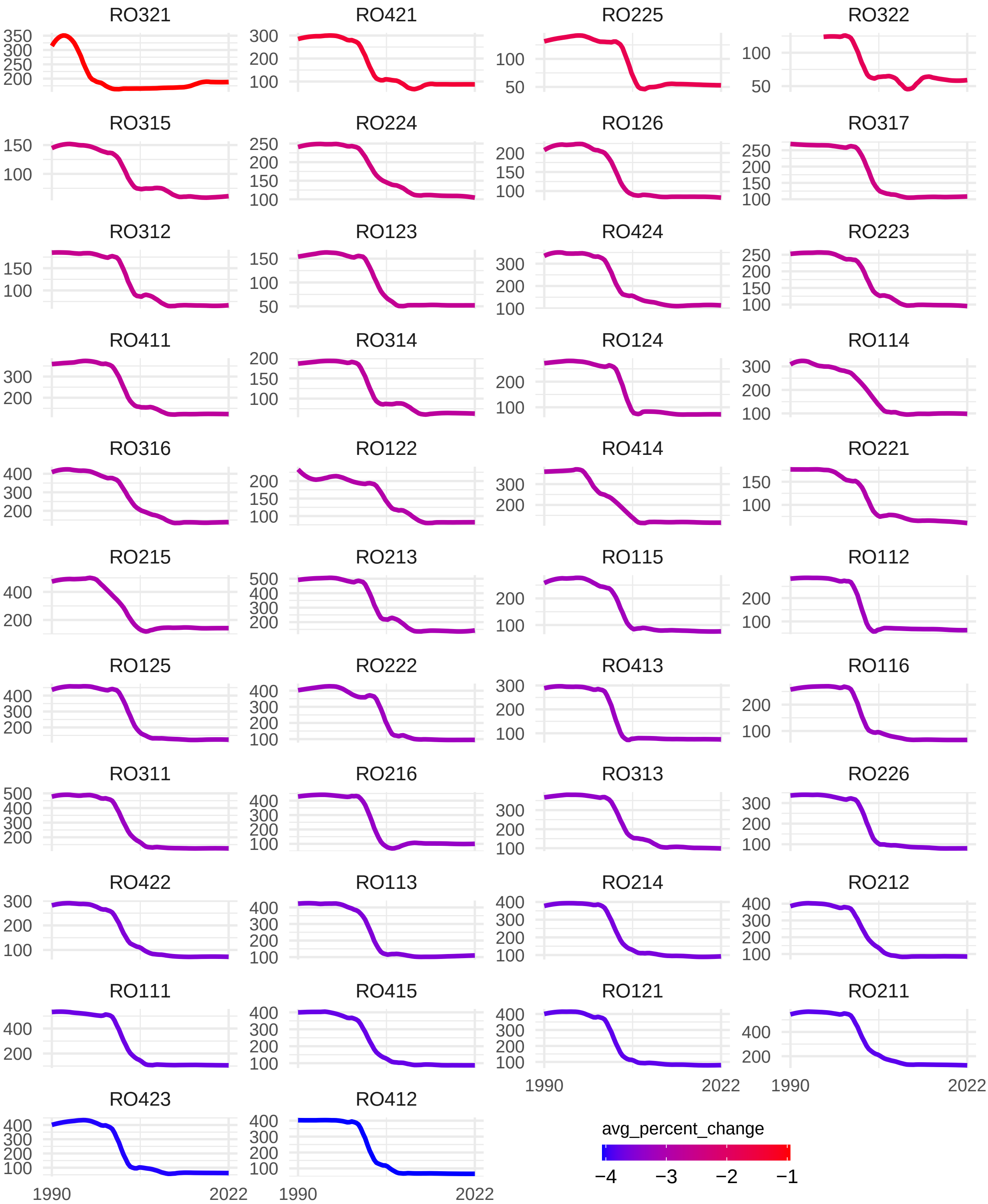


5.2 Number of Institutions

5.2.1 Number of Schools in Romania at NUTS3 Level

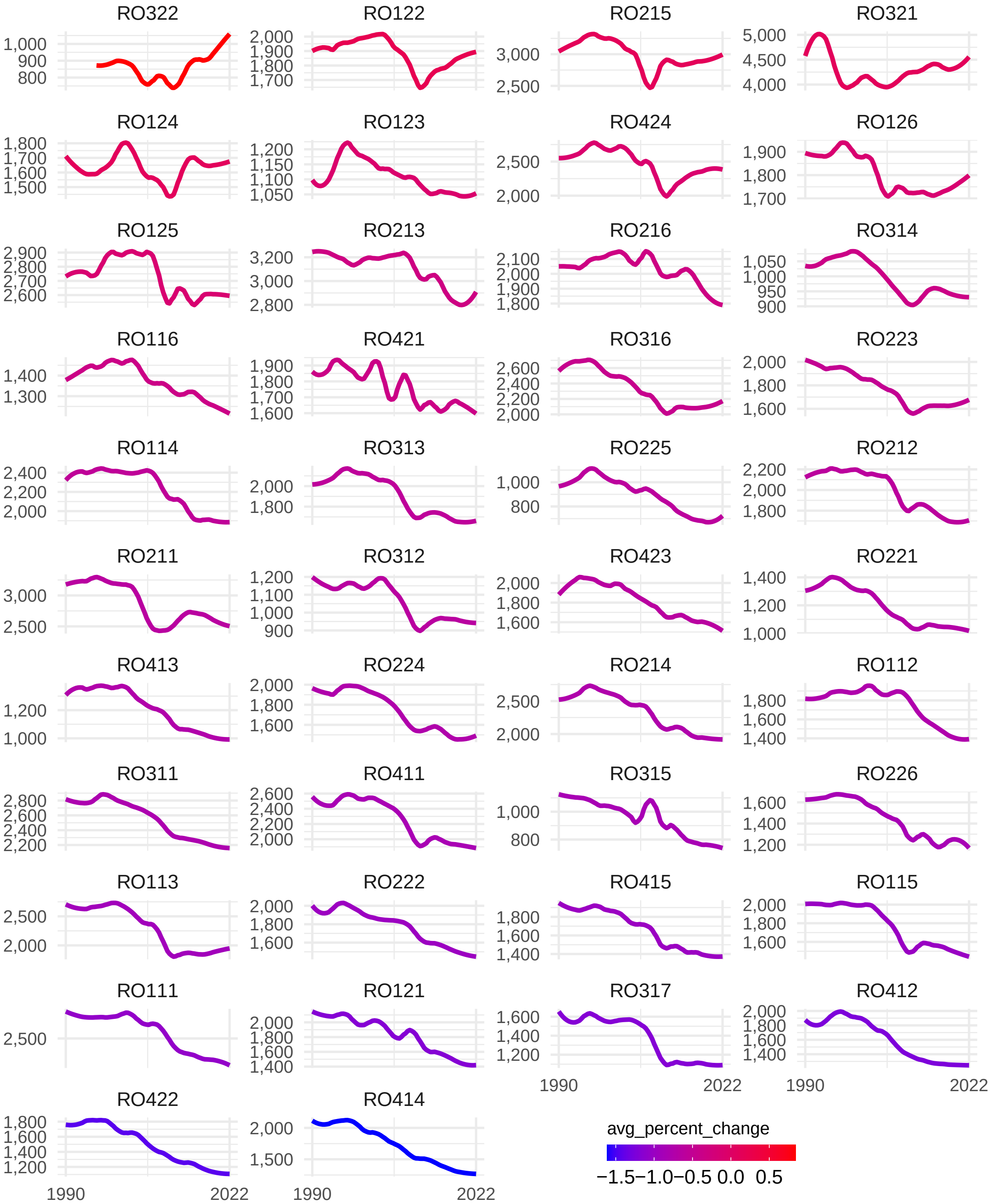
Many regions see a sudden drop in number of schools during the beginning of the 2000s, the reason for which is currently unclear.

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



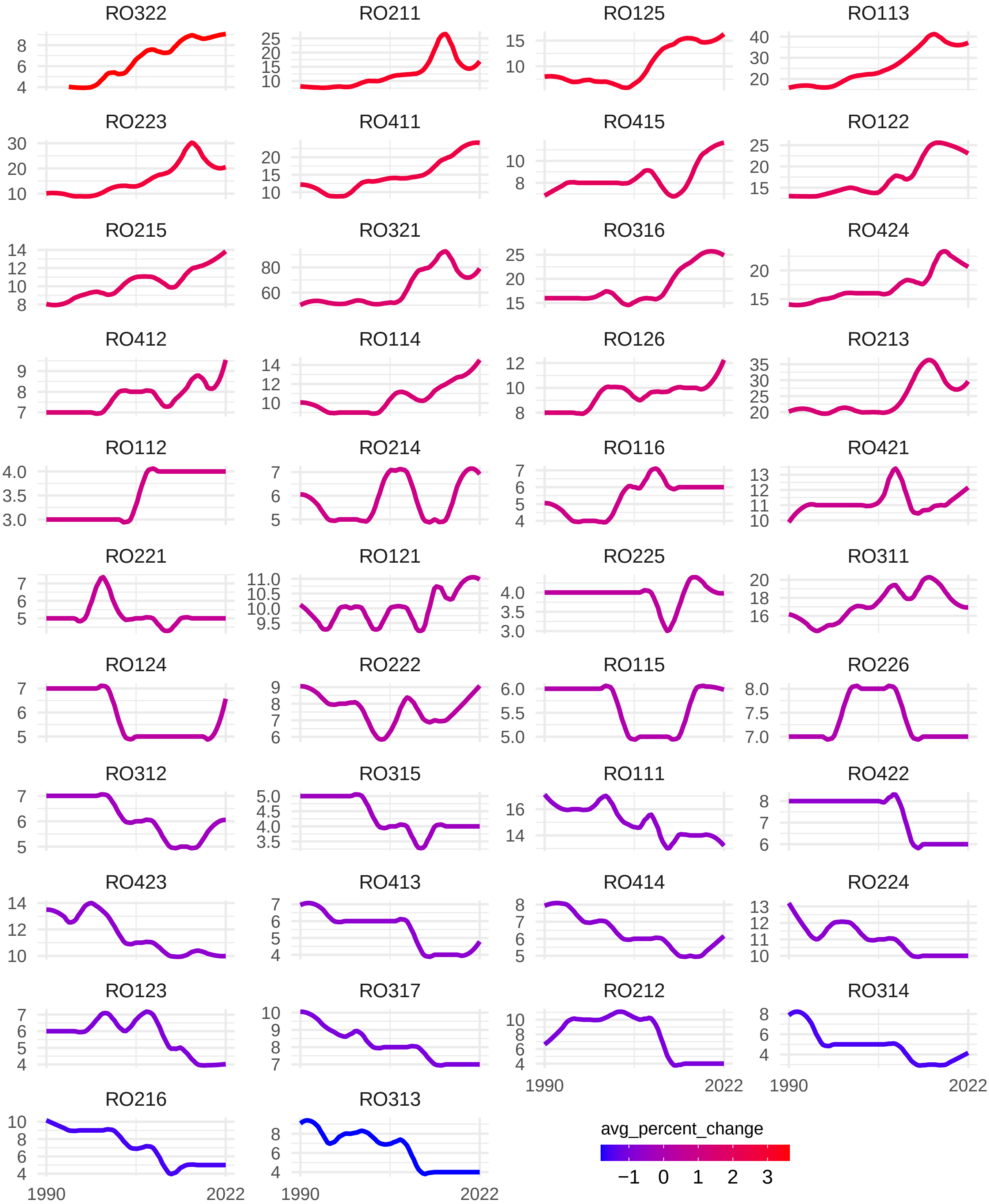
5.2.2 Number of Classrooms in Romania at NUTS3 Level

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



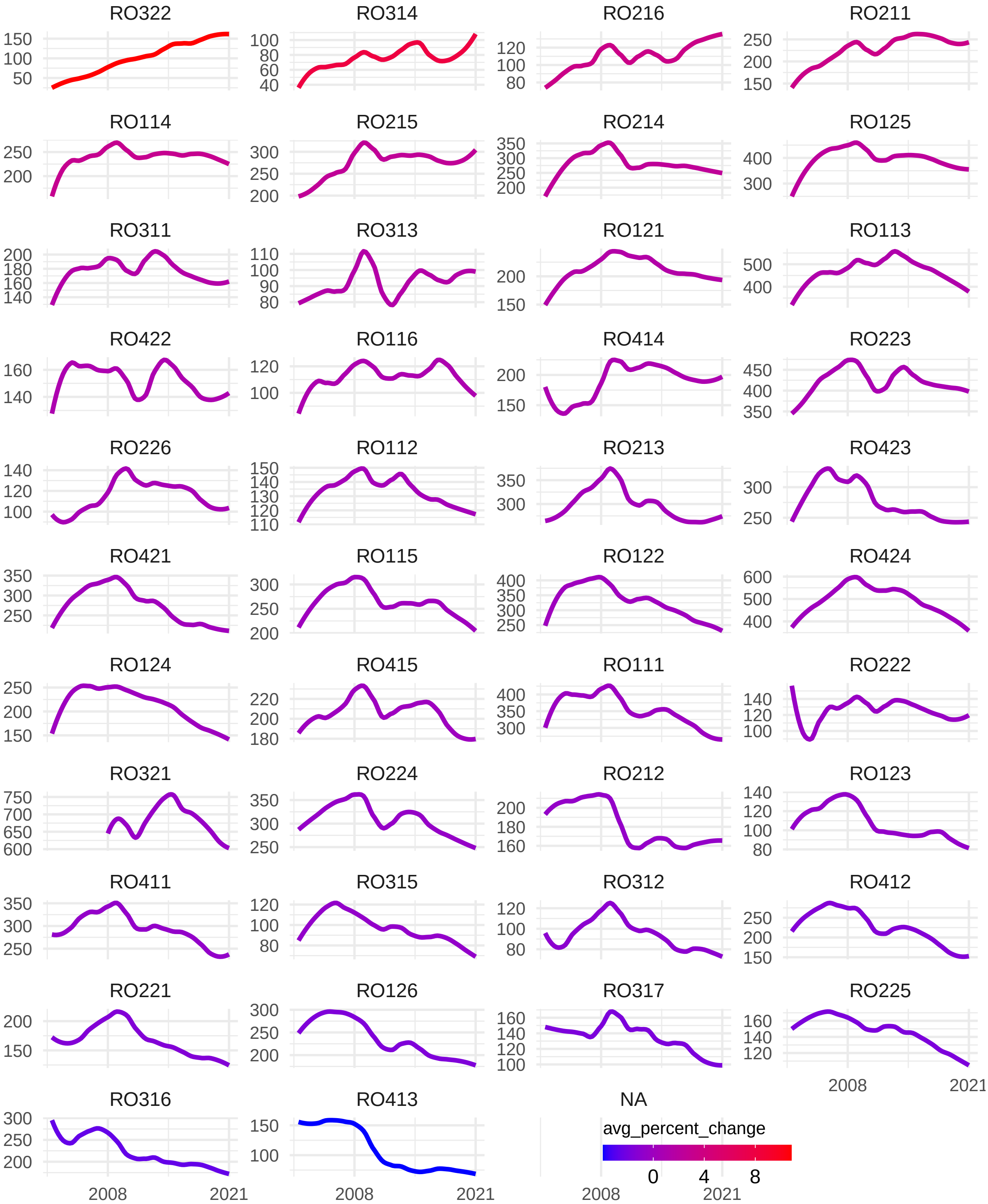
5.2.3 Number of Hospitals in Romania at NUTS3 Level

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



5.2.4 Number of Third Places in Romania at NUTS3 Level

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



5.3 Ratios of People per Institution

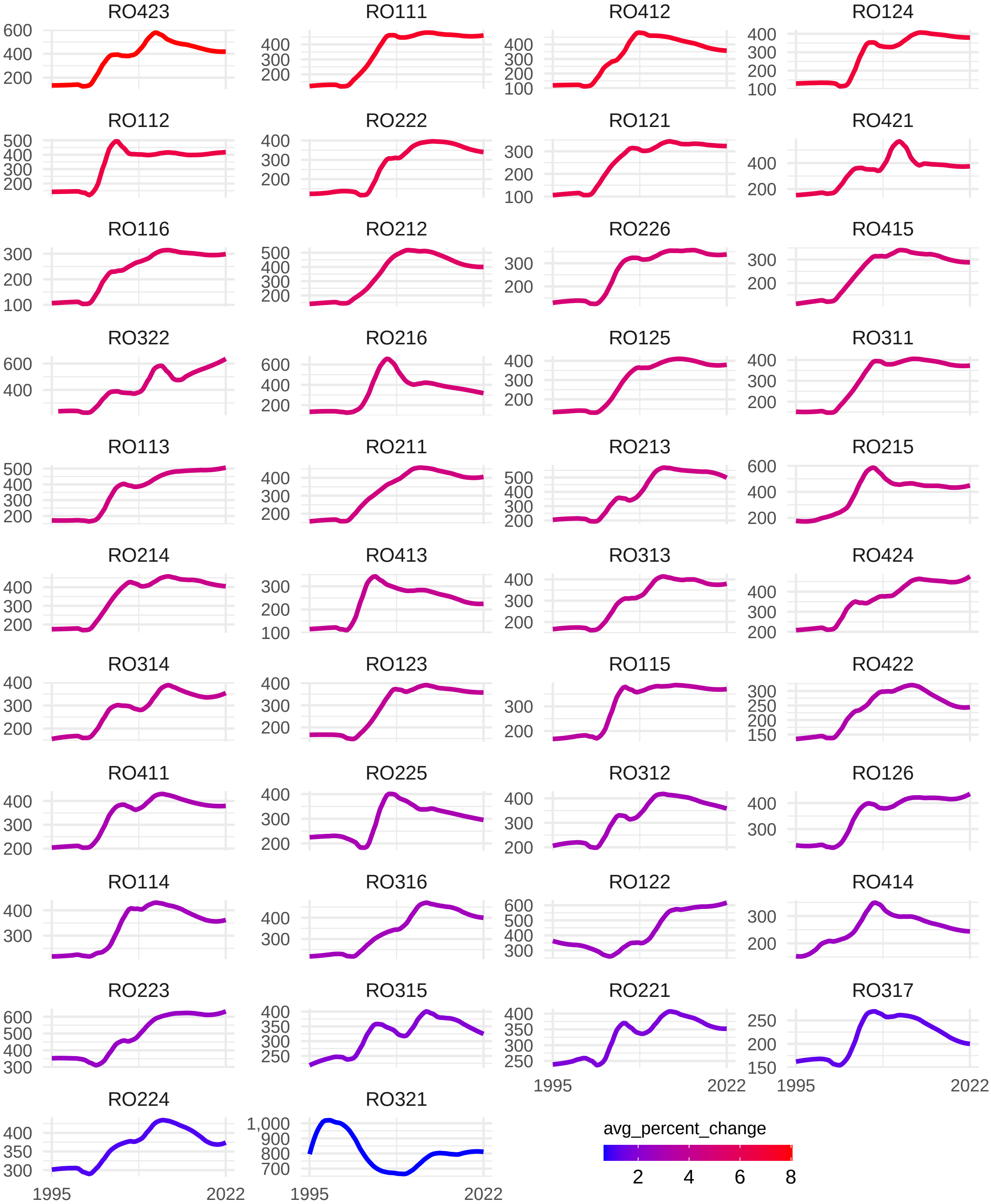
In a next step, I look at the number of people per institution within a region. For example, I count the number of primary school children per school on average, or the number of a region's inhabitants per hospital.

The following plots do not show a consistent trends across all regions in Romania. A possible next step could be to categorise NUTS3 regions, e.g., into urban and rural regions, or regions that border neighbouring countries, in an attempt to find groups with similar trends.

5.3.1 Number of Primary School Children per School in Romania at NUTS3 Level

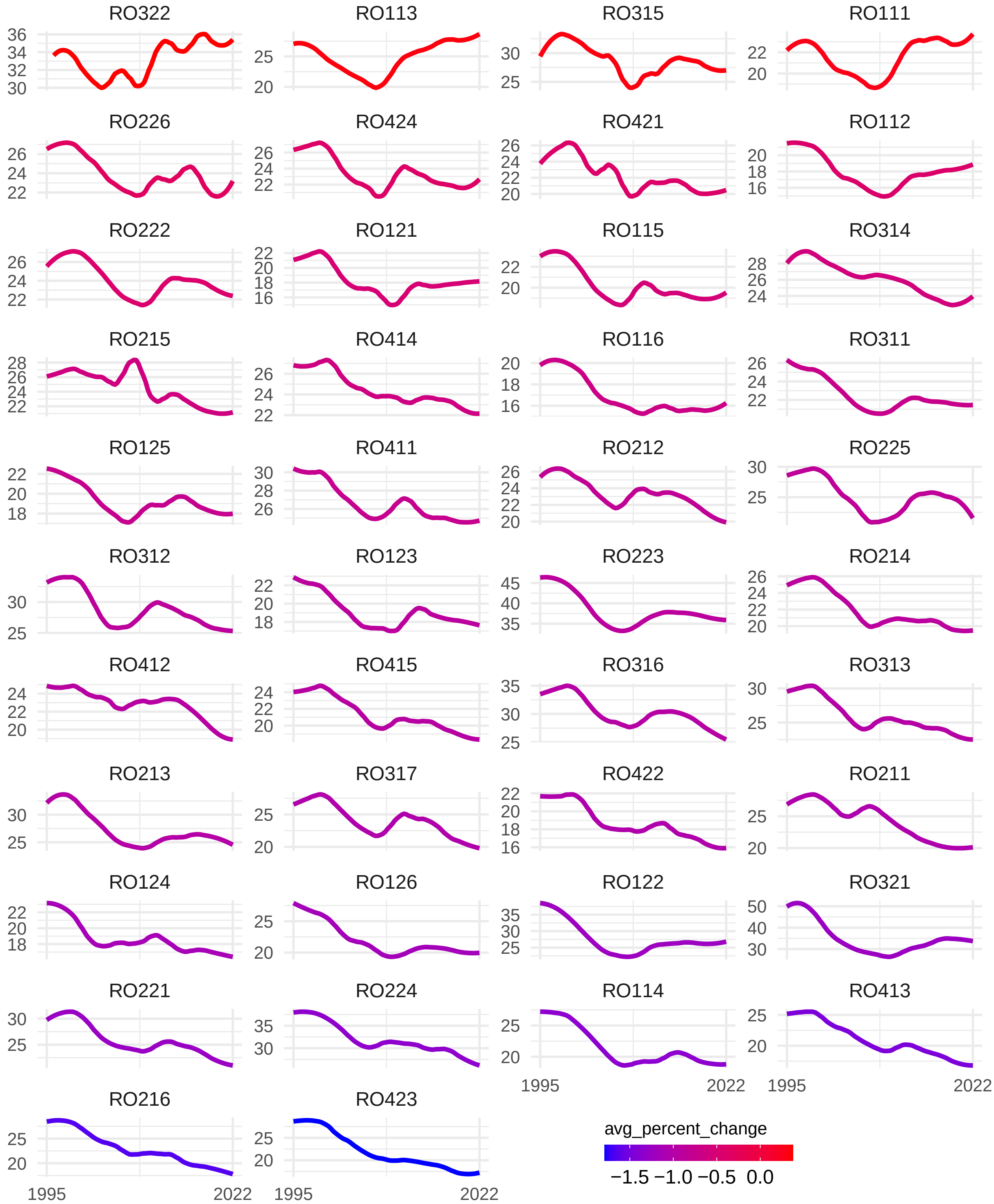
We can generally observe an increase in children per school in Romania. This increase seems to follow the sudden decrease in schools at the beginning of the 2000s.

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



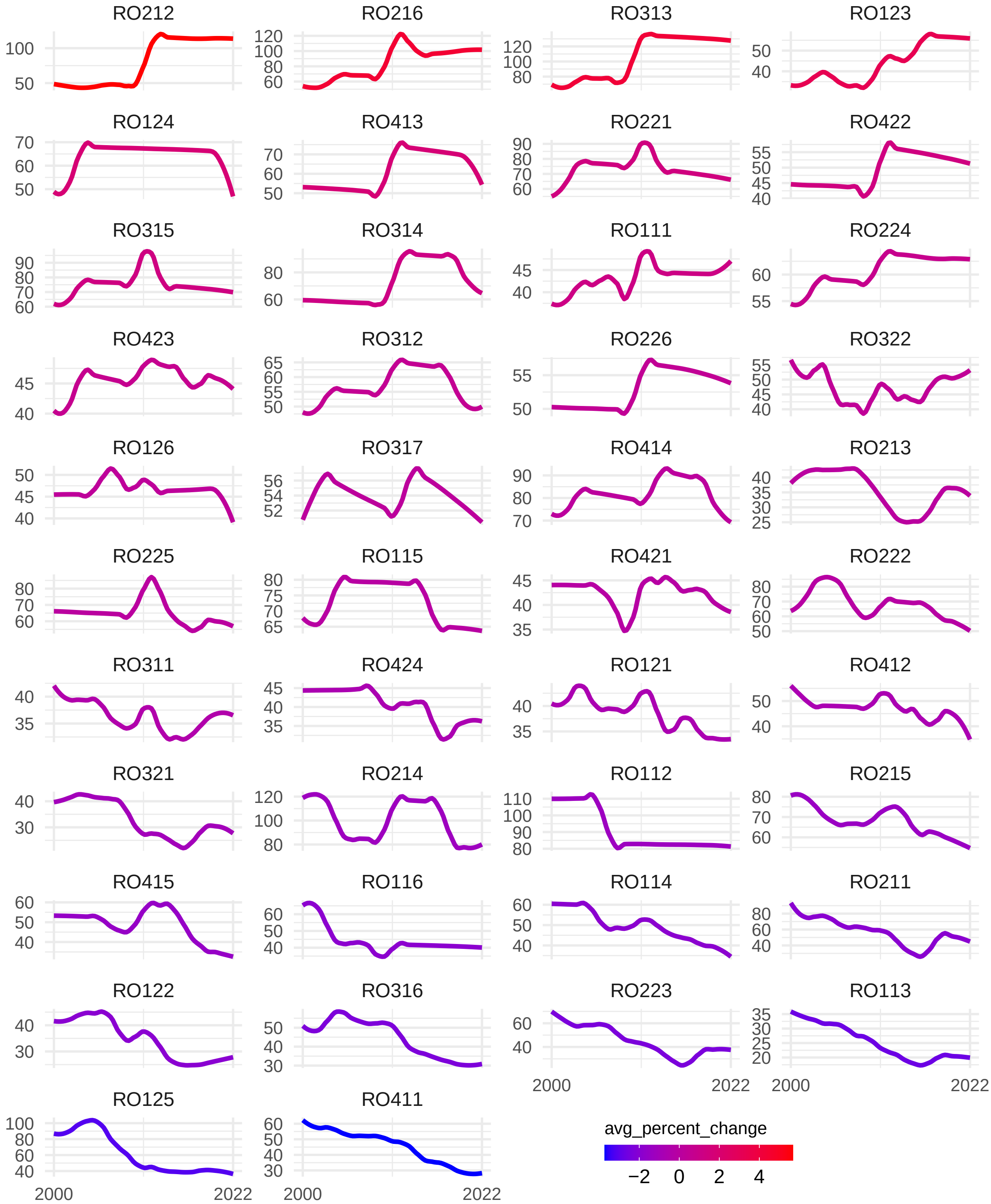
5.3.2 Number of Primary School Children per Classroom in Romania at NUTS3 Level

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



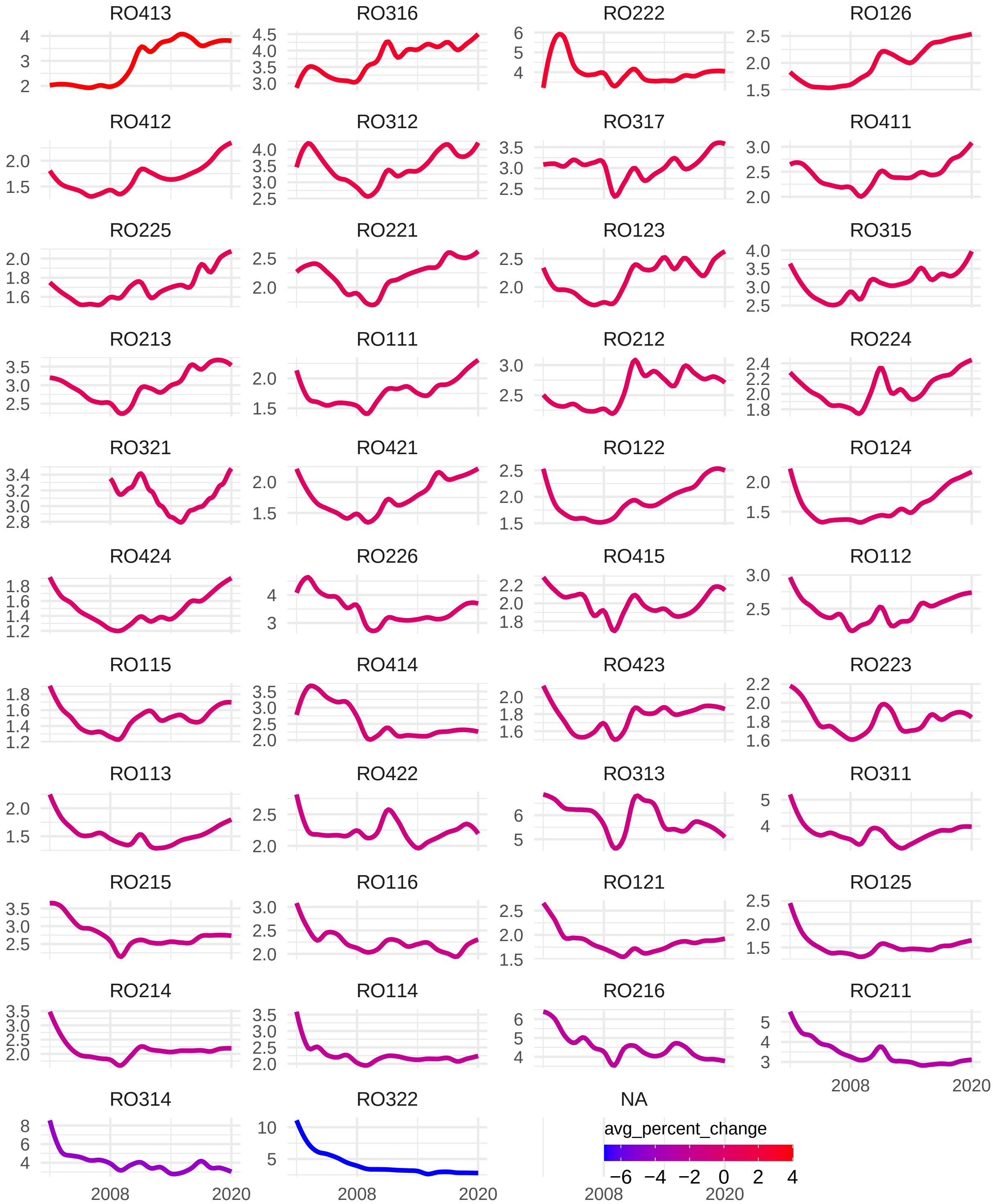
5.3.3 Number of People in 1000s per Hospital in Romania at NUTS3 Level

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



5.3.4 Number of People in 1000s per Third Place in Romania at NUTS3 Level

Curves apply smoothing to enhance readability. Plots are ordered by average annual growth rate, with the highest at the top left and decreasing to the right. The growth rate is also indicated by the curve's colour.



5.4 Control Variables

I use these data as a control variable in my models.

5.4.1 GDP at Current Market Prices in Romania at NUTS3 Level (Euros per Inhabitant)

Each line represents a NUTS3 region in Romania. Bucharest (RO321) displays a consistently higher GDP than all other regions.

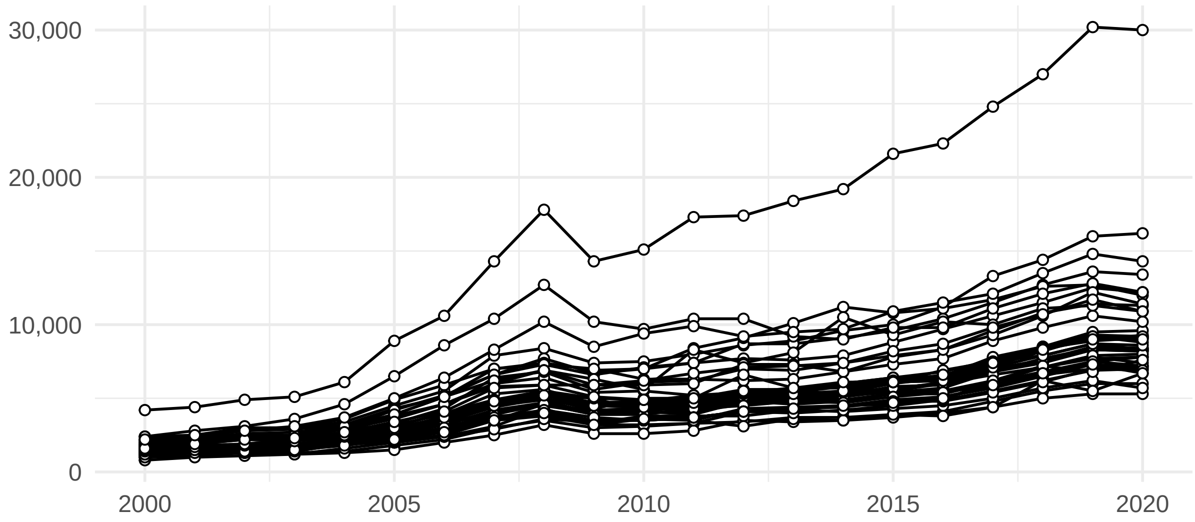


Table 11: DV: Incumbent's Change in Vote Share in Romania

	(1)	(2)	(3)	(4)
Children per School	−0.012			−0.018
People per Hospital		0.000		0.000
People per Third Places			0.001	0.001
Avg. Emigration between Elections	−7.134***	−6.697***	−6.916***	−6.715***
Volatility	1.374	1.829*	1.428+	1.581*
GDP	0.004*	0.003*	0.004*	0.003*
Num.Obs.	168	168	168	168
R2	0.807	0.809	0.807	0.811
R2 Adj.	0.734	0.737	0.733	0.734
R2 Within	0.204	0.214	0.202	0.220
R2 Within Adj.	0.178	0.188	0.176	0.180
AIC	1238.0	1235.9	1238.3	1238.6
BIC	1384.8	1382.7	1385.2	1391.7
RMSE	7.28	7.24	7.29	7.21
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X	X
FE: year	X	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.5 Modelling Anti-Incumbent Voting in Romania at NUTS3 Level using Ratios

I model separate ratios on incumbent vote change while controlling for emigration, volatility and GDP. Models 1, 2 and 3 in Table 11 each use a ratio separately, Model 4 combines all ratios. NUTS3 regions and years are used as fixed effects in all models. The emigration rate is the rolling emigration average between two national parliamentary elections per 1000 inhabitants. No independent variable is statistically significant.

A highlight is the emigration control variable, which displays a relatively strong and statistically significant effect. Higher levels of emigration between elections is associated with a decrease in incumbent vote share across all models.

Table 12: DV: Incumbent's Change in Vote Share in Romania

	(1)	(2)	(3)
Children per School × Avg. Emigration	0.004		
People per Hospital × Avg. Emigration		0.000	
People per Third Place × Avg. Emigration			0.000
Avg. Emigration between Elections	−9.237**	−7.329*	−7.454*
Volatility	1.415	1.799*	1.428+
GDP	0.004+	0.004*	0.004*
Num.Obs.	168	168	168
R2	0.808	0.809	0.807
R2 Adj.	0.732	0.735	0.731
R2 Within	0.207	0.214	0.202
R2 Within Adj.	0.174	0.181	0.169
AIC	1239.3	1237.8	1240.3
BIC	1389.3	1387.8	1390.3
RMSE	7.27	7.24	7.29
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X
FE: year	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

I add a separate interaction term between every ratio and average emigration. No results are statistically significant.

Table 13: DV: Incumbent's Change in Vote Share in Romania

	(1)	(2)	(3)	(4)
Avg. Change of Children per School	−0.070			−0.090
Avg. Change of People per Hospital		0.000		0.000
Avg. Change of People per Third Place			0.013	0.006
Avg. Emigration between Elections	−6.811***	−7.080***	−7.349***	−7.787***
Volatility	1.241	1.414+	1.553+	1.255
GDP	0.004*	0.004*	0.005*	0.004*
Num.Obs.	168	168	165	165
R2	0.809	0.808	0.822	0.826
R2 Adj.	0.736	0.736	0.753	0.754
R2 Within	0.211	0.210	0.223	0.240
R2 Within Adj.	0.185	0.184	0.196	0.200
AIC	1236.4	1236.7	1204.0	1204.4
BIC	1383.2	1383.5	1350.0	1356.6
RMSE	7.25	7.26	6.99	6.92
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X	X
FE: year	X	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 13 uses different independent variables compared to Table 11. Instead of using the ratio in an election year, I calculate the average ratio *change* between two national parliamentary elections. As in Table 11, no independent variables are statistically significant.

Table 14: DV: Incumbent's Change in Vote Share in Romania

	(1)	(2)	(3)
Avg. Change of Children per School × Avg. Emigration	−0.086*		
Avg. Change of People per Hospital × Avg. Emigration		−0.001+	
Avg. Change of People per Third Place × Avg. Emigration			0.000
Avg. Emigration between Elections	−3.787	−7.855***	−7.320**
Volatility	1.443+	1.850*	1.555+
GDP	0.005**	0.004**	0.005*
Num.Obs.	168	168	165
R2	0.815	0.813	0.822
R2 Adj.	0.743	0.739	0.751
R2 Within	0.239	0.228	0.223
R2 Within Adj.	0.207	0.196	0.189
AIC	1232.4	1234.8	1206.0
BIC	1382.3	1384.7	1355.1
RMSE	7.12	7.17	6.99
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X
FE: year	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

I add a separate interaction term between every average change in ratio and average emigration. Results show that the change in ratio of children per school and the change of people per hospital are statistically significant and have negative coefficients. This indicates that the negative impact of increased children per school and people per hospital on the incumbent's vote share is moderated by the level of emigration. The average change of people per third place shows no effect.

Table 15: DV: Incumbent's Change in Vote Share in Romania

	(1)	(2)	(3)	(4)
Number of Schools	0.188*			0.238*
Number of Hospitals		0.023		0.252
Number of Third Places			−0.007	−0.058
Avg. Emigration between Elections	−7.521***	−7.034***	−6.884***	−6.954***
Volatility	1.051	1.518+	1.472+	0.890
GDP	0.004**	0.004+	0.004**	0.003
Num.Obs.	168	168	168	168
R2	0.814	0.806	0.806	0.817
R2 Adj.	0.744	0.733	0.733	0.743
R2 Within	0.234	0.202	0.202	0.245
R2 Within Adj.	0.209	0.175	0.175	0.207
AIC	1231.5	1238.5	1238.4	1233.1
BIC	1378.3	1385.3	1385.3	1386.2
RMSE	7.15	7.29	7.29	7.10
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X	X
FE: year	X	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.6 Modelling Anti-Incumbent Voting in Romania at NUTS3 Level using Number of Institutions

As an alternative to using number of people per institution as the independent variable, I instead use the actual number of institutions. I do this to examine if the closing of an institution has an effect on the incumbent's vote share, regardless of the number of people who then use the institution. In contrast to using ratios as independent variables, using actual numbers should result in positive coefficients in order to align with my theory. This is because an increase in the number of, e.g., schools, should be associated with an increase in the incumbent's change in vote share – and reversely – a decrease in schools is associated with a decrease in vote share.

Using the number of schools as an independent variable is statistically significant across all models and always displays a positive coefficient. This means that a decrease in the number of schools is associated with a decrease in the incumbent's vote share. In short, less schools in a region is bad for incumbent parties.

Table 16: DV: Incumbent's Change in Vote Share in Romania

	(1)	(2)	(3)
Children per School × Avg. Emigration	−0.003		
People per Hospital × Avg. Emigration		0.024	
People per Third Place × Avg. Emigration			0.005
Avg. Emigration between Elections	−7.185	−7.584***	−8.408**
Volatility	1.027	1.515+	1.578+
GDP	0.004**	0.004+	0.003+
Num.Obs.	168	168	168
R2	0.814	0.807	0.807
R2 Adj.	0.741	0.731	0.732
R2 Within	0.234	0.203	0.205
R2 Within Adj.	0.202	0.170	0.172
AIC	1233.5	1240.1	1239.7
BIC	1383.4	1390.0	1389.7
RMSE	7.14	7.29	7.28
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X
FE: year	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

I add a separate interaction term between every ratio and average emigration. No results are statistically significant.

Table 17: DV: Incumbent's Change in Vote Share in Romania

	(1)	(2)	(3)	(4)
Avg. Change of Schools	−0.090			−0.089
Avg. Change of Hospitals		−0.782		−0.568
Avg. Change of Third Places			−0.270	−0.279
Avg. Emigration between Elections	−7.315***	−6.952***	−6.557**	−6.723**
Volatility	1.463+	1.450	1.469+	1.381
GDP	0.004**	0.004*	0.003+	0.003+
Num.Obs.	168	168	165	165
R2	0.808	0.807	0.824	0.825
R2 Adj.	0.735	0.733	0.755	0.753
R2 Within	0.208	0.202	0.228	0.236
R2 Within Adj.	0.182	0.176	0.202	0.196
AIC	1237.2	1238.3	1202.8	1205.2
BIC	1384.0	1385.1	1348.8	1357.4
RMSE	7.27	7.29	6.97	6.93
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X	X
FE: year	X	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 17 uses different independent variables compared to Table 15. Instead of using the ratio in an election year, I calculate the average ratio *change* between two national parliamentary elections. No independent variables are statistically significant.

Table 18: DV: Incumbent's Change in Vote Share in Romania

	(1)	(2)	(3)
Avg. Change of Schools × Avg. Emigration	0.123*		
Avg. Change Hospitals × Avg. Emigration		0.597	
Avg. Change of Third Places × Avg. Emigration			0.118
Avg. Emigration between Elections	−4.820*	−7.472***	−7.363**
Volatility	1.537+	1.546+	1.528+
GDP	0.003*	0.004*	0.003+
Num.Obs.	168	168	165
R2	0.813	0.807	0.825
R2 Adj.	0.740	0.732	0.755
R2 Within	0.230	0.206	0.235
R2 Within Adj.	0.198	0.173	0.203
AIC	1234.3	1239.5	1203.3
BIC	1384.2	1389.5	1352.4
RMSE	7.16	7.27	6.94
Std.Errors	by: nuts2016	by: nuts2016	by: nuts2016
FE: nuts2016	X	X	X
FE: year	X	X	X

+ p $<$ 0.1, * p $<$ 0.05, ** p $<$ 0.01, *** p $<$ 0.001

Analogue to Table 14, I add a separate interaction term between every average change in ratio and average emigration. While all three independent variable coefficients are positive, thus supporting my theory, only the average change of number of schools is statistically significant. This suggests that the negative impact of numbers of schools on the incumbent's vote share is moderated by the level of emigration. The average change of number of hospitals also displays a strong effect. However, the coefficient is not statistically significant at conventional levels ($p = 0.20$).

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