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The Rise of Extreme Right: Evidence from the Slovak Parliamentary Election

Bachelor thesis

Prague 2017

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Academic Year: 2016/2017

Bibliographic note

KOTRČ, Michal. *The Rise of Extreme Right: Evidence from the Slovak Parliamentary Election.* Prague 2017. 55 p. Bachelor thesis (Bc.) Charles University, Faculty of Social Sciences, Institute of Economic Studies. Thesis supervisor PhDr. Lenka Šťastná, Ph.D.

Abstract

What explains the late election success of extreme right in Slovakia? Although there are many studies on Western European extreme right parties, less attention is devoted to their Central European cousins. From a methodological perspective, even fewer studies consider spatial effects in their models. This thesis aims to explain electoral support for the extreme right Kotleba – People's Party Our Slovakia political party (Kotleba-ĽSNS) in the 2016 parliamentary election using a broad range of socio-demographic, economic and cultural variables on the municipal level. In the first stage, we use ordinary least squares regression as our baseline model. As this model suffers from spatial error correlation, we use a spatial error model in the second stage. We managed to create a variable which removed Roma people from the group of unemployed and thus we disentangled the effect of Roma people and unemployment on the electoral support for the Kotleba-ĽSNS party. In this way, we found a significant positive effect of share of unemployed people on the electoral support for the extreme right-wing party. Other estimates indicate a significant positive effect of share of the young people and share of people with a lower level of education on support for the Kotleba – People's Party Our Slovakia. On the contrary, support for the Kotleba-ĽSNS party decreases with increasing share of old people and increasing share of Hungarian people in the municipalities.

Abstrakt

Čo vysvetľuje nedávny volebný úspech extrémnej pravice na Slovensku? Hoci existuje veľa štúdií o západoeurópskych extrémne pravicových stranách, menšia pozornosť je venovaná ich stredoeurópskym náprotivkom. Z metodologického hľadiska ešte menej štúdií berie vo svojich modeloch do úvahy priestorové efekty. Cieľom tejto bakalárskej práce je vysvetliť volebnú podporu extrémne pravicovej politickej strany Kotleba – Ľudová strana Naše Slovensko (Kotleba-ĽSNS) v parlamentných voľbách v roku 2016 s využitím širokej škály sociálno-demografických, ekonomických a kultúrnych premenných na obecnej úrovni. V prvej fáze používame regresiu s využitím metódy najmenších štvorcov ako náš základný model. Keďže tento model vykazuje koreláciu priestorových chýb, v druhej fáze využívame model s priestorovými chybami. Podarilo sa nám vytvoriť premennú, ktorá odstránila Rómov zo skupiny nezamestnaných, a tak sme oddelili efekt Rómov a nezamestnanosti na volebnú podporu strany Kotleba-ĽSNS. Týmto spôsobom sme zistili významný pozitívny vplyv podielu nezamestnaných ľudí na volebnú podporu tejto extrémne pravicovej strany. Ostatné odhady naznačujú významný pozitívny vplyv podielu mladých ľudí a ľudí s nižším vzdelaním na

podporu Kotleba – Ľudovej strany Naše Slovensko. Naopak, podpora pre stranu Kotleba-ĽSNS klesá s rastúcim podielom starých ľudí a zvyšujúcim sa podielom maďarského obyvateľstva v obciach.

Keywords

radical right, spatial analysis, compositional characteristics, contextual characteristics, voting pattern, ordinary least squares method, spatial error model, Slovakia

Klíčová slova

radikálna pravica, priestorová analýza, kompozičné charakteristiky, kontextuálne charakteristiky, štruktúra hlasovania, metóda najmenších štvorcov, model s priestorovými chybami, Slovensko

Range of thesis: 106,762 characters without spaces

Declaration of Authorship

I hereby proclaim that I wrote my bachelor thesis on my own under the leadership of my supervisor and that the references include all resources and literature I have used.

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Prague, 17 May 2017

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Acknowledgements

I would like to express my gratitude to my supervisor PhDr. Lenka Šťastná, Ph.D. whose guidance and many valuable comments improved the final contents of the thesis. Thanks belongs to Matej Hruška who gave me the initial inspiration with his article in Denník N. I would like to acknowledge my colleague Zbyněk Janoušek for his insights on the topic of spatial analysis. I would also like to thank my confirmation sponsor and good friend Jakub Kocák for his continuous encouragement, help with processing the thesis in LaTeX and editorial modification of the text. Special thanks belongs to a dear friend of mine Tomáš Hládek for inspiring discussions over a glass of the most delightful of all beverages.

Bachelor Thesis Proposal

Author	Michal Kotrč
Supervisor	PhDr. Lenka Šťastná Ph.D.
Proposed topic	The Rise of the Extreme Right: Evidence from the Slovak Parliamentary Election

Topic characteristics In my bachelor thesis, I would like to analyse voting patterns of the extreme right reflected in the results of the Slovak parliamentary election in 2016 (the extreme right represented by the party Kotleba – People's Party Our Slovakia gained around 8% of the vote) and explain them mainly via the socio-demographic and socio-economic structure of municipalities. Using an aggregate statistical approach, I will concentrate on the structural characteristics of almost 3,000 municipalities across Slovakia.

Motivation and contribution Paul Hainsworth (2008) argues that "contemporary problems and the solutions offered to ever more difficult questions such as immigration, unemployment and law and order have enabled extremist, nationalist and populist movements to emerge". The rise of right-wing extremism is extensively analysed in the countries of Western Europe by researchers such as Ford and Goodwin (2010), Brückner and Grüner (2010) or Arzheimer and Carter (2006) but it seems to me that less attention is dedicated to explanation of its rise in the countries like Slovakia. At the same time, the knowledge of characteristics of extreme right voters may help the policy makers to target better their policies in order to prevent further increase of radical ideas in the society. Based on previous research in this field and applying its methodology, tools and techniques, I would like to uncover the determinants of support for the right-wing extremism in Slovakia and assess the extent to which it differs from that in Western Europe.

Data The data which I will use in my thesis can be divided into three categories: sociodemographic, economic and cultural. All the data is municipality-level data. The dependent variable will be represented by the election results of the party Kotleba – People's Party Our Slovakia in the Slovak parliamentary election in 2016. As the explanatory variables for the support of right-wing extremists from the sociodemographic perspective, I will use determinants like a percentage share of elderly population and Roma people, density of population, a percentage share of highly educated persons and people working in the services. From the category of economic variables, I will look at the share of unemployed people and I will also work with the level of municipal debts. Based on the research of Brückner and Grüner (2010), who argue that economic growth may explain the rise of political extremism, I will measure economic conditions estimated by the change in unemployment level and by the change in the number of housing units in municipalities. Unlike all the mentioned research, based on the conclusion of Kostelecký (2001), who argues that the explanation of geographically varying electoral support across Slovakia arises from "deeper social roots", I will try to explain the support of extreme right by a more hidden cultural variable. The unique electronic database of historical parliamentary elections results in all Slovak municipalities shall serve this purpose of uncovering potential cultural

aspects behind the electoral success of the extreme right based on the results of a right-wing party arguably representing an ideological base of the Kotleba – People's Party Our Slovakia in the 1929 and 1935 elections.

Methodology Regarding the empirical strategy, I would like to build an econometric model providing cross-sectional analysis of the voting pattern of the party Kotleba – People's Party Our Slovakia. First, I will estimate the election results of the party using ordinary least squares (OLS) method. Then I will compare this baseline model with a geographically weighted regression (GWR) model whose purpose is to deal with spatial heterogeneity which assumes that estimates may vary across space. This approach may be suitable as there is a possibility of different characteristics of right-wing voters across a country – as an example, this may be the case for typically rural areas of Slovakia compared with the more urban ones. I would like to find out whether this method has the potential to bring any significant improvement in the performance of the model and whether GWR can show a manner in which relations differ across Slovakia. Taking into account the spatial interdependence of the municipalities, I would also like to use a spatial error model specifying spatial effects using a given weighting scheme. In the process of choosing the explanatory variables in the model, the chosen aggregate statistical approach will assume that individuals belonging to the same social group behave essentially the same as they share similar status, interests and values.

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Core Bibliography

1. *Paul Hainsworth.* The Extreme Right in Western Europe. *Taylor & Francis e-Library,* 2008.
2. *Robert Haining.* Spatial Data Analysis: Theory and Practice. *Cambridge University Press,* 2004.

3. *A. Stewart Fotheringham, Chris Brunsdon, Martin Charlton.* Geographically Weighted Regression: The Analysis of Spatially Varying Relationships. *John Wiley & Sons Ltd,* 2002.

4. *Roger S. Bivand, Edzer J. Pebesma, Virgilio Gómez-Rubio.* Applied Spatial Data Analysis with R. *Springer Science + Business Media, LLC,* 2008.

5. *Michal Pink a kol.* Volební mapy České a Slovenské republiky po roce 1993: Vzorce, trendy, proměny. *Centrum pro studium demokracie a kultury,* 1. vyd., 261 s., 2012.

6. *Alena Kluknavská.* The far right parties in 2012 Slovak parliamentary elections. *Rexter – Časopis pro výskum radikalismu, extremismu a terorismu,* 01/2012.

7. *Cas Mudde.* The War of Words: Defining the Extreme Right Party Family. *Manchester University Press,* 2000.

8. *Ford and Goodwin.* Angry White Men: Individual and Contextual Predictors of Support for the British National Party. *Political studies,* VOL 58, 1-25a, 2010.

9. *Markus Brückner and H. P. Grüner.* Economic Growth and the Rise of Political Extremism: Theory and Evidence (March 2010). CEPR Discussion Paper No. DP7723.

10. *Arzheimer and Carter.* Political opportunity structures and right-wing extremist party success. *European Journal of Political Research,* 45: 419–443, 2006.

11. *Kostelecký.* Vzestup nebo pád politického regionalismu? Změny na politické mapě v letech 1992 až 1998 – srovnání České a Slovenské republiky. *Sociologické texty,* 2001, SP 01:9, 96 s.

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Contents

Introduction

After the World War II, in which right-wing extremism was responsible for the deaths of millions of people across the continent, it seemed that the post-war politics and the Western European society were heading for an open and tolerant future. This fact was also reflected in the successful supranational cooperation of Western countries. However, recent years have shown that there is a rising number of people who are dissatisfied with the status quo and who are losing faith in the established political system. The rise of the right-wing extremism in the countries of Western Europe offers the most striking evidence.

Even though Western extreme right-wing parties do differ in some characteristics, they share the same ideology. Mudde (2000) lists features of their ideology such as nationalism, exclusionism, xenophobia, anti-democratic features and ambitions for the strong state. After the fall of communism in the countries of Central Europe in the 1990s, return of the party plurality provided new opportunities for radical right-wing groups. As suggested by Allen (2017), right-wing extremism in post-communist and Western Europe differs in certain aspects, for instance focus on immigrants and internal minorities in Western and post-communist Europe, respectively. Nevertheless, society should be concerned over the rise of electoral base of these parties. The primary aim of research is to determinate characteristics of the extreme right electorate. Our thesis aims to contribute to the already conducted research regarding the right-wing extremism with an analysis of the electoral results of a Slovak extreme right-wing party.

More specifically, our objective is to explain support for the extreme right Kotleba – People's Party Our Slovakia political party (Kotleba-ĽSNS) which won 8.04% of the total votes in the 2016 Slovak parliamentary election and managed to get into parliament. Given that the Kotleba-ĽSNS party shares many ideological features with the Western extreme right-wing parties, we assume that also characteristics of their electoral bases will be similar. As we conduct our analysis on the municipal level, we work with data aggregated for approximately 3,000 Slovak municipalities. In our analysis, we include variables reflecting age, employment, ethnic, religious and educational structure of the municipalities. We also work with variables measuring demographic and economic changes in time such as percentage increases in the population size and in the number of unemployed people. As an economic indicator, we include municipal debt per capita. To the best of our knowledge, the only rigorous study of the electoral results of the Kotleba-ĽSNS party in the 2016 Slovak parliamentary election which uses municipal level data is the study of Bahna and Zagrapan (2017). However, this study focuses on individual level data which limit its municipal sample to only 161 municipalities. Moreover, Bahna and Zagrapan do not work with such a broad range of variables as we do.

We apply two models in our thesis. In the first stage, we estimate an ordinary

least squares model. As we find evidence of spatial error in the model, we estimate a spatial error model in the second stage. As far as we know, no analysis of electoral results of the Kotleba-ĽSNS party taking into account also spatial effects has been published yet.

We find a significant positive effect of share of young people and share of people with a lower level of education on support for Kotleba-ĽSNS. We create a new variable representing share of unemployed previously exercising a job requiring a higher level of education. In this way, we solve the collinearity issue between share of Roma people and total share of unemployed and find a significant positive effect of the new variable on the electoral support for Kotleba-ĽSNS. Our estimates indicate decreasing support for the Kotleba-ĽSNS party with increasing share of old people and increasing share of Hungarian people in the municipalities.

The thesis is structured as follows: Chapter 1 presents an overview of primarily Western studies in relation to the determinants of support for extreme right-wing parties and in relation to the methodology they use. Chapter 2 contains definition of right-wing extremism and its characteristics together with description of its representatives in the context of Slovakia. In Chapter 3, we elaborate on the theory behind the ordinary least squares and spatial error models. Chapter 4 is devoted to description of the data which we use for our empirical analysis. Chapter 5 is devoted to the results of our analysis. The last chapter concludes our thesis.

Chapter 1

Literature Review

The existence of extreme right-wing parties in politics has interested researchers for a long time. Existence of data and rise of scientific methods enabled to identify determinants of support for parties close to the fascists in Italy right after the World War II (Fontana et al. 2016) and to the Nazi party in Germany before the World War II (O'Loughlin 2002). Despite a few exceptions (Buštíková 2014, Allen 2015, Spáč and Voda 2015), most researchers focus on explaining the rise of right-wing extremism only in Western Europe (Arzheimer and Carter 2006, Ford and Goodwin 2010, Buštíková 2014).

In the 1990s, social researchers started adopting spatial analysis and contextual factors as a method to explore electoral results (O'Loughlin et al. 1994). There was a discussion about justification of this method (King 1996). Since the 1990s, spatial data analysis has become a relevant tool also for social researchers to explain more confidently various voting patterns.

Arzheimer (2012) classified previous studies based on data and methodology. We adapt his classification and hence create a broad picture of various possible aspects which researchers take into account and methods they apply. We review literature based on the determinants of support for extreme right-wing parties and the types of data and applied methodology.

1.1 Determinants of Support

First, it is essential to make a distinction between two major groups of determinants influencing voting behaviour in general: compositional and contextual variables. Compositional variables focus on the variables which can be attributed to individuals such as age, level of education, sex. Contextual factors describe the environment in which individuals live. They focus on variables which may influence behaviour of individuals and typically cannot be attributed to individuals such as a number of immigrants, level of unemployment, population density. However, there are examples when these two groups overlap. Obviously, unemployment as a status of a person can be attributed to an individual. However, unemployment can also act as a contexual variable if we assume that different unemployment levels in a certain environment may have different impacts on the behaviour of individuals in the given environment regardless of their own employment status. There are also other factors such as media coverage or political position of the party which can be included in a wider definition of context (Arzheimer 2012). These factors belong to the opportunity structure of a political system or to a party within the system. Attitudes of voters are similar with socio-

demographic factors in the sense they are attributed to individuals and hence we decided to include them under compositional variables. We slightly adjusted the table created by Arzheimer (2012) which shows allocation of various variables to specific groups and subgroups:

(i) **Compositional variables**

- *socio-demographics*: sex, education, age, race, class, marital status, household size, nationality, unemployment status, religion
- *attitudes*: anti-immigrant attitudes, identification with a party, disaffection with existing parties

(ii) **Contextual variables**

- *opportunity structures*: electoral thresholds, position of other parties, media coverage
- *variables related to the extreme right parties themselves*: availability of "charismatic leaders", policy positions, reliance on populism, party subtype
- *macroeconomic variables*: unemployment, economic growth and their trends
- *other variables*: immigration levels

Compositional approach assumes that "individuals belonging to the same social group behave essentially identically as they share similar status, interests and values" (Pink et al. 2012). Compositional variables focus on mainly socio-demographic characteristics. If units of observation are represented by individuals, their individual characteristics are observed. Hence, instead of the term "compositional variables", the term "individual characteristics" is often used in the literature. If observed units consist of more individuals, structure of the units is what researchers are interested in.

Another label for the contextual variables in literature is "contextual characteristics". Agnew et al. (2015) offer a demonstrative example for understanding the difference between contextual and compositional variables. If we transformed their example to a municipality level, it would be as follows:

Let us consider two municipalities A and B with identical compositional characteristics (e.g. the same structure of education, age and work). Based on the compositional approach, both municipalities should have identical voting results, regardless of where they are located. However, let us now imagine that the municipality A is located in a more conservative region, whereas the municipality B in a less conservative region. It is then very likely to expect different voting patterns in both municipalities.

Discussion about relevance of the contextual variables was very live in the 1990s. An example is a reaction of King (1996) on Agnew's (1996) paper. Agnew (1996) stresses the importance of "the spatial situatedness of human action in contrast to the non-spatial sorting of people out into categories based on census and other classification schemes". In this way, he advocates geographical context. King (1996) criticizes the extent of interest of political geographers in the context

and argues that researchers should try to learn more about voters so that "there is not much left for contextual effects". In practice, researchers use a mixture of both contextual and compositional variables.

The work of O'Loughlin et al. (1994) is extraordinary in terms of both chosen methodology and used data. O'Loughlin analyses results of the Nazi party in the election of 1930. Due to a lack of survey data on individuals, he works with census data. Under the assumptions of heterogeneous regional and local contexts and the ability of the Nazi party to adapt its appeal to local circumstances, he takes into account also spatial heterogeneity. He suggests that the most significant determinant of a weaker support for the Nazi party was a membership in the Catholic church. Most importantly, he finds evidence and arguments for a greater validity of spatial analysis of the Nazi party supporters rather than for working with the idea of "nationalized electorate". In the more recent work of O'Loughlin (2002), he works with a longer time span (1924 to 1933) and using more sophisticated methodology comes to the same conclusion as in his previous study.

Using a multi-level approach, Lubbers et al. (2002) analyse both between-country and across-country differences in the voting patterns of extreme right supporters. They work with contextual characteristics such as economic and political conditions of the country and extreme right-wing party characteristics. From the socio-demographic perspective, they choose education, social position, age and sex. From a large survey, Lubbers et al. (2002) take into account also anti-immigrant attitude and dissatisfaction with democracy as indicated by the respondents. The typical sociological profile of right-wing voter does not differ substantially from findings of other studies. However, one of their most interesting findings is the significant importance of political factors and more specifically the factor of "favourable party characteristics" such as a charismatic leader of the right-wing party.

Arzheimer and Carter (2006) work with socio-demographic factors such as sex, age, social class and education to explain variation in the right-wing extremist party vote across Western Europe. They consider also context in terms of levels of immigration and unemployment (both levels and change in these levels) and in terms of political opportunity structure. In terms of political opportunity structure, Arzheimer and Carter (2006) analyse long-term institutional variables such as electoral system, degree of decentralization and medium-term party system variables such as ideological position of other competitors in the party system, degree of convergence between the mainstream parties and coalition format in the respective party systems. They find out that the impact of political opportunity structure is considerable. Maybe surprisingly, unemployed people tend to vote less for extreme right-wing parties. In terms of education, the voters with a middle level of education are more likely to vote for the extreme right than those with a lower level of education.

Brückner and Grüner (2010) argue that "economic growth increases the cost of uncertainty and so increases support for a moderate regime". Hence, they look at a relationship between GDP growth and support for right-wing and communist parties. They come to a conclusion that there is a negative and significant effect of real per capita GDP growth on support for extreme political parties.

The study of Ford and Goodwin (2010) belongs to the first ever individual-level analysis of extreme right supporters in Great Britain. The main reason for such a long-lasting lack of this type study is a small number of individuals

who admit their support for extreme right in the surveys. Ford and Goodwin (2010) conduct a multi-level analysis combining compositional variables such as race, age and contextual variables such as number of Muslims. They come to a conclusion that white, working-class, middle-aged men who are dissatisfied with existing parties and have worries on immigration tend to vote more for extreme right-wing. They can be found mainly in regions with low education levels and significant Muslim communities.

Pink et al. (2012) suggest that contextual approach focuses more on the qualitative aspects whereas compositional approach focuses more on the quantitative aspects. Moreover, they emphasise that "territorially defined group of citizens is not simply the sum of the individuals" as compositional approach would suggest and so justify the use of contextual variables. Arguably, political attitudes are shaped also by social processes and interactions that occur in specific regions. In this sense, "contextual approaches to voting behaviour differ from compositional ones by emphasizing socio-geographical processes and interactions that are situated in particular places over the ascribed characteristics of voters alone" (Agnew et al. 2015).

Pink et al. (2012) explain support for various parties in the Czech republic and Slovakia using only compositional variables such as share of people working in services, employers, unemployed people, Catholics, share of people working in the agriculture, share of people with Hungarian nationality and share of people with higher education. In the case of arguably extreme right-wing Slovak National Party, they find out that the strongest influence on the electoral results of this party is represented by ethnic structure. The electoral support for this party is higher in the municipalities with a low or zero share of people with Hungarian nationality.

Buštíková (2014) chooses only contextual variables in order to explain success of extreme right-wing parties in the European post-communist countries. She works with variables such as presence of ethno-liberal party and extreme right party and their vote shares in the previous governing coalitions, ideology of the ethno-liberal party, electoral threshold, effective number of parties, disproportionality of the political system. She finds enough evidence to conclude that "the electoral success of the ethno-liberal party in the previous electoral cycle increases the prospects for the extreme right party in the subsequent electoral cycle". She also comes to the conclusion that "the presence of an ethno-liberal party in a governing coalition increases the electoral prospects of the extreme right party in the next electoral cycle".

Van Gent et al. (2013) use a multi-level analysis to explain the success of the Dutch extreme right-wing party. They conduct the analysis on the individual, neighbourhood and municipal level. The variables they choose range from static variables such as whether the person receives social benefits, their level of income, age category, their type of household (with children or without), sex, highest level of education, urban density of municipality through compositional variables of the neighbourhood (share of students, single-person households, households with children, age structure etc.) to dynamic variables such as population growth (between 2005 and 2009) and difference in the number of low income earners (between 2005 and 2009). Their most important finding is the validity of context as explanation for the success of the right-wing extremism in the suburban environments in cities and suburban municipalities.

The way in which the contextual factor of media influence has impact on

support for right-wing extremists, received some attention among researchers as well. Bos et al. (2016) try to assess whether there is not only correlation between media coverage and right-wing support but also causality. Analysing extreme right in the Netherlands, they come to a conclusion that the media coverage of issues which the extreme right parties regard as their own, indeed increases support for them, but only under certain conditions. The effect is stronger for individuals who already agree with many issues which are part of agenda of extreme right. Wilson and Hainsworth (2012) point out at the role of social media which helps the extreme right-wing parties to "bypass the conventional media". However, they do not further elaborate on this idea.

In the region of Central and Eastern Europe, Kluknavská contributed to the debate of media coverage of right-wing extremists and their success by two papers (a shorter Kluknavská 2015 paper and another Kluknavská 2015 paper concerning Internet activities of the ĽSNS party). The first one looks at the success of the leader of ĽSNS Marian Kotleba in the regional election in 2013. More specifically, Kluknavská studies a six-week period of high media attention dedicated to the person of Marian Kotleba after his surprising success in the first round of the election. However, she conducts her analysis based on theoretical concepts rather than empirical study. Her other short paper offers a quite detailed description of Internet activities of the ĽSNS party and stresses the importance of analysis of the activities considering the unwillingness of the ĽSNS party representatives to communicate in mainstream media.

Allen (2017) studies whether typical characteristics and attitudes of the extreme right-wing voters are regionally specific or general conclusions can be made. He compares far right voters in Western Europe with those in post-communist Europe. He controls for variables such as age, years of education, sex and employment status. In his study, he comes to a conclusion that religion plays a more important role in post-communist Europe as a determinant of support for the extreme right. Regarding position of voters on the economic left-right scale, post-communist far right voters are more economic leftists than their Western counterparts. According to Allen (2017), the most important finding is that "in post-communist Europe, dissatisfaction with democracy correlates with increased odds of a far right vote even controlling for negative attitudes toward politicians and parties". Interestingly, he states that "internal minorities, rather than immigrants, bear the brunt of the post-communist far right's xenophobia, including Roma, Jews, Turks in Bulgaria, and Hungarians in Slovakia".

Spáč and Voda (2015) analyse possible reasons of support for an extreme right-wing politician Marian Kotleba in the context of 2013 regional election in Slovakia. They focus mainly on share of Roma people as the main determinant for support for the extreme right-wing candidate. They find out that share of Roma people itself is not sufficient to explain the success of the extreme right-wing politician. They also include a contextual variable for the type of Roma settlement as they believe "it creates different conditions for the nature of everyday contact between majority and minority". In their analysis, they include compositional control variables such as share of people with a higher than secondary education, share of Catholics, Hungarians etc. Spáč and Voda (2015) come to the conclusion that support for the extreme right-wing politician rises with an increasing share of Roma people in the municipalities to the point the Roma people represent a majority in the given municipality. Moreover, the extreme right-wing politician is less successful in the municipalities with Roma people dispersed among the

majority and in the town centres as opposed to the municipalities with Roma people concentrated on the outskirts and in segregated settlements.

Agnew et al. (2015) state several possible levels and examples of context ranging from national competitive environment of an election to a local unit of analysis such as a neighbourhood, voting district or electoral precinct. As stated by Agnew et al. (2015), Pattie and Johnston (2000) consider informal conversations between residents, Carty and Eagles (2005) take into account local and targeted campaign effects. As an example of possible effects, all these interactions represented by contextual variables may have the consequence for locally dominant parties to gain even greater support.

The study of Fontana et al. (2016) is extraordinary in terms of analysing historical data. The authors study how Nazi occupation of Italy shaped the new political system of the country. More specifically, they look at a percentage of votes received by political parties at the municipal level (including extreme right wing parties) in the elections after World War II until 1992. They work with historical context defined by variables such as total resident population, population density, literacy rates and industrial plants per capita (as an indicator of economic development). Given their specific research question, Fontana et al. (2016) collected also data comprising other contextual variables such as city hall altitude, maximum and minimum altitude in the municipality, presence of Partisan brigades in the municipal area, violence by the fascist or the Germans, duration of the German occupation. These variables are rather unusual but illustrate how broad the definition of context can be.

In the same study, Fontana et al. (2016) also conducted a survey (conducted in 2015) in which they considered usual compositional factors such as sex, age, years of education but also special ones such as house ownerships, having children and vital record in order to study possible "correlations between individual political positions and the memory of the civil war". Fontana et al. (2016) come to a conclusion that the political effect of exposure to German occupation in the northern region with longer duration of Nazi occupation is significant and persists long after the war. However, this finding is not reflected in the results of extreme right-wing parties but rather in the success of left-wing extremism.

In her more recent study, Buštíková (2017) argues that the influx of refugees from Syria redirected the attention of extreme right-wing parties in post-communist countries from internal minorities to migrants which reduced previously present ideological difference between the extreme right in Western and post-communist Europe. Despite this finding, she further elaborates on aspects which still distinguish political systems and extreme right within the systems in the two parts of Europe. These aspects include left position of the extreme right-wing parties on the economy, effect of increased minority rights through the process of democratization and the existence of radicalised mainstream parties in post-communist Europe.

Although our review reflects only a small fraction of all the research on this topic, it represents well the diversity of determinants chosen by researchers. In our analysis, we concentrate mainly on compositional variables. We include age, employment, ethnic, religious and educational structure of the municipalities. From the variables reflecting attitudes of the voters, we also include voter turnout at the Slovak same-sex marriage referendum in 2015.

In terms of context, we include an economic indicator for the municipalities represented by the total municipality debt per capita. We also analyse a possible

relationship between share of votes for Hlinka's Slovak People's Party in the election in 1929 and the results of Kotleba-ĽSNS at the 2016 parliamentary election. As a proxy for urbanisation level, we use population density. We also include contextual variables reflecting changes in the municipalities in time: increase in the number of unemployed people between 2009 and 2015 and percentage change in the population size between 2005 and 2015. We work with the voter turnout in the 2012 parliamentary election as well. Although the variables related to political opportunity structure may play an important role in explaining the success of the extreme right-wing party Kotleba-ĽSNS, we leave the contextual variables related to the Kotleba-ĽSNS party and the interaction of social media and voters for an analysis to other researchers.

1.2 Data and Methodology

Arzheimer (2012) suggests we can divide the empirical research regarding right-wing extremism in two groups depending on the type of used data: micro and macro data. Micro data is related to variables collected from individual respondents, e.g. national opinion polls. Macro data refers to data collected at the level of groups, e.g. census data for municipalities. Arzheimer (2012) also proposes further categorization of studies depending on the source, temporal and geographical coverage and the level of aggregation. The choice of researchers within these categories depends then mainly on the type of question they investigate and availability of data. The categorization can be found in Appendix A.

Micro data extracted from interviews with individuals are very popular mainly due to their potential to analyse specific motives of respondents. They have become more available recently (e.g. the large and free accessible database of European Social Survey or the database of The Comparative Study of Electoral Systems). Their main disadvantage is clearly reflected in regard to the voters of extreme right-wing who often tend not to admit their preference in the interviews. Also, if support for extreme right is very weak like in the case of Great Britain, it may require a large sample to get some self-identified extreme right-wing voters. Ford and Goodwin (2010) needed a sample of 150,000 individuals in order to get 965 extreme right-wing supporters.

However, macro (aggregate) data is more reliable and usually more accessible. However, because of a certain level of aggregation, there is a danger of ecological fallacy (Robinson, 1950). Inspired by the example proposed by Arzheimer (2012), we can explain the ecological fallacy in the context of Slovakia. Spáč and Voda (2015) show that support for the extreme right-wing politician Kotleba grows if the municipality has share of Roma people between 10% and 50% as opposed to the municipalities with share of Roma people lower than 10%. However, it is unlikely to expect that the Roma people (who are a negative target of the ĽSNS campaign) have a higher propensity to vote for this party. The more likely explanation is that the aggregate correlation reflects a mixture of the below-average propensity of the Roma people to vote for the ĽSNS and a hostile reaction of other voters to the presence of the Roma people in the municipality. However, we need individual data to verify this.

There is also another kind of analysis which works with both micro and macro data: multi-level analysis. In our review, we had a couple of examples (Lubbers et al. 2002, Ford and Goodwin 2010, Van Gent et al. 2013). Such models may combine positive aspects of both types of data and diminish seriousness of the

negative aspects.

From the perspective of applied empirical approach, there is a great variety ranging from logistic regression models to spatial econometric models. Again, the type of chosen data and hypotheses are crucial for the selection of the specific model. We created a summary of the models which were used by the researchers in our reviewed literature. The summary can be found in Appendix D.

Both papers of O'Loughlin (1994 and 2002) cover the same topic of the geography of the Nazi vote in Germany in the inter-war period. The latter covers a longer time span (1924 to 1933). In both studies, macro data had to be chosen due to unavailability of historical micro data from the particular period. The units of analysis are counties and cities in Germany. Similarly with Pink et al. (2012), O'Loughlin et al. (1994) find out that the proportions of votes cast for the extreme right-wing party (in this case for the NSDAP) are not represented by a normal distribution but exhibit a binomial distribution. However, at the same time they conclude that due to a large sample, parameters can be consistently estimated by means of a least squares. Analysing summary descriptive statistics, maps of the spatial distribution of the vote share for the NSDAP and using a measure of spatial autocorrelation Moran's I, they find enough evidence to assume a spatial pattern of the NSDAP vote.

O'Loughlin et al. (1994) first estimate a linear-proportions model, then apply a method which is essentially the same as OLS (robust Jacknife) and afterwards apply weighted least squares. Next, they estimate a regression model working only with the significant variables. They find out that the residuals are non-normal, heteroskedastic and they contain a high degree of spatial autocorrelation. Hence, they take these spatial effects into account and compute both constrained and unconstrained versions of the previous regressions for six different regions in Germany. They conclude that "differences in regional effects indicate a level of spatial heterogeneity in Germany beyond that produced by socio-economic compositional differences".

Ford and Goodwin (2010), Lubbers et al. (2002) and Van Gent et al. (2013) apply multi-level analysis working both with micro and macro data. They all use a logistic regression model to estimate the model. The main difference is in the geographical coverage of the three studies. Ford and Goodwin (2010) focus on Great Britain, Van Gent et al. (2013) on the Netherlands while Lubbers et al. (2002) compare more countries.

Arzheimer and Carter (2006) work with micro data only. They offer a comparative multi-national study comprising seven West European countries. It is a panel study of more than 50,276 individuals based on individual survey results. Arzheimer and Carter (2006) use a logistic model "to estimate the probability of a voter voting for a party of the extreme right conditional on his or her individual socio-demographic attributes, and the particular political opportunity structures present in his or her country at the time of the election". If we tried to extend their approach to Central European countries, their assumption of constant regression coefficients across countries and time after controlling for individual and contextual variables may not be valid. Effectively, they do not consider the country of origin of the given respondent from the survey. Also, the adjusted pseudo-R^2 of their model is very low even after including system-level factors (0.09).

Brückner and Grüner (2010) constructed a semi-annual panel dataset comprising 16 OECD countries for the period between 1970 and 2002. Their hypothesis of growth influencing the vote share of radical parties requires a special methodo-

logical approach. There is a high probability of presence of endogeneity, which in this case translates into vote share as the dependent variable influencing the GDP growth as an independent variable. To avoid the endogeneity issue, they apply system-GMM (generalized method of moments) estimation and IV (instrumental variables) approach. As an instrumental variable for real per capita GDP growth, they decide to use international oil price shocks.

Pink et al. (2012) work with macro data only. As a source they primarily use census data and electoral results, regarding temporal coverage they use panel data and their unit of analysis is a municipality. Their main empirical model is based on OLS regression. However, they emphasize a possible violation of one of the OLS assumptions: no autocorrelation of the error terms. According to a well-known quote of Tobler (1970), "everything is related to everything else, but near things are more related than distant things". We can easily imagine this to be the case with municipalities affecting the near municipalities and vice versa. Hence, spatial autocorrelation should be taken into account. Another problem observed by Pink et al. (2012) analysing the results of election held in Slovakia is a violation of the normality assumption. This is due to the areas with higher share of people with Hungarian nationality, which as they argue, may cause an overestimation of the influence of ethnic structure on the results. Moreover, their unit of analysis is a district which makes their sample small: 79 districts. Given such a small sample, asymptotic consistency is unlikely as well. Therefore they decided not to include municipalities with share of Hungarian people higher than 50% in their analysis in order to standardize distribution of the dependent variable.

Within our reviewed literature, the work of Bos et al. (2016) is extraordinary in terms of their methodological approach. Bos et al. (2016) use an experimental design to assess a possible causal relationship between media coverage of extreme right-wing parties and their electoral success. They focus only on the Netherlands. In their online survey experiment, they assigned randomly 600 individuals to eight groups in which each individual read an article with the topic of immigration, crime, taxes or privacy and either the individual received or did not receive a right-wing populist party cue.

Buštíková (2014) works with data covering all post-communist democracies from 1991 to 2012. Her dataset is structured as a quasi-time series of 93 parliamentary elections in 17 countries and the dependent variable is the extreme right party's combined vote share in elections held at a given point of time. Her data consists of party-level data without any surveys of individuals or any census data. She then conducts regressions using random effects model. Her more recent paper (Buštíková 2017) reflects theoretically the recent changes in the electoral map of the Eastern European countries but she does not apply any data.

Allen (2017) considers the possibility of different effects of main variables between West Europe and post-communist countries and hence he interacts each main effect with a dummy variable indicating post-communist status. Otherwise, he also uses a logistic regression model comparing voters in 14 countries.

Spáč and Voda (2015) use macro data and apply a cross-sectional analysis of the results of a Slovak extreme right-wing politician Marian Kotleba in the 2013 regional election. Unlike Pink et al. (2012), their unit of analysis is a municipality. They estimate an OLS model and restrict their analysis only to the municipalities with less than 30% share of Hungarians. They use Pearson coefficients as indicators of correlation between the independent variables and hence manage to find a very high correlation between unemployment, share of Roma population

and the level of education. Therefore they conclude that mainly the coefficients of the variables unemployment and education may be affected by the existing correlation. As they believe the effect of share of Roma people in a municipality can vary depending on their actual share, they create dummy variable for various percentage shares of the Roma people starting from 1 for the municipalities with no Roma people up to 7 for the municipalities with share of Roma people more than 50%.

Fontana et al. (2016) work primarily with macro data from a historical census and historical database of parliamentary results. However, they also conducted a survey in 2015 where they worked with micro data comprising more than 2500 individuals. They focus their research only on Italy in the attempt to investigate the effect of Nazi occupation on political extremism. They apply a non-experimental causal analysis using regression discontinuity design. Effectively, they exploit the fact that the duration and intensity of Nazi occupation varied across Italy with a clear difference in two regions given a specific geographic boundary.

In our analysis, we work with macro data only. This does not allow us to work with certain variables related to individuals. There are cases when researchers find evidence for different propensity to vote for extreme right between men and women. However, the sex structure is almost identical across municipalities. Having almost no variation in share of men, we cannot include it in the model as our independent variable. Moreover, macro data may present a danger of ecological fallacy. However, the macro data enables us to observe spatial effects which is often not possible with individual data. The description of our data and their sources can be found in Chapter 5. In our model, we conduct a cross-sectional analysis at the municipal level using first OLS as our baseline regression model. We also check whether the assumption of normal distribution of the dependent variable for the OLS model is not violated. It is possible that the error term is spatially correlated due to omitted variable bias. We may solve this issue by taking space into account using a spatial error model. We further elaborate on the theory of both models in Chapter 3.

Chapter 2

Features of Right-wing Extremism and Its Presence in the Slovak Republic

In the literature, there are many terms ranging from right-wing populism through national populism, radical right-wing populism to neo-populism, which describe basically the same ideology significantly rising in the European political systems in recent years. In our work, we decided to use the term "radical right-wing extremism" or just "right-wing extremism". There is no single definition of right-wing extremism as it often differs from country to country or even within countries. Mudde (2000) offers an overview of possible definitions of the right-wing extremism from previous literature and considers aspects of right-wing extremism such as nationalism, exclusionism, xenophebia, populism, anti-democratic features on the small sample of Western radical right-wing parties which fit these characteristics. Although there are aspects of radical right-wing extremism (e.g. immigration) which are unique in the context of Western Europe, we may still find some common features with the countries of Central and Eastern Europe. Also, it is not exceptional that the radical right-wing parties establish common ideological platforms at European level (such as the Alliance for Peace and Freedom).[1]

After the fall of communism in 1989, democratic competition enabled politicians advocating features of radical right-wing ideology to become a relevant part of the Slovak political system. We consider two Slovak political parties which arguably share radical right-wing ideology and were successful in parliamentary election at some point of their history. The first party is the Slovak National Party (SNS). This party was established in 1990 by declaring its link to the historical SNS which existed until 1938 (Gyárfášová and Mesežnikov 2008). Right from its beginnings, the party stood up for the independence of Slovakia within the Czech and Slovak Federative Republic. In the years 1993 to 1994, 1994 to 1998 and 2006 to 2010, the party was a governing party. In the 2016 parliament-

[1]The Alliance for Peace and Freedom (APF) is an extreme right European political party. It was founded on February 4, 2015. The main member parties had been involved in the now defunct European National Front. The party is hard Eurosceptic. The member parties include parties from Belgium (Flanders Identitists and Nation Movement), Czech Republic (Workers' Party of Social Justice), Denmark (Party of the Danes), Germany (National Democratic Party of Germany), Greece (Golden Dawn), Italy (New Force), Slovakia (Kotleba – People's Party Our Slovakia), Spain (National Democracy) and United Kingdom (British Unity Party). *Source:* `https://en.wikipedia.org/wiki/Alliance_for_Peace_and_Freedom`

ary election, the party managed to become a governing party again. According to Gyárfášová and Mesežnikov (2008), the party was from its post-communist beginnings in favour of the concept of an ethnic nation. Its agenda was typically focused on the Hungarian minority living in Slovakia with the attempts to limit its minority rights and representatives of the party often used a confrontational rhetoric against representatives of the minority.

Kluknavská (2012) analyses the aggressive and nationalistic rhetoric of the Slovak National Party which can be seen in its slogans before the 1998 election such as "for God – for nation" (which became also one of the slogans of the Kotleba-ĽSNS party), "for the happiness in the lives of all of us, Slovaks" or "let us vote for Slovakia without parasites" (cited from Školkay 1999) which was aimed primarily at the Roma minority. SNS emphasised the idea of endangerment of the Slovak statehood and the proposed measures to defend it were often in a conflict with the principles of liberal democracy due to their repressive content (Gyárfášová and Mesežnikov 2008). From the other ideological features of radical right-wing extremism defined by Mudde (2000), the idea of a strong state was always in the ideological core of the Slovak National Party.

As mentioned by Kluknavská (2012), Rybář (2011) believes that under the leadership of the longest-serving chairman in the history of the party – Ján Slota, the Slovak National Party became one of the most centralised and the least democratic political parties in Slovakia primarily serving as a tool for reaching the personal and political ambitions of its chairman. The current Slovak National Party under the leadership of a new chairman moved away from the anti-minority rhetoric regarding Roma and Hungarian people to an anti-Muslim rhetoric. The new chairman proposed a ban to wear burqa, to construct mosques and minarets as well as to increase the church registration quota from 20,000 to 50,000 signatures.[2] Hence, in this sense the party is now arguably closer to its Western counterparts than ever before.

If we use the list of ideological features and themes of the radical right which Mudde (2000) considers, we find out that the Kotleba-ĽSNS party fits many of these characteristics. History of the party goes back to the late 1990s when right-wing extremists started gathering around a group called Slovenská pospolitosť (Slovak Togetherness) registered as a civil society in 1995. In July 2003, Slovak Togetherness gained more media attention during one public event when the group members dressed themselves in uniforms similar with the uniforms of Hlinka Guard.[3] Hence, the group members were labelled by the media as extremists. Slovak Togetherness used to defend itself to avoid prosecution by pointing at various details such as the colour of their uniforms which were dark blue but also features of their ideology which was according to them not anti-Semitic and xenophobic, but aimed at a defence against Zionism and oppression from Roma people (Kluknavská 2012).

Other features of right-wing extremism which could also be found in the case

[2]Cited from the article with the title "Andrej Danko: Islamizácia sa začína kebabom!" available at the official site of the Slovak National Party. *Source:* `http://www.sns.sk/aktuality/andrej-danko-islamizacia-sa-zacina-kebabom/` *or* `http://www.extraplus.sk/clanok/danko-proti-dankovi`

[3]The Hlinka Guard was officially established in Slovakia on October 8, 1938 but its roots can be traced back as early as the 1920s to the "Rodobrana" which was a strong arm group that styled itself along the lines of the Mussolini's Black shirts, and the Nazi SA. Hlinka guardsmen wore black uniforms and a cap shaped like a boat, with a woolen pompom on top, and they used the raised-arm salute. By October 1942 the Hlinka guard had overseen the deportation of some 60,000 Slovak Jews. *Source:* `http://www.holocaustresearchproject.org/nazioccupation/hlinka.html`

of the Slovak Togetherness include anti-democratic features such as the so-called leader principle (Führerprinzip) and elitism as proposed by Mudde (2000). As Kluknavská (2012) cites from the already not existing website of the Slovak Togetherness (pospolitost.org 2004), according to the Leader of the group (as the leader of the group Marian Kotleba let call himself) the aim of the Slovak Togetherness should have been to "build a new Slovak Estates country on the national, social and Christian principle in the spirit of the ideas of Ľudovít Velislav Štúr".

Under the leadership of a secondary school teacher Marian Kotleba the first attempt of the group to establish a political party was not successful. After the decision of the Slovak Supreme Court, the Slovak Togetherness – National Party was dissolved in 2006. However, members of the group managed to buy another already established party, renamed it to People's Party Our Slovakia (ĽSNS) and continued with their public actions under the new brand (Mesežnikov and Bránik 2017).

In the 2012 parliamentary election, the ĽSNS party received 1.58% of total votes (under 5% electoral threshold) and hence did not get into the parliament. As Kluknavská (2012) states, most of the party's topics in its election programme were linked with the protection of national interests of Slovaks and their security against "foreign influences" from minorities or from abroad. In the party journal Our Slovakia (Naše Slovensko) which would Mudde (2000) classify as internally orientated party literature, a harsh criticism of the Roma community is a dominant topic which can also be seen in the reference to the Roma people who are often called "parasites". Another topic of the party is a harsh criticism of the European union, the party places Slovak interests "above the dictate of EU" and calls for re-introduction of the Slovak national currency. As cited by Kluknavská (2012) from the journal Naše Slovensko (10/2011), the party claims that "EU with its bureaucracy and supranational dictate possesses a greater danger for Slovakia than Hungarian chauvinism". In the same journal from March 2014[4], author referred to the European flag as "an occupational European rag". We may conclude that in its euroskepticism, the party is certainly close to its Western counterparts.

The aspect of welfare chauvinism mentioned by Mudde (2000) is present in the ideology of the party in the form of belief that priority in jobs and social benefits should be attributed to the "decent citizens" rather than "parasites".

A prelude to the success of the party from the 2016 parliamentary election was a success of its leader Marian Kotleba in the regional election which took place in November 2013. Kotleba managed to win second round of the election in the central region of Banská Bystrica and became thus the Governor of the Banská Bystrica self-governing region.[5]

In the parliamentary election held in March 2016, already renamed party Kotleba-ĽSNS won 8.04% of the total votes (above 5% electoral threshold) and became thus a parliamentary party. As stated by Mesežnikov and Bránik (2017),

[4]The March 2014 issue of the Journal Naše Slovensko. *Source:* `http://www.naseslovensko.net/casopis-nase-slovensko/`

[5]Prognosis of the prime minister and chairman of the ruling party SMER-SD that "a sack of potatoes would beat Mr Kotleba" and that the candidate of the SMER-SD party Vladimír Maňka "will win sovereignly" after the first round of the regional election (in which the candidate Marian Kotleba received 21.30% of the total votes) was not fulfilled as Vladimír Maňka lost with Marian Kotleba in the second round (in which the candidate Marian Kotleba received 55.50% of the total votes). Voter turnout reached around 24.60% in both rounds. *Sources:* `http://www.topky.sk/cl/10/1367915/Kotleba-si-trufa-na-vitazstvo-v-druhom-kole---Skromna--kampan-za-tisicky-eur-` *and* `http://www.sme.sk/volby-vuc/2013/vysledky/banskobystricky-kraj/#p2`

"along with established and well-known radical nationalist activists, the party's candidate list included people who had broken the law". There were candidates with criminal history of violent acts against the Roma people and immigrants, people who denied Holocaust and defenders of Nazism.

After the election, party continued with its anti-Western ideology while attributing negative characteristics to both NATO and the EU. On the 1st of July 2016, Kotleba-ĽSNS announced that he would initiate petition for a referendum about the withdrawal of Slovakia from the EU and NATO (Mesežnikov and Gyárfášová 2016). Although the party became a parliamentary party, most of its activities stayed outside the parliament. During the 2016 Rainbow Pride in Bratislava, the party organised an unauthorized manifestation against this event under the title "Protest against the march of sickos in the city of Bratislava". The ideology of "law and order" was further enhanced by introducing the patrols aboard trains in order to protect the decent passengers from "violent" Roma. Although the Slovak parliament banned such patrols in trains, Kotleba-ĽSNS did not stop to organise them (Mesežnikov and Bránik 2017).

Based on the programme of Kotleba-ĽSNS, members in charge of the party, their professionalism and the first experience with its actions in the position of a parliamentary party, Mesežnikov and Gyárfášová (2016) believe that "the party is not set to a standard process of preparation and realisation of practical political solutions but represents a power directed towards the elimination of current system". Despite this, over a one year period after the 2016 parliamentary election, support for the Kotleba-ĽSNS party was quite stable according to polls reaching 9,5% at the beginning of the year 2017.[6] Hence, nothing suggests that the phenomenon of radical right-wing extremism in Slovakia will disappear in the near future.

[6]Based on the results of a representative survey conducted by the research agency MEDIAN SK s.r.o. between 23rd January and 19th February 2017 on the sample of 1,026 respondents. *Source:* `http://www.topky.sk/cl/100535/1615029/Prieskum-rok-po-volbach-ukazuje-rozlozenie-sil--Najviac-si-polepsila-SaS--Smer-naopak-klesa`

Chapter 3

Methodology

In this chapter, we elaborate on the methodology behind the models we apply in this study. We first introduce ordinary least squares model which we use as our baseline model. We explain mechanism of ordinary least squares model, its interpretation and assumptions behind the model. In the second part of the chapter, we concentrate on the methodology of spatial error model which we apply in our study in order to take spatial effects into account. This chapter is devoted to theoretical basis of ordinary least squares and spatial error models.

3.1 Ordinary Least Squares Model

Ordinary least squares (OLS) model is a linear regression model which uses ordinary least squares method to estimate its parameters. Using this method, the estimators of the model are calculated in such a way that the sum of squared differences between its predicted values and values of the dependent variable is minimized.

Let us define a general multiple regression model:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + u\,, \tag{3.1}$$

where y represents a dependent variable, $x_1, \ldots, x_k$ represent independent variables, β_0 is the intercept, β_1 is the parameter associated with x_1 (β_2 is the parameter associated with x_2, etc.) and u is the error term.

An important assumption for the multiple regression model states that the conditional expected value of the error term given all the independent variables equals 0:

$$\mathrm{E}(u|x_1, x_2, \ldots, x_k) = 0\,. \tag{3.2}$$

If there is a correlation between the error term u and any of the independent variables, the assumption (3.2) fails. If the assumption (3.2) does not hold, the OLS estimates are biased. Having this assumption and the definition of OLS method, the OLS estimators can be obtained applying partial differentiation and basic algebra. The aim is to find $b_0, b_1, \ldots, b_k$ such that the following expression is minimized:

$$\sum_{i=1}^{n} (y_i - b_0 - b_1 x_{i1} - \ldots - b_k x_{ik})^2\,. \tag{3.3}$$

After some calculations (see Appendix B), we get the OLS estimates $\hat{\beta}_0 = b_0, \hat{\beta}_1 = b_1, \ldots, \hat{\beta}_k = b_k$ of the following OLS sample regression function for k independent variables:

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 + \cdots + \hat{\beta}_k x_k \,, \tag{3.4}$$

such that $\hat{\beta}_j = \dfrac{\sum_{i=1}^{n} \hat{r}_{ij} y_i}{\sum_{i=1}^{n} \hat{r}_{ij}^2}$ for $j = 1, \ldots, k$ where $\hat{r}_{ij}$ represents residuals from regressing x_j on all the other independent variables.

The estimates $\hat{\beta}_j$ have ceteris paribus interpretations. From equation (3.4), we get for $\Delta\hat{y}$ (change in $\hat{y}$)

$$\Delta\hat{y} = \hat{\beta}_1 \Delta x_1 + \hat{\beta}_2 \Delta x_2 + \cdots + \hat{\beta}_k \Delta x_k \,, \tag{3.5}$$

where Δx_i is change of variable x_i.

If we fix $\Delta x_2, \ldots, \Delta x_k$, then

$$\Delta\hat{y} = \hat{\beta}_1 \Delta x_1 \,. \tag{3.6}$$

Hence, the estimate $\hat{\beta}_1$ measures the change in y given a one-unit increase in x_1, holding all other independent variables fixed. This definition provides us with another interpretation of OLS estimates as partial derivatives of y with respect to the x variable which they multiply:

Holding $\Delta x_2, \ldots, \Delta x_k$ fixed, then:

$$\hat{\beta}_1 = \frac{\partial \hat{y}}{\partial x_1} \,. \tag{3.7}$$

The $\hat{\beta}_i$ coefficients represent then the partial derivative of y with respect to the x_i whose effect they estimate under the assumption of ceteris paribus.

It is important to stress that we derived the OLS estimates assuming a well-specified model. Ideally, we want our model to fulfil Gauss-Markov assumptions which make our OLS estimates unbiased and efficient. We specify the assumptions in Appendix C. If we find presence of spatially correlated error violating the OLS assumptions, estimation of spatial error model may solve the issue.

3.2 Spatial Error Model

We continue with our previous general multiple regression model (3.1) which we can express also in the matrix form:

$$y = \mathbf{X}\beta + u \,, \tag{3.8}$$

where y denotes an $n \times 1$ vector, $\mathbf{X}$ denotes $n \times (k+1)$ matrix, β denotes $(k+1) \times 1$ vector of parameters and u denotes an $n \times 1$ vector. The error term u represents

normally distributed, homoskedastic and uncorrelated errors.

Spatial interactions between observations can enter the model (3.8) either in the form of spatial lag dependence where "nearby values of the dependent variable exert a direct effect on the value of the dependent variable itself" (Ward and Gleditsch 2008) or in the form of spatial error correlation where the errors u from the model (3.8) are spatially correlated. Spatial error model (SEM) treats the latter spatial interaction in the following way:

$$\begin{aligned} y &= \mathbf{X}\beta + u\,, \\ u &= \lambda \mathbf{W} u + \epsilon\,, \end{aligned} \tag{3.9}$$

where λ denotes the spatial autoregressive parameter indicating the correlation of the residuals, $\mathbf{W}$ denotes an $n \times n$ spatial weight matrix and ϵ denotes an $n \times 1$ vector. This time, the error term ϵ represents homoskedastic and uncorrelated errors. Clearly, if there is no presence of spatial error in the model, $\lambda = 0$ and we can apply the model (3.8). However, from now on we assume that $\lambda \neq 0$.

The error term u from the model (3.9) can also be written in the following form:

$$\begin{aligned} u &= \lambda \mathbf{W} u + \epsilon \\ \epsilon &= u - \lambda \mathbf{W} u \\ \epsilon &= (\mathbf{I} - \lambda \mathbf{W}) u \\ u &= (\mathbf{I} - \lambda \mathbf{W})^{-1} \epsilon\,. \end{aligned} \tag{3.10}$$

If we only wanted to get the OLS estimates for our independent variables and disregarded λ, the OLS estimates would be unbiased and consistent for the spatial error model. However, the reported standard errors would be incorrect and the estimated coefficients would not necessarily be efficient (Ward and Gleditsch 2008):

$$\begin{aligned} \mathrm{Cov}(u) &= \mathrm{E}(uu^T) \\ &= \mathrm{E}\{[(\mathbf{I} - \lambda \mathbf{W})^{-1}\epsilon][(\mathbf{I} - \lambda \mathbf{W})^{-1}\epsilon]^T\} \\ &= \mathrm{E}\{(\mathbf{I} - \lambda \mathbf{W})^{-1}\epsilon\ \epsilon^T[(\mathbf{I} - \lambda \mathbf{W})^{-1}]^T\} \\ &= (\mathbf{I} - \lambda \mathbf{W})^{-1}\sigma^2\mathbf{I}[(\mathbf{I} - \lambda \mathbf{W})^{-1}]^T \\ &= \sigma^2(\mathbf{I} - \lambda \mathbf{W})^{-1}(\mathbf{I} - \lambda \mathbf{W}^T)^{-1}\,. \end{aligned} \tag{3.11}$$

Data generating process for the spatial error model (3.9) has the following form (Sage and Pace 2008):

$$y = \mathbf{X}\beta + (\mathbf{I} - \lambda \mathbf{W})^{-1}\epsilon\,. \tag{3.12}$$

If we want to use the method of maximum likelihood estimation, the following condition indicating normal assumption for the error term ϵ must be fulfilled:

$$\epsilon \sim N(0, \sigma^2\mathbf{I})\,, \tag{3.13}$$

where $\mathbf{I}$ denotes an identity matrix (an $n \times n$ matrix with 1s on the diagonal and zeros everywhere else).

Maximum likelihood estimation leads to estimates and error variance that maximise the joint probability density for the given sample. The estimation is based on the eigenvalues of the spatial weights matrix. Using maximum likelihood estimation, we must first estimate the serial correlation and then transform the data and fix the spatial correlation (Ward and Gleditsch 2008):

The transformation from ϵ to y:

$$\epsilon = (\mathbf{I} - \lambda\mathbf{W})(y - \mathbf{X}\beta)\,, \tag{3.14}$$

so we can get the Jacobian:

$$J = \left|\frac{\partial\epsilon}{\partial y}\right| = |\mathbf{I} - \lambda\mathbf{W}|\,. \tag{3.15}$$

The log-likelihood function for the spatial error model is then obtained from the log-likelihood function for the classical regression model (Greene 2002):

$$\ln\mathcal{L}(\beta,\sigma^2) = -\frac{n}{2}\ln(2\pi) - \frac{n}{2}\ln(\sigma^2) - \frac{1}{2\sigma^2}(y - \mathbf{X}\beta)^T(y - \mathbf{X}\beta)\,. \tag{3.16}$$

We create the log-likelihood function for the spatial error model by correcting the function (3.16) with the natural logarithm of the Jacobian (3.15) and by replacing the expression $(y - \mathbf{X}\beta)$ with ϵ from (3.14):

$$\ln\mathcal{L}(\beta,\sigma^2,\lambda|y,\mathbf{X}) = \ln|\mathbf{I} - \lambda\mathbf{W}| - \frac{n}{2}\ln(2\pi) - \frac{n}{2}\ln(\sigma^2) - \frac{1}{2\sigma^2}\epsilon^T\epsilon\,. \tag{3.17}$$

Using (3.14), the log-likelihood function can also be written in the following form:

$$\begin{aligned}\ln\mathcal{L}(\beta,\sigma^2,\lambda|y,\mathbf{X}) = {} & \ln|\mathbf{I} - \lambda\mathbf{W}| - \frac{n}{2}\ln(2\pi) - \frac{n}{2}\ln(\sigma^2) \\ & - \frac{1}{2\sigma^2}(y - \mathbf{X}\beta)^T(\mathbf{I} - \lambda\mathbf{W})^T(\mathbf{I} - \lambda\mathbf{W})(y - \mathbf{X}\beta)\,.\end{aligned} \tag{3.18}$$

Finding a maximum-likelihood estimator for β from the function (3.18) is difficult as λ is unknown and the function (3.18) involves the determinant $|\mathbf{I} - \lambda\mathbf{W}|$ which is an n-th order polynomial in λ, which needs to be evaluated at every iteration of the estimation process (Ward and Gleditsch 2008). However, Ord (1975) showed that the estimation process can be simplified.

If the matrix $\mathbf{W}$ has eigenvalues $\omega_1, \ldots, \omega_n$, then:

$$|\omega\mathbf{I} - \lambda\mathbf{W}| = \prod_{i=1}^{n}(\omega - \lambda\omega_i)\,. \tag{3.19}$$

If we now set $\omega = 1$, the equation (3.19) has the following form:

$$|\mathbf{I} - \lambda\mathbf{W}| = \prod_{i=1}^{n}(1 - \lambda\omega_i)\,. \tag{3.20}$$

According to Ord (1975), the advantage of (3.20) is that the eigenvalues $\{\omega_i\}$ can be determined once and for all before the estimation of the rest of the model.

We can then relatively easily find the maximum likelihood estimator for the spatial error model by maximizing the log-likelihood function (3.18). Mathematically, we do this by setting the first partial derivative of the log-likelihood function (3.18) with respect to β equal to zero.

However, it should be stressed that in the maximum likelihood estimation for spatial models the data are assumed to be normally distributed as opposed to OLS where only a normal distribution of the errors is needed (Ward and Gleditsch 2008).

Chapter 4

Data

In this chapter, we introduce data and weighting schemes used in our work. We have 2,928 municipalities in our dataset out of which 4 municipalities are military training areas (Javorina, Lešť, Valaškovce, Záhorie) and 39 municipalities are boroughs belonging either to Bratislava or Košice.

We do not have complete data for all the municipalities. However, as the number of missing values in our dataset is small (usually ranges from 2 to 18 missing values), we may conclude that our sample is representative enough given the total number of municipalities.

In the following sections, we introduce the dependent variable used in our regression models: the 2016 parliamentary election results[1] of the party Kotleba-ĽSNS. Next, we describe variables which we use as independent variables in the regression models. We also introduce the weighting matrices used in the spatial regression model. Finally, we state the sources of our data.

4.1 Election Results

First, we check whether our dependent variable "votes" representing a percentage share of the votes for Kotleba-ĽSNS party in a given municipality is normally distributed. It is likely that a normal distribution assumption is violated (O'Loughlin et al. 1994, Pink et al. 2012).

Indeed, from Figure 4.1 we may conclude that the distribution of the dependent variable "votes" is skewed right (positive). This is likely to be due to the municipalities with a high share of the Hungarian population in which nationality plays the most important role in the voting behaviour. We check this by removing all the municipalities with share of the Hungarian population higher than 30%. This decreases the sample size to 2,479 municipalities. The histogram for our new sample is given by Figure 4.2. We may see that this distribution is still skewed right but the skewness is smaller. Also, this distribution follows the normal curve better. Based on these figures and methodological approach from

[1]Parliamentary election were held in Slovakia on 5 March 2016 to elect the 150 members of the National Council. The ruling left-wing Direction – Social Democracy (SMER-SD) party remained the strongest party, but lost its majority. The Slovak Democratic and Christian Union – Democratic Party (SDKÚ-DS) which led the government between 2000 – 2006 and 2010 – 2012 was defeated heavily, failing to pass the electoral threshold and losing its representation in the National Council. The centre-right Christian Democratic Movement (KDH) also failed to pass the threshold for the first time since 1990, whilst the far-right Kotleba-ĽSNS party entered parliament for the first time. *Source:* `https://en.wikipedia.org/wiki/Slovak_parliamentary_election,_2016`

previous studies, we decide to use two models in the following parts: one for all the municipalities and one for the reduced sample with 2,479 municipalities.

Figure 4.1: *Histogram of our dependent variable with the overlayed normal curve using all 2,928 municipalities.*

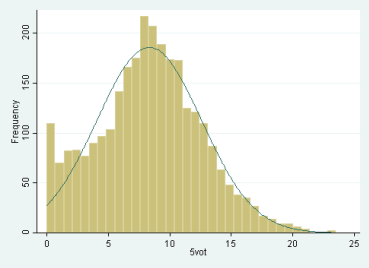
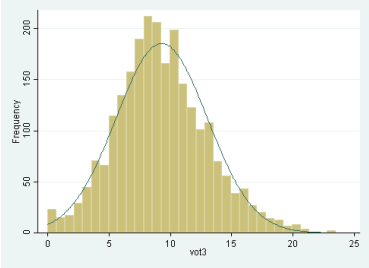


Figure 4.2: *Histogram of our dependent variable with the overlayed normal curve based on 2,479 municipalities.*



From the summary statistics for our dependent variable, we can see that it reflects the previous histograms with the mean of 8.60 being closer to minimum than maximum of the variable "votes" (Table 4.1).

Table 4.1: *Dependent variable - descriptive statistics.*

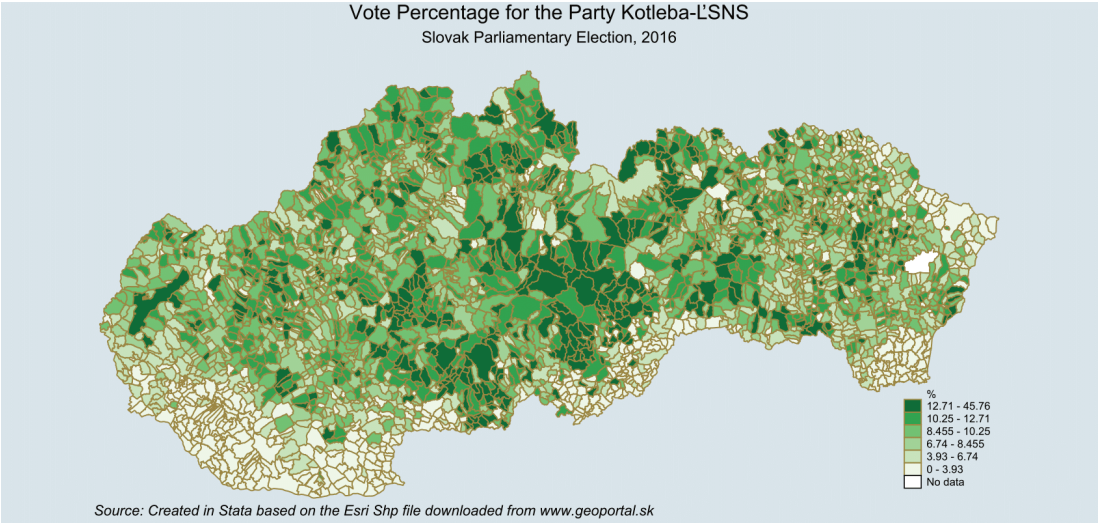
Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
votes	8.60	4.76	0	45.76	2926

We also observe a little geographically dispersed support for the party Kotleba-ĽSNS in the 2016 parliamentary election. Indeed, from Figure 4.3, we may conclude that support for the party is quite uniform (apart from the south of Slovakia). The coefficient of variation[2] for our dependent variable is equal to 55%. On the contrary, the same statistic for the result of the party in 2012 parliamentary election is equal to 119%. Hence, it seems that rather than having even greater support in the regions where the party already had a strong support, the party managed to find electoral support in regions where it had previously a smaller success.

Searching for some patterns in the spatial variation of the dependent variable "votes", we may clearly see that the Kotleba-ĽSNS party received significantly smaller support in the south of Slovakia (Figure 4.3) with a higher share of people with Hungarian nationality.

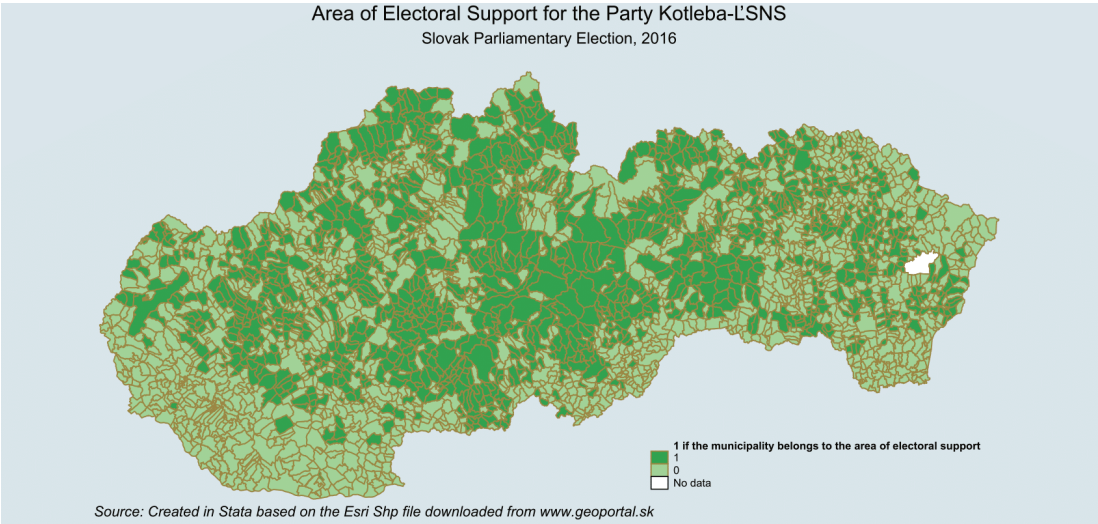
[2]Coefficient of variation is calculated as the ratio of the standard deviation to the mean. It is used to compare the variability of different variables. Smaller value of the coefficient suggests a smaller relative variability of the variable. *Source:* `http://stats.idre.ucla.edu/other/mult-pkg/faq/general/faq-what-is-the-coefficient-of-variation/`

Figure 4.3: *Map of Slovakia with the polygons representing boundaries of municipalities showing percentage support for Kotleba-ĽSNS.*



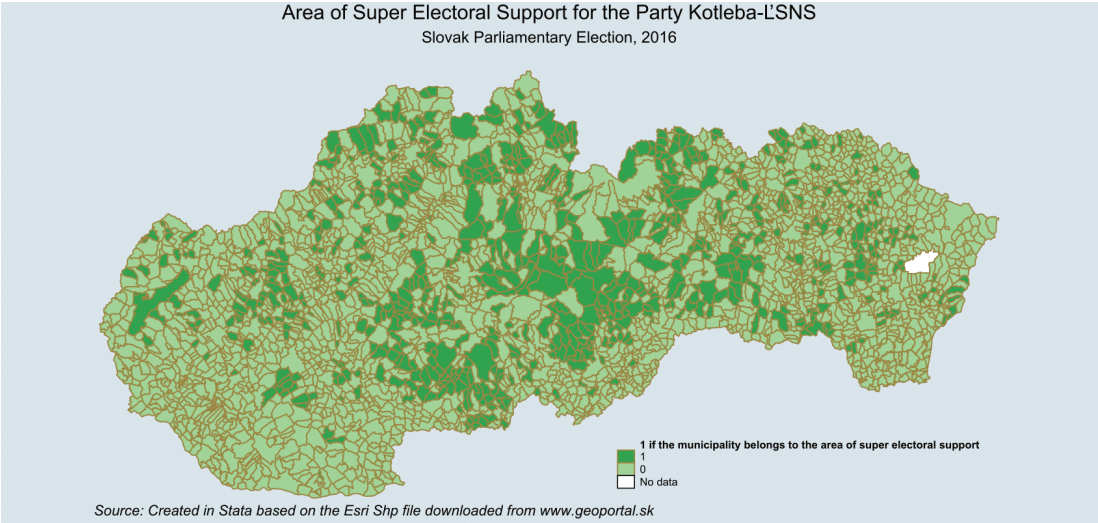
The areas of electoral and super electoral support[3] for the Kotleba-ĽSNS party are determined by Figure 4.4 and Figure 4.5, respectively. Based on both figures, it is clear that the party managed to gain most of its support mainly in the central part of Slovakia and in the northern regions of Slovakia.

Figure 4.4: *Area of electoral support for Kotleba-ĽSNS party within municipal boundaries.*



[3]As stated by Pink et al. (2012), the area of electoral support is created in the following way: First, electoral results of the party are ordered in a descending order from the municipality with the highest percentage success of the party to the municipality with the lowest percentage success of the party. Next, the number of votes for the party are summed up in the stated order of the municipalities. At the point where 50% of the overall support for the party is reached, the area of electoral support for the party is determined. At the point where 25% of the overall support for the party is reached, the area of super electoral support for the party is determined.

Figure 4.5: *Area of super electoral support for Kotleba-ĽSNS party within municipal boundaries.*



4.2 Determinants

The list of variables we consider as possible determinants of support for Kotleba-ĽSNS is very broad. The complete list can be seen in Appendix D. From the group of compositional variables, we expect that share of young people at age 20 to 24 years and share of people at age 65 and older have opposite effects on support for the Kotleba-ĽSNS party. We expect the variable "young" to have a positive effect and the variable "old" a negative effect on support for the radical right-wing party. Both variables were calculated as proportions of the total population living in the municipality as of the end of the year 2015.

Ethnic structure is reflected by three variables: share of Hungarian, Ruthenian and Roma population. Generally, we believe that municipalities with a higher share of people with other than Slovak nationality should bring a lower support for the Kotleba-ĽSNS party. All these variables were calculated based on the total population of the municipality as of the year 2011 (or 2013 for the variable "roma" where we had more relevant data for some municipalities from the year 2013).

Regarding the education and job structure, we analyse share of people working in services and science ("nonmanual")[4], share of people with a completed secondary education or a lower level of education ("lowEduc") and share of qualified unemployed people ("qualUne").[5] The effect of the variable "qualUne" on our dependent variable should be positive. We decided to use share of the qualified unemployed people in order to separate two groups with arguably different voting behaviour which would otherwise be mixed in the total share of unemployed people: the Roma people who are unemployed from all the other unem-

[4]We created this variable by summing up share of people working in the division 33 (Repair and installation of machinery and equipment) up to the division 96 (Other personal service activities) based on the classification of economic activities issued by Statistical Office of the Slovak Republic. All the divisions may be found in the following document: Statistical Classification of Economic Activities, Rev. 2 (2008). *Source of the document:* `https://slovak.statistics.sk` Metadata - Classifications - Statistical Classification of Economic Activities, Rev. 2 (2008).

[5]Share of people previously exercising a job requiring a higher level of education: members of the armed forces or managers, specialists, technicians, office workers, workers in services.

ployed people. Effectively, we manage to get a correlation between the variables "roma" and "qualUne" equal to 0.03 and thus solve the collinearity issue (see Table 4.5). It must also be stressed that share of unemployed people does not equal unemployment rate in this case. Unemployment rate is calculated based on the total economically active population whereas our variable "qualUne" is calculated based on the total population. The most recent availabe statistic on the unemployment rate is from the Census (2011) and hence we decided not to use it. Although there are papers (such as Bahna and Zagrapan 2017) where the unemployment rate as of 2011 was used in the model explaining support for Kotleba-ĽSNS party in the 2016 parliamentary election, we believe that given the recent period of financial crisis significantly affecting also the unemployment rate, it is not a good approach to work with such outdated data. On the contrary, age and ethnicity structure are not likely to change so dramatically over a couple of years. Regarding the variables "nonmanual" and "lowEduc", we believe that increasing the share of manual workers and the share of people with a lower education should increase support for Kotleba-ĽSNS.

From the variables related to religious structure, we expect the effect of share of Roman Catholics (from the 2011 Census) to be positive on support for the Kotleba-ĽSNS party. We also decided to include voter turnout at the same-sex marriage referendum ("refTurnout") which took place in the year 2015.[6] Opinion of the voters was primarily expressed by their participation or non-participation in the referendum. We assume that a higher participation in the referendum is linked with a more conservative environment. Hence, we expect that the variable "refTurnout" should have a positive effect on support for the Kotleba-ĽSNS party.

From the group of contextual variables, we work with voter turnout in the 2012 parliamentary election ("turnout12") and population density – people per km^2 ("popDensity"). It is often argued that in the 2016 parliamentary election Kotleba managed to mobilize voters in the municipalities with a low voter turnout from the parliamentary election in 2012. Hence, we expect that the variable "turnout12" has a negative effect on support for Kotleba-ĽSNS party. We decided to include the variable "popDensity" as a proxy for urbanisation level. If we make the assumption that urban areas tend to bring less support for radical right-wing parties, the variable "popDensity" should have a negative effect on our dependent variable.

We also work with a variable reflecting municipal financial management: total municipality debt per capita ("munDebt").[7] On one hand, one could argue that a healthy financial management should be a sign of having capable people in charge of municipal issues who should have support of local inhabitants. On the other hand, a strict budget policy with the aim to improve financial status of the municipality may reduce or worsen services provided by the municipality to its inhabitants. The first case should reduce support for the radical right-wing, the other case should increase support for the radical right-wing. However, the effect

[6] The referendum which was held on 7 February 2015 asked three questions: Do you agree that only a bond between one man and one woman can be called marriage? Do you agree that same-sex couples or groups should not be allowed to adopt and raise children? Do you agree that schools cannot require children to participate in education pertaining to sexual behaviour or euthanasia if their parents do not agree? The referendum was not successful as only 21.4% of citizens casted their votes (the voter turnout above 50% is necessary for a referendum in Slovakia to be legally binding).

[7] *Total municipality debt per capita* is calculated based on the data from the Ministry of Finance of the Slovak Republic indicating the total debt of municipalities in relation to current income for the previous year (data is subsequently converted per 1 person). *Source:* `http://www.hospodarenieobci.sk/`

is generally disputable mainly if we take into account that in a parliamentary election, voters may often express their dissatisfaction with issues that are not under control of a municipality.

Inspired by the work of Brückner and Grüner (2010), who argue that economic growth (or stagnation) is an important factor to explain the rise of right-wing extremism, we use two contextual variables attempting to measure the growth effects: increase in the number of unemployed between the years 2008 and 2015 ("uneChange") and increase in the population size between 2005 and 2015 ("popIncrease"). Our expectation is that the variable ("uneChange") should have a positive effect on our dependent variable as dissatisfaction and worsened economic well-being is likely to be reflected in casting votes for the extreme right-wing parties. The effects of financial crisis were not fully present in Slovakia in 2008 yet and the employment levels actually reached their peaks.[8] Hence, we decided to use the year 2008 as the base year for the variable "uneChange". As also census data is typically collected in ten-year intervals to observe some potentially significant changes in population structure, we decided to use the year 2005 as our base year for the variable "popIncrease". Negative values of the variable "popIncrease" suggesting that people leave the municipality should be linked with a worse economic situation in the given municipality and hence we expect support for Kotleba-ĽSNS to be higher in the municipalities where the number of inhabitants decreased over the ten-year period.

Table 4.2 summarizes the descriptive statistics of both groups of contextual and compositional variables considered in the regression models.

[8]In the middle of 2008, the unemployment rate in Slovakia was at its historical minimum (below 7.5%). The effect of economic crisis on employment began to impact at the end of the year. At the beginning of 2009 the unemployment rate was above 9% and in the second half of the year it rose to over 12%. Towards the end of the year 2015, the unemployment rate was lower but still above 10%. As of March 2016, the unemployment rate declined below 10%. *Source:* `http://www.upsvar.sk/` (Hlavná stránka - Štatistiky - Nezamestnanosť-mesačné štatistiky)

Table 4.2: *Determinants - descriptive statistics.*

Variable	Mean	Std. Dev.	Min.	Max.	N
Compositional variables					
young	6.92	1.84	0	26.32	2,926
old	15.54	4.99	1.20	57.14	2,926
qualUne	1.62	0.90	0	7.69	2,926
roma	8.59	16.83	0	100	2,925
hungarian	11.21	25.40	0	97.16	2,926
ruthene	2.21	9.11	0	92.68	2,926
catholics11	62.48	28.70	0	100	2,926
nonmanual	41.31	6.73	12.50	68.18	2,926
lowEduc	71.41	6.28	39.66	92.94	2,926
refTurnout	27.29	15.16	0	86.63	2,925
Contextual variables					
uneChange	-7.35	32.71	-100	500	2,925
munDebt	59.28	165.11	0	6926.93	2,910
munAccBal	18.88	199.60	-2152.57	2458.77	2,919
munBasCap	2015.82	1905.37	-6967.31	42054.60	2,913
munOperInc	44.86	217.67	-1716.51	4780.19	2,920
popDensity	112.70	395.30	0.57	13692.17	2,926
popIncrease	3.63	15.76	-47.39	337.50	2,926
turnout12	61.00	9.73	5.91	99.38	2,905

The last two considered variables include two categorical variables: "munSizeCat" and "romCat". As Roma minority is a negative target of the Kotleba-ĽSNS's campaign, we believe the effect of share of Roma people in municipalities on support for the extreme right-wing party may be different across municipalities depending on the actual share of Roma people living in the municipality. Also, there is a negative collinearity between the share of Roma people and voter turnout in the election (-0.6). Spáč and Voda (2015) call this a "selective ethnic" turnout. Hence, a few voters with a Slovak nationality in certain municipalities with Roma population are likely to affect overall percentage success of the Kotleba-ĽSNS party significantly given the low voter turnout. However, this effect may become negligible if Roma people represent a majority of the population in the given municipality.

If share of Roma people in a municipality is equal to 0%, the variable "romCat" attains the value of 1. If share of Roma people in a municipality is higher than 50%, the variable "romCat" attains the value of 7. Other values of the categorical variable are specified in Table 4.3.[9] Although we do not include a variable reflecting the type of presence of Roma minority in the municipality (dispersed, centre, outskirt, settlement) as suggested by Spáč and Voda (2015), our expectation is that support for Kotleba-ĽSNS should have an increasing trend with the increasing share of Roma people up to the point they represent a majority (cat-

[9]We also tried to use other specifications for the variable "romCat". However, we did not observe any significant change in the results. Hence, we decided to adopt specification of the categorical variable "romCat" as suggested by Spáč and Voda (2015).

egory 7). Regarding the size of municipality, we would expect support for the radical right-wing party to be higher in the small municipalities and smaller in the cities. Summary statistics and descriptions for the variable "munSizeCat" can be seen in Table 4.4.

Table 4.3: *Descriptive statistics for the categorical variable "romCat".*

romCat	**Roma**	**Freq.**	**Percent**	**Cum.**
1	0%	1,521	52.00	52.00
2	$(0\%; 5\%\rangle$	512	17.50	69.50
3	$(5\%; 10\%\rangle$	172	5.88	75.38
4	$(10\%; 15\%\rangle$	151	5.16	80.55
5	$(15\%; 25\%\rangle$	184	6.29	86.84
6	$(25\%; 50\%\rangle$	255	8.72	95.54
7	$(50\%; 100\%\rangle$	130	4.44	100.00
Total		2,925	100.00	

Table 4.4: *Descriptive statistics for the categorical variable "munSizeCat".*

munSizeCat	**Population**	**Freq.**	**Percent**	**Cum.**
1	500 or less	1142	39.03	39.03
2	501 – 2,000	1336	45.66	84.69
3	2,001 – 5,000	293	10.01	94.70
4	5,001 – 20,000	101	3.45	98.15
5	more than 20,000	54	1.85	100.00
Total		2,926	100.00	

Before we start estimating models using these variables, it is necessary to have a look at potential collinearity issues between the variables.

Originally we considered several variables measuring unemployment level. However, most of these variables ("une", "lowEducUne", "youngUne", "longTermUne") showed a collinearity with the variable reflecting share of Roma people ("roma"). From Table 4.5, we may see that the correlation between share of Roma people ("roma") and the variables "une", "lowEducUne", "youngUne" and "longTermUne" is significantly high (ranging from 0.68 to 0.77). This implies that categorisation of the unemployment based on education and age of the unemployed and on the duration of the unemployment does not solve the collinearity issue. However, if we use variable "qualUne" (as we mention above), collinearity with the variable "roma" becomes insignificant (0.03). Hence, in this way we can separate the Roma people who are unemployed from all the other unemployed people.

Table 4.5: *Correlations matrix for the variables regarding unemployment levels and share of Roma people.*

Variable	une	lowEducUne	youngUne	longTermUne	qualUne	roma
une	1.00					
lowEducUne	0.97	1.00				
youngUne	0.87	0.83	1.00			
longTermUne	0.94	0.94	0.77	1.00		
qualUne	0.40	0.25	0.29	0.32	1.00	
roma	0.69	0.77	0.68	0.68	0.03	1.00

Inspired by Fontana et al. (2016) who find evidence for historical events affecting current voting behaviour, we initially aimed to estimate the effect of historical support for Hlinka's Slovak People's Party in the 1929 election on support for the Kotleba-ĽSNS. However, we find a signficant collinearity (0.91) between share of votes for Hlinka's Slovak People's Party in the 1929 election and share of Roman Catholics in 2011. The values of correlations can be seen in Table 4.6 where we also included the variable "catholics30" measuring share of Roman Catholics in 1930. The variables "catholics30" and "catholics11" are very highly correlated (0.91). Hence, it is no surprise that the correlations between each one of them and the variable "hslsVotes" are almost identical (0.56 and 0.55, respectively). All these correlation values are too high to include more than one variable out of these in the model as this would result in multicollinearity. Hence, we decide to include only the variable "catholics11" in our regression model.[10]

Table 4.6: *Correlations matrix for the variables regarding results of the HSĽS party and both actual and historical share of Roman Catholics.*

Variable	hslsVotes	catholics30	catholics11
hslsVotes	1.00		
catholics30	0.56	1.00	
catholics11	0.55	0.91	1.00

4.3 Weighting Schemes

For the estimation of spatial error model in Chapter 5 we need a weighting scheme reflecting interactions between our observations. We start with two types of weighting schemes: the first-order contiguity matrix and the distance matrix measuring travel distance between municipalities in kilometres. Both of these matrices are 2,927×2,927 matrices, have zero diagonals and are symmetric.

The first-order contiguity matrix considers two municipalities as neighbours if they share a border.

If we have an $n \times n$ first-order contiguity matrix $\mathbf{W}$ with elements w_{ij} such that $i = 1, ..., n$ and $j = 1, ..., n$; then the matrix $\mathbf{W}$ is defined in the following way:

$$w_{ij} = \begin{cases} 1 & \text{for the municipalities } i \text{ and } j\,(i \neq j) \text{ which share a border}\,, \\ 0 & \text{otherwise}\,. \end{cases}$$

In the case of travel distance matrix, we assume that more weight and thus higher values should be put on the municipalities which are closer to a given municipality. Hence, we must also create an inverse version of the distance matrix.

If we have $n \times n$ matrix where $i = 1, ..., n$; $j = 1, ..., n$ and where d_{ij} is a specific distance in the distance matrix, then the inverse-distance matrix is defined in the following way:

$$w_{ij}(d_{ij}) = \begin{cases} 1/d_{ij} & \text{for } i \neq j\,, \\ 0 & \text{for } i = j\,, \end{cases}$$

[10] Although in our regression model we would get very similar estimates if we included the variable "hslsVotes" instead of the variable "catholics11", we rather decide to include the variable "catholics11" as it has fewer missing values.

where $w_{ij}(d_{ij})$ denotes weights in the inverse-distance matrix. The weights will thus become a decreasing function of distance.

The summary of both distance and inverse-distance matrices can be seen in Table 4.7 and the summary of the first-order contiguity matrix can be seen in the first column of Table 4.9.

Table 4.7: *Summary of spatial-weighting matrix based on travel distances.*

	Distance matrix	**Inverse-distance matrix**
Dimensions	2,927×2,927	2,927×2,927
min	0.0	0.0
min > 0	0.1	0.00182
mean	195.72	0.00879
max	550.40	10.0

We also created reduced versions of the matrices by removing the municipalities with share of Hungarian population higher than 30%. The resulting matrices are in the form 2,479×2,479. Their summaries can be seen in Table 4.8 and in the second column of Table 4.9.

Table 4.8: *Summary of the reduced spatial-weighting matrix based on travel distances.*

	Distance matrix	**Inverse-distance matrix**
Dimensions	2,479×2,479	2,479×2,479
min	0.0	0.0
min > 0	0.1	0.00182
mean	191.87	0.00923
max	550.40	10.0

Table 4.9: *Summary of both complete and reduced first-order contiguity matrices.*

	Complete matrix	**Reduced matrix**
Dimensions	2,927×2,927	2,479×2,479
min	0.0	0.0
min > 0	1.0	1.0
mean	0.00197	0.00212
max	1.0	1.0

The longest travel distance equal to 550.4 km can be found between the municipalities Vysoká pri Morave and Nová Sedlica. Municipality with the highest number of neighbours is Vysoké Tatry with 27 neighbours. We should also mention that our reduced first-order contiguity matrix contains 19 islands. Islands are municipalities without neighbours. These municipalities will not be affected by any other municipalities in the spatial regression. In this case, the islands do not present any serious issue as our matrix is big enough in comparison with the number of islands.

4.4 Data Sources

Data used in this study were obtained from several sources. Data on the electoral results of the Kotleba-ĽSNS party were extracted from the official website of the

Election to the National Council of SR 2016: www.volbysr.sk.[11]

Most of our data have their source in the DATAcube. database containing multidimensional tables for various indicators.[12] This source covers indicators including the population density, age structure, educational structure, share of the non-manual workers ("nonmanual"), increase in the population size etc.

The data on share of Roma people offered by the Statistical Office of the Slovak Republic coming from the 2011 Census are not very reliable as Roma people often tend not to confess their nationality honestly. Hence, in order to work with a more reliable indicator, we also decided to use data from the Atlas of Roma Communities (2013) which cover 1,070 municipalities in which researchers expected a larger Roma community (more than 30 inhabitants). The final variable "roma" was created based on the data from the atlas for the 1,070 municipalities and on the data from the 2011 Census for the remaining municipalities.

From the unique database "Electronic database of parliamentary elections results in all Slovak municipalities from 1929 until 2016" created by Vladimír Krivý, we extracted data on share of Roman Catholics in 1930 and on share of votes for the HSĽS party in the 1929 election.[13] All the data regarding share of unemployed for February 2016 were kindly provided by the Centre of Labour, Social Affairs and Family. Data on the financial management were collected by Institute for Economic and Social Reforms for the year 2015.[14]

Regarding our matrices, the first-order contiguity matrix was created in R software by the author based on the polygon structure of the Slovak municipalities which is freely available on the website of the Geodesy, Cartography and Cadastre Authority of the Slovak Republic: www.skgeodesy.sk. We decided to use the most detailed polygon structure which was available on the website: Basic level/ ZBGIS (Basic data base for the geographic information system) – Administrative boundaries.

Although we could use the above mentioned polygon structure, find centroids of the polygons and calculate distances between each of the centroids, we would only get rather unpractical "as the crow flies" distances this way. Hence, we decided to use a distance matrix which uses a road network to calculate the distances.[15]

[11]Data on the voter turnout at the 2012 parliamentary election and voter turnout at the 2015 same-sex marriage referendum were downloaded from the website: volby.statistics.sk

[12]DATAcube. is provided by the Statistical Office of the Slovak Republic. *Source:* datacube.statistics.sk

[13]The database can be found on the Slovak Archive of Social Data website. *Source:* http://sasd.sav.sk/sk/data_katalog_abs.php?id=sasd_2010001

[14]The data is available on the website: www.hospodarenieobci.sk

[15]The distance matrix can be found on the website of prof. Ing. Ľudmila Jánošíková, PhD. (Žilinská univerzita v Žiline) under the Section "Mapy" under the name "Matica vzdialeností". We had to add zeros to the diagonal of the matrix and add a transposed copy of its elements in order to get a matrix which we could use for further calculations. *Source:* http://frdsa.fri.uniza.sk/~janosik/

Chapter 5

Results

In this chapter, we present results of our analysis of the voting pattern for the party Kotleba-ĽSNS. In the first part, we use an OLS method to estimate our baseline model. In the other part, we take into account spatial relationships between the municipalities and estimate a spatial regression model. All the calculations are conducted in Stata software.

5.1 OLS Results

In our first robust regressions, we include all the variables which could be relevant for explaining the percentage vote share of the Kotleba-ĽSNS party and which we considered in previous chapter. From the variables which are highly correlated with each other, we always pick only one variable as specified in Chapter 4. In Model (1) we work with all the municipalities from the sample for which we have available data and in Model (2) we work with the reduced sample in which we excluded the municipalities with share of Hungarian people higher than 30%. Results of both models can be seen in the first two columns of Table 5.1.

For the catagorical variable "romCat", we decided to use the first category (municipalities with 0% share of Roma people) as our reference category. In the case of the categorical variable "munSizeCat", we decided to use the second category (municipalities with the population size larger than 500 but smaller or equal to 2,000) as our reference category.

We can see that the variables related to the financial management of the municipalities, size of the municipalities, change in the unemployment level and voter turnout at the same-sex marriage referendum do not explain support for the Kotleba-ĽSNS party. We drop all the variables from the model which are statistically insignificant (which are not significant at 5% significance level) in at least one of the models. We drop the variable measuring financial management of the municipalities ("munDebt") and the categorical variable describing size of municipalities ("munSizeCat"). We also remove the variables "uneChange" and "refTurnout" for the same reason. Although the variable "popDensity" is statistically significant, we remove it for further analyses as its effect is negligible. In order for the Kotleba-ĽSNS party to gain a 1% higher support, the density of population would have to decrease by 2,500 people per km^2. One can see that this effect is very small given that there are only 12 municipalities in our sample with population density above 2500 people per km^2.

In Model (3) we work with all the municipalities from the sample for which we have available data using reduced number of variables and in Model (4) we

work with the same variables but with a reduced sample. The new results after we remove the mentioned variables together with the previous results can be seen in Table 5.1. When interpreting OLS models from now on, we refer to Model (3) and Model (4).

Table 5.1: *Regression table.*

	Model (1)	Model (2)	Model (3)	Model (4)
hungarian	-0.106***	-0.117***	-0.104***	-0.111***
	(0.00274)	(0.0226)	(0.00241)	(0.0220)
ruthene	-0.0692***	-0.0629***	-0.0742***	-0.0700***
	(0.0117)	(0.0122)	(0.0114)	(0.0117)
catholics11	0.0133***	0.0141**	0.0102**	0.00986*
	(0.00373)	(0.00437)	(0.00341)	(0.00390)
qualUne	0.528***	0.498***	0.511***	0.470***
	(0.109)	(0.116)	(0.108)	(0.115)
young	0.203***	0.207***	0.175***	0.166**
	(0.0559)	(0.0615)	(0.0530)	(0.0575)
old	-0.154***	-0.175***	-0.158***	-0.182***
	(0.0248)	(0.0269)	(0.0244)	(0.0264)
nonmanual	-0.0762***	-0.0910***	-0.0801***	-0.0913***
	(0.0134)	(0.0157)	(0.0131)	(0.0154)
lowEduc	0.0883***	0.0834***	0.105***	0.104***
	(0.0208)	(0.0229)	(0.0180)	(0.0196)
popIncrease	-0.0137*	-0.0165**	-0.0168**	-0.0184**
	(0.00539)	(0.00574)	(0.00523)	(0.00568)
munDebt	0.0000726	0.0000586		
	(0.000273)	(0.000269)		
turnout12	-0.0304**	-0.0315*	-0.0329**	-0.0355**
	(0.0113)	(0.0132)	(0.0108)	(0.0126)
popDensity	-0.000412*	-0.000424*		
	(0.000192)	(0.000196)		
refTurnout	-0.0108	-0.0167*		
	(0.00729)	(0.00784)		
uneChange	-0.00220*	-0.00159		
	(0.000925)	(0.00101)		
1.romCat	-	-	-	-
2.romCat	0.103	0.201	-0.00935	0.102
	(0.187)	(0.209)	(0.178)	(0.198)
3.romCat	0.0738	0.289	0.0737	0.345
	(0.296)	(0.361)	(0.290)	(0.357)
4.romCat	-0.497	-0.306	-0.434	-0.212
	(0.276)	(0.318)	(0.276)	(0.319)
5.romCat	-0.540	-0.439	-0.436	-0.303
	(0.325)	(0.380)	(0.322)	(0.378)
6.romCat	-0.472	-0.549	-0.304	-0.343
	(0.376)	(0.433)	(0.370)	(0.426)
7.romCat	-3.091***	-3.601***	-2.797***	-3.203***
	(0.562)	(0.694)	(0.536)	(0.657)

1.munSizeCat	0.182	0.106		
	(0.185)	(0.211)		
2.munSizeCat	-	-		
3.munSizeCat	-0.201	-0.320		
	(0.196)	(0.220)		
4.munSizeCat	0.00886	-0.0465		
	(0.302)	(0.351)		
5.munSizeCat	-0.425	-0.495		
	(0.406)	(0.434)		
_cons	8.614***	10.12***	7.765***	8.934***
	(1.895)	(2.114)	(1.699)	(1.879)
R^2	0.37	0.16	0.37	0.16
F	112.70	21.97	166.0	29.06
N	2,884	2,442	2,904	2,457

Robust standard errors are in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Calculating variance inflation factors (VIFs)[1] for the independent variables specified in Model (3) and Model (4), we find out that there are no occasions of variables with VIF values higher than 5 in our models. Hence, we may conclude our models do not suffer from multi-collinearity.

We observe a significantly lower R^2 in Model (4) where we excluded the municipalities with share of Hungarian population higher than 30%. This goes in line with the argument of Pink et al. (2012) about the "clearly identified existence of the center-periphery conflict line in Slovakia" with the political periphery represented by a region with a strong representation from the Hungarian ethnic minority. In this region, support for the parties representing interests of the Hungarian minority is dominant. Hence, the t-statistic for the estimate of the variable "hungarian" equal to 43.27 in absolute value in Model (3) is related to a high R^2. In Model (4) the t-statistic for the variable "hungarian" is reduced to a more reasonable value of 5.02 in absolute value and the R^2 of the model drops from 0.37 to 0.16.

The estimates are not surprising. All our estimates apart from the estimates concerning Roma population are statistically significant. The most significant effect has the variable "qualUne". Increasing the share of unemployed people working before the loss of their job as members of the armed forces, managers, specialists, technicians, office workers or workers in services by 2% increases support for Kotleba-ĽSNS by 1%. This seems to go against the finding of Arzheimer and Carter (2006) who find out that unemployed people tend to vote less for extreme right-wing parties. Increasing the share of people at age 20 to 24 in a municipality by 6%, it is likely to expect an increase in the success of Kotleba-ĽSNS party by 1%. An opposite effect has share of elderly people at age 65 and older. The effect of the variable "turnout12" is more difficult to interpret. Basically, it says that if the voter turnout in the 2012 parliamentary election is lower by 30%, it is likely to expect that support for the Kotleba-ĽSNS party will be higher by 1% in the 2016 parliamentary election. We did not encounter any significant

[1]Basically, VIFs show how much the squares of the estimates' standard deviations are increased because of multi-collinearity. As a rule of thumb, we may consider a variable whose VIF value is greater than 5 as a variable which requires further investigation.

relationship when we worked with the voter turnout in the 2016 parliamentary election. One could argue that in the 2016 election Kotleba managed to mobilize voters in the municipalities with a low voter turnout from the parliamentary election in 2012. However, if we include in our model a variable measuring the difference in the voter turnout between the elections in 2016 and 2012, its effect is not significant again. So, it seems there were at least two different motives for mobilization of voters in the parliamentary election and only one of them was beneficial to the party Kotleba-ĽSNS. However, we do not analyse individual data, so our inferences must be made very carefully.

The variable "popIncrease" estimating the effect of economic deprivation has the expected effect. In the municipalities with a percentage decrease in the population size between the years 2005 and 2015, support for Kotleba-ĽSNS increases. If the difference in the population increase between two municipalities is 30%, it is likely to expect that support for the Kotleba-ĽSNS party will be higher by 0.5% in the municipality with a lower population increase. This result goes in line with the effect of growth as suggested by Brückner and Grüner (2010).

Regarding other compositional variables included in our model, the effect of the variable "hungarian" is the most significant. If share of Hungarian people increases by 10%, support for Kotleba-ĽSNS party decreases by 1% on average. A slightly less significant effect but with the same sign has the variable "ruthene". If share of Ruthenian people increases by 14%, electoral support for the Koleba-ĽSNS party decreases by 1%. Support for the party also rises with a decreasing share of non-manual workers ("nonmanual"). Although with an increasing share of Roman Catholics support for Kotleba-ĽSNS slightly rises, this effect is not very significant. Not surprisingly, a 10% increase in share of people with a completed secondary education or a lower level of education is related to a 1% increase in support for Kotleba-ĽSNS.

Regarding the results of our categorical variable "romCat", the only significant estimate concerns the municipalities with share of Roma people higher than 50%. If a municipality belongs to this category, Kotleba-ĽSNS is likely to receive around 3% lower support as opposed to a municipality with no share of Roma people. This goes in line with the conclusion of Spáč and Voda (2015) who analysed the influence of share of Roma people on the success of Kotleba-ĽSNS in the context of regional election in 2013. However, our results differ regarding effect of the municipalities with share of Roma people between 10% and 50%. We do not have enough evidence to state that support for radical right-wing rises in the municipalities with share of Roma people between 10% and 50%.

Regarding validity of our conclusions in terms of OLS assumptions, we already demonstrated a normal distribution of the dependent variable for which we excluded municipalities with share of Hungarian people higher than 30%. Having such a large sample size, we can conclude that p-values for t-test and F-test should be valid. During the process of selection of our final models, we chose variables in such a way that the models do not suffer from multi-collinearity. However, it seems our models are not well specified. Regression specification error test for omitted variables[2] indicate presence of omitted variables.

The omitted variables are likely to cause heteroskedastic residual variance in our model. Hence, we also decide to conduct a test for heteroskedasticity.

[2]Basically, RESET creates new variables based on the explanatory variables and checks whether some of the new variables do not become significant.

Having performed the Breusch-Pagan test[3], we must reject the null hypothesis of homogeneity of the variance of the residuals.

We also test for the presence of spatial autocorrelation. We conduct tests for the presence of spatial error and spatial lag dependence using our inverse-distance matrix and our first-order contiguity matrix as the spatial weights matrices for the tests. We also created maps of the residuals from both our Model (3) and Model (4) where correlations of the error terms across space can be seen (Figures 5.1 and 5.2). Results of the diagnostic tests for spatial dependence for both models can be seen in Tables 5.2 and 5.3.

Table 5.2: *Spatial diagnostics of the fitted Model (3) using the inverse-distance matrix and the first-order contiguity matrix as the spatial weights matrices.*

	Inverse-distance matrix			*Contiguity matrix*		
TEST	**Statistic**	**df**	**p-value**	**Statistic**	**df**	**p-value**
Spatial error:						
Moran's I	1.98	1	0.048	1.061	1	0.289
Lagrange mult. (LM-ERR)	890.397	1	0.000	31.947	1	0.000
Robust LM (RLM-ERR)	858.391	1	0.000	18.190	1	0.000
Spatial lag:						
Lagrange mult. (LM-LAG)	32.091	1	0.000	14.886	1	0.000
Robust LM (RLM-LAG)	0.085	1	0.771	1.129	1	0.288

Table 5.3: *Spatial diagnostics of the fitted Model (4) using the inverse-distance matrix and the first-order contiguity matrix as the spatial weights matrices.*

	Inverse-distance matrix			*Contiguity matrix*		
TEST	**Statistic**	**df**	**p-value**	**Statistic**	**df**	**p-value**
Spatial error:						
Moran's I	1.816	1	0.069	0.943	1	0.346
Lagrange mult. (LM-ERR)	630.41	1	0.000	20.793	1	0.000
Robust LM (RLM-ERR)	625.633	1	0.000	14.919	1	0.000
Spatial lag:						
Lagrange mult. (LM-LAG)	9.045	1	0.003	5.915	1	0.015
Robust LM (RLM-LAG)	4.268	1	0.039	0.041	1	0.840

[3]Together with the White test, they are the most frequently used tests for heteroskedasticity. In both tests, we work with the null hypothesis of homoskedasticity. In the Breusch-Pagan test, we first estimate the model and obtain the squared OLS residuals. Second, we run a regression of the squared residuals on the independent variables from our model and we keep the R-squared from this regression. Last, we let Stata form the LM statistic and calculate p-value using the chi-squared distribution. As the p-values are very small for both Model (3) and Model (4), we reject the null hypothesis of homoskedasticity.

Figure 5.1: *Map of residuals from the robust OLS regression of Model (3).*

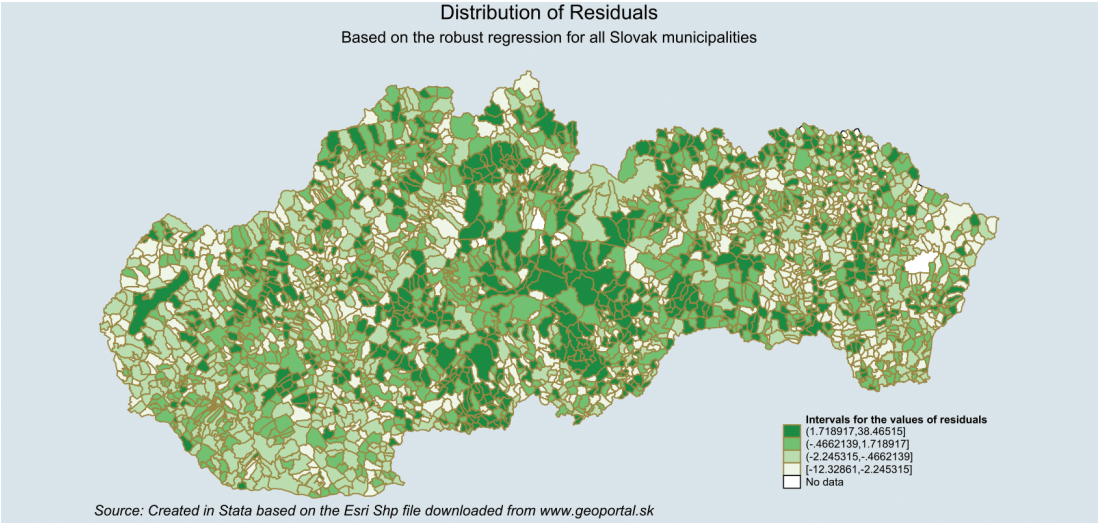
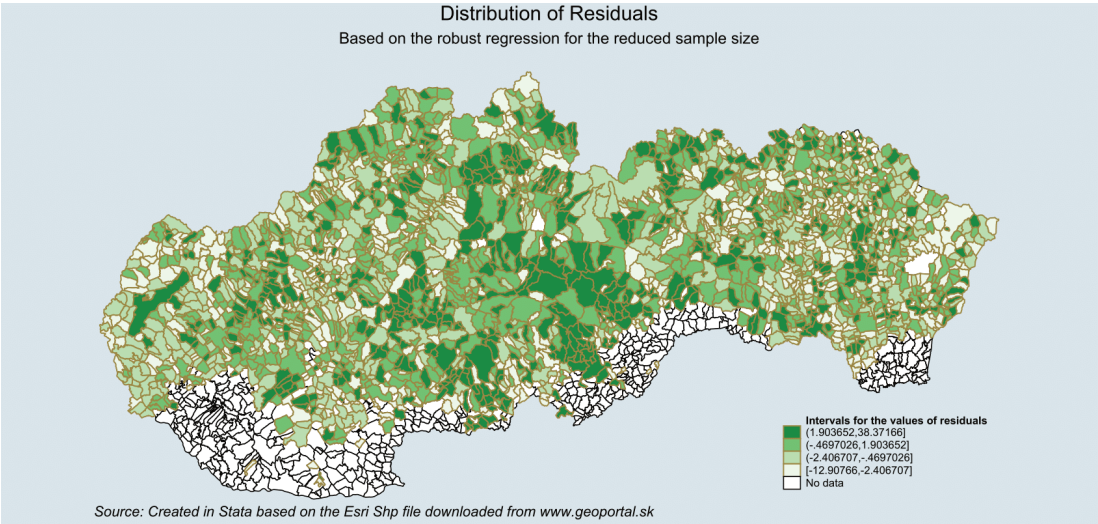


Figure 5.2: *Map of residuals from the robust OLS regression of Model (4).*



Based on the results from Tables 5.2 and 5.3, we can conclude that the inverse-distance matrix seems to measure presence of spatial interactions better for both our models as the statistics in spatial diagnostics are more significant in the case of inverse-distance matrix. From the Moran's I statistic[4] using the inverse-distance matrix, we can reject the null hypothesis of zero spatial autocorrelation at 5% significance level for Model (3) and at 10% significance level for Model (4). Lagrange multiplier test and its robust version provide even more significant evidence for the presence of spatial error. If we look at both maps of residuals (Figures 5.1 and 5.2), we can clearly see that there are some patterns such as positive residuals grouped in the central part of Slovakia or negative residuals more concentrated in the western edge of Slovakia.

[4]In this case, Moran's I measures how related the values of residuals are based on their location. Also Lagrange multiplier test and its robust version work with the null hypothesis of zero spatial autocorrelation. Anselin and Florax (2011) elaborate on these tests and also compare their effectiveness. They stress the asymptotic properties of the Lagrange multiplier tests being closely approximated for the largest sample they work with (N=127) Anselin and Florax (2011). From this perspective, Lagrange multiplier tests should be reliable in our case.

Regarding spatial lag dependence, test statistics for its presence in the model are less significant in comparison with the statistics for the presence of spatial error. As cited by Anselin and Florax (2011), Anselin and Rey (1991) come to the following rule:

"When the Lagrange Multiplier test for spatial error dependence (LM-ERR) is more significant than the LM test for spatial lag dependence (LM-LAG) and the LM test for spatial error dependence robust to the presence of spatial lag dependence (RLM-ERR) is significant while the LM test for spatial lag robust to the presence of spatial error dependence (RLM-LAG) is not, an error dependence is the likely alternative."

Indeed, that is exactly what we can see in our Tables 5.2 and 5.3. It is apparent mainly for the inverse-distance matrix representing complete sample of the Slovak municipalities where we can see that LM-ERR is much more significant than LM-LAG and RLM-LAG is insignificant while RLM-ERR is significant. Moreover, we believe that there is no practical reason to assume presence of a spatial lag dependence in our model.

5.2 SEM Results

In the previous part, we managed to find a sufficient justification for the estimation of spatial error model. As the inverse-distance matrix proved to perform better in the previous spatial diagnostics, we decided to use it as spatial weights matrix in the spatial regression. The SEM results for both Model (5) and Model (6) with a complete and reduced sample, respectively can be seen in Table 5.4.

Table 5.4: *Regression table.*

	Model (5)	Model (6)
qualUne	0.236** (0.0819)	0.150 (0.0945)
young	0.253*** (0.0401)	0.246*** (0.0432)
old	-0.127*** (0.0204)	-0.136*** (0.0223)
lowEduc	0.148*** (0.0103)	0.154*** (0.0113)
hungarian	-0.0994*** (0.00445)	-0.104*** (0.0233)
nonmanual	-0.0175 (0.0120)	-0.0263* (0.0132)
ruthene	-0.0536*** (0.0111)	-0.0495*** (0.0118)
turnout12	-0.0197** (0.00674)	-0.0208** (0.00745)
popincrease	-0.00355 (0.00437)	-0.00372 (0.00454)
catholics11	0.0131*** (0.00320)	0.0171*** (0.00366)

1.romCat	-	-
2.romCat	0.122 (0.186)	0.228 (0.209)
3.romCat	0.0995 (0.295)	0.273 (0.350)
4.romCat	-0.236 (0.313)	-0.0764 (0.365)
5.romCat	-0.0140 (0.288)	0.0543 (0.326)
6.romCat	-0.112 (0.274)	-0.0877 (0.318)
7.romCat	-2.118*** (0.382)	-2.372*** (0.437)
_cons	-0.838 (0.446)	-1.015* (0.474)
λ	0.134*** (0.00664)	0.153*** (0.00828)
sigma	3.578*** (0.0468)	3.716*** (0.0528)
Log likelihood	-7884.7495	-6771.7486
Variance ratio	0.328	0.148
Squared corr.	0.346	0.134
N	2,927	2,479

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The estimated λ coefficient is positive, moderate and significant, indicating moderate spatial correlation in the error term. In other words, an exogenous shock to one municipality is likely to cause changes in the electoral support for the Kotleba-ĽSNS party in the neighbouring municipalities or there may be omitted variables which are correlated in space. Results of the tests for the significance of $\lambda = 0$ for Model (5) and Model (6) can be seen in Tables 5.5 and 5.6, respectively. All the results indicate that the null hypothesis of $\lambda = 0$ can be significantly rejected.

Table 5.5: *The results for three tests of $\lambda = 0$ together with the acceptable range for λ for Model (5).*

Wald test of $\lambda = 0$:	$\chi^2(1) = 407.104$ (0.000)
Likelihood ratio test of $\lambda = 0$:	$\chi^2(1) = 357.104$ (0.000)
Lagrange multiplier test of $\lambda = 0$:	$\chi^2(1) = 890.397$ (0.000)
Acceptable range for λ:	$-3.737 < \lambda < 1.000$

Table 5.6: *The results for three tests of $\lambda = 0$ together with the acceptable range for λ for Model (6).*

Wald test of $\lambda = 0$:	$\chi^2(1) = 341.594$ (0.000)
Likelihood ratio test of $\lambda = 0$:	$\chi^2(1) = 289.034$ (0.000)
Lagrange multiplier test of $\lambda = 0$:	$\chi^2(1) = 630.410$ (0.000)
Acceptable range for λ:	$-3.489 < \lambda < 1.000$

There are two pseudo R^2 statistics calculated for both our models measuring their overall fit. Both variance ratio and squared correlation[5] indicate that the overall fit of both models decreased in comparison with their OLS counterparts.

Regarding the estimates, we do not observe any changes in the signs of the estimates but rather in their magnitudes in comparison with Model (3) and Model (4). The most significant difference between the spatial error models and OLS models is in the significance of the "qualUne" variable. The effect of this variable in the spatial error models decreases and is more than twice lower. Moreover, in Model (6) the variable "qualUne" is not significant even at 10% significance level. Also, the effect of share of Ruthenes on our dependent variable is lower in the spatial error models. If share of Ruthenian people increases by 20%, support for the Kotleba-ĽSNS party declines by 1%. While the effect of the variable "young" is higher, the effect of the variable "old" is lower in comparison with Model (3) and Model (4). If share of people at age 20 to 24 years rises by 4%, support for the extreme right-wing party rises by 1% while increasing the share of people at age 65 and older by 1% results in 8% decrease in support for the Kotleba-ĽSNS party. The effect of the variable "lowEduc" is higher in absolute value in comparison with its OLS counterpart. If share of people with a completed secondary education or a lower level of education rises by 7%, support for the party Kotleba-ĽSNS increases by 1%. The variable "popIncrease" becomes statistically insignificant in our spatial error models. The variable "nonmanual" is insignificant in Model (5) while its estimate in Model (6) is significant and its effect approximately three times lower in magnitude in comparison with our OLS models. All other estimates are very similar with their OLS counterparts.

The results of our spatial error models together with the results of spatial diagnostics for the previous OLS models suggest that space and spatial effects should be taken into account while analysing voting pattern of the Kotleba-ĽSNS party. Naturally, the choice of matrix together with the type of spatial model may have influence on the final results.

[5]Variance ratio is a pseudo R^2 statistic equal to $\text{Var}(\hat{Y})/\text{Var}(Y)$, where $\text{Var}(\hat{Y})$ denotes the variance of the predicted values of the dependent variable, and $\text{Var}(Y)$ denotes the variance of the observed values of dependent variable (Anselin 1992a). Squared correlation is also a pseudo R^2 statistic equal to the squared correlation between the predicted and the observed values of the dependent variable (Anselin 1992a). *Source:* Pisati, M. 2001. sg162: Tools for spatial data analysis. Stata Technical Bulletin 60: 21-37

Conclusion

In this thesis, we analysed electoral results of the extreme right-wing Kotleba-ĽSNS party in the 2016 Slovak parliamentary election using various socio-demographic, economic and cultural variables for approximately 3,000 Slovak municipalities. From the methodological perspective, we first used an ordinary least squares model. As spatial diagnostics for our ordinary least squares model provided a significant evidence for the presence of spatial error, we applied a spatial error model in the second stage.

In the ordinary least squares model, the most significant effect had a variable measuring share of the qualified unemployed people. Effectively, using this variable we managed to remove Roma people from the group of unemployed and thus solve the issue of a high collinearity between the total share of unemployed and share of Roma people. If share of qualified people in the municipality rises by 2%, support for Kotleba-ĽSNS increases by 1%. However, the effect of this variable in the spatial error model was more than twice lower. On the contrary, the effect of share of young people was higher in the spatial error model. If share of people at age 20 to 24 years rises by 4%, support for the extreme right-wing party rises by 1%. In both models, we find a significant positive effect of share of people with a lower level of education on support for the Kotleba-ĽSNS party. On the contrary, support for the Kotleba – ĽSNS party is lower with higher share of old people in the municipality. Electoral support for the Kotleba-ĽSNS party decreases also with a rising share of non-manual workers in the municipalities. Not surprisingly, if share of Hungarian people rises by 10%, support for the Kotleba-ĽSNS declines by 1%. The effects of municipal debt per capita and economic change reflected in the percentage increase in the number of unemployed people are insignificant. As opposed to Spáč and Voda (2015) who analysed success of the leader of the Kotleba-ĽSNS party in the context of 2013 Slovak regional election, we do not have enough evidence to state that the support for radical right-wing rises in the municipalities with a share of Roma people between 10% and 50%. Nevertheless, most of our results go in line with the results of Western studies regarding the electoral base of extreme right-wing parties.

Naturally, our study faces several limitations. As we do not work with individual data, results cannot be referred to individuals. Hence, we continuously face the danger of ecological fallacy if we want to deduce the nature of individuals from the municipality in which those individuals live. Also, due to the type of our data we cannot take into account many other potentially important variables such as sex structure as it is almost identical across municipalities. Moreover, Bahna and Zagrapan (2017) stress the importance of "anti-system sentiment, not directly linked to the economic situation of voters" which can hardly be estimated but at the same time may play an important role for the voters' decision-making.

Despite these limitations, our methodological approach and findings can es-

pecially be useful if combined with the studies based on individual data as our study takes into account also contextual effects resulting from the environment which individuals share. Also, if we make the assumption that determinants of support for the Kotleba-ĽSNS party may vary across space, the presence of spatial heterogeneity in the electoral results of the extreme right-wing party may be further investigated.

Appendices

A Appendix

Categorization of the empirical research regarding right-wing extremism based on the the type of data used as suggested by Arzheimer (2012):

(i) **Micro data**

- *source*: national opinion polls or comparative multi-national studies
- *temporal coverage*: cross-sectional, trend or panel studies
- *geographical coverage*: one, few or many countries
- *level of aggregation*: individual cases or aggregated survey results

(ii) **Macro data**

- *source*: census data, electoral results, macro-economic, government data
- *temporal coverage*: cross-sectional or panel data
- *geographical coverage*: one, few or many countries
- *level of aggregation*: wards, constituencies, subnational units or the whole country

B Appendix

First,

$$y_i = \hat{\beta}_0 + \hat{\beta}_1 x_{i1} + \hat{\beta}_2 x_{i2} + \cdots + \hat{\beta}_k x_{ik} + \hat{u}_i, \tag{1}$$
$$\hat{y}_i = \hat{\beta}_0 + \hat{\beta}_1 x_{i1} + \hat{\beta}_2 x_{i2} + \cdots + \hat{\beta}_k x_{ik}, \tag{2}$$
$$y_i = \hat{y}_i + \hat{u}_i \,, \tag{3}$$

where $\hat{u}_i$ are residuals from regressing y on $x_1, \ldots, x_k$.

Next,

$$x_{i1} = \hat{\alpha}_0 + \hat{\alpha}_2 x_{i2} + \hat{\alpha}_3 x_{i3} + \cdots + \hat{\alpha}_k x_{ik} + \hat{r}_{i1}, \tag{4}$$
$$\hat{x}_{i1} = \hat{\alpha}_0 + \hat{\alpha}_2 x_{i2} + \hat{\alpha}_3 x_{i3} + \cdots + \hat{\alpha}_k x_{ik}, \tag{5}$$
$$x_{i1} = \hat{x}_{i1} + \hat{r}_{i1} \,, \tag{6}$$

where $\hat{r}_{i1}$ are residuals from regressing x_1 on $x_2, \ldots, x_k$.

Finally,

$$\sum_{i=1}^{n} \hat{r}_{i1} \hat{x}_{i1} = 0, \tag{7}$$
$$\sum_{i=1}^{n} \hat{u}_i x_{i1} = 0, \tag{8}$$
$$\sum_{i=1}^{n} \hat{r}_{i1} x_{ij} = 0 \,, \tag{9}$$

for $j = 2, \ldots, k$.

Having stated (1) – (9), we want to find such $b_0, b_1, \ldots, b_k$ that the following expression is minimized:

$$\sum_{i=1}^{n} (y_i - b_0 - b_1 x_{i1} - \ldots - b_k x_{ik})^2 \,. \tag{10}$$

In order to do so, we take partial derivatives of the expression (10) with respect to $b_0, \ldots, b_k$ and set the resulting expressions equal to 0:

$$-2 \sum_{i=1}^{n} x_{ij} (y_i - \hat{\beta}_0 - \hat{\beta}_1 x_{i1} - \ldots - \hat{\beta}_k x_{ik}) \,, \tag{11}$$

where $j = 1, \ldots, k$.

For the process of calculation, it is necessary that the sample size exceeds the number of estimated parameters ($n > k + 1$). We can then derive an exact formula for $\hat{\beta}_1$ using (3), (6), (7), (8) and (9). We set $j = 1$:

$$\sum_{i=1}^{n}(\hat{x}_{i1}+\hat{r}_{i1})(y_i-\hat{\beta}_0-\hat{\beta}_1x_{i1}-\ldots-\hat{\beta}_kx_{ik})=0$$

$$\sum_{i=1}^{n}\hat{r}_{i1}(y_i-\hat{\beta}_0-\hat{\beta}_1x_{i1}-\ldots-\hat{\beta}_kx_{ik})=0$$

$$\sum_{i=1}^{n}\hat{r}_{i1}(y_i-\hat{\beta}_1x_{i1})=0$$

$$\sum_{i=1}^{n}\hat{r}_{i1}y_i-\sum_{i=1}^{n}\hat{\beta}_1\hat{r}_{i1}x_{i1}=0$$

$$\sum_{i=1}^{n}\hat{r}_{i1}y_i-\sum_{i=1}^{n}\hat{\beta}_1\hat{r}_{i1}(\hat{x}_{i1}+\hat{r}_{i1})=0$$

$$\sum_{i=1}^{n}\hat{r}_{i1}y_i-\sum_{i=1}^{n}\hat{\beta}_1\hat{r}_{i1}\hat{x}_{i1}-\sum_{i=1}^{n}\hat{\beta}_1\hat{r}_{i1}^2=0$$

$$\sum_{i=1}^{n}\hat{r}_{i1}y_i-\sum_{i=1}^{n}\hat{\beta}_1\hat{r}_{i1}^2=0\,. \tag{12}$$

Finally, we have:

$$\hat{\beta}_1=\frac{\sum_{i=1}^{n}\hat{r}_{i1}y_i}{\sum_{i=1}^{n}\hat{r}_{i1}^2}\,, \tag{13}$$

provided that $\sum_{i=1}^{n}\hat{r}_{i1}^2\neq 0$ (Assumption MLR.3).

C Appendix

Summary of the assumptions for multiple linear regression (MLR) model necessary for its OLS estimates to be unbiased and efficient as summarized by Wooldridge (2012):

Assumption MLR.1 – Linearity in Parameters
The model in the population can be written as:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + u\,, \tag{14}$$

where $\beta_0, \beta_1, \ldots, \beta_k$ are the unknown parameters (constants) of interest and u is an unobserved random error or disturbance term.

Assumption MLR.2 – Random Sampling
We have a random sample of n observations, $\{(x_{i1}, \ldots, x_{ik}, y_i) : i = 1, \ldots, n\}$ which follow the population model in Assumption MLR.1.

Assumption MLR.3 – No Perfect Collinearity
In the sample (and therefore in the population), none of the independent variables is constant, and there are no exact linear relationships among the independent variables.

Assumption MLR.4 – Zero Conditional Mean
The error u has an expected value of zero given any values of the independent variables. In other words,

$$\mathrm{E}(u|x_1, x_2, \ldots, x_k) = 0\,. \tag{15}$$

Assumption MLR.5 – Homoskedasticity
The error u has the same variance σ^2 given any values of the explanatory variables. In other words,

$$\mathrm{Var}(u|x_1, x_2, \ldots, x_k) = \sigma^2\,. \tag{16}$$

D Appendix

Table 7: *Variables.*

votes	share of total eligible votes for Kotleba-ĽSNS (2016)
refTurnout	voter turnout at the same-sex marriage referendum (2015)
popDensity	population density – people per km^2 (2015)
munDebt	total municipality debt per capita (2015)
lowEducUne	share of the unemployed people with "lower" education: secondary (without school leaving exam) or a lower level (2016)
youngUne	share of the unemployed people at the age less than 30 (2016)
longTermUne	share of the unemployed people with a duration of their unemployment longer than 2 years (2016)
qualUne	share of the qualified unemployed people (2016)
roma	share of Roma people (from Atlas of Roma Communities 2013 and Census 2011)
hungarian	share of Hungarian people (2011)
catholics11	share of the Roman Catholics (2011)
catholics30	share of the Roman Catholics (1930)
hslsVotes	share of votes for the HSĽS party in the election in 1929
popIncrease	increase in the population size between 2015 and 2005
une	share of the unemployed on the total population of the municipality (2016)
uneChange	increase in the number of unemployed between the years 2015 and 2008
young	share of the people at age 20 to 24 years (2015)
old	share of the people at age 65 and older (2015)
ruthene	share of the Ruthenian people (2011)
nonmanual	share of the people working in services and science (2011)
lowEduc	share of the people with a completed secondary education or a lower level of education (2011)
turnout12	voter turnout in the 2012 parliamentary election
pop	total population in 2015 (31.12.)
romCat	a categorical variable (2011 & 2013): • 1 if roma = 0%, • 2 if roma > 0% & roma ≤ 5%, • 3 if roma > 5% & roma ≤ 10%, • 4 if roma > 10% & roma ≤ 15%, • 5 if roma > 15% & roma ≤ 25%, • 6 if roma > 25% & roma ≤ 50%, • 7 if roma > 50% & roma ≤ 100%.
munSizeCat	a categorical variable (2015): • 1 if pop ≤ 500, • 2 if pop > 500 & pop ≤ 2000, • 3 if pop > 2000 & pop ≤ 5000, • 4 if pop > 5000 & pop ≤ 20000, • 5 if pop > 20000.

Table 8: *Overview of reviewed studies based on the type of data and methodology they use.*

Name	**Type of data**	**Temporal coverage**	**Geographical coverage**	**Aggregation**	**Type of model**
O'Loughlin et al. (1994)	macro	cross-sectional	Nazi Germany	counties	spatial econometric
Lubbers et al. (2002)	macro & micro	panel study	more countries	survey results	logistic regression
O'Loughlin (2002)	macro	cross-sectional	Nazi Germany	counties	spatial econometric
Arzheimer & Carter (2006)	micro	panel study	more countries	survey results	logistic regression
Brückner & Grüner (2010)	micro	panel study	more countries	survey results	IV & GMM
Ford (2010)	macro & micro	cross-sectional	England	survey results	logistic regression
Pink et al. (2012)	macro	cross-sectional	Czech and Slovak Republic	constituencies	OLS regression
Bos et al. (2014)	micro	cross-sectional	Netherlands	survey result	experimental design
Buštíková (2014)	macro	quasi-time series	more countries	whole country	random effects
Van Gent et al. (2014)	macro & micro	cross-sectional	Netherlands	survey results	logistic regression
Allen (2017)	micro	panel study	more countries	survey results	logistic regression
Spáč & Voda (2015)	macro	cross-sectional	Slovakia	municipalities	OLS regression
Fontana et al. (2016)	macro & micro	cross-sectional	Italy	mun. & survey	regression discontinuity

Bibliography

Agnew, J. (1996). Mapping politics: How context counts in electoral geography. *Political Geography*, 15(2):129–146.

Agnew, J., Mamadouh, V., Secor, A. J., and Sharp, J., editors (2015). *The Wiley Blackwell Companion to Political Geography*. Wiley-Blackwell.

Allen, T. J. (2017). All in the party family? Comparing far right voters in Western and Post-Communist Europe. *Party Politics*, 23(3):274–285.

Anselin, L. and Florax, R. (2011). *New Directions in Spatial Econometrics*. Springer.

Arzheimer, K. (2012). Electoral sociology: Who votes for the extreme right and why - and when? In Backes, U. and Moreau, P., editors, *The Extreme Right in Europe. Current Trends and Perspectives*, pages 35–50. Vendenhoeck & Ruprecht, Göttingen.

Arzheimer, K. and Carter, E. (2006). Political opportunity structures and right-wing extremist party success. *European Journal of Political Research*, 45(3):419–443.

Bahna, M. and Zagrapan, J. (2017). Volia voliči v obciach s rómskou populáciou ĽSNS častejšie? Analýza individuálnych a kontextuálnych faktorov volebných rozhodnutí v parlamentných voľbách 2016. *Working Papers in Sociology*, (1):1–11.

Bos, L., Lefevere, J. M., Thijssen, R., and Sheets, P. (2016). The impact of mediated party issue strategies on electoral support. *Party Politics*, page 135406881562660.

Brückner, M. and Grüner, H. P. (2010). Economic growth and the rise of political extremism: Theory and evidence. CEPR Discussion Papers 7723, C.E.P.R. Discussion Papers.

Buštíková, L. (2014). Revenge of the radical right. *Comparative Political Studies*, 47(12):1738–1765.

Buštíková, L. (2017). *The Oxford Handbook of the Radical Right*. New York: Oxford University Press.

Fontana, N., Nannicini, T., and Tabellini, G. (2016). Historical Roots of Political Extremism: The Effects of Nazi Occupation of Italy. Research paper.

Ford, R. and Goodwin, M. J. (2010). Angry white men: Individual and contextual predictors of support for the british national party. *Political Studies*, 58(1):1–25.

Greene, W. H. (2002). *Econometric Analysis (5th Edition)*. Prentice Hall.

Gyárfášová, O. and Mesežnikov, G. (2008). *Národný populizmus na Slovensku: politické postoje a nálady verejnosti*. Inštitút pre verejné otázky.

King, G. (1996). Why context should not count. *Political Geography*, 15(2):159–164.

Kluknavská, A. (2012). The far right parties in 2012 Slovak parliamentary elections. *Rexter*, 1:35.

Kluknavská, A. (2015). The extreme right and the Internet: The case of the People's Party Our Slovakia.

Kluknavská, A. (2015). A right-wing extremist or people's protector? Media coverage of extreme right leader Marian Kotleba in 2013 regional elections in Slovakia. *Intersections*, 1(1).

Lubbers, M., Gijsberts, M., and Scheepers, P. (2002). Extreme right-wing voting in western europe. *European Journal of Political Research*, 41(3):345–378.

Mesežnikov, G. and Bránik, R. (2017). *Hatred, violence and comprehensive military training - The violent radicalisation and Kremlin connections of Slovak paramilitary, extremist and neo-Nazi groups*. Political Capital.

Mesežnikov, G. and Gyárfášová, O. (2016). *Súčasný pravicový extrémizmus a ultranacionalizmus na Slovensku: Stav, trendy, podpora*. Inštitút pre verejné otázky – Nadácia Hannsa Seidela.

Mudde, C. (2000). *The Ideology of the Extreme Right*. Manchester University Press.

O'Loughlin, J. (2002). The Electoral Geography of Weimar Germany: Exploratory Spatial Data Analyses (esda) of Protestant Support for the Nazi Party. *Political Analysis*, 10(03):217–243.

O'Loughlin, J., Flint, C., and Anselin, L. (1994). The geography of the nazi vote: Context, confession, and class in the reichstag election of 1930. *Annals of the Association of American Geographers*, 84(3):351–380.

Ord, K. (1975). Estimation methods for models of spatial interaction. *Journal of the American Statistical Association*, 70(349):120–126.

Pink, M., Eibl, O., Havlík, V., Madleňák, T., Spáč, P., and Voda, P. (2012). *Volební mapy České a Slovenské republiky po roce 1993: Vzorce, trendy, proměny*. CDK, Brno.

Sage, J. L. and Pace, R. K. (2008). *Introduction to Spatial Econometrics*. Taylor & Francis Ltd.

Spáč, P. and Voda, P. (2015). Just a Roma Issue? The Support for Marian Kotleba in 2013 Regional Elections. *CENAA Policy Papers*, 3:88–100.

Tobler, W. R. (1970). A Computer Movie Simulating Urban Growth in the Detroit Region. *Economic Geography*, 46:234.

Van Gent, W. P. C., Jansen, E. F., and Smits, J. H. F. (2013). Right-wing radical populism in city and suburbs: An electoral geography of the partij voor de vrijheid in the netherlands. *Urban Studies*, 51(9):1775–1794.

Ward, M. D. and Gleditsch, K. S. (2008). *Spatial Regression Models*. SAGE PUBN.

Wilson, R. and Hainsworth, P. (2012). *Far-right Parties and Discourses: A Challenge for our Times*. Brussels: European Network Against Racism (ENAR).

Wooldridge, J. M. (2012). *Introductory Econometrics: A Modern Approach (Upper Level Economics Titles)*. Cengage Learning.

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