KATHOLIEKE UNIVERSITEIT LEUVEN

VIRTUOUS VILLAGES AND SINFUL CITIES?

A SPATIAL ANALYSIS INTO THE EFFECT OF COMMUNITY CHARACTERISTICS ON ABSTENTION AND INVALID VOTING IN LOCAL ELECTIONS IN BELGIUM 2006-2012

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Abstract

The influence of the size of a community on political participation has only scarcely been researched since the famous work by Dahl and Tufte on the subject in 1973. In most cases a smaller community seems to be more propitious to higher levels of participation. The few researches that have been performed on the subject point at a stronger influence of the size of the place of residence compared to some of the much investigated personal characteristics and this warrants more attention to this subject. Using spatial analysis techniques, in this paper this question is investigated for electoral turnout at the local level using aggregate data from all Belgian municipalities in the 2006 and 2012 local elections. The paper looks at both the absolute level of the depend variables as their change between the last two elections. The large dataset allows us to investigate the effects separately for turnout and invalid voting, as literature suggests these are not caused by exactly the same mechanisms. The results show that the size of a community measured by its population has a clear effect on turnout and blank and invalid voting. The actual size of a community in surface matters far less and this effect is even in the inverse direction as theory would predict. The results furthermore demonstrate that compulsory voting in Belgium seems to be able to keep young people showing up at the voting booth, but they have a higher likelihood of spoiling that vote. The technical issue as to whether a municipality uses paper and pencil ballots or computer voting (in a booth), seems to be one of the more influential community variables related both to turnout and blank and invalid voting. Finally a strong regional effect is present for both dependent variables, with clear differences between the language communities in Belgium even after controlling for a host of other community variables.

Keywords: turnout, spatial analysis, blank voting, invalid voting, compulsory voting

1. Introduction

In 1973 Dahl and Tufte put forward their famous statement that there should be a strong relation between the size of a polity and the political participation of its inhabitants. They stated that two opposed forces are at work in this relation: "*smaller democracies provide more opportunities for citizens to participate"* while "*larger democracies provide opportunities for citizens to participate […] in the decisions of a political system large enough to control the major aspects of their situation"* (Dahl & Tufte, 1973, p. 13). There was a tension between "closeness of politics" and the "effectiveness" of a political system related to its size. Although they empirically found several forms of participation to be connected to the size of a democracy, they did not find a positive relation between small size and turnout for national elections (Dahl & Tufte, 1973, p. 45). But the purported effect of size on civic engagement could also be translated to local politics where it would relate to a difference between small entities such as villages of a few thousand inhabitants to large urban centers with over a million inhabitants. But Dahl and Tufte concluded that there was not enough data to investigate the matter for local elections. They only found one Swedish study with 36 communities that pointed at some positive effects of small size on participation, although it did not look at turnout (Dahl & Tufte, 1973, p. 64) . With the focus of most electoral research on national elections, this relationship between size and local electoral participation has only received limited attention in the academic literature (Denk, 2012; Mouritzen, Rose, & Denters, 2009; Orford, Rallings, Thrasher, & Borisyuk, 2008; Rallings & Thrasher, 1990). This is to a certain extent remarkable as local elections within one country allow for a better test of the hypothesis as they offer a lot of variation in elections that are using the identical electoral system. Differences can therefore more easily be attributed to community characteristics or the political competition without having to account for the influence of using different electoral systems.

This scarcity in research into the electoral effect of small political communities is also remarkable as they have often been lauded for their positive influence on citizen participation. Putnam for example in his seminal work *Bowling Alone* (2000) finds positive effects of civic engagement from living in smaller communities, thereby empirically echoing de Tocqueville's praise of political life in small communities in New England : *"c'est l'homme qui fait les royaumes et crée les républiques; la commune paraît sortir des mains de Dieu"* (De Tocqueville, 2003). But other authors have frowned upon the village and its possibility to have a sensible political impact on the lives of its citizens. John Stuart Mill for example stated when discussing local elections - which he supported - that *"a mere village has no claim to a municipal representation. By a village I mean a place whose inhabitants are nor markedly distinguished by those of the rural districts adjoining"* (Mill, 2004). Mill believed villages had no common interest big enough to warrant any meaningful political voice. And in Federalist paper n°14, James Madison equally refutes the idea that only small political entities could be democratic and well administered, hereby brushing aside the argument that the US was to vast to be a union: *"The natural limit of a republic is that distance from the center which will barely allow the representative to meet as often as may be necessary for the administration of public affairs"*(Hamilton, Jay, & Madison, 2012, p. 40).

These examples show that the tension between closeness, effectiveness and size of political systems has been a recurring topic in political theory. One of the main arguments in favor of small communities – as will be detailed below – has been that forms of social control will lead to more virtuous political behavior and lead to higher turnout. One could therefore see compulsory voting as a technique that has to compensate for this mechanism in places where it does not occur naturally, namely in bigger communities. Those in large cities not virtuous enough to go to the polls would do so out of sheer compliance with the law. Under compulsory voting the differences between communities of different sizes should disappear.

The research question for this paper is therefore: *Does the size of a community influence turnout in local elections under compulsory voting?*

We will examine this relation between size and turnout in local elections using data from the last two local elections in Belgium (2006 and 2012), a country with compulsory voting for elections at all levels. By controlling for a broad set of structural community variables we will be able to investigate whether the size of the political community in itself still has an influence. We will furthermore look into the influence of community characteristics on the change in turnout between two elections and whether size as a characteristic also relates to a decline in turnout. The first question was investigated before on data from the Flemish Region (from 2006) and found a small negative effect of the number of inhabitants on turnout, but the paper did not investigate change in turnout, only used a subset of Belgian communities and did not look at spatial relations in the data (Ackaert, Wauters, & Verlet, 2011). We will therefore build on this existing research by using a complete dataset of all Belgian cities which will increase the variation in the community characteristics. We will also add a geographical dimension to the existing research by using spatial analysis to gauge for geographical patterns in the data that could point to community characteristics that were neglected in hitherto research.

We first discuss the importance of taking into account blank and invalid voting when looking at turnout in a country with compulsory voting. Second we give an overview on the literature on turnout and blank and invalid voting, with a focus on local elections. In a third section we present data and methods, followed by the results of our analysis and a discussion.

2. Turnout, blanc and invalid votes

Belgium is one of the few remaining countries in Europe that has compulsory voting. This results in comparatively high turnout rates for elections at all levels, including so-called secondary elections (Deschouwer, 2009). The much problematized decline in electoral participation in many western countries is therefore less pressing in Belgium, with turnout still hovering around 90% until recently (Delwit, 2013; Fieldhouse, Tranmer, & Russell, 2007; Franklin, 2004). But a few caveats have to be mentioned here. The Belgian turnout rate is to a certain extent misleading, as it does not take into account blank or invalid voting. In most countries this kind of voting is rather limited, but in countries with compulsory voting (CV) blank and invalid voting is much higher (Pion, 2010; Zulfikarpasic, 2001). Because some voters turn up that might not go to the polling if it were not for the legal obligation, they will just vote blank instead. Comparative research showed that in most countries with CV almost fifty percent of the increased turnout due to compulsory voting is composed of spoiled or blank votes (Uggla, 2008). When looking at the data, we also see high levels of this type of voting in Belgian elections. For the last national election of the Senate in 2010 for example, almost 9% of all the votes in the Walloon region were blank or invalid, while this was almost 6% in the Flemish Region. In those 2010 elections out of a total of 7 million Belgian voters almost half a million did not vote for a party or spoiled their ballot. If we combine abstention and blank/invalid votes, the total number of valid votes is clearly below 90%, with that number even going under 80% for the Walloon Region in those last national 2010 elections. Investigating turnout in a country using compulsory voting will therefore need to take into account blank and invalid votes, but because other mechanisms might cause them, we will look at them separately. In the next two sections we discuss the literature on turnout, with specific attention for local elections, and on blank and invalid voting.

3. Factors determining turnout

The topic of turnout and electoral competition belongs to the oldest quantitative research traditions of political science (Berelson, Lazarsfeld, & McPhee, 1963; Campbell, Converse, Miller, & Stokes, 1963). We can therefore formulate a number of hypothesis coming from this vast amount of research that we expect will also influence turnout in local elections. We distinguish between a number of structural variables and a number of elements related to the political system

Structural variables

A first set of variables that have found to have a strong connection to turnout are those related to socio-economic status. On an individual level SES has been found to be one of the most stable predictors of any form of political participation, including voting (Brady, Verba, & Schlozman, 1995; Dalton, 2008). In comparative research with national data this was confirmed with a higher GDP or economic situation correlating with a higher level of turnout (Blais & Dobrzynska, 1998; Blais, 2006; Franklin, 2004). And a low socio-economic level at an aggregate level has equally been found to explain differences in turnout between electoral districts or communities (Gimpel, Morris, & Armstrong, 2004; Rallings & Thrasher, 1990). We would therefore expect the socio-economic level of the community to have a positive relation to turnout. We will use unemployment and the proportion of single households as indicator of the SES of a community. Age has been shown to be one of the best indicators related to voting in most of recent empirical research. There is a clear indication that young people in Western democracies vote less than the older age groups (Gallego, 2009; Kimberlee, 2002). Fieldhouse et al. (2007) found in their comparative analysis that for Belgium the age gap was almost non-existent, which could be attributed to the 'socializing' effect of compulsory voting (Bilodeau & Blais, 2011). The data from this last piece of

research date from 1999, but when looking at data from the last wave of the ESS (2010) we find that more than ten years later the gap they found (i.e. 3% less voting in the 18-25 age group) has remained stable. So although in many countries the percentage of young people is seen as an important explanatory variable for district or ward level differences in turnout (Gimpel et al., 2004; Rallings & Thrasher, 1990), we expect only a very limited or no effect of age on turnout and change in turnout. Gender has often been cited in international research as an important variable to explain traditional political participation on the individual level (Marien, Hooghe, & Quintelier, 2010). But recent comparative research on turnout finds it non-significant when controlling for other individual level variables such as SES and education (Dassonneville & Blais, 2013) and some even report women to be voting more (Coffé & Bolzendahl, 2010). Recent ESS data equally indicate that for Belgium there is no gender gap for voting in elections, with a turnout gap of a mere 0.3 percent. So, although Ackaert et al. (2011) found a strong effect of the percentage of women in a city or village on local turnout in Belgium, we will not take this variable up in our model[1].

Two last variables related to community characteristics are the migration of autochthonous citizens and immigration of foreigners into the community. It has been found that when people have only recently arrived in a community they will vote less in local or regional elections (Hoffmann-martinot, Rallings, & Thrasher, 1996). People who just arrived in a community are less acquainted with both its political issues as with the local parties and

[1] We found that although there is very little variation in this indicator (mean is 50.7 and SD is 0.9) the percentage of women in a community correlates almost 0.5 with indicators of low SES and the number of single households in a community. Both of these are strongly related to turnout and therefore we suspect that the finding of Ackaert et al. (that more women implies higher absenteeism) are caused by this relation as all research on individual level data in Belgium points at no gender gap.

candidates and therefore would be less inclined to vote (Gimpel et al., 2004; Orford et al., 2008). This was equally found in France where young people would initially not register to vote when moving to a new city, but after having resided there for a while did enlist and voted (Bréchon & Cautrès, 1987). We would therefore predict internal immigration (i.e. autochthonous) to be related to a lower turnout in local elections. The ethnic heterogeneous character of communities has often been found to depress participation (Alesina & Ferrara, 2000; R. D. Putnam, 2007) and so we would also predict external immigration (i.e. by non-Belgians) to depress turnout.

Political variables

Next to structural variables a number of political variables have been found to increase turnout significantly in previous research. The degree of proportionality of an election has shown to be stimulus to turnout in western- democracies (Gallego, Rico, & Anduiza, 2012). This is due to the fact that disproportional systems decrease the number of possible parties obtaining a seat and hence discouraging those identifying with those parties to show up at the polls (Karp & Banducci, 2008). In some cases a too large set of parties could equally depress turnout (Blais & Dobrzynska, 1998). Although the electoral system for local elections in Belgium is slightly less proportional than the one used in national elections (it uses the Imperiali divisor instead of D'hondt), it is still a strong proportional system with a high possibility for smaller parties to obtain a seat. There is nevertheless a large variation in the number of effective electoral parties in local elections in Belgium. In the last elections (2012), the ENEP ranged from a mere 1.19 to 6.5 (calculated using the formula from Laakso & Taagepera, 1979). This difference is mainly caused by the existence or absence in a

community of pre-electoral alliances that reduce the offer[2]. Another factor related to the political system that has an influence on turnout is the closeness of the electoral competition (Blais & Aarts, 2006). It has been found that in electoral districts where there is an absence of electoral competition, turnout strongly declines in national elections (Blais, Gidengil, Nevitte, & Nadeau, 2004; Blais, 2006). Research on local elections equally points at the importance of electoral competition to explain the differences in turnout between localities that otherwise share most other structural characteristics (Orford et al., 2008; Rallings & Thrasher, 1990). Franklin (2004) specifies that this effect of competition on turnout might only be present in plurality systems as in proportional systems most parties will get representation and the 'winner takes all' dimension of competition is absent. But in local elections the margins can be much wider under a proportional system than in national elections and in some cases resemble those of a plurality system: in the local elections we use in this paper the variation in winning margin between the first and second party ranges from a staggering 82% to a minuscule 0.006%. We would therefore expect that just as in plurality systems, there will be a negative relation between the margin of victory and turnout as measured by the gap in percentage points between the biggest and second biggest party.

Electoral competition can be measured using several indicators, which are all strongly interrelated [here we need to give the correlation]: either the maximum score of the winning party, the difference between the largest and second largest party or the ENEP are commonly

[2] In many localities in Belgium electoral blocks are formed between parties that compete on the national level. There is also a tradition of having a 'list of the mayor' in many localities that will combine politicians that are part of the traditional political parties and a number of less affiliated candidates that only take part in the local election (Deschouwer, 2009). In medium sized and large communities, the main parties will most often present their own list, but even here there can be exceptions.

used indicators. As they all point to the same underlying information and are highly correlated in our dataset, we will use only one indicator in our analysis, the difference between the first and the second party.

Voting technology

In Belgium voting by means of a computer has been gradually introduced since 1994. This happens at the polling place and so it does not imply voting at home through the internet. The wish to investigate the consequences of implementing this technique nationwide had the government starting in 1994 by using it in a number of test case communities. Mainly due to the high cost for the equipment, twenty years later not all communities use computer voting. Actually, a majority of the cities (i.e. 208 cities or 65%) are still using paper ballots. This means that although all communities use the same electoral technique, there are two kinds of communities with regards to the technique the citizen uses to cast her ballot. A study in 2004 found that voters actually trusted the electronic voting system more than the old ballot papers. Some subgroups in the populations such as the elderly and lowly educated voters on the other hand had more difficulty using the electronic system (Delwit, Kulahci, & Pilet, 2004). We would therefore assume that some subsets of the population might be motivated to abstain out of inexperience with computer technology and predict lower turnout in communities with electronic voting.

Spatial parameters

The main focus of the paper is on the influence of size of the community. Of course, size or population in itself does not influence turnout, but it does so indirectly due to its effect on personal or community characteristics, ranging from social pressure to perform behavior in a village to higher social capital due to a richer associational life. Here we briefly discuss the

literature on those characteristics that might indirectly affect turnout through size. For most of them we have no data on community level, but they should show their influence in a greater turnout in smaller political communities. We also give some reasons why the reverse might be true.

Smaller communities make it easier for citizens to have direct contact with their representatives at a local level (Lewis, 2011). In an electoral period this also means that it is easier for the politician to bring his campaign to most of the voters in a direct way. Mobilization in a village will therefore happen on an more informal personal basis, while in cities this will be more anonymous using media campaigns (Lewis, 2011). This difference between small and large communities was even found for internet based political contact between citizens and local politicians (Saglie & Vabo, 2009). Another reason turnout might be higher in small villages is the social norm enforcement that takes place as there is a tighter community with more social control (Lewis, 2011). This effect of social pressure on turnout was investigated by Gerber and Green (2008) in an experiment where they send letters to voters saying their neighborhood would be informed on their voting behavior after the next election and which resulted in an eight percent increase in turnout (But see: Panagopoulos, 2011). Analysis of the introduction of postal voting in Switzerland also gave support to the social pressure-thesis as it showed that the introduction of postal ballots caused the highest drop in turnout in small communities. According to the author this indicates that part of the village electorate until that point went to the polls out of social pressure (Funk, 2010). But a close-knit community can also foster turnout through positive effects. A high level of attachment to a community was shown to lead to more local participation, including voting (Anderson, 2013). In a research into the effects of community characteristics Oliver (2000) found that whereas there was no difference in interest in national politics between people

living in cities and villages, there was a clear difference with people in villages having a higher interest in local politics.

But there are also elements that would predict a higher turnout in larger communities. Cities have much more capacities to change important policy problems, such as employment or mobility, on which small villages have little influence. As Dahl (1994, p. 28) puts it: *"In very small political systems a citizen may be able to participate extensively in decisions that do not matter much but cannot participate much in decisions that really matter a great deal; whereas very large systems may be able to cope with problems that matter more to a citizen"*. Moreover, in a local election campaign, media will pay most attention to the 'horse races' in the big cities for mayor and this could have a positive influence on turnout (Oliver, 2000). In Belgium one could refer to the high media attention in Flemish national media concerning the 'battle' over the position of mayor in the large portal city of Antwerpen (Van Aelst & Nuytemans, 2007). Research has also shown that an increasing distance to the nearest ballot box has a decreasing effect on electoral participation and this distance would be smaller in cities (Dyck & Gimpel, 2005). Finally the argument could be given that cities have a socially more diverse population and this could increase the opportunity that people encounter politically active citizens, thus increasing turnout (Verba & Nie, 1972).

Overall the existing empirical research favors the arguments for small scale communities having a positive influence on turnout (Gaarsted Frandsen, 2002; Gimpel et al., 2004; Oliver, 2000; Rallings & Thrasher, 1990). But in many case, researchers using data from western-Europe also found that the "size-effect" on turnout in local elections was nonexistent (Denk, 2012; Mouritzen et al., 2009). It needs to be noted that 'size' in most cases is measured by population and not by surface, although several of the arguments related to 'size' could be accounted for by both indicators. Especially since recent research in Sweden using both parameters concluded: *"political support, as a condition for democracy, is more affected by*

area size than by population size, which may shift the emphasis toward the issue of what geographic space is optimal for democracy." (Denk, 2012, p. 789). We will therefore include both indicators (surface and population) and based on the literature above we expect a negative or no effect from size on electoral turnout.

A last spatial parameter is whether the national border is part of the community border. Research on blank voting in Belgium has indicated that due to the fact that many inhabitants of border villages are working in the neighboring country, they would be less motivated to participate in village politics and hence vote blank (Pion, 2010). Although that paper did not look at turnout, we would assume the same mechanism applies and so we will also include a dummy variable that indicates if a village is limitrophe to a neighboring country. Finally we will also include dummy variables for the three different federal Regions in Belgium and for the German speaking community as differences in participation have been found before between them, with the Flemish region expected to have a higher turnout than the other regions.

4. Factors determining blank or invalid voting

Because in some cases blank and invalid voting will because have a different relation to the variables mentioned above, we briefly review the literature on blank an invalid (henceforth BI) voting in this paragraph. First of all it needs to be noted that while compulsory voting increases BI voting, it also blurs the profile of voters that perform BI voting. In a country where there is no compulsory voting, someone voting BI has been through the effort to register, turn up at election day and still votes BI. This leads to a specific profile that differs from those not turning up (Zulfikarpasic, 2001). In a country with CV such as Belgium part of the BI voters are those that would be absentees if there was no obligation and therefore should be more aligned with the characteristics described above. We will here

only focus on the variables where we expect a difference for BI voting compared to turnout. When looking at structural variables, we would expect new, young, voters to have a higher rate of BI voting (Zulfikarpasic, 2001). Previous survey research has also shown that BI voters are proportionally higher educated than the regular voters as a BI vote is often a motivated choice to protest in relation to the political situation in the locality or country, a behavior that is more present in those with higher education (Zulfikarpasic, 2001). We would therefore expect no relation or a positive one between SES and BI voting. Regarding the political variables, we expect lower electoral competition to lead to more BI voting as voters will signal their discontent with a limited choice or a race that is already a forgone conclusion (Uggla, 2008). We would also expect much more BI voting in small communities as more people will only show up at the polling place to abide to a social norm and not out of personal motivation (cfr. supra). This effect of small villages on BI voting has been confirmed in previous research (Pion, 2010; Uggla, 2008; Zulfikarpasic, 2001). As has been said in the section above, being a border town has been found to increase the level of BI votes (Pion, 2010). Finally, electronic voting has made it impossible to spoil your vote, but it does offer an option to vote blank. Still we would suspect this to decrease the level of BI voting. We have no specific expectation of BI voting related to the different regions in Belgium as previous research on this topic did not include all regions in the country.

After this literature review, table 1 summarizes the expected results for turnout and BI voting.

Table 1: Summary of hypothesized relations

	Turnout	Blank / Invalid
SES	+	0/+
Proportion Over 65 years	+	-
Proportion 20-29 years	0/-	+
Difference between 1st and 2nd	-	+
Electronic voting	-	-
Border town	-	+
Population movement	-	+

Size	0/-	-
Population	0/-	-

5. Data & Methods

Our data consists of the electoral data of 588 of the 589 Belgian localities[3] for the local elections in 2006 and 2012. For the models on absolute levels of turnout and BI voting, the 2012 data will be used. For the change models the difference between 2006 and 2012 in turnout and BI voting will be used. Because the dependent variables are proportions, it is advisable not to simply conduct a linear, ordinary least squares (OLS) regression, without any adaptations. A proportion is strictly bounded between 0 and 1, and as such a linear regression could predict senseless and logically impossible results. Ideally a binomial form of logistic regression should be implemented for turnout, with the valid votes over the number of voters as the response variable. Overdispersion can then be handled by a random term. Since we explicitly want to take into account the spatial structure of our data, which would not be possible in a binomial regression or with a logit link, we opt for the second best choice, transforming out dependent variable using a logit transformation.[4] After this transformation, a spatial analysis is still possible.

[3] The smallest Belgian village (Herstappe) which has less than 100 inhabitants did not organise an election in 2006 because there was only one political party that wanted to take part in the elections. The village is an odd and only remnant that was not involved the fusion of small villages into larger entities in the 1970's. The median size of a local level electoral community has since been about 10.000 inhabitants.

[4] In the literature an arcsine transformation is suggested, but logit gives similar results and has a natural, more straightforward interpretation (Warton & Hui, 2011)

The municipal level is the natural and smallest possible level of analysis for municipal elections. Conclusions of these analyses therefore are only valid on this level, and cannot be reduced to individual behavior. In other words, we are investigating the context in which voting behavior surfaces, rather than the individual background or motives for turnout. Working with aggregate data does have advantages over individual data when looking at turnout or BI voting. First of all both of them have been found to be underreported in surveys (BI voting is even sometimes missing as an option in surveys). Fieldhouse et al. (2007) when investigating turnout in 22 countries using the ESS data found the survey data to overestimate the actual turnout by more than 10% in half of the countries and by more than 15% in a quarter of them. The qualitative Belgian PartiRep exit-poll conducted during the 2012 local elections had BI voting at 2.2% where the actual number is 4.7%. Another problem for survey-data is that they often lack sufficient variation in localities to look for geographical patterns or to investigate the influence of size (Mouritzen et al., 2009). Especially for BI voting this would leave a few dozen respondents which would be not allow the investigation of multivariate multilevel analysis (Pion, 2010). Finally, because we want to investigate the change in turnout and BI voting, we have no other data-source to investigate this dynamic model for local elections than aggregate data (Orford et al., 2008).

We summarize the independent variables that were deducted from the literature and will be used in the analysis:

-Federal Region/Community: We combine both federal levels to distinguish, Flanders, Wallonia, Brussels and the Germanophonic community
-Bordertown: Is the village/city connected to the national border?
-Population: because most of the cities fall in the lowest category with less than 10.000 inhabitants and a few have over one hundred thousand inhabitants, we us the natural logarithm.
-Size: we us the natural logarithm of the surface measured in acres
-For age we add the proportion over 65 years old in the population and the proportion of 20 to 29 olds
-To measure migration patterns within Belgium, we use the net immigration of Belgian inhabitants proportional to population size

-Immigration from outside the country, is measured using the net immigration from outside of Belgium proportional to population size
- We use the percentage of single households and the percentage of unemployed as economic indicators.
-For marginality of the electoral outcome, we use the difference in percentage points between the first and second party
-Electronic voting: a dummy is used when the village/city used electronic voting.

Two different forms of spatial analysis techniques will be used to account for the spatial structure of our data: Spatial autoregressive regression (SAR) (Anselin, 1994) en Geographically weighted regression (GWR) (Brunsdon, 1996). It is necessary to use SAR, because the observations are in a clear spatial relation with each other, so that the assumption of independence of observations necessary for OLS regression might be unrealistic (Anselin, 1988). The first law of geography states that everything is related to everything else, but near things are more related than distant things, and provides a reasonable rationale to analyze spatial data from a spatial perspective, as ignoring this might compromise the reliability of coefficients and outcomes (Tobler, 1970). A global spatial model, including a spatial lag and/or error component, allows us to investigate to what extent spatial structure has an influence on our dependent variables. Spatial lag and spatial error are two different specifications of spatial interdependence, that each have their own theoretical interpretation. When one municipality influences the turnout in its neighboring municipalities, a mechanism of contagion or distribution is at work, specified in a spatial lag component.[5] Social networks, media influences or imitation behavior all function without taking municipality boundaries

[5] In its structural form, a spatial lag regression equation reads as $Y = \rho WY + X\beta + \varepsilon$, with ε ~N(0,Ω) and Y as the outcome, ρWY as the spatial lag component, $X\beta$ as the independent variables and ε as the error term. The spatial lag component is composed of a spatial coefficient ρ and a row standardised spatial weights matrix (W), in our case a first order queen contiguity matrix, capturing the geographical structure of our observations

into account, but are nested in proximity. If the error terms of neighboring municipalities are influenced by on another, this illustrates that there might be a spatial influence on a different level of geography, or that an important explanation is missing from the model. To control for this form of spatial influence, a spatial error term is added.[6] These spatial models make it possible to investigate the relative importance of different explanations, just like in multivariate regression, but controlling for spatial structure. Because we are working with data on the municipality level, it is very important to keep an eye on multicollinearity. Rather than specifying models that try to control for every possible aspect, it makes more sense to focus on a small number of theoretically relevant core variables.

After identifying the relevant explanations for differences in turnout in a global spatial model, the local variation of the explanations themselves can be investigated by using geographically weighted regression (GWR) (Brunsdon, 1996). This second step is useful, because we cannot assume that our explanations are universally valid. Local elections are by definition locally embedded, and as such the relevance of explanations, and the influence of coefficients, can vary locally. This is often called non-stationarity.

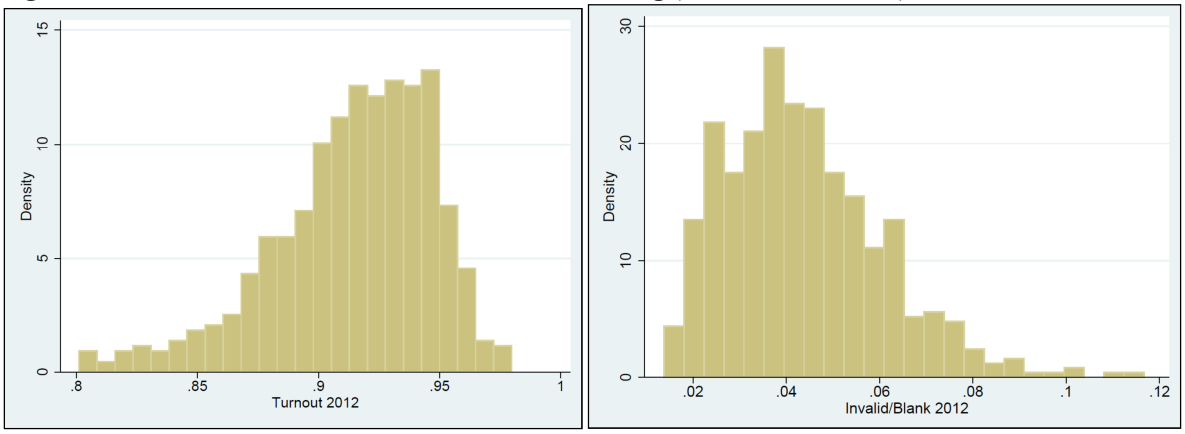
6. Analysis

Before we proceed with the multivariate analysis, we need to take a first look at the distribution of our dependent variables. We need to determine whether the chosen methods

[6] The structural form of the spatial error regression is $Y = X\beta + \lambda W\varepsilon + \mu$, with μ ~N(0,Ω) and Y as the outcome, $X\beta$ as the independent variables, $\lambda W\varepsilon$ as the spatial error component and μ as the homoscedastic error term. The spatial error component is composed of a spatial coefficient λ and a row standardised spatial weights matrix (W), in our case a first order queen contiguity matrix, capturing the geographical structure of our observations.

suit the DV's distribution as especially turnout under compulsory voting can be very skewed and this can equally be the case for change variables (Taris, 2000). Figures 1 illustrate these distributional irregularities. Turnout is heavily skewed, as there seems to be a natural censoring to the right: there are no municipalities where more than 98 percent of the population come out to vote, while there are definitely municipalities where turnout is relatively low. The distribution of invalid or blank voting can be analyzed in a different way: there is always some invalid and blank voting, but in exceptional cases it is over 10 percent. Both turnout and proportion of valid or blank votes will therefore be transformed using their logit.

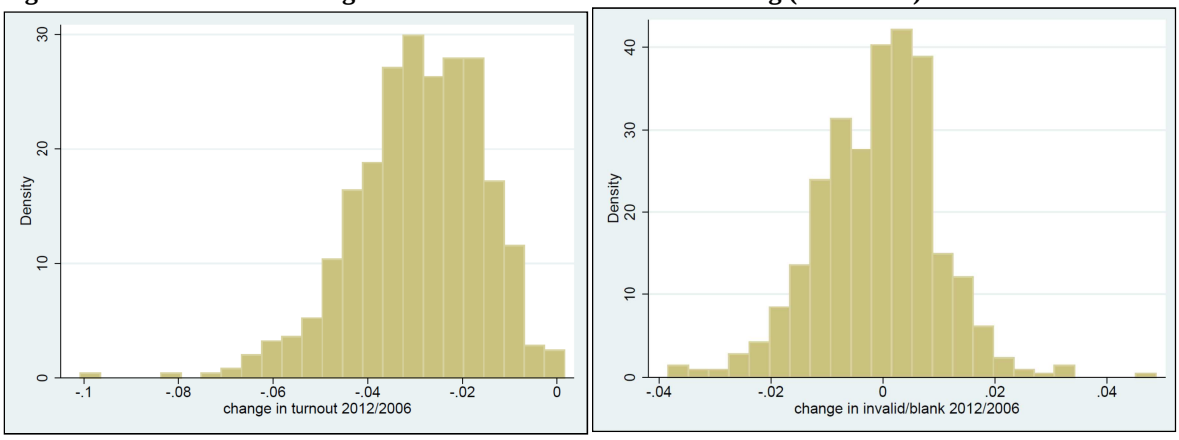
Figure 1: Distribution of turnout and Blank/Invalid voting (2012 local elections)



Change in turnout or invalid and blank voting does not have to be irregularly distributed, as there could be a random process going on, where at one point a municipality simply has a lower turnout than at another time point or vice versa. That would result in a normally distributed set of differences, as seems to be more or less the case with the changes in invalid and blank votes (see figure 2). The change in turnout on the other hand illustrates that turnout went down in almost all of the municipalities, and that it went down with more than 5 percent

in quite a few places. The distribution is still quite normal, but the mean is around -.03. As such transformation is not necessary for both of the difference measures.

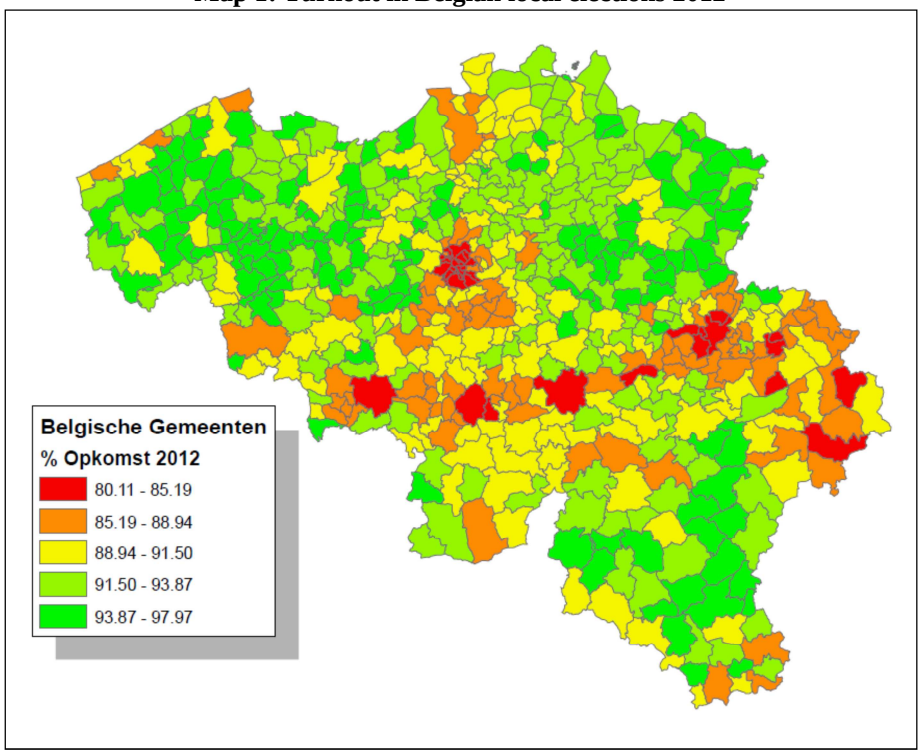
Figure 2: Distribution of change in turnout and Blank/Invalid voting (2006-2012)



The relation between turnout and BI voting is negative and of moderate strength, with a Pearson coefficient of -.38. This means that low turnout goes hand in hand with a higher proportion of invalid or blank voting, pointing out that both invalid voting and low turnout point to severe problems with the duties of citizenship, and involvement in local politics. This goes against the theoretically expected relationship that high turnout would go hand-in-hand with higher levels of BI voting under compulsory voting.

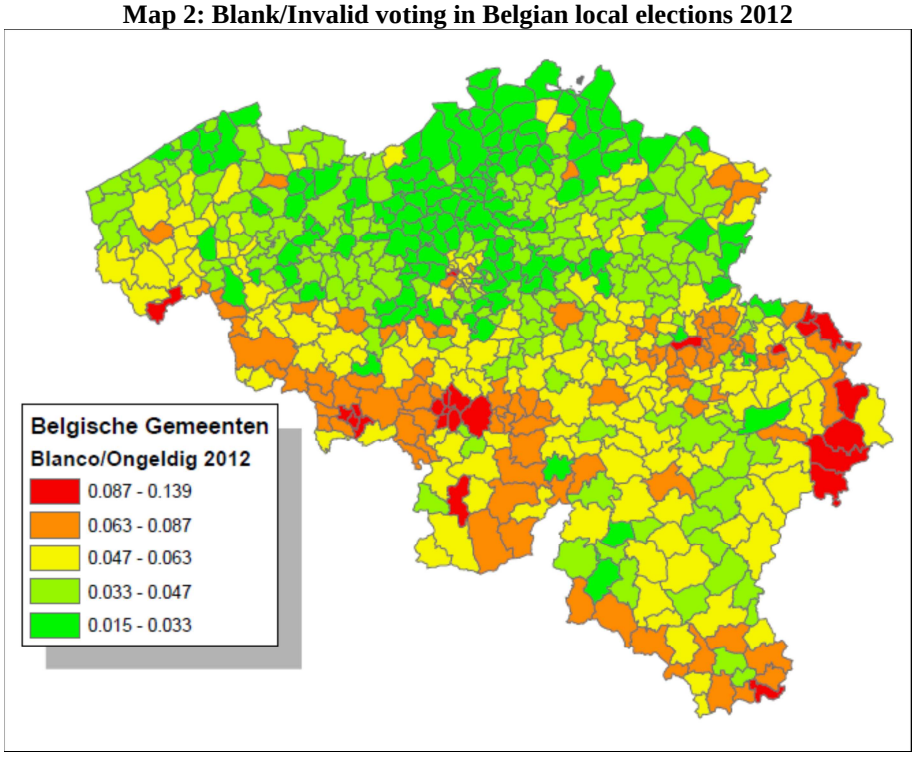
When we now look at the geographical variation in turnout (Map 1) a spatial pattern can be noticed: low turnout occurs mainly in the district of Brussels and its neighboring municipalities, in the cities on the old industrial axis running from Mons to Liege, and in the German Community of Belgium. In Flanders some notable exceptions to the generally relatively high turnout are Leuven, Antwerp and some coastal municipalities.

Map 1: Turnout in Belgian local elections 2012



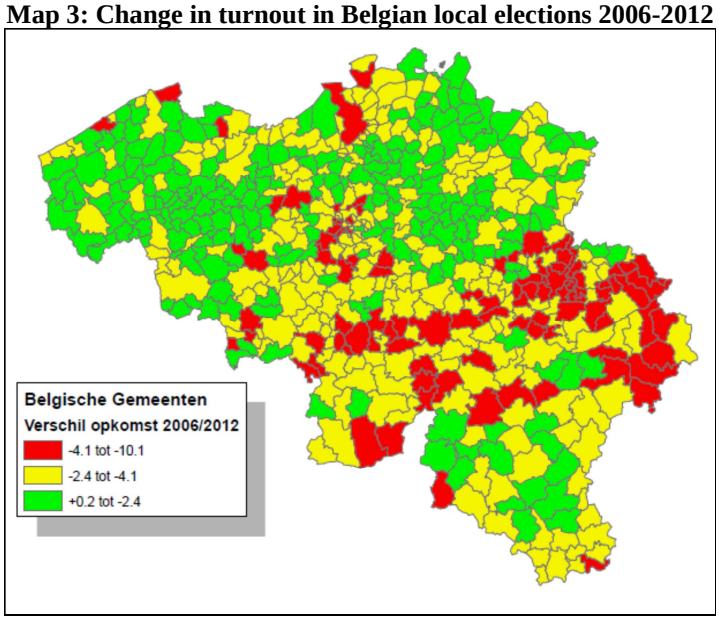
Map 2 shows invalid or blank voting and it seems to have a slightly different spatial distribution than turnout, but some of the same places reappear: Charleroi and its neighboring municipalities and the German speaking community. Municipalities in the Walloon region seem to have more invalid votes, while this is not the case in Flanders. With the exception of Molenbeek and Anderlecht, suburbs with large immigrant populations, there is a lot less invalid voting in Brussels, and it seems almost absent in the municipalities surrounding Brussels.

Map 2: Blank/Invalid voting in Belgian local elections 2012



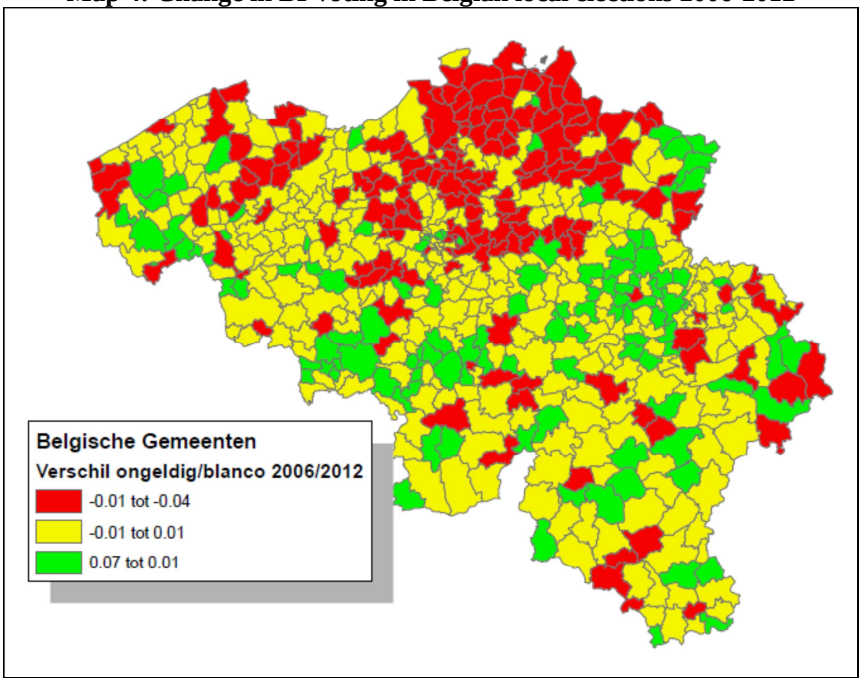
If we finally look at the change patterns, for turnout (Map 3) we see that it bears a lot of similitude to the absolute levels of turnout in Map 1, although in the Brussels region the steepest decline seems to have happened in the wealthier suburban region. But again the old steel axis in Wallonia and the German speaking region are clearly in the group with the biggest decline.

Map 3: Change in turnout in Belgian local elections 2006-2012



When finally looking at the map for change in BI-voting (Map 4), we clearly see a difference. In Flanders, and especially the province of Antwerp and Brabant that have among the lowest BI voting in 2012 (Map 2), we see that a decrease in BI voting occurred. In the Walloon 'rust belt', that accounted for low turnout and high BI voting, we see that changes went in both directions. Overall, we see that the regions with a high decrease in turnout have less visible unified patterns for BI-voting.

Map 4: Change in BI-voting in Belgian local elections 2006-2012



We can now turn to the spatial analysis to see whether we can account for these differences between communities. Table 2 illustrates the main determinants for turnout and BI-voting in the local elections of 2012. The first important thing to note is that we find a very high pseudo-R^2 for both models, indicating that our variables do a good job at predicting the absolute level of turnout and BI voting. When we inspect the different variables it seems that turnout is connected more to the geographical, cultural aspects of political systems, such as the region or community a municipality belongs to, rather than the degree of competition in a

political system. Practical issues such as electronic voting, seem to also affect turnout significantly. We actually see minor positive effects of being a border town, where we expected the reverse. We see that both seniors as well as young people have higher turnout, although the effect is stronger for young people. We equally find a positive effect of external migration, which might seem counter-intuitive, but echoes findings by Oliver (2000, p. 367) with US data who found that communities with more African-Americans had a higher turnout, controlling for other community variables. There is no significant effects of internal migration or unemployment rate. It's relevant to note that the lower turnout in Brussels can be explained away by the influence of social isolation and urbanity. When turning to the main research question, we see that both population and size still matter after using the control variables. More urban municipalities, characterized by larger populations and higher amounts of single households are a fertile context for low turnout, as hypothesized. Large surface does increase turnout, which we expected to have the reverse effect. Both the spatial lag and spatial error component are positive and significant. The small spatial lag component illustrates that being next to a town with a high (or low) turnout is slightly contagious. The larger spatial error component illustrates that the influence of spatial effects on turnouts none the less is not fully captured by this model, and that larger regional effects might be at play.

The third column of Table 2 shows us which contexts lead to higher amounts of invalid or blank voting. The German region speaking especially stands out here, and the Walloon region as well has higher amounts of invalid voting than we can expect based on the other factors in the model. Electronic voting has a strong and negative influence on BI voting, which was to be expected, as only a blank vote is still technically possible, and not an invalid one. A higher proportion of young voters equally has a positive influence on invalid or blank turnout. The unemployment rate has a very large positive influence on the prevalence of invalid and blank voting and this might emphasize that under compulsory voting, a BI-vote might be more

related to traditional turnout patterns compared to the more educated critical voter that Zulfikarpasic (2001) found in French data. A more modest effect of internal net immigration is also significant. This is understandable, as municipalities with a large influx of new, but Belgian inhabitants, might have a population that knows less about the local politicians, leading to indecisive citizens and invalid votes in the booth. When looking at population, we see that it does not matter. This is running against the hypothesis that due to social pressure in communities with few inhabitants more people would show up (which was confirmed) and vote blank or invalid. Size is slightly influential with larger communities having more BI-voting. In contrast to turnout, invalid voting barely seems contagious among municipalities, but it does cluster regionally, over and above the information included in the model, illustrated by a significant spatial error component. It is interesting that although Pion (2010) found BI-voting in Belgium to be influenced the status of a border-town, we do not find this in our data. But Pion used larger electoral districts and only Wallonian data and hence had far less data-points and less detail in community characteristics.

Table2: Spatial autoregressive model with spatial autoregressive disturbances (SARAR) of logit turnout 2012 and logit of blank/invalid voting - only significant results are shown in the table

Parameter	Turnout	BI-vote
Cons	4.583***	-4.134***
Region/Community (ref: Flanders)		
Brussels		
Wallonia	-.331***	0.102*
Germanspeaking Community	-.603***	1.067***
Bordertown (ref: no)	.093**	
Population (ln)	-.246***	
Surface (ln)	.026*	0.037**
Prop Over 65	1.703**	
Prop 20-29	4.183***	4.174***
Internal net immigration		5.713***
External net immigration	6.842*	
Single Households (%)	-2.444***	

Unemployment		0.029***
Difference between 1st and 2nd		
Electronic voting	-.173***	-0.248***
Spatial lag	.010***	.005*
Spatial error	.076***	.088***
Pseudo-R^2	**0.7269**	**0.6322**

The change in turnout and BI voting is analyzed in Table 3. The larger declines in turnout occur in places with electronic voting and a less dominant winning party. We see that a lower SES as measured by the share of single households also decreases turnout. But unemployment leads to an increase in turnout. This might indicate that while both are generally indicative of a lower SES, unemployment might still be motivating to participate in politics compared to the more immutable state of the family household. While the Walloon region and the German speaking community again seem to do considerably less well than we would expect, Brussels does better than could be expected. There is also a small positive effect of having an older population. Being a border town, surface and immigration rates do not have influence on the change in turnout. When looking at size, we see that cities with larger populations see a decline in turnout compared to smaller communities. Size expressed in surface is not influential. The spatial lag is not significant. The spatial error component is again very present, illustrating that there is an influence of spatial structure on the changes in turnout. If we now turn to change in BI voting, it seems that the change in invalid or blank votes is not easily explainable, and as such is rather random. The only significant association we found were that electronic voting has a negative influence on the change in invalid voting. Invalid voting seems to be slightly higher in Brussels in 2012 than it was in 2006. There are no significant spatial effects of the change in invalid or blank voting. The more modest R^2 values

in this table compared to Table2 also indicate that the dynamic patterns of turnout and BI-voting are less straightforward to explain.

Table3: Spatial autoregressive model with spatial autoregressive disturbances (SARAR) of logit of change in turnout and logit of change in blank/invalid voting (2006-2012) - only significant results are shown in the table

Parameter	Δ Turnout	Δ BI-vote
Cons		
Region/Community (ref: Flanders)		
Brussels	0.014**	0.010**
Wallonia	-0.007***	
Germanspeaking Community	-0.023***	
Bordertown (ref: no)		
Population (ln)	-0.004***	
Surface (ln)		
Prop Over 65	0.060*	
Prop 20-29		
Internal net immigration		
External net immigration		
Single Households (%)	-0.071***	
Unemployment	0.0004*	
Difference between 1st and 2nd	0.0001**	
Electronic voting	-0.006***	-0.011***
Spatial lag		
Spatial error	.089***	
Pseudo-R^2	**0.4585**	**0.2846**

7. Conclusion

Looking back at Table 1 which gave the expected relations between our variables, we can now summarize which hypotheses were confirmed or not. This is done in Table 4, we will only focus on a number of peculiar results that go against the expected relationship (in green in Table 4) and to our main question related to size and electoral participation. All these explanations need of course to take into account the caveat that while using aggregate data there is always a risk for ecological fallacy. With our high number of cases, we might nevertheless have somewhat reduced that risk.

Table 4: Summary of hypothesized relations

	Turnout		Blank / Invalid	
	expected	found	expected	found
SES	+	+	0/+	+
Proportion Over 65 years	+	+	-	0
Proportion 20-29 years	0/-	+	+	+
Difference between 1st and 2nd	-	0	+	0
Electronic voting	-	-	-	-
Border town	-	+	+	0
Population movement	-	+	+	+
Size	0/-	+	-	+
Population	0/-	-	-	0

If we look at the structural variables, one of the most interesting findings is that the proportion of young voters is related to high turnout in 2012, which goes against most of the international literature. But this is immediately countered by the much higher BI voting in the same group. This result shows that in Belgium compulsory voting still succeeds in getting young people to the polls, but that a part of them is not yet informed enough to make a meaningful vote and hence refrains from voting or spoils the ballot. We find older people still show up, and their presence accounts for a small increase in turnout. This stable effect on both level of turnout and change might relate to the '*dutiful*' political characteristics of older generations as Dalton (2008) claims. It is interesting to note that while political variables get a lot of attention in the

literature on turnout, we only find it to be significant for change in turnout, not for the absolute level. Moreover it behaves inversely as one would predict, with a larger winning margin actually leading to an increase in turnout. So more intense political competition actually depresses turnout. This might be related to a higher number of parties that might be present in the political system with small victory margins as ENEP correlates negatively with the margin of victory. In the theoretical section, some authors stated that a large set of parties can also depress turnout, but we need to investigate this more to vindicate that idea with our data. We also find that electronic voting presents a trade-off between turnout and BI voting. While it keeps more people from voting, those that do vote more often cast a valid vote this way. It is moreover the only variable that accounts for a change in BI voting between 2006 and 2012. When implementing this voting technique in more cities, the governments of the Regions should consider which of the variables they consider more important.

Finally when we investigate our main research question, we have a mixed answer. We can confirm for the population variable that smaller communities have a larger turnout as expected, but we did not find the concomitant level of high BI voting. We could tentatively state that the higher turnout in the villages is more related to a sense of community as described by Anderson than by the social pressure as described by Zulfikarpasic as the latter should go together with higher BI voting. When we look at the change in turnout, we see that the larger metropolitan areas are the ones that see an additional decrease on top of the existing turnout gap. This might cause a larger difference in political participation between smaller and bigger communities in Belgium. *"Get out the vote"* campaigns and measures to increase electoral participation might best be targeted to larger cities and neglect smaller villages as turnout there seem to be stable at a high level in the latter. If we look at the area a community covers as a measure of size, we have to refute the results from Denk (2012) on Swedish data: In Belgium it is not the actual size of the political community that is more important, rather

the population size. The effects we found were even twice the inverse direction that we would predict following the literature. Especially for BI voting this might be caused by the fact that compulsory voting relates it to different variables compared to countries where turnout is a voluntary act. But overall we can confirm that size is important for the level of turnout, but it is less so for the dynamic aspects of turnout and blank voting.

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