

The Impact of e-Voting on Turnout: Insights from the Belgian Case

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Abstract—Even in countries where compulsory voting is applied, one can observe large variations in turnout across electoral districts. This paper analyses turnout rates and the number of invalid votes in local elections in Belgium and tests whether differences across municipalities can be explained by e-voting. Taking into account various elements related to the electoral system, political competition and socio-demographic factors, multivariate models demonstrate that turnout decreases in municipalities where e-voting is used. This is true for all election years (1994-2012) and the paper also finds out that the negative effect of e-voting on turnout increases over time.

Index Terms—turnout, e-voting, compulsory voting, local elections

I. INTRODUCTION

The explanation of turnout has been done in numerous studies and for a variety of local, regional, national and supra-national elections, often in a cross-country comparison. Most of these studies tested the impact of institutional variables and of the electoral system on turnout. Yet, these studies seldom analyse electoral participation within one system [15, p. 368], particularly if this system presents some specific institutional or electoral characteristics. E-voting is one of them. Depending on the political context, the socio-demographic characteristics of the voters and on the type of electronic system used, e-voting can significantly affect turnout.

But e-voting is not the only variable related to the electoral system that has proven to have an impact on turnout. Compulsory voting leads to a higher turnout and Geys concluded that “the effect of compulsory voting on turnout is one of the robust findings in studies that analyse cross-national variation in voter turnout” [15, p. 652]. This effect has been empirically confirmed for national legislative elections (see for example [2]), for presidential elections (see for example [11]) or for regional elections (see for example [21]). The same applies to the proportional system. Following [1], we know that the system of transformation of votes into seats (i.e. mainly proportional representation vs. majoritarian system) has an important effect on turnout. This has been for example proven by previous studies (refer to [2], [11], [16]). Similarly, voting age has a positive impact on turnout [2], meaning that systems where the minimum age for voting is 21 witness a higher turnout than systems where the minimum age is 18.

Belgium is the ideal case if one wants to analyse the impact of e-voting on turnout while controlling for most of the effects of the electoral system (compulsory voting, PR and voting age), i.e. keeping them constant over time and across the

territory. In this paper, I analyse turnout for local elections in the Walloon region¹ of Belgium. E-voting does not concern all municipalities in this region. The organization of paper vote in some municipalities and of e-vote in some other allows the comparison of their effects across municipalities while keeping constant most of the aspects of the electoral system. This kind of analysis is not possible in countries where e-voting has been implemented in all municipalities.

Students of turnout believe that compulsory voting produces homogeneous participation rate, but this is far from being the case in Belgium. Dewachter and Lismont [8] attempted to explain differences in turnout (as well as in the amount of invalid votes) for all local elections in Belgium between 1919 and 1968. More recently, Geys and Heyndels demonstrated that turnout rates vary considerably between Flemish municipalities in the local elections of 2000, allowing for an empirical analysis aimed at identifying the determinants of turnout [15].

I observe the same phenomenon for the local elections in the 262 Walloon municipalities between 1994 and 2012. Due to compulsory voting, turnout is high in Belgium and one of the highest in the world². The average turnout for the local election in Wallonia was 91.63% in 1994, 90.8% in 2000, 91.92% in 2006 and 87.77% in 2012. But turnout is not only different across time but also different equal across municipalities. In Graphs 1 and 2, I present the distribution of turnout and of invalid votes across the 262 Walloon municipalities. Turnout varies from 98.05% in Bertogne in 1994 to 80.28% in Liège in 2012. Compulsory voting produces relatively high turnout rates that vary significantly across the Belgian territory. This paper aims to explain this variation.

The study of local elections presents two main advantages. First, the number of municipalities permits a large N study, which is lacking in most studies of turnout at the national level. For example, in one of largest analysis of turnout in national elections for 91 countries between 1972 and 1995, Blais and Dobrzynska [2] managed to deal with ‘only’ 276 elections. In this paper, I cover local elections in 262 municipalities in 1994, 2000, 2006 and 2012, which makes 1048 elections³.

¹There are three main regions in Belgium: the Flemish region (308 municipalities), the Walloon region (262 municipalities) and the Brussels region (19 municipalities).

²See for example the world rankings of www.idea.int/.

³There is one missing data (the municipality of Ramillies in 2000). I did not include by-elections that occurred in the municipalities of Jurbise in 2001 and Brugelette in March 2013.

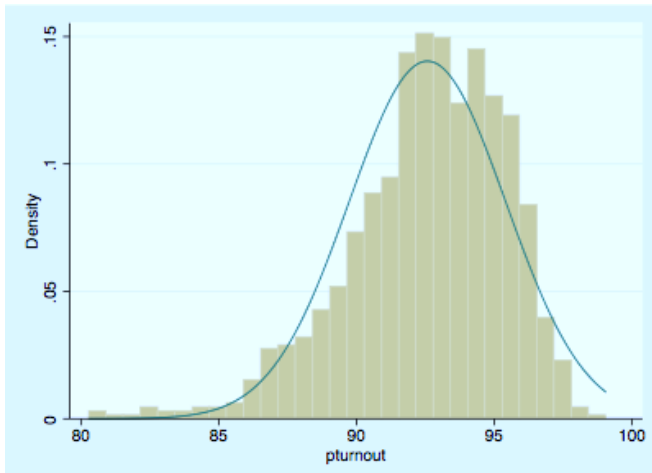


Figure 1: Distribution of turnout rates per municipality (1994-2012)

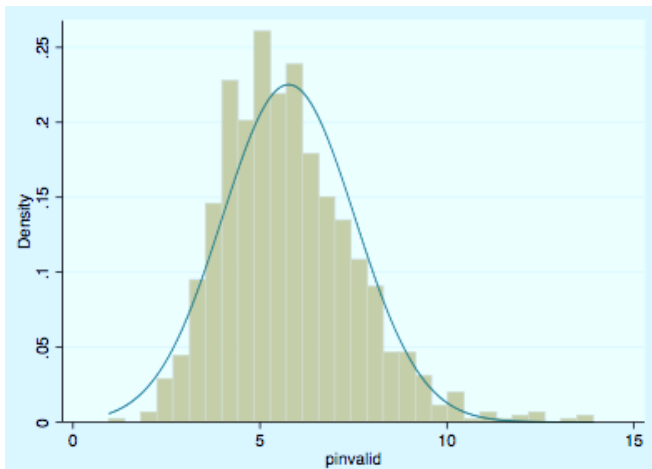


Figure 2: Distribution of invalid votes per municipality (1994-2012)

Second, some of the variables traditionally used for explaining turnout are based on the national and not the district level. For example, the classic indicator used to measure the closeness of an election (i.e. the difference in vote shares between the two largest parties) only measures the impact of the overall systemic closeness. An election may very close at the national level, but not close at all in a number of electoral districts or vice versa (refer to [2, p. 249]). The use of data based on the lowest policy level (the local level) allows controlling for these differentiated effects.

This paper is structured as follows. A first section reviews the characteristics of the electoral system for the local elections in Belgium. A second section lists the potential explanation of turnout by identifying three competing sets of hypotheses (electoral system, party competition and socio-demographic). I will run a series of regression models explaining turnout and invalid votes. A conclusion will summarize the main findings of this paper.

II. ELECTORAL SYSTEM IN BELGIUM

Similarly to all other elections in Belgium (provincial, regional, community, federal and European, including by-elections), voting is compulsory for the local elections. Voters are automatically inscribed on the voting lists based on the registries of population in each municipality. Since the elections of 2000, foreigners, non-UE citizens have the right to vote in the local elections. Voting age is 18. The electoral system is based on proportional representation with semi-open lists. The local elections take place on the same day as the (second-order) provincial elections⁴ and the voter has to cast two ballots. Local elections take place every six years on the second Sunday of October.

Since 2006, there is gender parity on the list, i.e. the same amount of male and female candidates on the list⁵ and both gender has to be represented on the first two places of the list. Seats are allocated based the Imperiali system and there are no electoral thresholds. The number of seats in each municipality depends on the total population but the minimum number of seats per district is also regulated (a minimum of 11).

Computer-based voting is used in 39 Walloon municipalities (out of 262). In these municipalities, the voter needs to vote first for the provincial elections and then for the local ones. Based on the Law of 11 April 1994, e-voting was gradually introduced in all elections in Belgium. The first votes with a computer took place in October 1994 for the local elections. The e-voting system for the Walloon municipalities was developed by the company Jites/Digivote. Each polling station is equipped of at least one computer. The voter receives a smart card that (s)he introduces in the card reader of the machine. The computer screen displays the parties and the candidates and the voter indicates his/her preferences using a light pen. Blank votes are allowed and the different votes are all recorded in the same card. After the voter confirm his/her votes, (s)he gets the smart card back and introduces it into the ballot box. Internet voting is not permitted.

Overall, there are very few differences across the Walloon territory and across time regarding institutions and the electoral system for the local elections. Exceptions are to be found in the computer-based voting and the number of seats to be elected.

III. HYPOTHESES

Similarly to Blais and Dobrzynska [2], I divided the explanatory factors into three competing sets of hypotheses: electoral, party competition and socio-demographic.

A. *Electoral system*

The impact of these variables should remain very limited as most of the effects of the electoral system (i.e. compulsory voting, PR system and voting age) on turnout are constant in

⁴For more information on the 2006 and 2012 provincial elections (electoral system, parties, issues and results), see [7].

⁵With the exception of the list composed of an uneven number candidates, including the lists composed of one single candidate.

the Belgian case. Yet, some other institutional elements have to be considered as potential explanatory variables.

Some municipalities used a system of e-voting. Literature teach us that e-voting supposedly has an impact on the voters based the concept of digital gap. The digital gap refers to the varying ability of the voters to fully understand and control their e-votes, depending on their familiarity of using a computer, previous experience of on-line voting, etc. Voters are not alike as some voters do master computer technologies while some others have never approached a computer. In other words, e-voting increases the inequalities among voters.

The impact of e-voting on political behaviour is located at two different stages. First, e-voting theoretically has an impact on voter's trust in the election. Compared to the (simplicity of the) paper voter, the e-vote may not provide the same guarantee of transparency and democracy in the eyes of the voter. The complexity of the computer technology prevents the voter to fully understand the whole process of its vote from the voter registration to the announcement of the official results. As a result, e-voting brings along the question of the confidence in the political system but more particularly in the political parties and the electoral process.

Second, e-voting theoretically has an impact on voter's electoral behaviour. Similarly to the question of literacy in the case of the paper vote, the e-vote brings along another concern: the familiarity with computer technology. A significant proportion of voters do not have much experience in handling a computer and this low familiarity with computer technology may create feelings of fear. Those voters are mostly found in the following categories of population: poorer, older, rural and less educated voters. Persons without a professional activity are also expected to have less contact with a computer.

All together, distrust towards e-voting and non-familiarity with computer technology should make some (categories of) voters more reluctant to go to the polling station if the voting act requires the use of a computer rather than a ballot paper. I therefore expect that e-voting would lead to a lower turnout and to a higher rate of invalid votes.

Even if closely related to the size of the municipality (see the socio-demographic variables), the number of seats in the local assembly may have an impact on turnout. It is expected that voters will feel less concerned by elections if they have the feeling that their votes would not have an impact on the electoral outcome. This is likely to be the case in large communities and in large cities.

B. Party Competition

Political factors – and more particularly factors related to party competition – have a large impact on turnout. Many studies underlined the fact that the expected benefits of voting are influenced by the probability of affecting the election results. The competitiveness of an election “increases uncertainty as to the electoral result and thereby strengthens elites’ incentives to campaign as well as citizens’ incentives to turn out and cast a ballot” (refer to [14, p. 236]).

This competitiveness is often associated to the closeness of an election. If close election results are expected, it should increase the expected utility of voting and thereby the voter turnout. In addition, parties and candidates would invest more efforts and resources in the campaign of they believe that they can change the electoral outcome. The vote share difference between the first two parties in elections is the standard measure used in numerous studies (see for example [2], [12], [14], [17], [18], [22], [23]). The logic is that the smaller the votes difference between these two parties, the larger the competitiveness of the party system and therefore the higher the expected turnout.

Yet, the use of such measure in the Belgian case is not without problems⁶. Blais and Lago [3] demonstrated that the impact of competitiveness of elections – based on this standard measure – on district-level turnout tends to vanish in PR systems with large district magnitudes. Local elections in Belgium are based on a PR system (see above). In addition, there is a huge variation in the party system of each municipality between two elections⁷. Local parties may change their name, split into different units or simply disappear; new local parties can be created or join an existing party; national parties can create an electoral alliance with a local or another national party; can change name or simply decide to not participate in the elections; etc. With very few exceptions, the local party system for an election is not comparable to the one in the previous elections. As a result, it is impossible to link the two largest parties at time $t - 1$ with parties at time t . Finally, given the specificities of the local level (no available opinion polls or surveys before the elections, particularly for small municipalities), the use of *ex post* measures of electoral closeness is not relevant, not to mention the fact that the use of *ex ante* measures generate a significantly higher success rate than the use of *ex post* measures (refer to [15, p. 648]).

Based on the assumption that parties that won the absolute majority of the votes in the previous elections would remain unchanged (unlike other types of parties are more likely to witness important changes – see above), I developed a first measure of political competition: the presence of a party that won the absolute majority of the votes in the previous elections. Blais and Dobrzynska [2, p. 249] expect that elections that produce one-party majorities lead to a higher turnout.

The second measure concerns the number of parties in competition. This measure is used in numerous studies (see for example [2], [11], [16], [17]) and is based on two conflicting arguments. First, it is expected that a larger number of parties would give more choice for the voter and therefore produce a higher turnout. Second, it is expected that a larger number of parties should lead to a lower turnout. A fractionalized party system often requires coalitions but this process of coalition formation being unpredictable, voters may feel that they do not directly select the government (refer to [11, p. 914]).

⁶Not to mention the fact that some authors - such as Fornos, Power and Garand [11] - found out that this measure had no significant impact on turnout.

⁷Paradoxically, the national and regional party systems are very stable over time.

However, Geys and Heyndels [16, p. 273] demonstrated that both the number of parties and size inequalities between parties have to be measured. In the context of the local elections, it is not rare to witness a large set of folkloric and tiny parties that participate in the elections. Yet, Copus et al. underlined the importance of small and independent parties. They expect that these parties are able to galvanise political opinion and “act as a vehicle by which discontent can be signalled to political elites” [4, p. 7].

Following this latter argument, I believe that – especially in a compulsory voting setting – turnout can be related to the presence of so-called protest parties. Protest parties can attract the votes of the people that are discontent with politics or with mainstream parties and candidates. In Belgium, four types of parties can be identified as protest parties: the green parties (that advocate an alternative way of doing politics or that want to change the existing political culture) and the populist, radical-right and radical-left parties (that can also be labelled as anti-politics or anti-establishment parties)⁸. Since I believe that a portion of voters do send a (protest) signal to established parties and candidates by not participating to the elections, I expect that these voters would reconsider their decision not to vote if one or several protest parties participate in the elections in their municipalities.

Finally, local elections are not only a matter of local politics and local issues, but are also to be understood in a national framework. National parties often participate in local elections and bring along more stakes and incentives for the voter. Indeed, in those municipalities where one or several national party present a list of candidates, the voter can not only vote in function of local issues but also in function of national issues. Following the argument of the second-order theory, a voter might be willing to vote, in order to be able to punish electorally the national party in government.

C. Socio-demographic variables

Previous analyses of turnout across countries and regions demonstrated that small entities are often related to a higher turnout [2, p. 250]. The explanation of this relationship is to be found in the fact that elections in these countries take place in political environments where citizens feel closer to the decision-makers and have a more direct impact on policies (refer to [2], [5, p. 168]). In addition, in large communities, one single voter is less likely to make a difference, de facto decreasing the expected utility from voting [15, p. 642]. A greater sense of community and larger participation rates may be expected in small cities while, in large cities, it is expected that public life becomes more impersonal and distant [1], [6]. I measure the size of municipality by using the amount of registered voters. This measure is a very good proxy for the population of a municipality since all Belgian citizens

⁸There is another type of non-mainstream party that could mobilize protest voters: the regionalist parties. However, most of these parties only participated to the 2012 elections, in a small amount of municipalities and they obtained an insignificant electoral result those elections. I therefore did not include them in our operationalization of protest parties.

above 17 years are registered on the voting lists, as well as a significant number of non-Belgian residents.

Somehow connected to the size of the municipality, urbanization is also used in studies of turnout. Urbanization is expected to lead to a weakening of interpersonal bonds since cities are more individualistic and characterized by a lower social pressure to turn out [15, p. 643]. I measure the degree of urbanization by using the Eurostat concept for each municipality. Finally, I control for language as nine municipalities in Wallonia are German-speaking.

IV. EXPLAINING TURNOUT IN LOCAL ELECTIONS

I first test the influence of the variables related to the electoral system on turnout. In these models, I explain turnout by measuring the effect of e-voting (voters in 39 municipalities used computers while the others used ballot papers) and the number of seats in the local council. Even if our research design controls for most of the effects of institutions and of the electoral system (i.e. compulsory voting, PR system and voting age), we find that these two institutional variables have a significant impact on turnout (see Model 1). E-voting has negative effect on voting. Municipalities with such voting system witness a decrease of turnout of almost 1%. This effect is important, considering the cross-municipality variation of turnout.

The number of seats has also an impact on turnout: turnout is lower in large city councils and higher in small city councils. Each additional seat in the local assembly produces a decrease of 0,27% of electoral participation. However, the effect of this variable may be related to the size of the municipality since the correlation between the number of seats and the number of voters is .83.

However, turnout is not only a matter of institutions and electoral systems, but also of competing parties and candidates. As outlined above, the incentives for voting highly depend on the expected benefit of voting. If the voter is convinced that his/her vote will not influence the electoral outcome, (s)he may not turn out. This likely to be the case if the municipality has been ruled by a single party that benefitted from an absolute majority of the votes during the previous term. Yet, our results indicate that turnout is not different in municipalities dominated by a single party.

On the contrary, we observe that the amount of parties (lists) competing in an election influence voting behaviour. Elections where a large amount of competing lists lead to higher turnout rates. And this impact of the amount of candidates is considerable: for each additional list, turnout increases by 0,28%. When one observes that the amount of lists per municipality ranges from 1 to 14, this effect is potentially important.

I also tested whether the type of parties that compete in a particular municipality do influence turnout. The presence of national parties among the lists in competition has an impact on turnout. Local elections are mainly about local issues, local candidates and local politics and the presence of national actors does not influence voting behaviour.

Table I: Explaining turnout

		Turnout (Model 1)	Turnout (Model 2)	Turnout Dev. (Model 3)
Electoral system	E-voting	-.9552497³ (.2875845)	-.7704293² (.2481055)	-.7592577² (.2517693)
	Seats	-.2681378 ³ (.0280872)	-.1752309 ³ (.0235025)	-.1472356 ³ (.0235377)
Party competition	Lists	.2753158 ³ (.0697502)	.0312972 (.0420414)	-.01944 (.0414607)
	Absolute majority	.0327799 (.1465458)	.0648486 (.0941956)	.0449638 (.0942004)
	National parties	.0862295 (.0788338)	-.0883804 (.0503593)	-.1447352 ² (.0516349)
	Protest parties	-.4290248 ³ (.0790467)	-.0075916 (.0507644)	.0400051 (.0473701)
Socio-demographics	Voters	.0000164 (.0000117)	-9.08e-06 (.0000101)	-.0000128 (.0000103)
	Urbanization	-.4826893 ² (.1822707)	-.7804036 ³ (.1638268)	-.8498626 ³ (.1650156)
	German-speaking	-1.559425 ² (.5612751)	-1.848499 ³ (.5105605)	-1.905086 ³ (.5157181)
Election year dummies	No		Yes	No
	Constant	98.09261 ³ (.4407785)	95.46623 ³ (.3732191)	7.096645 ³ (.371573)
Model summary	N	1047	1047	1047
	Groups	262	262	262
	R^2 (within)	.1205	.7544	.00004
	R^2 (between)	.6645	.6733	.6723
	R^2 (overall)	.4745	.7009	.5888

¹ GLS regression, random effects. $\rho < 0.05$.

² GLS regression, random effects. $\rho < 0.01$.

³ GLS regression, random effects. $\rho < 0.001$.

On the contrary, the presence of protest parties is negatively linked to turnout. I expected that the protest vote would lead to a higher turnout when citizens have the opportunity to vote for one (or more) protest party. Turnout decreases by 0,43% for each additional protest party participating in the elections. An alternative measurement of the presence of at least one protest party (using a dummy - not shown) leads to similar results.

Our third set of variables concerns the demographic and socio-economic aspects of voting. Model 1 includes demographic variables in the explanation of turnout rates for local elections. Some of these variables have an important impact on turnout. The number of voters – or, to put it simply, the size of the municipality – does not influence turnout. Yet, most of the effects of this variable are taken over by the variable of the number of seats in a municipal council. We have seen above that turnout is higher in small municipalities than in large one.

Similarly, the degree of urbanization of the municipality is connected to turnout. Turnout is higher in rural municipalities than in urban ones. These results confirm previous findings on the impact of the demographical characteristic of an entity in election results. Turnout is also surprisingly lower in German-speaking municipalities (-1.56%), even if most of them are small (small amount of voters) and rural. To assess the robustness of these findings, I tested the impact of the same variables in two alternative models (including one with an alternative dependent variable). We observed in the introduction that there have been large differences in turnout over time. For instance,

the average turnout was 91.92% in 2006 while it drops to 87.77% in 2012. The differences in turnout are also observed at the municipal level, sometimes dramatically as in the case of Saint-Vith (- 10.08% between 2006 and 2012). Following Rose [20], I do not only analyse differences between municipalities by looking at their turnout rate but I also analyse differences between municipalities by calculating their deviation from the regional mean⁹. This measurement of the deviation from the regional mean for each election year allows disentangling the overall effects due to each electoral campaign. We ran similar models but using the deviation from the regional mean as the independent variable.

Compared to the previous model, Model 3 confirms the effect of most of the identified variables on turnout for this alternative measurement of turnout. Among others, e-voting decreases the turnout deviation from the regional mean by 0.76%. Yet two exceptions are found. The number of competing parties (lists) and the number of protest parties do no longer have a significant impact on turnout in the number of seats. On the contrary, the number of national parties in each local election has a negative impact on turnout deviation.

Finally, I disaggregated the data per election year. Table III confirms most of the previous findings. E-voting has a significant and negative effect on turnout in all four local

⁹An alternative way of introducing election years consists in the integration of election dummies in the model. Model 2 confirms most of the effects previously identified, with the exception of the number of competing lists and the number of protest parties.

Table II: Explaining invalid votes

		Invalid (Model 4)	Invalid (Model 5)	Invalid Dev. (Model 6)
Electoral system	E-voting	-.3237394 (.2254287)	-.4618676¹ (.2205719)	-.4235588 (.2204263)
	Seats	.1034796 ³ (.0217764)	.093632 ³ (.0212978)	.1128624 ³ (.0208098)
Party competition	Lists	-.1818506 ³ (.0389778)	-.1158247 ² (.0364435)	-.1512699 ³ (.0349695)
	Absolute majority	-.0486241 (.0870872)	-.0273765 (.0819079)	-.1175356 (.0798341)
	National parties	-.1505361 ² (.0477451)	-.1973475 ³ (.0438722)	-.2195763 ³ (.0439731)
	Protest parties	.0786309 (.0447633)	-.0955664 ¹ (.0440227)	-.0744118 (.0399872)
Socio-demographics	Voters	-.0000225 ¹ (9.15e-06)	-.0000222 ¹ (8.99e-06)	-.0000238 ² (8.97e-06)
	Urbanization	.2422001 (.1466025)	.2220095 (.1471322)	.1948998 (.146511)
	German-speaking	3.006763 ³ (.4577937)	2.793543 ³ (.4567655)	2.790852 ³ (.4556806)
Turnout	Turnout	-.2113485 ³ (.017463)	-.3231076 ³ (.0270905)	-
	Turnout Dev.	-	-	-.3031893 ³ (.0263891)
Model summary	Constant	23.92509 ³ (1.749261)	34.06826 ³ (2.60659)	-1.313089 ³ (.373602)
	N	1047	1047	1047
	Groups	262	262	262
	R^2 (within)	.2252	.3961	.00004
	R^2 (between)	.3978	.3947	.3933
	R^2 (overall)	.3518	.3941	.3524

¹ GLS regression, random effects. $\rho < 0.05$.

² GLS regression, random effects. $\rho < 0.01$.

³ GLS regression, random effects. $\rho < 0.001$.

elections. This effects ranges from -0.64% in 2006 to -1.22% in 2012. The other explanatory variables are the same, with the exception of the party competition variables that no longer have a significant effect.

V. TURNOUT AND INVALID VOTES

Turnout – especially in a country where voting is compulsory – does not fully indicate dissatisfaction with parties or politics. This dissatisfaction – or protest behaviour – can be observed through the analysis of the invalid and blank votes¹⁰. Indeed, some citizens that would not vote if voting would not be compulsory and might use the possibility of producing a blank vote as a way to protest or to express its dissatisfaction. Our data for the local elections of 1994 to 2012 indicate that turnout and invalid votes are connected to a certain extent but negatively. The correlation between the two variables is -.403 indicating that a higher rate of invalid votes is likely to be found in municipalities with a lower turnout and vice versa¹¹. In other words, the presence of a high number of

invalid votes reinforces the effect of a low turnout. It is likely that our measure of turnout is too conservative and that both phenomena should be somehow combined in order to properly measure non-participation in local elections in Belgium. The average percentage of invalid votes was 5.94% in 1994, 7.16% in 2000, 6.08% in 2006 and 6.73% in 2012.

Since invalid votes and turnout are similar or, at least, connected phenomena, I tested whether they may be explained by the same variables. Even if the voter has the possibility to produce a blank vote, these systems do not permit invalid votes per se. As a result, I expect that the e-vote would lead to a lower rate of invalid votes. The impact of all other variables (electoral system, party competition, and socio-demographic) on the number of invalid votes is expected to be similar as the one on turnout.

Compared to the factors explaining turnout, Model 4 indicates that similar variables have a significant impact on the rate of invalid votes, i.e. the size of the municipality (via the number of seats), the number of competing parties (lists), and the German-speaking municipalities. These municipalities do not only display a lower turnout rate (-1.56% in Model 1) but also a much higher rate of invalid votes (+3.01%). This confirms the connection between turnout and invalid votes. Indeed, the model also indicates that turnout has a negative impact on the amount of invalid votes (-0.21%). Since the

¹⁰In parallel to this paper, I ran a series of interviews with election officials and election observers for the local elections of 2012. They overall confirm that purely invalid votes (i.e. votes where the voter unconsciously invalidates his/her vote) are not common and that the large majority of invalid votes are in fact blank votes.

¹¹In the following models, turnout and turnout deviation have been used as a control variable.

Table III: Explaining turnout (per election year)

		Turnout 1994	Turnout 2000	Turnout 2006	Turnout 2012
Electoral system	E-voting	-1.07539³ (.2669784)	-.8303655² (.2979884)	-.6380555¹ (.2665399)	-1.215332² (.4099022)
	Seats	-.16098 ³ (.0258595)	-.1711303 ³ (.0320179)	-.2002794 ³ (.0278197)	-.2723701 ³ (.0433135)
Party competition	Lists	-.1148294 (.0910663)	.0387143 (.108546)	- (.0860131(.1019875))	- (.2709908)
	Absolute majority	-.0127777 (.1795321)	.1149662 (.1944528)	-.1839848 (.171354)	-.2478938 (.2709908)
	National parties	-.0324584 (.0861901)	-.0824846 (.1046218)	-.1560919 (.0868882)	-.0622522 (.1459975)
	Protest parties	-.1176184 (.1250738)	-.2473209 (.1258776)	-.103433 (.110692)	.1952526 (.1603254)
Socio-demographics	Voters	8.06e-06 (.0000109)	1.28e-06 (.0000123)	.000021 (.0000116)	.0000129 (.0000166)
	Urbanization	-.6801351 ³ (.1598519)	-.5206752 ² (.1925557)	-.4279723 ¹ (.1738576)	-.7536016 ² (.2587375)
	German-speaking	-.2343523 (.4955003)	-.9068259 (.5797311)	-1.848596 ³ (.5166825)	-3.655709 ³ (.7797424)
	Constant	98.76676 ³ (.4527342)	97.48725 ³ (.5091029)	99.35399 ³ (.4602627)	97.95991 ³ (.7005673)
Model summary	N	262	261	262	262
	Adj. R^2	.6765	.5908	.6422	.5838

¹ GLS regression, random effects. $\rho < 0.05$.

² GLS regression, random effects. $\rho < 0.01$.

³ GLS regression, random effects. $\rho < 0.001$.

phenomena of turnout and invalid votes concern similar voters, it is not surprising to witness a higher amount of invalid votes in municipalities that already displayed a low turnout.

More surprisingly, urbanization and the number of protest parties do not longer play a role in this model. The number of national parties and the number of voters have a negative impact on the number of invalid votes¹². This confirms that voters do not use the possibility to express a blank/invalid vote when they are given the opportunity to express their distrust towards mainstream (national) political parties and candidates. In that sense, such results are in line with the second order election model that predicts voters to sanction national parties in second-order (i.e. local) elections.

We have seen above that turnout was explained by the two variables related to the electoral system (e-voting and the number of seats). Surprisingly, e-voting does not similarly influence the rate of invalid votes. There is a smaller number of invalid votes in municipalities with e-voting systems but the effect of this variable is not significant. It is likely that those who would express an invalid vote do not turn out in those municipalities.

Finally, I also tested whether our variables could explain the rate of invalid votes when overall differences between election years are taken into account (using election year dummies – Model 5 – and using the deviation from the regional mean for each election – Model 6). The obtained results are almost similar as for the previous model (Model 4). The size of the

municipality – measured in terms of the number of seats in the local council – positively explains this deviation, together with the negative impact of the number of competing lists and the number of national parties. Finally, the amount of invalid votes is also related positively to the German-speaking municipalities and negatively to (the regional deviation of) the turnout rate. This final model confirms once again the connection between turnout and invalid votes: a lower turnout is associated to higher proportion of invalid votes.

VI. CONCLUSIONS

This paper aimed at understanding turnout in a very specific electoral setting: e-voting in a compulsory voting system. Our research strategy was not only to analyse turnout in a constraining environment but also to keep constant some of the effects of the electoral system (compulsory voting, PR and voting age). Altogether, we aimed at identifying the factors that could explain variation in turnout when the vote is electronic and when the electoral rules are the same for all electoral districts. I choose to analyse local elections in Belgium since they not only allow a large N study but also demonstrated important variation of turnout across municipalities. If the electoral system does not explain these variations, what contributes to a low or high turnout ?

The results show that elements related to the electoral system play a role. It is the case of the e-voting (that decreases turnout) and size of the municipality (via the number of seats in the local council - that also decreases turnout). If the literature on turnout clearly indicates size as an important explanatory factor, the effects of e-voting are rather overlooked. Yet, this paper draws a clear conclusion concerning the impact of e-voting on voting behaviour. In all our models,

¹²Paradoxically, the number of seats indicates that a higher rate of invalid vote is to be found in municipalities with larger city councils. Yet the variable measuring the number of voters is also significant but negative. Both variables are connected to the size of the municipality but indicate contradicting results. More research efforts are needed to disentangle these diverging effects.

Table IV: Explaining turnout and invalid votes (e-voting municipalities only)

		Turnout	Invalid
Electoral system	E-voting experience	-1.226012³ (.1572672)	.2917303¹ (.1140951)
	Seats	-	.0547283
		0.016343129	(.0627996)
Lists		.0621057 (.1952349)	- 0.052611296
Party competition	Absolute majority	-1.132908 ² (.4000196)	.9313381 ² (.2949714)
	National parties	-	-.2024668
	Protest parties	0.074940034 (.2225831)	.1967819 (.1618486)
Voters		-0.0000201 (0.000023)	.0002086 (.0001705)
Socio-demographics	Urbanization	.1591244 ¹ (.4955995)	.8739636 ¹ (.3730369)
	German-speaking	-	3.207118 ³ (.4878475)
Turnout		-	-.000252 (.0002115)
Constant		99.8394 ³ (1.365586)	3.437101 ² (1.02875)
N		152	152
Groups		39	39
Model summary	R ² (within)	.4659	.2267
	R ² (between)	.6936	.7196
	R ² (overall)	.5786	.546

¹ GLS regression, random effects. $\rho < 0.05$.

² GLS regression, random effects. $\rho < 0.01$.

³ GLS regression, random effects. $\rho < 0.001$.

turnout decreases in the municipalities using e-vote. This is true when considering turnout rate as the independent variable, but also deviation from the regional, as well as in models disaggregating the data per election year.

These findings are based on the comparison between municipalities that use e-voting and municipalities that use paper ballot. Complementary findings originate from the analyses of only municipalities that use e-voting. In such analyses (see Table IV), I observe that the e-voting experience (the number of elections since the introduction of the e-vote) has an effect on turnout. Turnout significantly decreases with e-voting experience: -1.23% for local elections. In other words, it means that many voters turn out for the first elections where e-voting was implemented and that tend to vote gradually less the subsequent elections. Either the 'newness' of the e-voting system attracted the curiosity of the voters in the first computer-based elections, either the negative effects of the e-vote on voting behaviour are only on the long term. More research is needed to answer to these questions.

Another interesting conclusion¹³ originates from the variables that do not play a role: party competition does not have much influence on turnout, especially when elections are considered separately. This is maybe related to the length

¹³Not to mention the identification of a German-speaking exceptionalism. Voters living in German-speaking municipalities demonstrated a different voting behavior than voters in French-speaking municipalities in almost all models.

of the term (6 years) and the voter's lack of information on the current balance of power between parties. Yet, the major events that occurred in the local party system in the recent years could have also played in role in the stakes of these elections. Not only the parties and candidates in competition do matter but probably the political changes since the last election. Local party systems are characterized by a important instability: new parties are created, dissidences emerge, parties are split or merged, individual and candidates more from one party to another, etc. In a further step of this research, I need to take these events into account in order to have a larger picture of the actual pattern of party competition.

Finally, I tested whether our model could contribute to the explanation of a phenomenon often related to turnout in compulsory voting settings: invalid and blank votes. It has been often argued that since voters do not have the opportunity to express their dissatisfaction or distrust by the act of non-voting (as voting is compulsory), they tend to vote in a invalid way or vote blank. Data for local elections in Belgium indicate that turnout and invalid votes are connected to a certain extent but negatively. The correlation between the two variables equals - .403 indicating that a higher rate of invalid votes is likely to be found in municipalities with a lower turnout and vice versa. In other words, the presence of a high number of invalid votes reinforces the effect of a low turnout. We need further research to properly analyse these phenomena: should we somehow combine them in order to measure non-participation or protest (non-)voting in local elections in Belgium or should they be considered separately?

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