

# WORKING PAPERS

LEARNING THE MECHANICAL EFFECT OF  
ELECTORAL SYSTEMS

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### Abstract

Sub-national elections following legislative decentralization can enhance the opportunities that voters have to learn about the mechanical effects of electoral systems. Specifically, by voting at sub-national elections that are both regularly held *and* are characterized by similar electoral systems to the national one, voters are expected to learn more quickly the reductive effects of electoral systems. Consequently, we should expect a faster reduction in wasted votes over time in those countries that satisfy these two conditions simultaneously. This hypothesis is tested in new democracies across Eastern Europe and the Former Soviet Union, where the occurrence of strategic voting might face more difficulties due to failed elite coordination. The findings suggest that voters, even in non-favorable contexts, are able to recognize similar electoral systems, process how votes are translated into seats, and modify their behavior accordingly in future elections.<sup>1</sup>

**Keywords:** electoral learning, mechanical effects, wasted vote, new democracies, multi-tiered elections.

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*“Even for a voter who supported the UDF, what was a strategic vote when faced with three parties named UDF?”*

(Dawisha and Deets (2006), on 1991 Bulgarian Elections).

## INTRODUCTION

This paper seeks to explain the evolution of wasted votes in post-communist democracies. A vote is considered to be *wasted* when it is given to representatives of parties who fail to gain representation in parliament (Anckar, 1997). Reluctance to waste one’s vote is a common motivation for strategic voting (Duverger, 1951). Strategic voting itself typically involves voting for a second preferred candidate because that candidate’s chances of winning are much greater than the voter’s sincere first preference (Duch and Palmer, 2002).

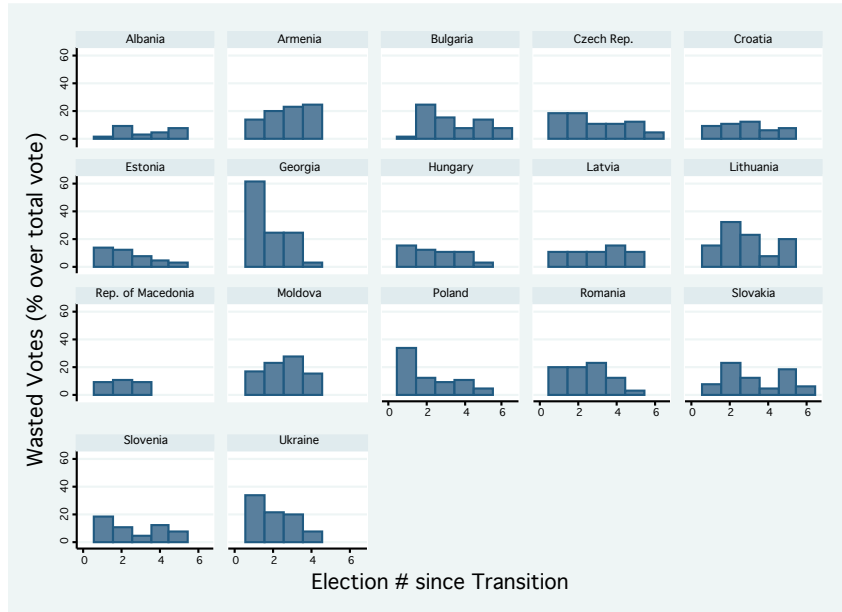
Even under the most strict assumption of instrumental rationality (Cox, 1997), voters need time to recognize when they face an opportunity to vote strategically, desert trailing lists, and support viable and secure lists (Duverger, 1951). Specifically, in order not to waste one’s vote, voters should *learn* three pieces of information: the mapping between votes and seats - or Duverger’s *mechanical effect*; the party platforms, ethnic affinities, or leaders’ qualities of the political parties running a given election; and the social support of these party lists and candidates. These elements comprise the minimum set of elements to be learned in order to rank political parties, approximate their social support, and assess their chances of exceeding the threshold of parliamentary representation.

The empirical support for the *actual* occurrence of *electoral learning* is more limited than its theoretical foundations. To help fill this gap, this paper analyzes whether learning has taken place across Eastern Europe (EE) and the Former Soviet Union (FSU) over the last two decades. Bochsler (2005), Duch and Palmer (2002), Kostadinova (2006), Dawisha and Deets (2006) and Tavits and Annus (2006) have already provided evidence suggesting that the amount

of wasted votes decreased over time across this region. However, none of these analyses identifies what piece of information was learned in this process: party awareness, party social support and/or the mechanical effect of electoral systems. In this paper I seek to clarify these issues. Specifically, I seek to identify institutional conditions under which voters find it easier to learn the mechanical effect of electoral systems over time. I will test whether political decentralization contributes to a faster reduction in the level of wasted votes over time in those countries where sub-national collective bodies are elected under similar electoral systems to the national lower chamber, *and* elections for these sub-national bodies are regularly held. If the amount of wasted votes at general elections decreases the more sub-national elections are held under *similar* electoral systems to the national one, we will be in a better position to affirm that voters do recognize these similarities, process this information, and learn sooner how not to waste their vote.

The paper will test this hypothesis by extending the work undertaken by Tavits and Annus (2006), adding new observations, covariates and controls. As Tavits and Annus (2006) argue, EE and the FSU represent a big challenge for the theory of strategic voting. This region made the transition from autocratic rule to democracy rapidly, and the new regimes experienced a mushrooming of party lists without precedent. Constitutional architects in the region chose particularly complex electoral systems, usually involving more than one national-tier and mixed electoral rules (Golder, 2005). Most voters lacked any experience of competitive electoral processes - due to their age or the lack of a democratic past in the country. Taken together, these young democracies contained all the ingredients to prevent a parsimonious aggregation of voters’ preferences. And that is precisely what happened: for the first four election cycles, the average level of wasted votes for EE was four times that experienced a century ago in Western Europe and Latin America: 12.75% over total vote share vs. 3.03% and 3.35%, respec-

**FIGURE 1: Evolution of Wasted Vote. On the x axis, the Number of Elections since the Onset of Democratization**



tively (Bielasiak, 2005); and the FSU experienced even higher rates: 20.48% (ibid.).

Despite the relative magnitude of the level of the wasted votes, and the potential harm it could cause if it remained this high over time (Mainwaring and Scully, 1995),<sup>2</sup> the picture might be slightly less dramatic once the evolution of wasted votes is observed at country level. As can be seen in Figure 1, the amount of wasted votes has decreased over time almost everywhere across EE and the FSU.

Together, Figure 1 offers a more optimistic picture for the occurrence of strategic voting and party system consolidation, consistent with Cox (1997) and Duverger’s predictions. However, this paper seeks to move beyond the mere confirmation of the reduction of wasted votes over time: specifically, I will test whether voters across EE and the FSU *learned* the magnitude of the mechanical effects of electoral systems and, as a direct consequence, learned as well how not to waste their votes on trailing lists. In

<sup>2</sup> Voters’ systematic exclusion from the institutionalized channels of representation is not inconsequential: it has been argued that it could lead to political disaffection (Enyedi, 2006), low legitimacy of electoral politics (Lewis, 2000; Dawisha and Deets, 2006), alienation (Duch and Palmer, 2002) and the spurring of populist nationalist parties (Innes, 2002).

order to test this hypothesis, I will study the differential effect that certain institutional configurations (political decentralization vs. unitary states) can yield over the reduction of wasted votes over time. To this end, three new measures will be introduced: the *resemblance* of electoral systems across tiers of government, the degree of vertical party nationalization (*VPN*), and the regularity at which sub-national elections (local, county, and regional) are held. The research hypothesis will be tested for the complete sample and its two sub-samples (EU-members vs. non-EU-members). Such a distinction will allow us to account for confounding factors related to the stage of democratic consolidation.

The analysis is organized as follows: First, I briefly review the fundamentals of strategic voting under PR and mixed systems. Second, I discuss how *electoral learning* has been conceptualized and measured in the literature, and introduce an indirect approach to measure the learning process of the mechanical effect of electoral systems. Next I will present the variables I use to test the research hypothesis. Fourth, I review the effect that the control variables are expected to exert over the amount of wasted votes. Fifth, I offer an argument against the main

counter-hypothesis for the analysis: that is, that wasted votes' reduction is being driven *purely* by elites' coordination (Tavits and Annus, 2006). The details of the estimation method and the analysis of the empirical models follow. Some final comments conclude the paper.

## STRATEGIC VOTING IN NON-MAJORITARIAN SYSTEMS

The analysis of strategic voting began with the publication of Maurice Duverger's *Political Parties*, in 1954.<sup>3</sup> In that work, Duverger postulated two forces behind the concentration of votes around a small number of party lists: namely, the *mechanical* and the *psychological* effects of electoral systems. The former refers to the process by which votes are mapped into seats. The more majoritarian an electoral system is, the more disproportionately seats are allocated relative to vote share. The *psychological effect* refers on the other hand to the voters and parties' anticipation of the mechanical effects of electoral systems. More specifically, such anticipation is expected to encourage voters to concentrate votes around the leading parties even if those lists do not constitute their first preference. If voters did not behave strategically, there would be less chance of the preferred list winning (among those that are viable). Once combined, the mechanical and psychological effects are expected to result in a steady disappearance of third parties and a smooth decrease in the levels of wasted votes over time.

The two mechanisms offered in *Political Parties* were originally devised for majoritarian, single-member district systems, where the mechanical effect is intense by definition. The theory was subsequently adapted for non-majoritarian systems, such as those across EE and the FSU.<sup>4</sup>

Strategic behavior in PR systems can be driven by different motivations: basically, voters may not want to waste their own vote in trailing lists that may not exceed the electoral threshold - or the *effective* electoral threshold, when exceeding the legal barrier is not sufficient to ensure parliamentary representation (Leys, 1959; Lijphart, 1994; Sartori, 1968; Taagepera and Shugart, 1989); Alternatively, voters may prefer to vote for their second preferred lists in order to enhance the probability of a government coalition. Whatever the ultimate motivation, the amount of wasted votes should reduce over time as a consequence of strategic voting (Cox, 1991; Cox and Shugart, 1996; Cox, 1997).

In mixed electoral systems with a dual ballot (all mixed systems in the sample have this ballot structure), strategic voting differs depending on whether the two tiers are linked or not. When they are linked, ineffective votes in the SMD-tier compensate for the disproportionality of the results by allocating additional seats in the PR-tier. When the tiers are parallel, no such compensation exists, and voters should behave in the PR-tier as they would do in a pure PR system. Strategic voting when both tiers are mixed is certainly more complex, but it can still exist, as Duch and Palmer (2002) have proved for Hungary, and Kostadinova (2006) for Ukraine, Lithuania and Croatia. Specifically, voters are expected to split their ticket (i.e. voting for the secure candidate in the SMD-tier and the favorite list in the PR-tier) as long as the smaller list has any chance of exceeding the legal threshold for receiving compensatory seats (Gschwend, 2001; Ferrara et al., 2005).<sup>5</sup> All in all, if strategic behavior takes place in mixed systems, we should also observe gradual a decrease in the level of wasted votes over time in countries operating this electoral system.

<sup>3</sup> See Shugart (2005) for a comprehensive review of the literature

<sup>4</sup> *PR-system*: Estonia, Romania, Slovenia, Ukraine (2006), Czechoslovakia, Czech Rep., Slovakia, Bulgaria, Croatia (2000-), Macedonia (2002-), Moldova, Poland (1993-), Latvia. *Mixed-system*: Alba-

nia (compensatory tiers 92,01,05), Albania (parallel tiers 96,97), Armenia (parallel), Croatia (parallel 92,95), Georgia (parallel), Hungary (compensatory), Lithuania (parallel), Macedonia (parallel 98).

<sup>5</sup> Implicit in this strategy is the desire to influence the composition of a coalition government.

## LEARNING TO VOTE STRATEGICALLY

The previous section reviewed the fundamentals of strategic voting in non-majoritarian electoral systems. But strategic voting (and its consequences) does not occur overnight, as Figure 1 suggested. Indeed, the literature agrees that some time needs to elapse before voters learn the need (or opportunity) to vote strategically and to avoid wasting their vote (Anckar, 1997; Bielasiak, 2005; Cain, 1978; Cox, 1997; Riker, 1982; Taagepera and Shugart, 1989), “Indeed, the reasoning Duverger offers for his law is a *dynamic story* in which voters *over time*, gradually abandon an unpopular party in larger numbers until no support remains” (Fey, 1997, pg.142, italics added by author). Several case studies claim that such a learning process has occurred across EE and the FSU too: Apart from Tavits and Annus (2006), Bochsler (2005), Duch and Palmer (2002), Kostadinova (2006) and Dawisha and Deets (2006) have claimed that voters in this region learned over time how to behave strategically.

Unfortunately, even though the *learning hypothesis* is frequently invoked in the literature, none of these studies have specified exactly what is learned over time, and how.<sup>6</sup> It is agreed that one must first learn the following elements in order to engage in strategic voting: 1) to understand how the electoral system translates votes into seats (the mapping function); 2) to be informed about the different alternatives available on the ballot (i.e. party platforms, ethnic affinity, candidate quality); and 3) to be aware of the level of popular support each party/candidate has among the electorate.

Learning the mapping between votes and seats (or Duverger’s mechanical effect) is a complex process. This mapping depends on several elements: First, the basic structure of the system (proportional, majoritarian,

mixed), the particular formulae, and the number of seats to be allocated; Second, the presence of upper-tier with compensatory seats; And third, the threshold of parliamentary representation (which is a function of the legal threshold and/or the district magnitude (Lijphart, 1994; Taagepera and Shugart, 1989)). To assume that voters (even in the most established democracy) are aware of all these nuances is unreasonable; however, we can presuppose that voters learn over time, even approximately, the extent of the reductive effect of the electoral system (i.e. what vote share is needed to exceed the electoral threshold of parliamentary representation, and the extent of the proportionality at which votes translate into seats). Assuming that most voters do not want to waste their vote, we should observe lower levels of wasted votes the more accurate their understanding of the mechanical effect of electoral systems becomes.

A precondition for this to happen, however, is voters being able to rank their preferences over party lists: this requires the ability to identify the party, and being aware of parties’ programmatic lines, ethnic-affinities, candidates’ types, or whatever other criterium that structure the voter’s preferences.<sup>7</sup>

The third and last element voters should learn (even tentatively) in order not to waste their vote is the parties’ social support. Voters can learn that piece of information from polls (when they are reliable enough (Kostadinova (2006)), via the media, or by heuristics (Lago, 2008)). The more accurate these beliefs are, the better voters can predict the parties’ popular vote share and, if required, when and how to vote strategically.

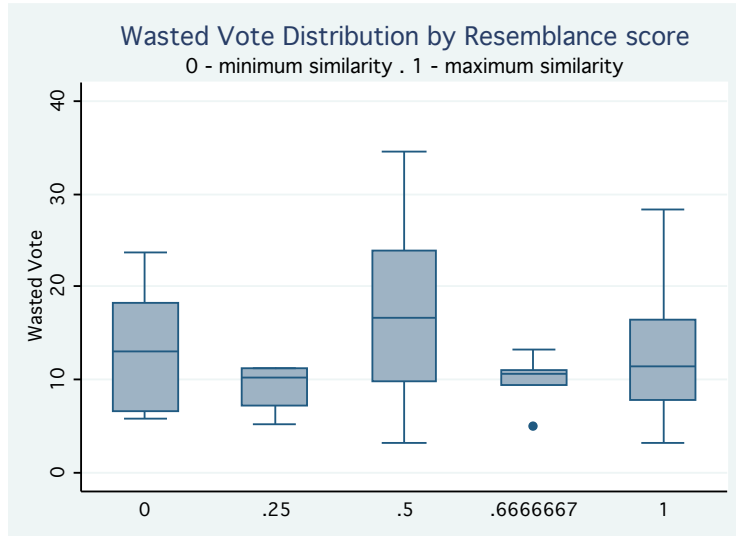
### Learning Process’ Identification

Without the existence of repeated cross-country survey-data, I have decided to follow Tavits and Annus (2006) approach and test the occurrence of electoral learning with an aggregate measure of wasted votes across

<sup>6</sup> Fey (1997) and Myatt (2007) develop a formal model for majoritarian systems in which voters update their beliefs about the support of electoral lists. No such approximation exists for proportional and mixed systems.

<sup>7</sup> The only requirement is that she applies the same criterium to all parties.

**FIGURE 2: Distribution of Wasted Vote for the 5 categories of the Resemblance Index (or the Degree of Similarity of Electoral Systems across Tiers)**



EE and the FSU. Specifically, Tavits and Annus (2006) claim voters learn over time how not to waste their vote. They test their theory by running a model with the level of wasted votes as the dependent variable and the number of parliamentary elections held in a given country by a given time as the main independent variable.<sup>8</sup> Results for their cross-national sample confirm their expectations: the number of elections held since a democratic transition seems to be a powerful predictor of the reduction of wasted votes. But the mechanisms by which the number of past elections achieves significance are not specified beyond the statement of the hypothesis (i.e. over time voters become more experienced with the functioning of democracy). Without devaluing the merits of their finding, Tavits and Annus' (2006) approach does not identify what is what voters are supposed to learn over time. Do they learn about political parties' cues, as Miller et al. (2000) or Tworzecki (2003) claim? Do they approximate more accurately the level of social support of parties? Or do they improve their understanding about how votes are translated into seats?

Probably, voters learn the three elements

<sup>8</sup> They also control for the standard set of institutional variables affecting the strategic vote (Anckar, 1997).

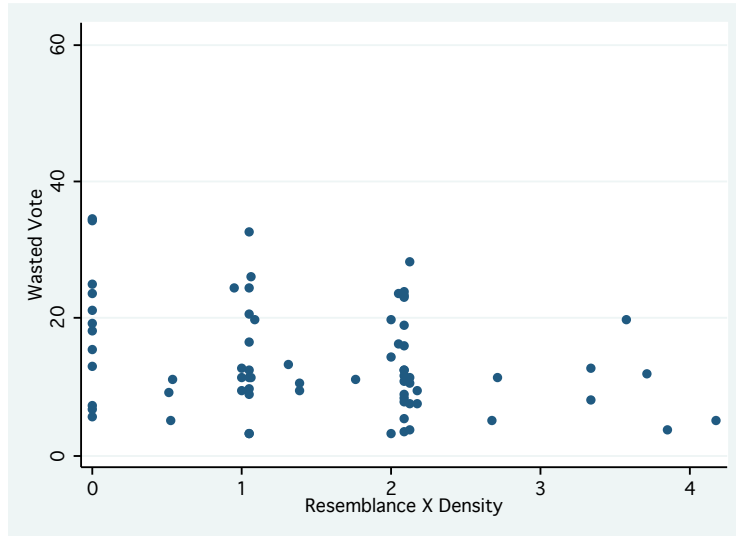
almost simultaneously. Nonetheless, we still should try to identify these parallel processes separately. To this end, I propose one strategy to test whether voters learn one of these three elements: the mechanical effect of electoral systems. I plan to fulfill this goal by testing whether there are less wasted votes in countries where elections at different tiers of government are governed by similar electoral systems. The underlying intuition is simple: the mechanical effects of electoral systems should be easier to learn the more chances voters have of experiencing the same electoral system at whatever level of government (local, county, regional or even Senate). If this hypothesis is right, the more sub-national elections are held using a similar electoral system to the national one, the lower the amount of wasted votes should be.<sup>9</sup> If the expectation is confirmed, we would have suggestive evidence in favor of the ability of voters to recognize similar electoral systems, process their reductive effect, and vote strategically if required at the next national election.

Figure 2 plots the distribution of the

<sup>9</sup> The hypothesis involves the measure of the wasted vote at the national level, although the argument should extend to sub-national assemblies as well. In other words, the expected effect should be bidirectional, although due to the scarcity of official records, I can only test the hypothesis at the national level.



**FIGURE 3: Bivariate Relation between the Level of Wasted Votes and the Interactive Variables**



wasted votes across different degrees of similarity between the sub-national and national levels of electoral systems. The horizontal axis represents the score for the 82 cases in the *resemblance* index, which measures the degree of similarity across the electoral systems of different tiers of government (further details below).

At first glance, the relationship described in Figure 2 between the level of the wasted votes and the similarity across electoral systems within a country is moderate, or even nonexistent. The reason lies in the nature of the hypothesis. I claim it is *purely* interactive. Specifically, the hypothesis states that similar electoral systems across tiers of government will reduce the level of the wasted votes if, and only if, sub-national elections are held on a (reasonable) regular basis. The codification of the resemblance index describes only the *formal* institutional setting, but does not measure the *actual* call for sub-national elections (this information is captured by the *density* score). For this reason, the similarity of the electoral systems across tiers should only make a difference if, and only if, sub-national elections have been held recently (i.e. more recently than the last national elections), and this effect should increase in the tiers involved in those sub-national elections (i.e. only local, local and regional, or local, county

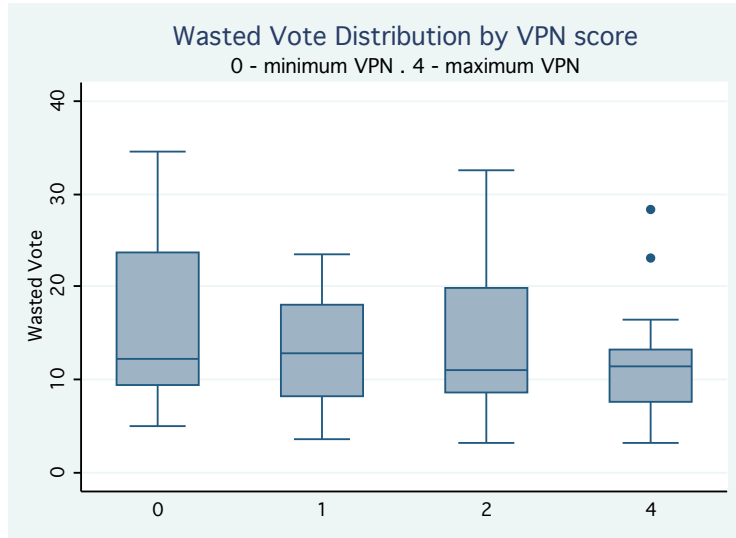
and regional elections). The multivariate analysis will test cross-nationally whether the interaction between the degree of similarity across tiers and the density of sub-national elections does reduce the level of wasted votes. Figure 3 plots the bivariate relation between the interaction and the level of wasted vote.<sup>10</sup>

As a counter-hypothesis, it could be argued that voters learn the parties' ideologies or their social support by participating in multi-tiered elections instead of the mechanical effect of electoral systems.<sup>11</sup> If this was the case, the reduction of wasted votes in the presence of sub-national elections would be induced by increased party awareness and social support instead of the mechanical effect. I cannot directly control for this alternative causal mechanism since I lack individual data. However, I can use an indirect measure that identifies the opportunities voters have to learn the social support of parties, and particularly, their programs and cues: the *Vertical Party Nationalization*. The *VPN* captures the ex-

<sup>10</sup> This graph should be interpreted with caution, since the principal effects are missing.

<sup>11</sup> For simplicity, I will stick to the expression "parties' ideologies": however, what is relevant here is that voters learn what parties have to offer them in whatever they care about the most: ethnicity, candidate capability, or whatever other criteria they might follow.

**FIGURE 4: Distribution of Wasted Vote for the 4 categories of Vertical Party Nationalization**



tent to which the same parties run for elections for every single tier of government in the country. Specifically, I expect that the higher the VPN, the more chances voters have to learn what national parties offer the electorate and what their likely support is. An example might be illustrative: if parties A, B and C run in the local, regional and national elections, voters will get a clearer picture of what these parties have to offer (in terms of manifestos, ethnic-affinities or candidates' qualities), as well as their social appeal, compared to an alternative scenario where different parties run at different tiers. According to this counter-hypothesis, the higher the VPN, the more likely it is that voters learn about parties' characteristics and support. Figure 4 plots the distribution of the amount of wasted votes across the measure of VPN (coding details below).

At first glance, there seems to be a smooth but negative relation between the extent to which the same (national) parties compete at all levels of government and the amount of wasted votes at national elections. This preliminary evidence seems to justify the need to control for this variable in order to estimate the effect of the interactive term over the level of wasted votes.<sup>12</sup> If the work-

ing hypothesis is still confirmed after controlling for VPN, we will get indirect but suggestive evidence in favor of the ability of voters to recognize similar electoral systems, internalize its reductive effects, and vote strategically. For completeness, Table 1 summarizes the multi-tiered structure of the countries under consideration.

## OPERATIONALIZATION OF THE LEARNING VARIABLES

The analysis will replicate, first of all, the specification proposed by Tavits and Annus (2006), whereby the level of wasted votes is a function of a vector of institutional variables and the number of the national elections held since the onset of democratization. This variable, labeled *time*, ranges from 0 to 6.<sup>13</sup> Tavits and Annus' specification will be our base model. To test the interactive hypothesis, we will add to the base specification two new variables (and their interaction): the resemblance index and the density score. Moreover, the models will be adjusted by the VPN score.

<sup>12</sup> The correlation between the similarity of electoral systems across tiers and vertical party nationalization is .13 (N=70), a score which could barely gen-

erate problems of multicollinearity.  
<sup>13</sup> The last election considered is Romania, November 20, 2008.

**TABLE 1: Sub-National Elections across EE and the FSU**

<b>Country</b>	<b>Sub-national Elections</b>
Albania	only local
Armenia	only local
Bulgaria	only local
Croatia	local, regional, and Senate (until 2001)
Czech Rep.	local, regional (since 2000) and Senate
Estonia	local and Senate
Georgia	local and regional
Hungary	local and regional
Latvia	only local
Lithuania	only local
Macedonia	only local
Moldova	local and regional (since 1999)
Poland	local, county and regional (since 1998) and Senate
Romania	local, regional, Senate
Slovakia	local, regional (since 2001)
Slovenia	local and regional
Ukraine	local and regional

**The Resemblance Index** This variable measures the degree of similarity of electoral systems across all tiers of government for 17 countries across EE and the FSU, from 1990 to 2008. With this variable, I intend to measure how the level of wasted votes at the national level decreases when voters are allowed to participate in sub-national elections governed by the same electoral system to the national one.

The resemblance index is certainly an imperfect measure, since it only focuses on a broad categorization of electoral systems: majoritarian, PR, or mixed structure. Ideally, we would prefer to know the similarity over all the dimensions that compose the mapping function (previously reviewed). However, information for sub-national elections in new democracies is scarce, particularly for the first years in the sample. The sole piece of information that is systematically reported in the available sources is the structure of vote allocation: PR, Majoritarian or Mixed.

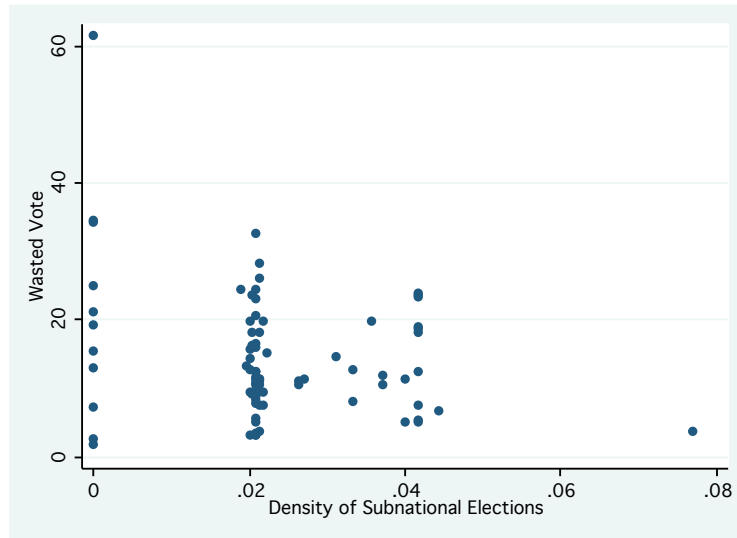
The resemblance index ranges from 0, complete dissimilarity (e.g. local election run by SMD and national election run by PR), to perfect similarity (e.g. local election, regional and national run by PR).

Overall, the resemblance index takes 5 different values. The resemblance index only takes into consideration the electoral systems that rule the elections for collegiate representative bodies (i.e separate elections for city majors or regional leaders, which take place only in some of the cases considered, are excluded). For completeness, the resemblance measure also takes into consideration the electoral system employed for the Senate elections, when it applies. According to the research hypothesis, voters should find Senate elections as useful as sub-national ones in order to infer how the mechanical system works when that system matches with the national lower chamber's. Taken together, electoral learning should be easier the more congruent electoral systems are across different tiers. Perfect congruence would occur in a country in which elections for collective bodies at all tiers of government were governed by the same electoral system.<sup>14</sup>

**The Density Score** The *density* score of sub-national elections is computed by dividing the number of non-concurrent sub-

<sup>14</sup> Further details of the resemblance index codification can be found in the Appendix.

FIGURE 5: Bivariate Relation between the Level of Wasted Votes and Density



national elections held between two consecutive parliamentary elections. The density score restarts after every national election (i.e. it is not cumulative). With such a transformation, I erase the systematic correlation between the number of national and sub-national elections held since the onset of democratic transition. Moreover, I stick to the more conservative measure of density and I do not consider concurrent elections (i.e. a sub-national election held on the same day as national elections, or sub-national elections held on the same day). The density measure will be interacted with the resemblance index to test the working hypothesis.

The interpretation of the density measure is not straightforward since it reports the number of elections at sub-national level over the amount of months elapsed between two consecutive national elections. For the empirical section, it will be easier to remember the main intuition behind this measure: the higher the density score is, the more sub-national elections are held between two consecutive national elections. The magnitude of the coefficients reported in the empirical section should not be a surprise, either. They are big simply because of the scale of the density measure. Figure 5 reports the bivariate relation between the level of wasted votes and the density score.<sup>15</sup>

<sup>15</sup> There is a potential outlier in the density distribu-

**Vertical Party Nationalization** Following the path initiated by Caramani (2004) and Jones and Mainwaring (2003), Bochsler (2005) developed a measure of party nationalization for the sample of countries considered in this analysis. Bochsler's index, however, measures the extent of *horizontal* party nationalization. That is, the extent to which parliamentary parties receive similar votes across all regions/districts of the country. Here, on the other hand, we are interested in the degree of *vertical* party nationalization, or the extent to which the same parties run in the races for all tiers of government: local, county, regional and national. As far as I am aware, this measure does not yet exist. For this reason, I have coded the degree of VPN in the 17 countries considered. Specifically, the VPN index is the mix of two scores: first I classify the extent to which national parties run at the local level (the *L-N score*).<sup>16</sup>

tion, which can be clearly seen in Figure 5. However, after it is interacted with the resemblance index, that case approaches the center of the distribution.

<sup>16</sup> The punctuations for the "L-N score", low, moderate and high correspondence between local and national parties, were coded using the very scarce data on election results available at local level for this set of countries. The classification criterium consists of the amount of support that independent lists received at the local level: for marginal support (circa 3%), the country received a "high" L-N punctuation; for moderate (circa 10%), a "moderate" punctuation; and for high support (circa 20%),

Then I multiply this value by the number of sub-national elections held in that country - under the confirmed premise that once a national party runs at the local level, it also does at any other upper tier. The result of this interaction is the *VPN score*. This variable will control for the alternative causal mechanism that links the reduction of the level of wasted votes and political decentralization.

## DEPENDENT AND CONTROL VARIABLES

The dependent variable in the analysis is the level of *wasted votes* in an election for the lower chamber of the national parliament. Wasted votes are those votes for party lists that do not ultimately exceed the electoral threshold of parliamentary representation. Wasted votes are measured as a share of the total vote. In mixed system, the measure of wasted votes involves only those occurring in the PR-tier. The dataset gathered contains the level of wasted vote in all parliamentary elections held in 17 states across EE and the FSU, from their transition to democracy to November 2008.<sup>17</sup>

The models will be controlled by two institutional variables assumed to influence the amount of wasted votes (Anckar, 1997; Cox, 1997; Duverger, 1951): the *structure* of the electoral system (PR vs. mixed), and the *legal threshold* of parliamentary representation. Due to their complexities, mixed systems are likely to increase the level of wasted votes, particularly among inexperienced voters (Kostadinova, 2006; Moser and Scheiner, 2009; Tavits and Annus, 2006). Likewise, higher electoral thresholds are

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a "low" score. When detailed electoral records were not available, I used secondary sources for classification. In that case, more than one source was used (wherever possible) to contrast evaluations (see Appendix for data sources).

<sup>17</sup> I did not consider elections held under non-competitive conditions. I used Birch (2003) and Nations in Transit scores to determine whether it was the case. Neither did I consider elections held under single-member-district systems (Albania 1991, Macedonia 1994 and Ukraine 1994), where wasted votes occur by definition.

likely to yield higher levels of wasted votes, at least in the years following a democratic transition (Cox, 1997; Lijphart, 1994). The average district magnitude (ADM), which is expected to be the *decisive factor* for vote concentration (Taagepera and Shugart, 1989), is not required in this analysis: the reason lies in the high thresholds adopted across EE and the FSU. As Tavits and Annus (2006) pointed out, the legal electoral threshold already *bites* in these democracies, which renders the district magnitude ineffective.<sup>18</sup> ADM could still influence entry decisions (Cox, 1997). Nevertheless, this effect would be adjusted by the number of electoral lists running in each election.<sup>19</sup>

Cox (1997) claims that a necessary condition to vote strategically is the ability to create rational expectations about parties' support. In order to approximate these conditions, I computed the Pedersen index of *electoral volatility* between the current and previous election. The index provides an ex post measure of the predictability of the actual results. When the index approaches 0 (i.e. few votes traveled from one list to the other), we can infer that the parliamentary party system was stable and therefore predictable. High scores for this index, on the other hand, signal an intense flow of votes from one party to the other. In such circumstances, predicting electoral results is likely to have been a difficult task for voters. The higher the volatility index, then, the more wasted votes we should expect, other factors being constant.<sup>20</sup>

Finally, we will also adjust the models for the extent of electoral *competitiveness*. Other things constant, the higher the com-

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<sup>18</sup> For completeness, I have checked that for the added cases to the sample the legal threshold bites as well. The only exceptions are Albania, 1996, 1997 and 2005, and Georgia 2004, four cases among 82, less than 5% of the sample.

<sup>19</sup> Following Tavits and Annus (2006), I also excluded the two cases that had no electoral thresholds at all: the inaugurating elections in Poland (1991) and Romania (1990).

<sup>20</sup> Working with pre-electoral polls would be the ideal substitute for the volatility index. However, I have not had access to these kinds of surveys. Moreover, those polls might not always be reliable (Kostadinova, 2006).

TABLE 2: Summary Statistics

Variable	Mean	Std. Dev.	N
wasted vote	14.272	9.214	82
mixed es	0.354	0.481	82
threshold	4.518	0.938	82
electoral list	25.866	14.265	82
winner vote share	34.756	10.335	82
election counter	2.976	1.474	82
volatility rate	30.822	15.165	65
resemblance	0.683	0.319	70
indicator resemblance	0.514	0.503	70
VPN	1.797	1.42	69
indicator VPN	0.623	0.488	69
density	0.023	0.013	82
new system	0.171	0.379	82
upper tiers	0.28	0.452	82

petitiveness, the stronger the minority incentives to concentrate votes around the runner-up. I will work with the measure proposed by Tavits and Annus (2006) and Duch and Palmer (2002), which consists of the vote share of the winner list. Accordingly, we can expect that the larger the vote share of the winner, the stronger the incentives to concentrate the votes around a single, strong opposition list. Their proposed measure, moreover, has a mechanical effect on the amount of wasted votes: the more votes go to the winner, the fewer are left over to be wasted.

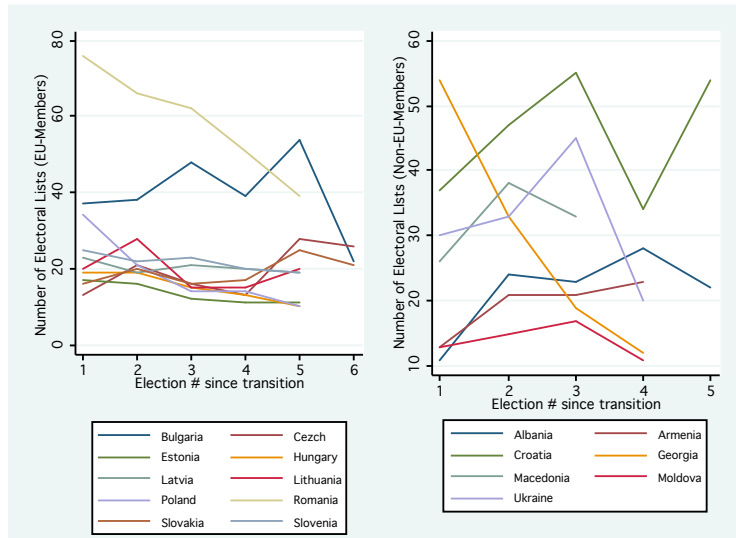
Together, the analysis will first replicate the model proposed by Tavits and Annus (2006). This time, though, I will consider a broader set of cases (N=82 instead of 54), and a more suitable method for the error structure (further details below). To the Tavits-Annus' specification, I will add the *resemblance* index of electoral systems, the *density* of sub-national elections, and their interaction, controlling for *vertical party nationalization*, the *volatility index*, and two additional institutional indicators: the adoption of a new electoral system, and the presence of upper-tiers with compensatory seats. Table 2 reports the summary statistics of all the variables (sources in Appendix).

## AN ELITE-DRIVEN PROCESS?

Before we move onto the empirical analysis, we must address a challenging counter-hypothesis previously raised by Tavits and Annus (2006): what if the reduction in the wasted vote is not the result of strategic voting but of better party coordination? Following these scholars, I argue as well that strategic entry by parties cannot explain in itself the reduction of wasted votes. If that was the case, we would observe a decrease in the number of *electoral parties* (i.e. those which run in a given election) over time, as a result of pre-electoral party-coordination or strategic exit - precisely because running for office is costly. Figure 6, however, does not provide strong evidence in favor of the elite-driven process. The pattern of electoral parties is not unidirectional: in some countries the number of electoral lists have decreased; in others, it did not. In order to control for this source of heterogeneity, the empirical models will be adjusted by the number of electoral parties.

The electoral fortunes of new parties are not clear either: Tavits (2007) finds no clear pattern among these parties across Eastern Europe: some new parties disappear, while others join the coalition government. The relative electoral success of new parties sug-

**FIGURE 6: Number of Electoral Lists by EU-Membership**



gests that the reduction of wasted votes cannot be explained by voters bringing about the collapse of new parties running in their first contest.

To sum up, this scattered evidence suggests that the reduction of wasted votes is *at least* partially explained by an increase in strategic voting over time, by which voters learn how not to waste their vote in trailing lists which would not achieve parliamentary representation.

## ESTIMATION AND ANALYSIS

### Random-Coefficient Model

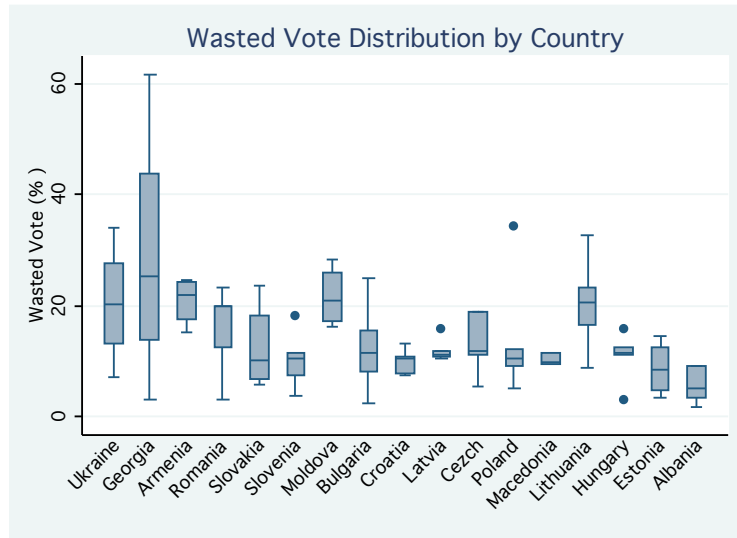
In contrast to Tavits and Annus (2006), I prefer to avoid using Panel Corrected Standard Errors (PCSE) in the estimation. By implementing PCSE, we implicitly assume that the observations are correlated across units, which seems inappropriate given the dependent variable we are considering: why should wasted votes be correlated across countries? Additionally, by performing PCSE we completely pool the panels and ignore all unit-specific variation. The cross-country variation in the average level of wasted votes reported in Figure 7 suggests, on the contrary, that unit-specific heterogeneity can make a difference in the estimation.

For both reasons, instead of assuming that errors are correlated across units (countries), I assume that wasted votes are correlated within them. Accordingly, the models are estimated using a Random-Coefficient Model (RCM). This model takes into consideration the limited unit-specific heterogeneity by *partially*-pooling the data. Pooling is greater for those panels with fewer sample observations, which prevents us from overfitting these units.

There is a third technical reason to reject PCSE, and it relates to the asymptotic behavior of the GLS estimators: the elements in the covariance matrix in the PCSE are estimated across panels for each point in time.<sup>21</sup> Therefore, they become efficient only as the repeated observations in time approach infinity (Beck and Katz (1995) consider  $T > 15$  as the minimum acceptable threshold to achieve such properties). Since the number of elections held since the transition to democracy is still small ( $T \leq 6$ ), the PCSE standard errors would be too optimistic. In contrast, the RCM Maximum-Likelihood estimators achieve their asymptotic behavior as the number of panels approaches infinity; in this sample  $J = 17$ , which are sufficient units to achieve the desired behavior (Gelman and Hill, 2007). All in all, given that the number of panels in this

<sup>21</sup> In this case, each point in times corresponds to a new national election.

**FIGURE 7: Distribution of dependent variable by country**



study is clearly superior to points in time, RCM with Maximum Likelihood estimators will outperform PCSE with GLS estimators (Beck and Katz, 2004).

The small N in the sample does not suggest modeling much more complexity: hence, I simply work with a varying-intercept and constant-slopes model, in which the intercept and residuals errors are assumed to distribute normally and be mutually independent.<sup>22</sup> All models are reported in Table 3.

## Analysis

The first model in Table 3 replicates Anus and Tavits' (2006) specification, except for the indicator variable for inaugural elections, which I deliberately omit.<sup>23</sup> Model 1 clearly confirms their results, except for

the mixed electoral system, which holds the expected sign but does not achieve statistical significance. The electoral threshold increases the level of wasted votes, and so the number of electoral lists. The concentration of votes around the winning candidates, on the other hand, attenuates the amount of wasted votes. The effect of time is negative and clearly significant. On average, each additional election is expected to reduce the level of wasted vote by 2.5 points at a 99% level of confidence.

Taken together, the specification proposed by Tavits and Anus (2006) does seem to receive support from the data, even after extending the sample and changing the estimation technique (from PCSE to RCM).<sup>24</sup> But even though *time* is proved to matter, we still do not know why this is the case and what it involves. The following models seek to shed light on this issue.

Prior to testing the working hypothesis, the second model will assess the convenience of considering additional controls to the Tavits and Anus (2006) model.<sup>25</sup> Specif-

<sup>22</sup> The common (normal) distribution from which all intercepts are drawn will not be modeled with unit-level predictors because the institutional variables that would theoretically apply for this level of analysis have changed too frequently in the countries under consideration (see Benoit and Hayden (2004) and Birch et al. (2002) for a comprehensive review of such changes).

<sup>23</sup> Based on Reich (2004), Tavits and Anus (2006) argue that first elections are special. Although this is probably right, several of these particular characteristics can be captured in the multivariate model: lower thresholds, larger numbers of electoral lists, and a high concentration of votes around the

winning list - which usually gathers the opposition forces to the old regime. All these properties are already controlled for in the model.

<sup>24</sup> The outlier in the dependent variable (Georgia 1996) that can be observed in Figure 7, influences the estimates only marginally. Hence, I decided not to drop this case from the sample.

<sup>25</sup> In other words, from now onwards, all additional variables were not considered by Tavits and Anus



**TABLE 3: Dependent Variable: Level of Wasted Votes. All models are RCM except for Model 6, which is estimated with OLS and Robust Standard Errors. For Model 6, F-test is reported instead of Wald  $\chi^2$**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	All	All	All	All	EU-member	non-EU
Mixed ES	1.463 (2.371)	2.500 (2.405)	2.189 (2.602)	2.235 (2.697)	3.282 (2.609)	5.195* (2.988)	4.224 (3.770)
Threshold	3.547*** (1.044)	2.512** (1.018)	2.294** (1.035)	2.327** (1.085)	2.762*** (1.048)	0.0178 (1.946)	4.474*** (1.607)
contenders	0.366*** (0.075)	0.206*** (0.070)	0.201*** (0.069)	0.205*** (0.073)	0.184*** (0.070)	0.207*** (0.058)	0.102 (0.100)
Winner vote share	-0.348*** (0.076)	-0.161** (0.079)	-0.135* (0.080)	-0.135* (0.082)	-0.141* (0.080)	-0.152* (0.089)	-0.152* (0.090)
Volatility Rate		0.0680 (0.046)	0.0799* (0.047)	0.0771 (0.051)	0.0840* (0.050)	0.0672 (0.060)	0.196*** (0.060)
Time	-2.499*** (0.477)	-2.495*** (0.536)	-2.332*** (0.526)	-2.326*** (0.540)	-2.293*** (0.535)	-2.301*** (0.631)	-1.291 (0.886)
New System		0.223 (1.818)					
Higher-tiers		-1.122 (2.135)					
density			-42.52 (54.965)	-41.40 (55.469)	15.17 (62.664)	194.5 (126.518)	-128.2** (55.615)
Resemblance			-1.404 (2.270)	-1.342 (2.303)	3.785 (3.492)	7.446 (5.653)	7.011 (6.299)
VPN				-0.203 (2.354)	-0.778 (2.217)	-0.698 (1.627)	1.635 (5.233)
ResemblanceXDensity					-224.6** (112.701)	-380.5** (161.103)	-476.1* (269.099)
Constant	7.925 (6.150)	7.998 (6.367)	8.909 (6.435)	8.779 (6.569)	5.644 (6.498)	13.74 (11.691)	-4.154 (10.485)
N	82	65	65	65	65	43	22
J groups	17	17	17	17	17		7
$R^2$						0.610	
$\alpha$	6.218	4.131	4.069	4.190	3618		6.268
$\sigma_\alpha$	1.495	1.226	1.198	1.237	1.174		2.477
Log Likelihood	-266.112	-195.128	-191.367	-189.596	-182.093		-41.260
Wald $\chi^2$	96.21	55.27	56.20	55.51	60.82	5.62	83.68

Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

ically, the second model evaluates the partial effect of three variables: the volatility index, the adoption of a new electoral system, and the presence of higher tiers with compensatory seats. The latter two are expected to increase and decrease the level of wasted votes, respectively. The adoption of a new electoral system is expected to confuse the voters and undo some or all accumulated knowledge, depending on the extent of that change. On the other hand, the presence of higher tiers with compensatory seats increases proportionality, which should help geographically spread minorities to exceed the electoral threshold - and decrease wasted votes overall. Despite the reasonable expectations for these two controls, their coefficients do not become significant -by far- in this or any of the remaining models. In order to maximize the degrees of freedom, given that their coefficients are (almost) 0, we can omit these two variables in the following models without biasing other coefficients. Only the coefficient for the volatility index holds the expected sign and is close to statistical significance. Since this coefficient will become significant in subsequent models, I will keep it in the base model.<sup>26</sup>

The third model evaluates the effect of the variables which identify scenarios for an easier learning of the mechanical effect of electoral systems. I assume linearity in the relation between the *resemblance index* and the level of wasted votes; however, the few cases in some of the 5 categories of the former variable do not recommend treating it as a continuous variable.<sup>27</sup> Accordingly, I

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(2006).

<sup>26</sup> It could be argued that the level of wasted votes decreases over time because discontented voters prefer to stay at home (Dawisha and Deets, 2006). However, the final results do not change if we control the models by *turnout*. This variable, moreover, has proved to lack statistical significance in all models.

<sup>27</sup> I recoded the original variable in 5 dummy variables, and analyzed their marginal effects (dropping one category from the model). I concluded that the division of the variable into two main categories was a reasonable option, both theoretically (the progression of coefficients was approximately linear), and methodologically (the standard errors for the categories with fewer cases were very high). In fact, when I repeated the same exercise controlling for VPN, I achieved a more interesting result: the sec-

recoded the original variable into a dichotomous one: scores below or equal to .5 were set to 0, and those above .5 were set to 1.<sup>28</sup> The recoded variable enters the equation in model 3, which also contains the *density* of sub-national elections.<sup>29</sup> None of their coefficients become significant, although they both have the expected sign. Nevertheless, this is not an unexpected result; the research hypothesis is conditional. In order to yield some effect on the dependent variable, the *resemblance* index should be interacted with the modifying variable *density*. The coefficient for this interaction is reported in the fifth model. Previous to that, however, I add the final control: the degree of vertical party nationalization (VPN). Again, I assume linearity in the relation between this covariate and the dependent variable. But following the same criterium I employed with the resemblance index, I prefer to recode *VPN* into a dummy variable: 0 for the last two categories; 1 for the upper two.<sup>30</sup> The coefficient for VPN is negative, but not significant. Indeed, the t-stat is .09, and the 95% confidence interval ranges from -4.1 to 4.4. This evidence should bring into question the negative effect reported by the coefficient. According to the interval of confidence, the odds of becoming positive are almost the same to those of becoming negative.

The fifth model reports the marginal effect of the interaction controlling for VPN. According to the interactive hypothesis, similar electoral systems across tiers of government will reduce the level of wasted votes if, and only if, the density of sub-national

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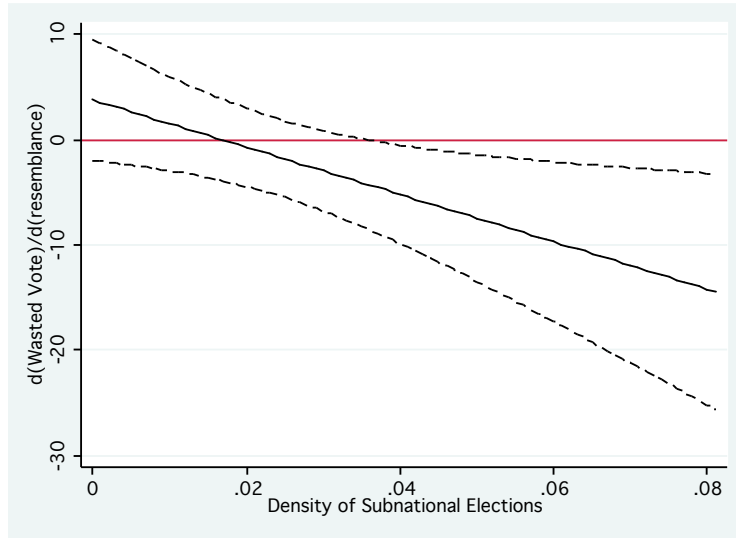
ond and third categories of the *resemblance* index held a positive coefficient, while the two higher categories became negative. This change in the sign sticks to the working hypothesis: the lack of similarity across electoral systems of different tiers of government is detrimental for learning, while high similarity seems beneficial.

<sup>28</sup> The division of both categories was even: almost 50% of cases lie at either side of .5.

<sup>29</sup> Recall, the magnitude of the coefficient for the density measure is big due to the range of values that the variable takes.

<sup>30</sup> The analysis of the marginal effect of the four categories in VPN suggests that the relationship is approximately linear.

**FIGURE 8: Marginal Effect of Resemblance on Wasted Votes, with 90% Confidence Interval**



elections is sufficiently high. Consistent with this expectation, the coefficient for the interaction in model 5 is significant at .046 level. However, the effect of an interaction cannot be interpreted by its p-value (Brambor et al., 2006; Kam and Franzese, 2007). To understand the coefficient reported in model 5, it is convenient to plot the conditional effect of the resemblance index on the level of wasted votes for a reasonable range of values of the modifying variable (the density of sub-national elections). Figure 8 will plot this relation. First, however, we should interpret the sign of the coefficients for the principal effects:  $\hat{\beta}_{resemblance}$  and  $\hat{\beta}_{density}$ . Both of them are positive. These coefficients reflect the estimated effect of the principal effects when the other interacted variable equals 0. The effect of the density of sub-national elections when the resemblance level is 0 (maximal difference between systems) is positive. This result, although not significant, moves in the direction of the working hypothesis. When voters participate in sub-national elections that do not match the national electoral system, not only do they not seem to learn from this experience, but they might become even more confused. The coefficient for the resemblance level, also positive, lacks substantive meaning; The degree of resemblance between elections can only exist when sub-

national elections are actually held. When they are not implemented ( $density = 0$ ), it is simply not possible to assess the effect of the resemblance of electoral systems across different tiers over the level of wasted vote.<sup>31</sup>

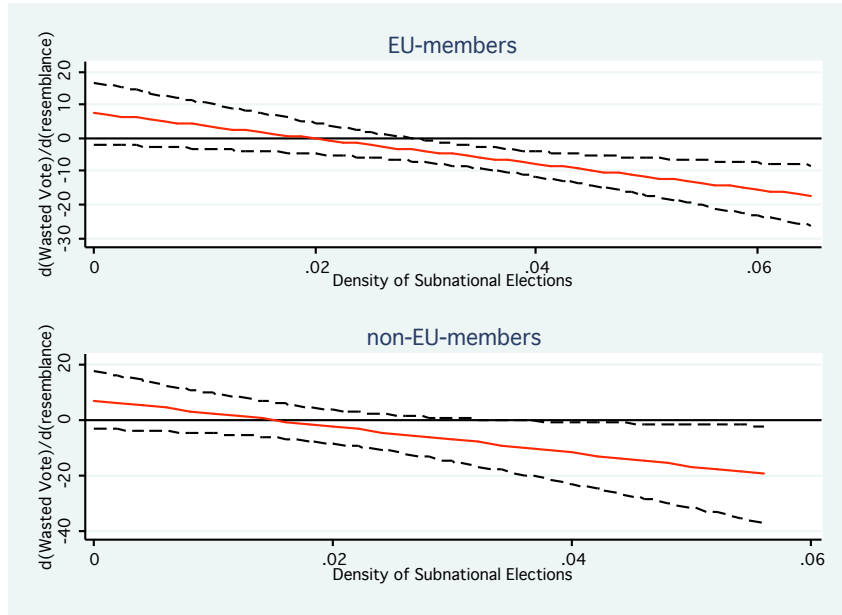
Finally, Figure 8 plots the marginal effect of the resemblance index over wasted votes, conditioned on a reasonable range of values for the modifying variable. It will be remembered from Table 2, that the density of sub-national elections ranges from 0 to .0769 - although the maximum value is far from being a representative one. The average score for density is .0232, which is equivalent to holding one sub-national election between two national elections distanced by three and a half years.<sup>32</sup> Figure 8, for which I used the Stata code written by Brambor et al. (2006), plots the marginal effect of the resemblance index over the dependent variable,  $\frac{\partial \widehat{WastedVote}}{\partial Resemblance} = (\hat{\beta}_R + \hat{\beta}_{RD} \cdot Density)$ , for different values of  $density$ , and 90% interval of confidence.<sup>33</sup>

<sup>31</sup> The lack of substantive meaning of the principal effects in interactive models is far from unusual (Kam and Franzese, 2007).

<sup>32</sup> The substantive interpretation of the density score is not straightforward. It is recommendable to remember the following intuition: the higher the score, the more sub-national elections are held within the time interval that distances two national elections.

<sup>33</sup> The standard error of the prediction is the square root of the estimated variance:  $Var(\frac{\partial \widehat{WastedVote}}{\partial Resemblance}) =$

**FIGURE 9: Marginal Effect of Resemblance on Wasted Vote by EU-membership (with 90% Confidence Interval)**



The slope of the marginal effect is negative, as expected. However, we can only be sure (at 90% of confidence) that such an effect decreases the level of wasted vote when density is slightly greater than .034.<sup>34</sup> Although the Figure might be convincing, since the modifying variable can achieve values higher than .034, we should be careful in drawing conclusions. First, only one fifth of the observations in the sample have a higher score for the modifying variable than its average value. Second, if we modify the interval of confidence, and use instead a 95% confidence interval, the results would not be this clear.

Before moving to the next model, we should analyze one more interesting result in model 5: the coefficient for VPN falls far from significance again. This result, combined with the one for model 4, seems to provide a weak empirical basis for the possibility that voters, by participating at subnational elections, learn about political parties' cues and their social support *instead of* the mechanical effect. The lack of sig-

nificance of VPN in any of the subsequent models (and others omitted) suggests we are moving along the right track when we associate the participation in sub-national elections to the learning of the mechanical effect.

For the next two models, 6 and 7, I have split the sample into two groups with the aim of testing the interactive hypothesis in different contexts. The division is based on European Union membership - which correlates with income levels and, more importantly here, democratic scores (available from Freedom House).<sup>35</sup> There are three specific reasons to split the sample: First, EU members have on average more tiers of directly elected government; hence, the density scores are higher on average for the EU-members than non-EU members. Second, the group of less established democracies have held less elections on average, which could involve lower electoral learning - and less elite coordination as well. Third, some of the non-EU members experienced traumatic episodes and/or revolutions in the re-

$Var(\hat{\beta}_R) + D^2 \cdot Var(\hat{\beta}_{RD}) + 2D \cdot Cov(\hat{\beta}_R, \hat{\beta}_{RD})$ , where  $D$  stands for density, and  $R$  stands for resemblance.

<sup>34</sup> Which is equivalent to holding one sub-national election between two national elections distanced by two years and a half.

<sup>35</sup> The two groups are: EU-members: Bulgaria, Czech Rep., Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. Non-EU-members: Albania, Armenia, Croatia, Georgia, Macedonia, Moldova and Ukraine.

cent past which could have influenced the evolution of party systems and voters' behavior in ways my indicators are not able to capture. While two of the three ex-Yugoslav Republics were involved in or affected by the civil wars of the 1990s (Croatia and Macedonia, respectively), Georgia and Ukraine have recently experienced episodes of social or political unrest caused by electoral fraud (Tucker, 2007).

Models 6 and 7 report the interactive specification for both samples. Confirming the initial expectations, the interactive hypothesis seems to fit better the EU members than non-members.<sup>36</sup> The interactive coefficient for the EU-member is negative, and significant at .024. Once it is plotted across reasonable values of the modifying variable (figure 9, top), we observe that the negative relation is significantly different from 0 beyond  $density = .028$  (at 90% of confidence). That involves 34% of the cases among EU members.

The conclusions are slightly different for the non-EU members (model 7). The number of cases for this second group is very low:  $N = 22$ . This circumstance reduces dramatically the degrees of freedom, and increases the standard errors (which makes it more difficult to reject the null hypothesis). The interaction is significant at .077. The simulation (figure 9, bottom) shows that the conditional marginal effect of resemblance starts at a value slightly above .032. However, only two observations in the non-EU members sample achieve higher scores than .032.<sup>37</sup> Taken together, both simulations suggest that the theory is more binding for EU members than for non-members, although the interactive hypothesis achieves the expected outcomes as well

for the few cases of the latter group that most regularly hold sub-national elections. This is not a small finding: it suggests that suitability of the interactive hypothesis is not related to unobserved factors (degree of democratic consolidation, most likely), but depends on the frequency at which sub-national elections are held *and* the amount of sub-national representative bodies directly elected. Still, it could be argued that those two characteristics are themselves correlated with democratic consolidation. However, we can find democratically consolidated countries among the EU members with only one level of sub-national government and relatively low density scores: Bulgaria, Latvia, Lithuania conform to such a description. All in all, the suitability of the research hypothesis does not seem biased by the extent of democratic consolidation.

To conclude the section, Table 4 provides a simulation which illustrates the extent to which the conditions satisfying the research hypothesis (high density and high resemblance) make a difference over the level of wasted votes. Specifically, Table 4 reports the predicted values for the level of wasted votes when *resemblance* equals 0 and 1, and for the range of values of *density* that Figure 8 proved to yield a significant decrease in the level of the dependent variable ( $density \geq .033$ ). The estimates are taken from model 5 (where the whole sample is considered).

Consistent with the research hypothesis, Table 4 shows that the resemblance index makes a bigger difference over the dependent variable the higher the density measure is. For high levels of density, the predicted difference between the levels of wasted votes could be up to 10%; more than one standard deviation of the cross-national distribution of wasted votes. In other words, the level of wasted vote votes could be 10% lower in countries that hold frequent sub-national elections governed by similar electoral systems to the national one. Likewise, for those countries in which the electoral systems at different tiers of government are a mirror opposite (*resemblance* = 0), the model predicts no decrease in the level of wasted votes,

<sup>36</sup> The EU members alone did not require semi-pooling, which provides further evidence of the unobserved differences between this and the other group.

<sup>37</sup> For this model, VPN has a positive coefficient; an outcome that goes against our expectation. However, if we analyze the t-stat (.31) and the 95% confidence interval (-8.6 and 11.9), we can conclude that the odds of being positive are almost equal those of being negative. In other words, the marginal effect of VPN is virtually 0 for the sample of non-EU members.

**TABLE 4: Predicted Level of Wasted Votes (share over total votes) for Different Values of Resemblance and Density** For the simulation, *mixed* and *VPN* (dummy variables) are set to 0, and the remaining variables are set to their means. The higher the density score, the more sub-national elections are held in the interval that separates two national elections. All values for density are on the right of .33, the cutting point of the upper bound for the 90% confidence interval prediction

	Resemblance=0	Resemblance=1
<b>Density = 0.033</b>	14.22	10.59
<b>Density = 0.043</b>	14.37	8.50
<b>Density = 0.053</b>	14.52	6.40
<b>Density = 0.063</b>	14.67	4.31

regardless of how many sub-national elections are held. These statistically significant predictions suggest that voters may learn sooner how not to waste their vote when they have more chances to experience the same electoral system, at whatever tier of government. This result is robust to the partial effect of Vertical Party Nationalization, which did not prove statistically significant in any of the models considered.

## CONCLUSION

This paper has tried to build on previous work on wasted votes in EE and the FSU. To develop what has already been tested, we have first replicated the most comprehensive analysis in the field: Tavits and Annus (2006). Accordingly, we have tested whether the level of wasted votes decreases with the number of elections held since democratic transition. The results supported Tavits and Annus (2006) model, even after changing the estimation technique and expanding the sample. Still, the discussion preceding the empirical analysis has pointed out the limitations of the classic approach if we want to unravel the way voters learn how not to waste their vote. Briefly, *time* does predict lower levels of wasted votes but says nothing about what voters learn over time: parties' cues, their social support, or the mechanical effect of electoral systems.

The second part of the paper has proposed a research design intended to test whether voters learn the mechanical effects

of electoral systems over time. Specifically, I proposed to estimate the decrease of wasted votes in countries where sub-national elections are regularly held and are governed by similar electoral systems to the national elections for the lower chamber. I argued that if the level of wasted votes was found to be significantly lower in these countries, we would get suggestive evidence of the ability of voters to recognize comparable electoral systems, process this information, and vote accordingly in the next elections.

The interactive hypothesis has been tested in a region where wasted votes have not reached an equilibrium yet, but still tend to reduce election after election (Tavits and Annus, 2006). In order to test the hypothesis, several measures have been coded for this exercise: the resemblance index of electoral systems across tiers of government, the density of sub-national elections, and finally, the extent of vertical party nationalization.

The empirical evidence reported in the previous section seemed to support the research hypothesis: that is, similar electoral systems across tiers of government are expected to reduce the level of the wasted vote if, and only if, the *density* of sub-national elections is sufficiently high. Certainly, the conclusions drawn from this analysis should be complemented by individual data, from which we could directly measure voters' increasing proficiency with the reductive effects of electoral systems. Cross-national survey or experimental research should be useful for these purposes. In the mean-

time, however, the results in this analysis yielded three suggestive results: First, for sufficiently high *density* and *resemblance* scores, the level of wasted votes decreases by more than one standard deviation of the crossnational distribution of this same variable. Second, this effect is robust to confounding effects such as an improvement of parties' awareness which could occur in those countries where the same parties ran for all tiers of government. Third, the effect of the interactive hypothesis does not seem to be conditioned on the extent of democratic consolidation. Altogether, these findings suggest interesting policy-prescriptions: sub-national elections regularly held in between national elections and governed by relatively similar electoral systems to the national one could help to accelerate the decrease of the level of wasted votes in young or even unstable democracies. By reducing the amount of wasted votes, party system stability would probably grow and democracy could strengthen. Certainly, these are sufficiently good reasons to keep investigating this unexplored area of comparative politics.

## APPENDIX

### Sources

The sources for Wasted Vote, Electoral Thresholds, Higher Tiers, Mixed Electoral Systems, New Systems, Volatility and Winner Vote Share are:<sup>38</sup> Birch (2003), Tavits and Annus (2006), Armigeon and Careja (2006), IPU Parline Database, Adam Carr, Binghamton University Electoral Archive, OSCE Election Reports, IFES Elections Guide and Wikipedia. The sources for sub-national election data: Centre de Donnees Socio-Politiques, International Republican Institute, European Union Council of Local and Regional Authorities, Robert Schuman Foundation, Local Government and Public Service Reform Initiative and OSCE Election Reports.

The sources for Vertical Party Nationalization are: European Union Council of Lo-

cal and Regional Authorities, Lankina et al. (2008), Nations in Transit, International Republican Institute, Wikipedia, UNPAN, OSCE, Estonian Electoral Commission, Local Government and Public Service Reform Initiative, Vanags (2005), Centre de Donnees Socio-Politiques, Slavic Research Center, US Department of State, Policy Warning Report, Slovenian Statistical Yearbook 2007, Statistical Office of Slovak Republic.

Table 5 reports the complete list of sources.

### The Resemblance Index

The resemblance index measures the similarity between the electoral systems governing sub-national and national elections. The index is coded as follows:

(1) I compute the number of sub-national elections for a given country-year:  $n$ .

(2) I divide 100 over the number of subnational elections ( $\frac{100}{n}$ ) to compute the weight of each election over the resemblance index. For instance, for 3 sub-national elections (regional, county and municipality), the weight equals  $\frac{100}{3} = .33$  for each of them.

(3) I analyze the resemblance of each of the sub-national elections and the national election. A given election achieves the maximum score (1) if it is governed by the same system as the national election. If it is governed instead by a mixed system, it gets half the weight (.5). And if it is governed by a different system, it scores 0. Once all scores are computed for a given election, they are added up according to the weights computed in (2). The resulting value is the resemblance score itself. For instance, suppose a national election is ruled by PR system. And the regional, county and local elections of that country are ruled by a mixed, SMD and PR system, respectively. The total score is computed as follows:  $.5 * .33 + 0 * .33 + 1 * .33 = .495$

(4) If the national election system is mixed, I compute the resemblance index for the system governing sub-national elections (important: under mixed elections, the sample does not include two opposite systems for sub-national elections (i.e. PR at regional and SMD at local). This empirical

<sup>38</sup> Press on source for url

**TABLE 5: Sources**

<i>Variable</i>	<i>Main Sources</i>
Resemblance	Tabulated by author
Density	Tabulated by author
Electoral lists	Tavits and Annus (2006), IPU Parline
Higher tiers	Birch (2003) and Tabulated by author
Legal threshold	Armigeon and Careja (2006), IPU Parline
Mixed Electoral Sys	Birch (2003), Armigeon and Careja (2006), IPU Parline
New system	Birch (2003) and Tabulated by author
Time	Tabulated by author
Volatility	Birch (2003) and Tabulated by author
VPN	Tabulated by author
Wasted Vote	Tavits and Annus (2006), Birch (2003), and updated by author
Winner vote share	Tabulated by author

regularity allows us to proceed this way). For instance, suppose the national election is governed by a mixed system. And the regional and local elections are governed by a mixed and PR system, respectively. In this case, the total score is computed according to the PR system, and would take the following value:  $.5 * .5 + .5 * 1 = .75$

(5) Bonus and penalizations: in the version of the index provided in the document, I penalized compensatory mixed systems due to the lack of clarity about how votes are translated into seats. Penalization consists of subtracting .25 points from the final value of resemblance.

(6) Georgian autonomous regions have not been considered for the resemblance index due to the lack of reliable data.



## ADDENDUM

The Addendum contains the corrected list of sources for Wasted Vote, Electoral Thresholds, Higher Tiers, Mixed Electoral Systems, New Systems, Volatility and Winner Vote Share are: Birch (2003), Tavits and Annus (2006), Armigeon and Careja (2006), IPU Parline Database, Adam Carr, Binghamton University Electoral Archive, OSCE Election Reports, IFES Elections Guide and Wikipedia.

Accordingly, Table 5 in the Appendix remains:

<i>Variable</i>	<i>Main Sources</i>
Resemblance	Tabulated by author
Density	Tabulated by author
Electoral lists	Tavits and Annus (2006), IPU Parline
Higher tiers	Birch (2003) and Tabulated by author
Legal threshold	Armigeon and Careja (2006), IPU Parline
Mixed Electoral Sys	Birch (2003), Armigeon and Careja (2006), IPU Parline
New system	Birch (2003) and Tabulated by author
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VPN	Tabulated by author
Wasted Vote	Tavits and Annus (2006), Birch (2003), and updated by author
Winner vote share	Tabulated by author

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