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## Article

# ‘People are running, but where are they heading?’ Disentangling the sources of electoral volatility

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**Abstract** Electoral volatility as measured by the Pedersen index is probably one of the most popular indicators in political science, but its interpretation is far from clear. Volatility is produced by a mix of party-switching, differential turnout and generational replacement. However, there is virtually no empirical research on which, if any, of the main mechanisms leading to volatility tends to have the stronger net impact on election results. Furthermore, the presence of generational replacement and its relative impact on election results have received little attention in studies of volatility. This article develops several theoretical expectations concerning the strength that each of the three components of volatility is expected to exert on the latter. Subsequently, it estimates the net impact of each component on the results of 73 elections in six West European democracies using survey data. According to these estimates, party-switching produced 75 per cent of the total amount of volatility, with differential turnout and generational replacement producing 17 and 8 per cent, respectively. Although the effect of these components may work against each other at times, on average only 11 per cent of volatility was cancelled out this way. Findings provide, for the first time, a map of the components of volatility in established democracies and set the ground for further research on the topic.

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## Introduction

Electoral volatility in the form of the Pedersen index (Pedersen, 1979) is perhaps one of the most widely known indicators in political science. Owing to its ease of computation (it is only necessary to have data on the results of two subsequent elections), it has been employed as dependent or independent variable in a panoply of studies.<sup>1</sup> Volatility is a good indicator of party system change, but it is extremely difficult to assess what it really reflects in terms of individual voting behaviour. As a

consequence, scholarly work employing the Pedersen index must rely upon untested assumptions concerning the behaviour of individual voters, which raises important questions of interpretation. But what is behind electoral volatility?

In principle, electoral volatility may be produced by three main mechanisms: party-switching, differential turnout and generational replacement. However, to date there has been virtually no attempt to assess the net impact of these factors on volatility at the party and the election level in a general way. Moreover, generational replacement has received very little attention in the literature on party choice (Van der Brug and Kritzinger, 2012), and its net effect on volatility has, to the best of my knowledge, never been fully assessed. This article provides an analytical reasoning of the mechanisms leading to volatility and tests several theoretical expectations concerning their relative net impact on election results using data from 73 national elections in six West European democracies. By doing so, it provides a general map of electoral volatility in several established democracies and sets the ground for further research on the topic.

The study proceeds as follows. The first section defines electoral volatility and provides a review of the most relevant literature on electoral instability. Next, the article elaborates on the link between individual behaviour and aggregate volatility. It will be argued that, even though interpreting volatility is always difficult without further investigation, there are a number of theoretical reasons to argue that party-switching is likely to be the mechanism behind most of the net volatility seen at elections. Subsequently, the research strategy and method followed in the article are both explained. An empirical evaluation of the mechanisms leading to volatility is then presented by focusing on changes at party level first and then moving on to the election level. The article then ends with a conclusion.

## Volatility and Electoral Change

The term ‘volatility’ is often used to refer to the total amount of electoral change that takes place between two given elections. There is not a single way to measure aggregate volatility (see, for example, Rose and Urwin, 1970; Ascher and Tarrow, 1975; Przeworski, 1975), but the most popular indicator is the one introduced by Pedersen (1979), who defined it as ‘the net change within the electoral party system resulting from individual vote transfers’ and suggested the following formula:

$$\text{Volatility } (V_t) = \frac{\sum_{i=1}^n |\Delta p_{i,t}|}{2}$$

where volatility ( $V_t$ ) may be interpreted as the gains of all winning parties in the party system or, symmetrically, the losses of all losing parties.<sup>2</sup> The subscript  $i$  stands for each party,  $t$  stands for the election year, and, therefore,  $p_{i,t}$  corresponds to the percentage of votes gained by party  $i$  at election  $t$ .

The main advantage of volatility as an indicator is that it can be obtained for a great number of countries and elections, which allows for large-*n* comparative analyses. Thus, this indicator has been used in most of the comparative research on net volatility that has been published (for example Converse, 1969; Rose and Urwin, 1970; Pedersen, 1979, 1983; Bartolini and Mair, 1990; Mair, 1993; Roberts and Wibbels, 1999; Mainwaring and Zoco, 2007; Bischoff, 2013). This line of research has attempted to explain volatility by emphasizing the role of variables such as the electoral system and parties' socio-organizational bounds (Pedersen, 1983; Bartolini and Mair, 1990; Roberts and Wibbels, 1999), the timing of democratization and the party system (Przeworski, 1975; Tavits, 2005; Mainwaring and Zoco, 2007), patterns of mobilization (Huntington, 1968; Przeworski, 1975), political cleavages (Heath, 2005; Tavits, 2005), economic voting (Remmer, 1991; Roberts and Wibbels, 1999; Tavits, 2005), fiscal space (Nooruddin and Chhibber, 2008), and so on.

A handful of scholars have refused to make inferences about the behaviour of voters from aggregate measures of volatility, as they claim that the only thing that volatility certainly reflects is party system change (for example Rose and Urwin, 1970; Drummond, 2006). However, volatility is usually taken by the literature employing the Pedersen index as an indicator of electoral instability, assuming that this is somehow produced by a mix of voters switching parties and others switching between voting and non-voting.<sup>3</sup> In spite of this, there is not a real sense of how these different elements can really affect election results in empirical terms.

As Butler and Stokes (1974, p. 185) pointed out, 'electoral change is due not to a limited group of "floating" voters but to a very broad segment of [...] electors'. Election results may change because of three mechanisms. One is party-switching, which involves an active behaviour on the side of voters who decide to choose different parties in consecutive elections. A second mechanism is differential turnout, which is the joint effect of the mobilization of some voters and the demobilization of others. Though 'volatility' often brings to mind the image of switching voters, the role of differential turnout as a catalyst of change has been highlighted by several scholars. Campbell *et al* (1960), for instance, coined the term 'peripheral electorate' to refer to those voters who only participate in some elections and whose erratic behaviour may undoubtedly affect the results. For Boyd (1985, p. 521), too, 'the potential effect of abstention on election outcomes is quite high, even in countries with high voting rates'. Nevertheless, the question of whether or not this potential is generally translated into an empirical pattern has been contested. Särilvik and Crewe (1983) find 'switching by abstention' to be the most common of the inconsistent vote patterns. In a similar vein, Hansford and Gomez (2010) argue that irregular voters are less predictable than regular voters, and show turnout variations to have quite a meaningful impact on election results. By contrast, others have claimed the effect of differential turnout to be usually much smaller than that of switching between parties (Butler and Stokes, 1974; Boyd, 1985), while the influence of turnout on election results has been found by some to be negligible both in national (Bernhagen and

Marsh, 2007) and in European Parliament elections (Van der Eijk and van Egmond, 2007).

The third mechanism leading to volatility is generational replacement. Perhaps because it does not really imply an active change of behaviour on the side of voters, generational replacement has been ignored by most of the literature dealing with election-level volatility. However, as Przeworski (1975) puts it, volatility might well be an indicator of the difference in the political preferences of new voters compared to those of their elders. The generational renewal of the electorate may, thus, lead to sustained changes in election results even if voters did not change their choice at all. Indeed, this mechanism has been shown to play a major role in massive political realignments in periods such as the New Deal in America and the post-World War II elections in the United Kingdom (Andersen, 1979; Franklin and Ladner, 1995). But it is not necessary to focus on massive realignments and exceptional elections to realize the contribution that it may also have on election results even in the short term. Nevertheless, to the best of my knowledge there has been no serious attempt to estimate the net impact of generational replacement in ordinary elections.

It is thus clear that volatility may be brought about by different mechanisms. The question is whether the strength with which these mechanisms impact on election results can be said to follow a certain pattern. If it does not – that is, if the net effect of these mechanisms is purely random – then any assumption concerning the general meaning of electoral volatility in established democracies will simply be misleading. In the next section, I present some theoretical considerations that may help us understand why we can expect most elections to follow a pattern where party-switching plays the most relevant role in volatility.

## **Disentangling the Meaning of Volatility: Theoretical Considerations**

From a theoretical point of view, there are a number of reasons to argue that party-switching should be the prevailing mechanism leading to net volatility at most elections. The first of these reasons is that any vote captured from party-switching is simultaneously one vote gained by a given party and one vote lost by another (Boyd, 1985). In contrast, this is something that does not necessarily hold true for differential turnout or generational replacement. As an example, let me compare the effect of party-switching with that of mobilization. Table 1 shows different exemplary scenarios in a two-party system. In the first scenario, five voters switch from party B to A. This, as can be observed, produces in this example 5 points of volatility. The second scenario also involves the action of five voters, but these are previous non-voters who become mobilized to support party A. When non-voters decide to turn out at a given election, they provide their chosen party with an extra vote without any other party directly losing a single vote as a result of their behaviour. It is easy to realize that the effect of the same number of voters is much smaller in this example

**Table 1:** The effect of switching on net volatility versus other types of behaviour. Exemplary scenarios*Scenario 1 (switching): Five voters switch parties.*

|              | <i>Number of voters</i> |                     | <i>Percentage of votes</i> |                     |                   |
|--------------|-------------------------|---------------------|----------------------------|---------------------|-------------------|
|              | <i>Election t</i>       | <i>Election t+1</i> | <i>Election t</i>          | <i>Election t+1</i> | <i>Difference</i> |
| Party A      | 40                      | 45                  | 40.0                       | 45.0                | 5.0               |
| Party B      | 60                      | 55                  | 60.0                       | 55.0                | -5.0              |
| Total voters | 100                     | 100                 | —                          | Volatility:         | 5                 |

*Scenario 2 (mobilization): Five previously non-voters support A.*

|              | <i>Number of voters</i> |                     | <i>Percentage of votes</i> |                     |                   |
|--------------|-------------------------|---------------------|----------------------------|---------------------|-------------------|
|              | <i>Election t</i>       | <i>Election t+1</i> | <i>Election t</i>          | <i>Election t+1</i> | <i>Difference</i> |
| Party A      | 40                      | 45                  | 40.0                       | 42.9                | 2.9               |
| Party B      | 60                      | 60                  | 60.0                       | 57.1                | -2.9              |
| Total voters | 100                     | 105                 | —                          | Volatility:         | 2.9               |

than it is in the switching scenario (it produces 2.9 points of volatility in this particular example, as opposed to 5 points in scenario 1). Moreover, if demobilization or any of the elements that conform generational replacement were used instead, conclusions would remain the same, one switching voter having a much stronger impact on volatility than any other kind of voter.

Alongside this mathematical reason, there is yet another factor that is bound to work in favour of party-switching: the net effect of differential turnout and generational replacement on volatility is distributional. In other words, their effect depends not only on the number of voters involved but also on how these are distributed among the different parties. In the two scenarios presented earlier, only one of the parties received votes from previous non-voters. Now, imagine that both party A and party B received the same number of mobilized voters. In this case, the net effect of mobilization on net volatility would be zero. And again, the same also applies to the effect of demobilization and to the different elements of generational replacement.

It is evident that these factors give party-switching a comparative advantage. Indeed, one can argue that the effect of party-switching may also be cancelled out if the same number of voters switching from party A to B decide to switch from party B to A. Though this is a correct statement, as well as a likely possibility, differential turnout and generational replacement are both likely to be subject to two sources of cancelling-out. Apart from the cancelling-out that comes from their distributional nature, the effect of mobilized voters may also be counteracted by demobilized voters changing in the opposite direction. Similarly, the effect of new voters may compensate for the passing away of others, thereby leading to zero volatility. All these theoretical



considerations should, therefore, be enough to expect that the effect of party-switching will prevail over the rest. This in turn implies that studies where the Pedersen index is used as a surrogate of net switching are likely not to be misleading. As a consequence, most of the volatility observed in election results is probably produced by the net effect of voters defecting from one party to vote for another.

In addition, generational replacement is likely to be subject to an additional limitation coming from demographic dynamics. Variations in mortality and/or birth rates, as well as electoral rules lowering the voting age, may indeed have an important impact on election results by benefiting those parties with stronger attraction among the young at the expense of the rest. However, as the average rate of replacement in the electorate of Western European countries tends to be rather low, the net effect of generational replacement is likely to be relatively small in the short term as well. Thus, we should probably expect generational replacement to have the smallest effect on volatility.

Conspicuous readers will nevertheless argue that there is still another possible type of cancelling-out that takes place between (and not within) the three mechanisms of volatility. This kind of cancelling-out comes about when the net effects of different mechanisms present opposing signs. Thus, a party might, for example, obtain gains from switching voters but lose votes from differential turnout and generational replacement, obtaining as a result exactly the same percentage of the vote share as in the previous election. As the effect of party-switching is expected to be stronger than the effect of any other mechanism, we could perhaps expect that it will also be much more difficult for it to be removed by the action of the other two. The extent to which volatility is reduced as a result of the different components working against each other is an empirical question, but it also needs to be assessed in order to better understand the processes behind electoral change.

With these theoretical considerations in mind, the next section focuses on the research strategy that will be employed in this article.

## **Disaggregating Electoral Volatility: Data and Technical Issues**

### **Data**

Political scientists are prone to enlarging the variation in their data by including additional countries. However, when the goal is to study political change, it may be more appropriate to maximize the number of time-points over which change can be tracked, even though lengthy time-series are available only for a few countries. Thus, the cases that are the focus of this study are established West European democracies for which a large number of national election studies is available. This strategy will allow me to compare elections within countries and study the effect of the different mechanisms of volatility over time. Moreover, recent record peaks of volatility have

**Table 2:** Countries and elections included in the analysis

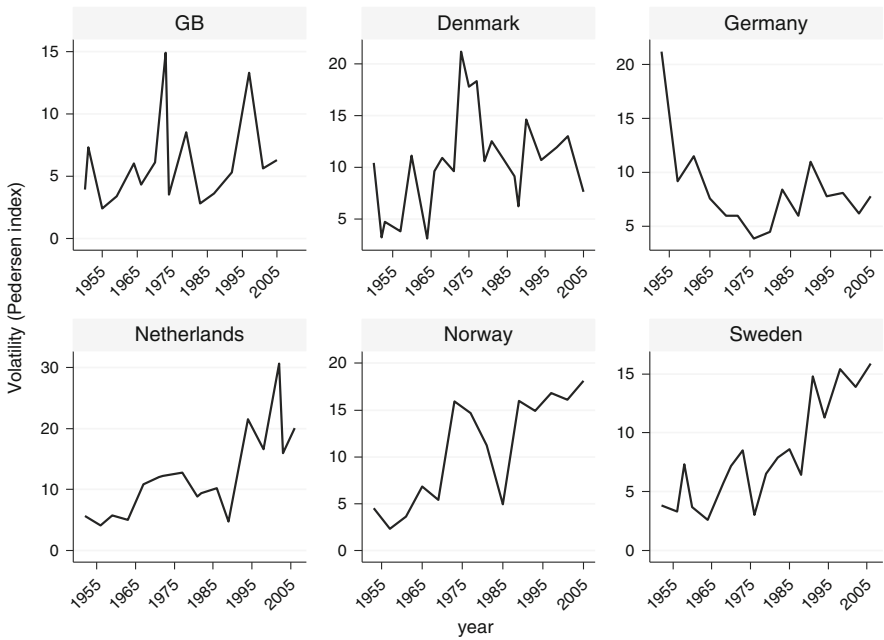
| <i>Country</i>       | <i>Election years</i>  |
|----------------------|--|
| Denmark              | 1971, 1975, 1977, 1979, 1981, 1984, 1987, 1988, 1990, 1994, 1998, 2001, 2005, 2007                       |
| Great Britain        | 1964, 1966, 1970, 1974 <sup>a</sup> , 1974 <sup>b</sup> , 1979, 1983, 1987, 1992, 1997, 2001, 2005, 2010 |
| Germany <sup>c</sup> | 1965, 1969, 1972, 1976, 1980, 1983, 1987, 1990, <sup>c</sup> 1994, 2002, 2005                            |
| The Netherlands      | 1972, 1977, 1981, 1982, 1986, 1989, 1994, 1998, 2002, 2006   |
| Norway               | 1965, 1969, 1977, 1981, 1985, 1989, 1993, 1997, 2001, 2005   |
| Sweden               | 1960, 1964, 1968, 1970, 1973, 1976, 1979, 1982, 1985, 1988, 1991, 1994, 1998, 2002, 2006                 |

<sup>a</sup>February<sup>b</sup>October<sup>c</sup>Excludes Eastern Germany.

been reported and generated much academic debate in Western Europe, which makes these countries an interesting case for study (see Pedersen, 1979, 1983; Mair, 1989, 1993, 2005, 2008; Bartolini and Mair, 1990; Drummond, 2006).

The countries selected for analysis are Denmark, Great Britain, Germany, the Netherlands, Norway and Sweden. These are the same cases used by the European Voter project (Thomassen, 2005a). Election surveys from that project were collected and examined, resorting to the original databases when coding mistakes were present. In addition, more recent National Election studies were collected to extend the dataset until the 2000s.<sup>4</sup> In total, the whole dataset contains 73 national election surveys in six countries<sup>5</sup> over an average time span of 50 years, as displayed in Table 2.

The resulting dataset provides sufficient variation over time, but also in terms of the different electoral and institutional settings of the six countries. Not only do they have different electoral and party systems, but they also show clear variations in volatility (see Figure 1). With an average level of volatility of 6.1 and 6.5, respectively, Germany and Great Britain show the lowest levels in the period analysed. The Netherlands is at the other extreme (14.22), with Norway (12.46) and Denmark (11.66) showing high levels too while Sweden (8.9) occupies an intermediate position. There are also different trends over time. Sweden departed from one of the lowest levels of volatility in the 1960s (2.6 in 1964) and reached levels higher than 15 points in the 2000s. Volatility has also increased in Germany after the 1990s, but changes have been very slow and relatively small, while abrupt changes are found in the Netherlands and Norway. In Great Britain, volatility does not seem to follow a clear trend, and in Denmark it remains high but is clearly lower than in the 1970s where record peaks of over 17 points are found in three consecutive elections. Thus, the sample of elections provides enough variation to have an idea of the patterns of volatility in Western Europe.



**Figure 1:** Volatility (Pedersen index) over time in the six countries.  
*Source:* Author's own elaboration from Peter Mair's file of electoral volatility.

In terms of operationalization, the survey questions employed for the analyses are vote choice in both the last and the previous election, and age of respondent. These are the standard survey questions where respondents are first asked whether they voted or not and, if they did, they are also asked about the party they voted for.<sup>6</sup>

### Research strategy and methods

This article is aimed at estimating the amount of vote-switching, differential turnout and generational replacement contained in electoral volatility. To do this, different possible strategies can be followed. Given the aggregate nature of electoral volatility, one of those strategies may indeed consist in the use of ecological inference (Brown and Payne, 1986; Mannheimer, 1993; King, 1997; Russo, 2014), but important shortcomings make it inconvenient for the purpose of this article. For one thing, ecological inference necessitates from data collected at the lowest possible level of aggregation, which entails problems of feasibility when it comes to studying several countries and elections. For another, and even





more importantly, ecological models are, by their own nature, based on the assumption that the population between two consecutive elections remains exactly the same. This rules out the possibility of estimating the effect of generational replacement and, therefore, of comparing its relative impact on volatility *vis-à-vis* the other mechanisms. An alternative and more feasible strategy consists in combining aggregate and individual data. As election surveys including vote recall for at least two elections have been conducted in several countries for decades now, there is no reason not to make use of them in order to have an overall idea as to what the common trends might be. To be sure, such a strategy is also far from perfect, as surveys do always contain some amount of measurement error. But, for the reasons already expressed, it looks like the best strategy in this case.

In what follows, several sources of information are employed to estimate the individual sources of volatility. First, I will employ the pooled database of national election surveys mentioned in the 'Data' section. Although many of these surveys are not panel studies,<sup>7</sup> which might perhaps give us more precise information, we may combine them with other sources to try and approach a general picture of what is going on in terms of the different mechanisms of volatility.<sup>8</sup> Together with the presence of misreports, the other source of error of survey data is associated with non-response.<sup>9</sup> To deal with these possible sources of error, this article follows the literature on vote transitions and applies a weighing procedure that takes into account the real proportion of non-voters and voters of each party in the population (for example Axelrod, 1972; Butler and Stokes, 1974; Särilvik and Crewe, 1983; Boyd, 1985; Aimer, 1989; Granberg and Holmberg, 1991; van Egmond, 2007).<sup>10</sup> An Iterative Proportional Fitting (IPF) procedure will be employed to weigh the data according to actual results.<sup>11</sup>

Estimating generational replacement requires combining more than two data sources. This is because certain voters come of age in between elections, and that has to be accounted for. Vote recall variables contain information on who those voters are. This information was checked on the basis of their age to prevent coding mistakes and, subsequently, weighed by the actual number of new voters at every single election.<sup>12</sup>

By combining all these data, we could get information on voters who changed their behaviour as well as on those who entered the electorate for the first time. This would enable us to calculate the net effect of switching and differential turnout, but not of generational replacement, as information on the voters who passed away is missing in the surveys. Generational replacement produces volatility if and only if the preferences of voters from older cohorts are different from those of new voters. As there is no way to know which of the voters from older cohorts died in between two given elections, a simulation was made in the following way:

- (a) First, using demographic statistics<sup>13</sup> the proportion of the population passing away between elections ( $t$  and  $t+1$ ) was calculated for three age cohorts: 50–59



- year-olds, 60–69 year olds and people over 70 years old. Age cohorts refer to the year when the first of each pair of elections (election  $t$ ) took place.<sup>14</sup>
- (b) Second, voters who had passed away between elections are absent in the surveys in spite of having voted at election  $t$ , and thus it is necessary to create those cases artificially. Therefore, a group of respondents within each of the age cohorts mentioned earlier was randomly duplicated maintaining the vote distribution and turnout rates of their cohort counterparts at election  $t$ .<sup>15</sup> The number of respondents to be created was determined on the basis of the proportions of people who passed away between elections within each age group.
  - (c) Naturally, ‘deceased electors’ were assumed to have only voted (or not) in the previous election (election  $t$ ) but not in the most recent one ( $t+1$ ). Moreover, they were assigned a weight corresponding to the actual percentage of individuals over 50 years old who passed away between elections.

Despite not being a perfect measure, this strategy has the advantage of producing approximate estimates of the effect of deceased voters on volatility. Of course, it does not account for the small number of younger people who die between elections, nor does it take into consideration that the distribution of preferences of deceased voters may be different from those of voters who are still alive even if they belong to the same cohort. The latter is likely the case with manual workers, whose higher mortality rates will probably affect the vote of labour, socialist and communist parties somewhat more than is predicted by this method. However, with regard to deaths of younger individuals, it must be borne in mind that these are, by definition, much less likely to be related to the ageing process and, as a consequence, cannot be directly linked to generational replacement. Moreover, as the passing away of younger voters is likely to have a larger random component, its impact on election results, if any, is bound to be very marginal. Therefore, aside from a certain amount of measurement error, this approximation method is far from problematic given our complete lack of information and the fact that the overall proportion of deceased voters is relatively small.

Once all the weights have been applied, vote recall questions can be used to calculate the percentage of votes gained or lost by each party as a result of party-switching. This is done by keeping only those respondents who voted at both elections and cross-tabulating the data election by election. For each party, the number of voters who left for other parties can then be subtracted from the number of voters gained from competitors. A similar strategy (albeit including non-voters) can be employed to compute the net percentage of votes gained/lost by each party as a result of voter mobilization, which is then subtracted from the percentage of votes gained/lost from demobilized voters. Lastly, in order to calculate the impact of generational replacement, the number of votes gained/lost by each party when new voters are added must be subtracted from the number gained/lost as a result of older voters passing away.<sup>16</sup>

The procedure was carried out and then repeated for each election in order to produce an estimate of how the different parties were affected by each mechanism. Results were then stored and put together in a pooled dataset.

Following this strategy, if switchers are set not to have switched, demobilized voters are set to have voted for the party that they did in the previous election, mobilized voters are set not to vote, young voters are set as missing and diseased voters are set to have voted in the way they presumably did, we can perfectly wind back from the most recent actual results to the results of the previous election. It is, therefore, perfectly possible to simulate how much is added when different groups of voters come into play and how that affects the electoral prospects of every single party in all of the 73 elections.

## What Lies Behind: Analyses of Electoral Volatility in Six Countries

### Analysis at party level

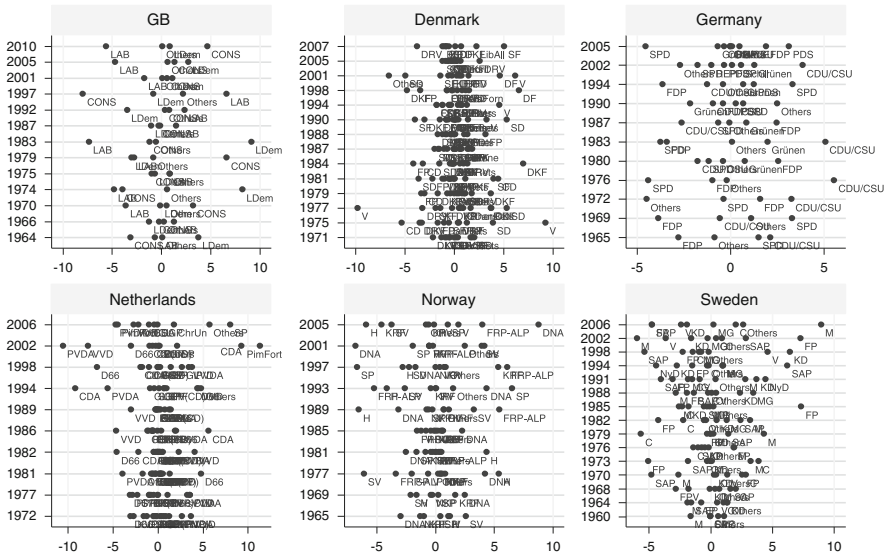
#### *(a) Mapping out the impact of the three components*

Even though electoral volatility tends to be measured at election level, it is at party level that net election change really takes place. Different parties lose and gain electoral support between consecutive elections, and volatility is only a measure of how much of the percentage changed hands.

As explained earlier, in spite of being an accumulation of processes that happen primarily at individual level, volatility is a net outcome. This implies that the effect of the underlying processes leading to it can potentially be cancelled out and have no observable impact on election results. As a consequence, volatility cannot be fully comprehended unless we take a step up in the ladder of aggregation. For that reason, the strategy followed in this article consists in aggregating individual-level data at party level in order to simulate the process that takes place between elections leading to changes in election results.<sup>17</sup>

Following the procedure explicated in the section ‘Research strategy and methods’, the net effect of party-switching, differential turnout and generational replacement was calculated for each party and election using survey data. The result is shown in Figures 2–3. These figures show the percentage of votes that each party lost or gained in each election as a result of the three mechanisms of volatility.

As can be seen, party-switching is by far the component of volatility that produced stronger changes in the support of most parties (Figure 2). Although the range of losses and gains for each party varies across countries, switching caused average changes of about 1.8 percentage points for the parties analysed. Overall, there seems to be a small centripetal tendency in many elections whereby a small number of parties tend to attract voters from a wider range of parties (332 losing cases versus 290 winning cases). Of all the parties under study, the one that suffered the greatest



**Figure 2:** Estimated impact of vote switching on parties' electoral support. *Great Britain.* LAB = Labour, CONS = Conservatives, LDem = Liberal Democrats. *Denmark.* SD = Socialdemocrats; DRV = Radical Liberal Party; DKF = Conservative People's Party; CD = Centre Democrats; DanRet = Liberal Justice Party; SF = Socialist People's Party; Grønne = Green Party; DHP = Humanists Party; SAP = Socialist Workers' Party; LibAll = Liberal Alliance; DKP = Danish Communist Party; LC = Centre Liberal; Minorit = Minority Party; DF = Danish People's Party; KF = Christian People's Party; APK = Communist Workers' Party; SP = Party of Schleswig; DU = The Independents; V = Liberals; VS = Left Socialists; FP = Progressive Party; EL = Red/Green Union List; FK = Common Course; DemoForn = Democratic Renewal. *Germany.* SPD = Social Democratic Party. CDU/CSU = Christian Democratic Union / Christian Social Union; FDP = Liberal Party; Grünen = Greens; PDS = Party of Democratic Socialism; REP = The Republicans; Schill = Schill Party; Graue = Grey Party. *The Netherlands.* PVDA = Labour Party; CDA = Christian Democratic Appeal; KP = Catholic People's Party; ARP = Anti-Revolutionary Party; CHU = Christian Historical Union; VVD = People's Party for Freedom and Democracy; D66 = Democrats 66; CPN = Communist Party of the Netherlands; PPR = Political Party of Radicals; PSP = Pacifist Socialist Party; DS70 = Democratic Socialists '70; SGP = Reformed Political Party; GPV = Reformed Political League; BP (RVP) = Farmers' Party; RKPN = Roman Catholic Party of the Netherlands; RPF = Reformatory Political Federation; EVP = Evangelical People's Party; CP (CD) = Centre Party; SP = Socialist Party; GL = Green Left; ChrUn = Christian Union; PimFort = Pim Fortuyn. *Norway.* RV = Red Party; NKP = Communist Party of Norway; SV = Socialist Left; DNA = Labour Party; V = Liberal Party; KRF = Christian Democratic Party; SP = Centre Party; DLF = Liberal People's Party; H = Conservative Party; FRP/ALP = Progress Party; KP = Coastal Party. *Sweden.* V = Left Party; SAP = Social Democratic Party; C = Conservative Party; FP = Liberal People's Party; M = Moderates; KD = Christian Democrats; MG = Green Environmental Party; NyD = New Democracy.

losses was the Dutch labour party (PDVA) in 2002, with a net loss of almost 10.6 per cent of the vote share owing to switching. Not surprisingly, this was precisely the

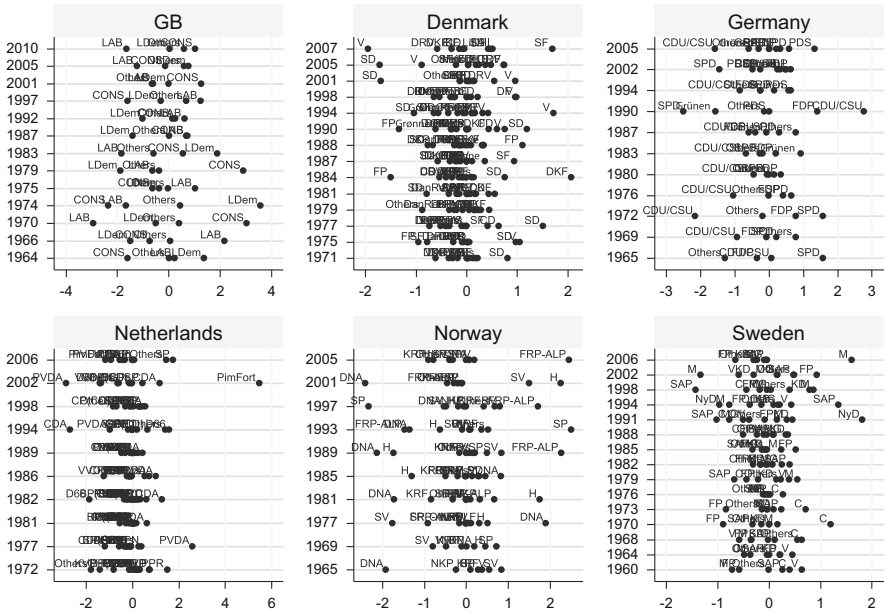
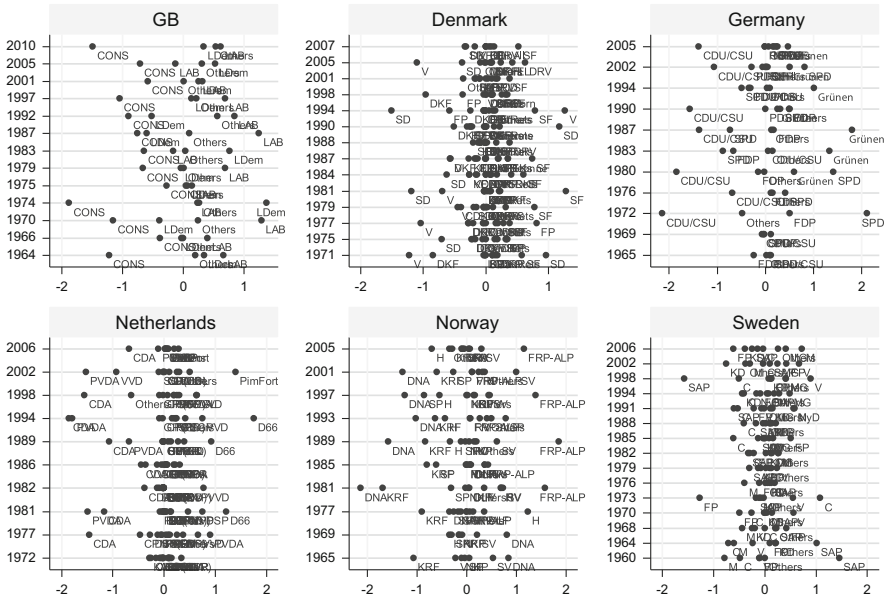


Figure 3: Estimated impact of differential turnout on parties' electoral support. See legend in Figure 2.

year that Pim Fortuyn's populist right party managed to get the highest number of switching voters in the sample (11.34 per cent of net gains from switching) and to be the second most voted party in the Netherlands. Clearly, switching voters were responsible for much of the changes that occurred in the most dramatic election in Dutch history to date.

Differential turnout, on the other hand, produced an average change in party support of 0.51 per cent of the vote share (Figure 3). This is 2.5 times less than the estimated average change produced by switching, which lends support to the expectation that switching is by far the most important of the mechanisms leading to electoral volatility – at least at party level. The party that managed to lose the highest vote share by the relative demobilization of its voters (2.9 per cent) was the British Labour party in 1970. Although most opinion polls before the election had predicted Labour Prime Minister Wilson's victory, the final result was a fall of 4.9 percentage points in Labour's vote share (Abrams, 1970). In light of these estimations, it seems that more than half of this fall could be explained by the effect of differential turnout. The other extreme is, once again, represented by Pim Fortuyn's party in the 2002 election. Not only did the party manage to attract voters from their main competitors, but also it obtained about 5.46 per cent of extra votes thanks to the relative mobilization of its voters *vis-à-vis* those of its competitors.



**Figure 4:** Estimated impact of generational replacement on parties' electoral support. See legend in Figure 2.

Lastly, the effect of generational replacement (Figure 4), although important, is the smallest among the three components. On average, this component produced a change of 0.34 percentage points in party support (4.3 times less than switching). The maximum amounts of votes gained and lost by a party because of generational replacement are both found in the 1972 German election. The stronger sympathy towards Chancellor Willy Brant among younger voters seems to have helped the former to win his second consecutive federal election, giving the SPD an extra 2.12 per cent of votes mostly at the expense of the CDU/CSU, which lost 2.14 percentage points from generational replacement. The reasons for the popularity of Willy Brant are not the focus of this article. However, it might be partly related to the development of the Ostpolitik, which in effect recognized the Democratic Republic of Germany as an independent country and was relatively less popular among those aged over 60 (Irving and Paterson, 1972).

It is worth noting that generational replacement also appears to be one of the main factors helping many Green, Populist and Radical Left parties to emerge in several countries. Examples of this are the German Grüne (Greens), the Norwegian FRP-ALP (right-wing populist) and SV (radical left), the Dutch Pim Fortuyn (right-wing populist), or the Danish SF (green/radical left).

**Table 3:** Correlations between parties' changes in vote share between elections and the changes produced by each of the three components of volatility

|                          | <i>All countries</i> | <i>Denmark</i> | <i>Great Britain</i> | <i>Germany</i> | <i>The Netherlands</i> | <i>Norway</i> | <i>Sweden</i> |
|--------------------------|----------------------|----------------|----------------------|----------------|------------------------|---------------|---------------|
| Net vote switching       | 0.97                 | 0.98           | 0.98                 | 0.88           | 0.98                   | 0.97          | 0.98          |
| Differential turnout     | 0.78                 | 0.72           | 0.90                 | 0.43           | 0.84                   | 0.87          | 0.76          |
| Generational replacement | 0.53                 | 0.55           | 0.36                 | 0.39           | 0.66                   | 0.63          | 0.54          |
| <i>N</i> (parties)       | 626                  | 175            | 52                   | 60             | 130                    | 95            | 114           |

All correlations are significant at  $P < 0.01$ .

*(b) Analysing changes in party support*

So far, the article has analysed the estimated impact of net switching, differential turnout and generational replacement on the electoral prospects of parties separately. However, actual changes in election results are the consequence of an aggregation that occurs when the effects of the three components of volatility are summed up, as the total percentage of votes that is lost or gained by each of the parties at a given election equals the following equation:

$$\text{Total change } i = s_i + t_i + g_i$$

where  $s$  is the net effect of party-switching for each party ( $i$ ),  $t$  is the net effect of differential turnout, and  $g$  is the net effect of generational replacement.

Therefore, in order to study how each of these three mechanisms (in what follows, they will also be called components) impacts on volatility, it is necessary to analyse the relationship between their effects and total vote changes at party level. In other words, what needs to be assessed is the relationship between the gains and losses in party support that are produced by each of the components and the total percentage of votes that parties lose or gain between elections. This way, it will be possible to assess which of the three components, if any, presents the stronger relationship with total change in parties' support. As previously mentioned, switching voters are expected to have the largest effect on net volatility, while generational replacement should have the smallest effect.

Correlations between the effect of each of the components and total change at party level are shown in Table 3. Looking at correlations is a useful strategy; if, for example, parties gain votes regardless of whether they attract or lose switching voters, then switching cannot be deemed to be a good indicator of volatility (or the other way around).

As can be seen, there is a very strong relationship between the net effect of switching and actual changes in party support (see first row in Table 3). This indicates that the effect of switching is not only large but also cancelled out to a lesser extent than the effect of the other components. The correlation is 0.97 when all six



countries are considered and, when split by country, it is actually equal or higher than that in five of them. Only in Germany does switching explain a little less of the variance of actual results (Pearson's  $r=0.88$ ), although the range of variation is also much smaller than in any other country. Therefore, on average, it is possible to get a very accurate idea of the actual amount of volatility by looking only at the net effect of switching on each party's results. In fact, regressing the effect of switching on total change in party support yields a coefficient of 0.75, indicating that 75 per cent of volatility is produced by switching voters.<sup>18</sup>

As expected, the picture is somewhat different with regard to the other two components. The correlation between the net effect of differential turnout and total change at party level (second row of Table 3) shows a more erratic pattern. The relationship is strong in most countries, but in no case does it reach the levels found with switching. This is especially true in Germany, where the net effect of turnout only explains 18 per cent of the variance of total change (Pearson's  $r=0.43$ ), and thus it can hardly be used as an accurate indicator of the latter. Regressing the effect of differential turnout on total change in party support yields a coefficient of 0.17, indicating that 17 per cent of volatility is produced by this component.<sup>19</sup>

The net effect of generational replacement, on the other hand, shows an even weaker correlation with total change in every one of the six countries (third row in Table 3), which indicates high levels of cancelling out between this and the other two components (in other words, parties often gain or lose votes regardless of the effect of generational replacement). Actually, in both Great Britain and Germany the correlation is particularly low (0.36 and 0.39, respectively). Finally, regressing the effect of generational replacement on total change in party support suggests that 8 per cent of volatility is produced by this component.<sup>19</sup>

Findings support the expectation that switching is the most important cause of changes in party support, followed by differential turnout and generational replacement. Having said that, it is necessary to keep in mind that total changes in party support are the sum of the changes caused by the three components. Therefore, components may have contradicting effects, with parties being able to benefit from one of the components while they lose from another. With this in mind, there may be two interrelated reasons for the strong correlation between switching and changes in party support: either switching has the stronger impact (which, as shown in the previous subsection, it does) and/or the effect of the other two components is more likely to be cancelled out by the action of switching voters. In other words, it might well be that differential turnout and generational replacement benefit different parties from the ones that are benefitted from switching.

To investigate the presence of cancelling-out between components, we need to look at the correlation between their effects individually (Table 4). As can be appreciated, correlations between components of volatility are moderate to strong in the six countries. Indeed, the positive signs show that, most of the time, the gains and losses of electoral support caused by the three components take place in a rather



**Table 4:** Zero-order correlations between the net effect of the components of volatility at party level

| <i>Great Britain</i> |           |               | <i>Denmark</i>         |           |               |
|----------------------|-----------|---------------|------------------------|-----------|---------------|
| <i>n</i> = 52        | Switching | Diff. Turnout | <i>n</i> = 175         | Switching | Diff. Turnout |
| Diff. Turnout        | 0.85***   | 1             | Diff. Turnout          | 0.59***   | 1             |
| Gen. Rplmt           | 0.24*     | 0.17          | Gen. Rplmt             | 0.43***   | 0.37***       |
| <i>Germany</i>       |           |               | <i>The Netherlands</i> |           |               |
| <i>n</i> = 60        | Switching | Diff. Turnout | <i>n</i> = 130         | Switching | Diff. Turnout |
| Diff. Turnout        | 0.04      | 1             | Diff. Turnout          | 0.74***   | 1             |
| Gen. Rplmt           | 0.05      | 0.23*         | Gen. Rplmt             | 0.55***   | 0.51***       |
| <i>Norway</i>        |           |               | <i>Sweden</i>          |           |               |
| <i>n</i> = 95        | Switching | Diff. Turnout | <i>n</i> = 114         | Switching | Diff. Turnout |
| Diff. Turnout        | 0.75***   | 1             | Diff. Turnout          | 0.66***   | 1             |
| Gen. Rplmt           | 0.46***   | 0.59***       | Gen. Rplmt             | 0.41***   | 0.48***       |

\*\*\*  $P < 0.01$ , \*\*  $P < 0.05$ , \*  $P < 0.1$ .

coordinated fashion. Parties that lose support from defection to other parties tend to also lose support from differential turnout and generational replacement, and the opposite seems to work for parties that gain support. Thus, the forces that lead individuals to help or damage the electoral prospects of particular parties seem to act in a similar direction regardless of the path we look at. Nevertheless, the fact that some of the correlations are not very strong also shows that there is in fact some degree of cancelling-out between the different components of volatility. The cases of Germany (where correlations do not even reach statistical significance at  $P < 0.05$ ) and Great Britain (where there is only a highly significant correlation between the effects of party-switching and differential turnout) provide clear evidence in this direction, suggesting that losses from one component may often be compensated with gains from another.

In order to estimate the total amount of cancelling-out that takes place between components, it is necessary to aggregate their effects at the election level. This is what the next section deals with.

### Analysis at election level: Taking account of cancelling-out between components

The total amount of volatility that vanishes as a result of cancelling-out between components can be better analysed by looking at what would happen were there no cancelling-out between components. With this aim, we must first calculate the amount of ‘intra-component volatility’ at each election. This is done by applying

Pedersen’s (1979) formula separately to the effect of each of the components as shown in Table 5. The total sum of these effects at election level (the ‘flux of volatility’) is the amount of net volatility that would be found if no cancelling-out took place between components (in the table, as well as in most real-world cases, that amount is higher than actual net volatility).

It is also possible to calculate the per cent contribution of each component to the total flux of volatility produced by the three components together. Note that this is not the average contribution of each component to actual volatility (which was shown in the previous section) but the contribution that the components would have if there was no cancelling-out between them. In the example shown in Table 5, the contribution of generational replacement to the flux of votes is 12.5 per cent, while party-switching and differential turnout represent 62.5 and 25 per cent, respectively.

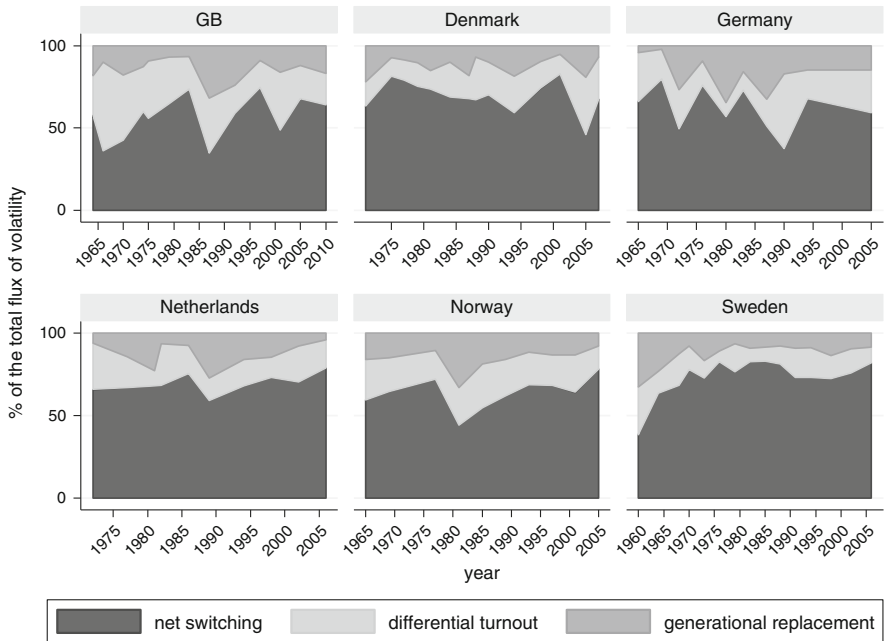
Moving on to the data, Figure 5 shows the estimated contribution of each component to the total flux of volatility in the 73 elections under study. As can be appreciated, switching is clearly the component that generates most of the net flux of votes between elections. Even though there is variation in this pattern, only in two cases is the effect of party-switching surpassed by that of another component. One is the exceptional election of 1990 in Germany (the first after reunification), where differential turnout clearly had a bigger effect (45 per cent compared to 38 per cent of switching) because of the high levels of mobilization among CDU/CSU supporters.<sup>20,21</sup> The second exception is Great Britain in 1966, when the extraordinarily low effect of vote-switching (only 1.5 per cent of the vote share, the smallest amount in the sample) resulted in a higher contribution of turnout (54 per cent versus 36 per cent of switching).

On average, party-switching would represent 66 per cent of volatility if there was no cancelling-out between components, whereas differential turnout and generational replacement would represent 20 and 14 per cent, respectively. This distribution

**Table 5:** Net switching, differential turnout and generational replacement and their corresponding contribution to the flux of volatility

|                  | <i>Party-switching</i> | <i>Differential turnout</i> | <i>Generational replacement</i> |                        |
|------------------|------------------------|-----------------------------|---------------------------------|------------------------|
| Party A          | -4                     | 2                           | -1                              | -3                     |
| Party B          | -1                     | 0                           | 1                               | 0                      |
| Party C          | 5                      | -2                          | 0                               | 3                      |
|                  |                        |                             | Total volatility:               | 3                      |
|                  | <i>a</i>               | <i>b</i>                    | <i>c</i>                        | Total ( <i>a+b+c</i> ) |
| Component effect | 5                      | 2                           | 1                               | 8                      |
| Contribution     | 62.5%                  | 25%                         | 12.5%                           | —                      |

*Note:* Figures in the upper table stand for losses or gains of vote share.



**Figure 5:** Relative contribution of each component to the flux of volatility (stacked areas).

contrasts with the figures on the amount of actual change in party support caused by each component that were explained in the previous section. The difference between them should give us an idea of how much the effect of each component is weakened or reinforced by the effect of the other two components. As expected, the presence of net switching is reinforced to a greater extent than the other components by the cancelling-out between them (from 66 per cent before cancelling-out to 75 per cent of actual change in party support, an increase of 9 points). Moreover, this reinforcement seems to happen at the expense of both of the other two components. While the effect of differential turnout is reduced by 3 points (from 20 to 17 per cent), the contribution of generational replacement decreases by 6 points (from 14 to 8 per cent) after this sort of cancelling-out is taken account of.

Finally, to analyse how much volatility is cancelled out by the effect of the three components working against each other, we can simply compare the amount of volatility without cancelling-out between components (that is the total flux of volatility) with the Pedersen index as in Table 6. As can be seen, the average amount of volatility in the sample would have been 1.32 percentage points higher if no cancelling-out between components had taken place. In other words, we can argue that about 11.5 per cent of volatility is lost as a consequence of this process.

**Table 6:** Average volatility (Pedersen index), total flux of volatility and paired *t*-test of the difference

|                             | <i>Mean</i> | <i>SE</i> |
|-----------------------------|-------------|-----------|
| Volatility (Pedersen Index) | 10.15       | (0.63)    |
| Total flux of volatility    | 11.47       | (0.63)    |
| Difference                  | -1.32***    | (0.11)    |
| <i>N</i> (elections) = 73   | —           | —         |

\*\*\*  $P < 0.01$ .

## Concluding remarks

Which are the mechanisms more likely to be behind electoral volatility? This article has provided several answers to this question. First, it has developed a series of theoretical expectations about which of the mechanisms leading to changes in election results are expected to have a more prominent presence in aggregate volatility. Second, patterns of volatility have been analysed across 73 elections in six countries over an average time span of 50 years employing survey data, demographic data and election records. The main finding is that, in spite of some variation, net volatility can be claimed to be, by and large, an indicator of net switching. On average, party-switching produced 75 per cent of the net volatility in the sample of elections analysed, while differential turnout produced 17 per cent and generational replacement 8 per cent.

Though parties may, in principle, lose votes from one of the three mechanisms and gain votes from another, this type of cancelling-out is demonstrated to have a very modest average effect. Moreover, the small percentage of volatility that is absorbed by it (11 per cent in the sample of elections analysed in this article) tends to negatively affect both differential turnout and generational replacement at the expense of vote-switching.

These findings have important implications. In spite of being one of the most popular variables in political science, research trying to elucidate what exactly volatility (as measured by the Pedersen index) reflects in terms of individual-level changes is scarce. This piece of research has contributed to clarify this subject and, therefore, to alleviate, at least in part, the interpretation issues of this aggregate indicator. Overall, research employing the Pedersen index can rest assured that volatility is by and large reflecting the net effect of party-switching.

Having said that, the effects of both differential turnout and generational replacement cannot be disregarded, as together they account, on average, for 25 per cent of volatility. Moreover, the effect of generational replacement is larger than what should probably be expected given the low birth and mortality rates of established democracies, which highlights the importance of taking account of differences in the political preferences of different cohorts. Generational replacement was found to produce an average 8 per cent of volatility, which is not low for a component that does not even require any changes in voting behaviour in order to produce changes in election results.



In spite of its small effect, the potential of generational replacement to produce electoral change over time in the long term should not be overlooked. This is especially true for those parties that have seen a steady decline in support over the past few years. In many of those cases, part of the answer to their electoral decline could be found in the natural replacement of the electorate. For example, the Conservative party has lost over 11 percentage points in support from 1958 to 2010 in Great Britain. On average, generational replacement has cost the party about 0.9 points every election year since the 1964 election, which amounts to almost 12 percentage points over the whole period (partly compensated by the effect of other components of volatility). The opposite could be said for the German Green Party. From 1980 to 2005, generational replacement granted the party an average of 0.85 percentage points at every election. As a consequence, almost 67 per cent of its votes in the 2005 election were because of the replacement of older voters over a 25-year period with new voters more sympathetic with the green cause. This is consistent with Franklin and Rudig's (1992) finding that Green voters were overwhelmingly young at the time of their study.

This article sets a stepping stone for further research, although there is still much work to be done. The empirical analysis presented in this study is limited to six West European democracies. There is arguably enough variation in volatility both across countries and over time in this sample so as to make findings representative of most established democracies. However, there are reasons to think that patterns of volatility might be different in other cases, especially in those countries that have recently transitioned to democracy and where differential turnout or even generational replacement might play a more important role. Studying the variations in the presence and strength of different components of volatility should definitely be part of the agenda of scholars working on political change. Moreover, the relative impact of some of the components of volatility may have changed over time, which opens an extremely interesting avenue for further research.

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## About the Author

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## Notes

- 1 Despite being the most widely used indicator of electoral instability, the Pedersen index is not the only one that has been proposed. For example, Rose and Urwin (1970) suggested other indicators such as elasticity, variability and persistence of party support. Ascher and Tarrow (1975), on the other hand, suggests using 'fluidity', which is measured as the total pool of voters who might eventually be prone to change from and towards a given party. By contrast, Ascher and Tarrow (1975) separated net change from total change, the latter resembling the notion of 'gross volatility' that measures the aggregate proportion of voters who switch parties between two elections.
- 2 Note that changes in the party system pose no particular problem for this formula. Parties that disappear are losing parties, while new parties are considered winning parties. Following Bartolini and Mair (1990), party splits and mergers are treated as if they all continued to be the same party at both elections  $t$  and  $t+1$ . This is because voters of those parties cannot be considered to be switching voters.
- 3 For some examples, see the works cited in the previous paragraph.
- 4 In total, the surveys employed are the following: European Voter dataset of election studies (Thomassen, 2005b), British Election Studies 1969–1987 (Heath, 1989), British Election Study 1997 (Heath *et al.*, 2000), British Election Study 2002 (Sanders *et al.*, 2002), British Election Study 2005 (Clarke *et al.*, 2006), British Election Study 2010 (Sanders *et al.*, 2010), Danish Election Study 2001 (Andersen *et al.*, 2002), Danish Election Study 2005 (Andersen *et al.*, 2005), Danish Election Study 2007 (TNS Gallup, 2007), Dutch parliamentary election study 1981–1984–1986 (van der Eijk *et al.*, 1997b), Dutch parliamentary election study 1986–1989 (van der Eijk *et al.*, 1997a), Dutch parliamentary election study 1989–1994 (Anker and Oppenhuis., 1997b), Dutch parliamentary election study 2002–2003 (Irwin *et al.*, 2005b), Dutch Parliamentary Election Study Cumulative Dataset, 1971–2006 (Aarts *et al.*, 2010), German Election Study 1998 (Schmitt and Wessels, 1998), German Election Study 2002 (Wessels and Schmitt, 2002), German Election Study 2005 (Wessels, 2005), Norwegian Election Study 2001 (Valen and Aardal, 2008a), Norwegian Election Study 2005 (Valen and Aardal, 2008b), Swedish Election Study 2002 (Holmberg and Oscarsson, 2004), and Sweden Election Study 2006 (Holmberg and Oscarsson, 2008).
- 5 Note that national election surveys in the United Kingdom only include Great Britain.
- 6 Fortunately, wording of party choice questions is rather stable over time and no major issues have been identified in this regard. Also, the questions were asked in a similar way across countries. Note, however, that in Germany two votes are cast and so respondents are asked about both the candidate and the party list they chose. The vote choice variable in this article refers only to the latter.
- 7 The exception is the Netherlands. Most of the respondents in the Dutch parliamentary election surveys (with the exception of years 1981 and 1986) had also been interviewed at the previous election and their past responses were employed in the vote recall question in order to reduce error (Anker and Oppenhuis, 1997a; Aarts *et al.*, 1999; Irwin *et al.*, 2005a; Todosijevic *et al.*, 2010). It is important to mention that conclusions remain generally the same after comparing Dutch results with the rest.
- 8 The main difference between panel data and cross-sectional surveys that have been found in the literature in this regard is over-reported vote stability in the latter, as some respondents tend to declare current party preference rather than their past choice (Waldahl and Aardal, 1982, 2000). In this article, a weighting procedure based on actual election results will be employed, as explained later, in order to deal with this problem. As Schoen (2011) argues, panel data are 'neither abundant nor without their

own problems', and cross-sectional studies are, despite their shortcomings, the best data available to date for the purpose of comparing volatility across a vast number of elections and/or countries (for example Trystan *et al.*, 2003; Anderson *et al.*, 2005; Carrubba and Timpone, 2005; Clark and Rohrschneider, 2009; Hobolt, 2009; Schmitt *et al.*, 2009).

- 9 In the sample, though, there is a moderately low number of missing cases (6.7 per cent of missing cases for vote choice in the last election and 8.8 per cent regarding the previous election, with 4.4 per cent of respondents giving no information on either variable).
- 10 In this case, weighting seems more adequate than other methods that deal with missing data, particularly multiple imputation. Multiple imputation is used to get more accurate standard errors from imputed data and what is required here are simple point estimates.
- 11 IPF, also known as raking, is a well-established technique that can be used to calibrate estimation by integrating disaggregated data from one source with aggregated data from others (Wong, 1992; Kalton and Flores Cervantes, 2003). IPF may be useful for the reduction of bias associated with non-response, non-coverage and measurement error (Flores Cervantes and Brick, 2008; Battaglia *et al.*, 2009), especially when this is random with respect to the joint distribution of vote for the two elections considered (Boyd, 1985, p. 527). IPF consists in putting together actual information on the margins of a distribution with individual survey data. Hence, what the iteration procedure does is repeat calculations following a specified algorithm until they converge to adjust marginal information from different sources keeping the cross-product ratios constant so that all the interactions that exist in the data are maintained (Bishop *et al.*, 1975; Simpson and Tranmer, 2005). The advantage of this method is that it produces good estimates of vote transitions assuming that no or very little systematic bias is present that affects all the parties.
- 12 Demographic statistics come from the following sources: Danmarks Statistikbank (Denmark), Statistisches Bundesamt (Germany), Centraal Bureau voor de Statistiek (Netherlands), Statistisk sentralbyrå (Norway), Statistiska centralbyrån (Sweden) and Office for National Statistics (Great Britain). Modifications of the voting age were taken into account to calculate the number of new voters.
- 13 Mortality statistics come from Eurostat together with the sources mentioned in previous footnote.
- 14 This is a reasonable assumption in the light of demographic statistics. On average, people who died at over 50 years old between elections represented 92 per cent of all deaths (standard deviation = 0.015).
- 15 The sample of 'deceased electors' was randomly selected. If the data were not weighed by the actual election results, this could potentially lead to random error, just as in a survey there is error produced by random sampling. However, applying all weights after the 'deceased electors' were created prevented that from happening and ensured that the vote distribution in the survey mirrored actual election results and turnout rates.
- 16 The latter is computed by looking at how the results of the previous election change when deceased voters are excluded. This mimics the process by which older voters' deaths affect election results in real life.
- 17 It is a common practice to calculate the Pedersen index grouping very small parties into a category labelled 'Others' (for a discussion, see Bartolini and Mair, 1990). This strategy has been followed here when supporters of very small parties were categorized as 'Others' in the surveys. While some surveys did provide information on the Scottish National Party and the Welsh nationalist party Plaid Cymru in Great Britain, these have been systematically included into the 'Others' category in the analyses – in fact, they are the only parties in such category in most UK elections, as surveys do not include Northern Ireland. Owing to the regional nature of these parties, including them in the same group does not impact results because vote transfers between them are impossible.
- 18 The coefficient corresponds to a regression model using total vote change as dependent variable and the net effect of switching as independent variable. This coefficient can be interpreted as 'every point of total change in party support corresponds to 0.75 points of change caused by switching'. In other words, switching provides 75 per cent of every point of total change. The model uses fixed effects by party and country as the amount of changes in party support might vary across these. Results are not shown but are available upon request.



- 19 See footnote 18. Results are not shown but are available upon request.
- 20 Note that Eastern German voters were excluded from the sample, as the amount of volatility caused by these cannot be attributed to any of the three components but to extraordinary reasons associated to that election. Note, too, that election results and volatility in 1990 correspond to Western Germany only.
- 21 In the whole United Kingdom the decrease has actually been somewhat larger: about 13 percentage points.

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