Minor party's political power and policy outcomes - evidence from European green parties and environmental policies

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[Work in progress]

Abstract

This paper studies the role played by a minor party in parliamentary politics, by assessing both theoretically and empirically how changes in the minor party's policy positions affect its political power and through that ideological policy outcomes. By adopting socio-economically a more moderate overall policy position, the minor party increases its role as an attractive coalition party for the major parties, thereby increasing its political power. First, I show the importance of agenda-setting in a two-dimensional policy framework, where policy outcomes are determined at the post-election stage. Then, I calculate parties' political power based on their left-right positions to empirically test the hypothesis with data of green parties and environmental policies from 9 European countries for a period of twenty years. Results support the hypothesis that front-line policy positions play a role through determining parties' political power, whereas changes in the green party's environmental policy position have an insignificant impact on policy outcomes.

JEL codes: D72, D78, P48

1   Introduction

This paper studies parliamentary policy making in a proportional electoral system, especially the role played by a minor party and its policy positions on ideological policy outcomes. There are some important theoretical contributions on the role of political parties, such as Levy (2004), as well as papers showing the importance of a secondary policy dimension on the policy outcomes, such as List

& Sturm (2006), Anesi & De Donder (2011) and Brauninger (2005). Majority of previous empirical research (starting from Hibbs 1977) on partisan politics, has however focused on two-party systems, or grouped parties into blocs or party families in proportional systems to study one-dimensional policy problems. There is only a very recent strand of empirical literature (Folke 2011, Freier & Odendahl 2012, and Fiva, Folke & Sorensen 2013) employing instrumental variables or regression discontinuity research designs to study the role of individual parties in multi-party systems. The results of these papers indicate that individual parties do have an impact on policy outcomes through changes in the seat allocation between parties.

This paper wants to take the analysis of partisan politics in proportional systems to the next level. More specifically, the aim is to study how a minor party's positions on two policy dimensions affect policy outcomes. First, its position on the overall left-right dimension, and second on a secondary ideological dimension, which is the defining feature of the minor party, such as environmental issues for green parties or immigration issues for extreme right parties. In this paper the minor party is a green party, and the ideological dimension is represented by an environmental policy. A party's position on the overall left-right ideology affects policy outcomes indirectly through determining the minor party's political power with regard to other parliamentary parties. By becoming more centrist a minor party becomes a more attractive coalition partner for other parties, which increases its political power, and its ability to affect the ideological policy outcomes. First, this paper presents a theoretical framework where parties first state their preferences on the two policy dimensions, and once the seat allocation is realised, parties enter post-electoral bargaining stage, the result of which determines policy outcomes. Then, the claims are tested empirically with data on European parliaments for the past twenty years.

To motivate this paper, the following observations of the environmental politics in Europe can be made. In the past twenty to thirty years, green parties have established stable minor party roles at national parliaments in many European countries, during which period there have been two parallel developments in green politics. First, party manifestos show that the general trend on the emphasis the green parties attach to environmental protection has been, with a few exceptions, mostly downwards (fig. 3 in appendix), while at the same time the overall left-right positions have been changing quite considerably from one electoral term to the next (fig. 4). Secondly, at the same time as the amount of total environmental taxation, as well as total environmental protection expenditure (see fig. 7) have been steadily increasing, looking at figs. 5 and 6 reveals that when looking at the environmental policies more closely (e.g. as % of GDP) there has been significant yearly variation.

What is of interest now is how to explain these changes in environmental policies. Since the importance of changes in seat allocation between parties have been proven to have some effect, this paper

wants to take a somewhat different approach to this issue by arguing that when it comes to a minor party's ability to affect policy outcomes, it is not only changes in its seat share, but more importantly its policy positions that play a role through determining parties' real political power. Policy positions can be regarded as strategic choices by parties, however in contrast to List & Sturm (2006), not to attract votes[1], but to increase bargaining power at the post-electoral stage. For example, extreme right parties that oppose immigration, may achieve their policy goals more efficiently if they tone down their ideological dimension and take a policy position closer to the political centre. The same logic applies to green parties that started off as an orthogonal ideological orientation, but over the decades have adopted ideologies on the traditional left-right dimension[2].

Since the green parties have had relatively small seat shares in national parliaments, their true impact on national politics in Europe may have been underestimated[3]. The question asked in this paper is of importance not only due to an increase in the popularity of minor parties, such as green parties or extreme right parties in many European countries. More importantly, despite theoretical interest in multidimensional policy issues, most empirical studies on partisan effects have focused more on the traditional left-right dimension, with only few papers focusing on the role of minor parties as already mentioned. This paper contributes to the existing literature by studying the role of minor parties through their programmatic positions on two policy dimensions. The novelty here is that both the overall left-right position as well as the ideological policy position are let to change from one electoral term to the next to see the impact on the ideological policy outcome.

The organisation of this paper is the following. In section 2, relevant literature is reviewed. Section 3 presents the framework, section 4 presents the empirical part with main results, and section 5 concludes.

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[1]The argument that shifts in policy positions result in changes in vote shares has only weak and inconsistent empirical support (Adams 2012). In fact, it is unclear if voters even notice parties' positional changes

[2]An extensive overview of the development of the green movement in the West from the 1970's into the 2000's is provided in Dalton (2009); it started as a self-proclaimed new ideological orientation, which promoted not only environmental values but also multiculturalism, women's rights or foreign policy. In the early days, this new political dimension was seen as orthogonal to the traditional left-right dimension.

[3]The European Greens in power has been analysed in a special issue of European Journal of Political Research, Vol. 45, 2006; the analysis covers time period from the 1970's until the early 2000's. The main results are not very convincing that the greens have been very successful. However, perhaps the most significant years of the green politics have been left out of the analysis, leaving a need to cover also the first decade of the 2000's as well.

2 Previous literature

First, this paper relates to very profound issues of policy-making. The traditional Downsian framework of purely office-motivated candidates leads to policy convergence into the median voter's preferred policy outcome[4]. However, with more than one policy dimension, this spatial model of voting is insufficient. Levy (2004) studies the role of political parties, and finds that in a unidimensional policy setting the equilibrium policies are the same regardless of the existence of them; in a framework of only right-wing or left-wing politicians no party can win against the median; the median wins even if no parties existed. However, in a multidimensional policy space, the formation of parties allows politicians to achieve compromises within parties, for instance in a case of two conflicting policy choices. The resulting political outcome therefore differs in the existence of political parties compared to their absence. The political power of extremist candidates/parties has been studied by Bordignon, Nannicini and Tabellini (2010) in a pluralist system by allowing partly endogenous party formation. They contrast single-round and runoff elections, and test their model with data on Italian mayoral elections. They find that a single-round system gives higher bargaining power to extremist candidates.

Policy making in a two dimensional policy framework is studied for instance by List & Sturm (2006), Anesi & De Donder (2011), and Brauninger (2005). List & Sturm (2006) use a two-dimensional policy framework where the environmental policy is a secondary dimension to the frontline issue of redistribution, and show that when politicians' preferences on the environmental policy are not known to citizens, there is an incentive for some politicians to utilise the existence of the single-issue voters to secure re-election. However, their paper is more an agency problem in its nature, therefore leaving only little confluence to this paper. Anesi & De Donder (2011) study electoral competition in a similar framework, and their somewhat surprising finding is that the emergence of green parties is not due to an increase in the amount of green voters in the economy, but is related to a large enough income polarisation compared to the saliency of environmental issues. I take the existence of parties as exogenously determined leaving party formation outside of this paper's scope. Closest to this paper in its framework is Brauninger (2005) who studies budgetary policy-making when partisan actors differ in their preferences regarding the total amount of public expenditure and its allocation on different budget items, and estimates the potential for fiscal policy change in i) a median voter model, and ii) a veto player model. With data from 19 OECD countries for 1971 to 1999, he finds that it is not the left-right position but rather the stated policy preferences that matter for policy outcomes. Although his framework is similar to this paper, the aim here is somewhat

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[4]For example, Duggan & Fey (2005) discuss the median voter paradigm, and some of its central results.

different; the interest is in how a minor party can utilise its policy positions to be able to have an impact on the ideological policy outcome.

Literature on coalition formation and electoral bargaining is plentiful. Baron & Diermeier (2001) study coalition formation and policy choice in a two-dimensional model, and Diermeier, Eraslan & Merlo (2002, 2003) study how different institutions affect government formation and dissolution in a coalition bargaining model. Schofield (1993) shows how different types of coalition governments can be explained by locating parties in a two-dimensional model into core or peripheral parties. For a more thorough survey on the literature of coalition formation, see Bandyopadhyay, Chatterjee & Sjostrom (2011, 6-9).

Second, from the perspective of empirical research this paper relates to an extensive strand of literature studying partisan effects on public policies, which goes back to at least Hibbs (1977), who was among the first ones to study the relationship between political orientation of governments and their macroeconomic policies. Since Hibbs, there has been an abundance of studies on partisan politics and budget politics, see survey e.g. Cusack & Fuchs (2002). The results of this line of research have been somewhat mixed; while some papers find clear evidence that left governments' policies tend to result in excessive deficits when rightist governments exercise more prudent policies, other papers find only modest or no impact of ideological orientation on budget deficits.

A newer strand of research studies partisan effects on some specific form of taxation, where the results are quite unanimous in that leftist parties tend to promote more taxation than right-wing parties. Examples of this are Debus & Osterloh (2012) who study partisan effects on the level of corporate taxes in Europe, or Allers, De Haan & Sterks (2001) who study partisan politics in determining local tax burden in the Netherlands. This strand of literature often groups parties into broader blocs thus ignoring the role of individual parties. However, the existence of minor parties is characteristic for proportional electoral systems[5], whose role has not been very widely addressed in the previous literature.

Freier & Odendahl (2012) and Folke (2011), and Fiva et al. (2013) study specifically the role of individual parties on policy outcomes in proportional systems. Freier & Odendahl (2012) study the voting power of political parties in German municipalities in the state of Bavaria. They use a modified Banzhaf index to estimate the causal effects of political power on tax rates. Folke (2011) applies a modified regression discontinuity design to local politics in Sweden. His results suggest a positive relationship between environmental policy and green party, a negative relationship between immigration policy and extreme right party, however, no significant party specific results were found when it comes to general tax policy. The latest paper is by Fiva et al. (2013) who study local politics in Norway, and find

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[5]The so-called Duverger's law.

e.g. that larger left-wing parties lead to higher property taxation, higher user charges and more spending on child-care. This paper makes two major departures from these. First, Folke (2011) and Fiva et al. (2013) assume that parties possess fixed policy positions from one electoral term to the next, as well as over space. Here instead the policy positions are let to change to see how they impact policy outcomes. Second, this paper does not rely on the mapping from vote shares into seat shares in defining political power. Instead, I calculate the political power based the seat allocation and on parties' left-right policy positions. Moreover, all these three papers are purely empirical.

Finally, I briefly discuss the concept of political power, for finding an appropriate measure for it is a complex issue. The simplest way is to use either the vote share in elections, or the seat shares in the parliament. However, the use of vote share is dependent on the electoral system - the number of votes does not always translate directly into parliament seats, making cross-country comparisons difficult. The use of seat share is also problematic; winning or losing a seat does not necessarily change coalition options for parties; or a party's vote share remains the same, but the vote shares for other parties change considerably meaning the emergence of new coalition options and therefore potentially dramatic changes in political power for each party (Freier & Odendahl 2012).

A more sophisticated way to approach is to use power indices[6]. Based on a party's seat share, the Banzhaf index (BI) calculates the coalition formation power for each party; e.g how many times a party is pivotal when all the possible combinations of coalitions are taken into account[7]. First, the absolute Banzhaf index is defined as the number of coalitions (η_k) where party k is pivotal divided by the total number of coalitions where party k is part of. With n parties, the absolute BI is defined as

$$\beta_k^a = \frac{\eta_k}{2^{n-1}}$$

Since this index does not add up to one, to measure relative voting power of party k in relation to all other parties, a normalised Banzhaf index can be used. It is defined as the number of times k is pivotal divided by the sum of the times all other parties are pivotal; i.e.

$$\beta_k^r = \frac{\eta_k}{\sum \eta_n}$$

Despite their wide use, the power indices are not completely unproblematic. One issue pointed out by Snyder, Ting & Ansolabehere (2005), is that the power indices assume all coalitions equally likely.

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[6]The most prominent power indices are Penrose-Banzhaf and Shapley-Shubik. (add original references).

[7]Another approach to political power is presented in the literature of veto players, e.g. Tsebelis and Chang (2004).

Moreover, they do not take into account differences in the actual political power due to a party's role as a coalition formateur. Furthermore, the importance of ideological ties between parties, such as as loyalty to other members of the same party family potentially restricts the actual coalition formation power of parties, as noted by Stenlund et al. (1985), i.e. a distinction between formal and real voting power. The former refers to the capacity of a party to be decisive (Banzhaf), whereas the latter is restricted by the realistic opportunities defined by ideology and other circumstances to actually be a decisive player. The last issue, related to empirical testing of political power is that majority of theoretical work uses the concept of voting weight to calculate the potential coalitions, whereas the empirical literature has largely relied on the use of seat shares as a measurement for political power. Although the voting weights and seat shares do correlate, the relationship between the two is not completely linear causing problems when relating theoretical frameworks with empirics (Ansolabehere, Snyder, Strauss & Ting 2005).

Freier & Odendahl (2012) propose one solution to these problems by weighing the normalised Banzhaf index by the likelihood of coalition formation between parties; coalitions are more likely to form between parties that are closer to each other on the left-right policy space, than between parties holding very different ideological views. Even if parties at the extreme ends of the left-right dimension could form a (winning) coalition, the weight on this coalition would be zero. In this paper's theoretical part it is shown how ideological closeness affects parties' bargaining power at the post-electoral stage, whereas in the empirical part, following Freier & Odendahl (2012) a measure for political power is calculated using data on election outcomes and parties' ideological positions. Whereas Freier & Odendahl assume policy positions to be fixed over time, here they are allowed to change from one term to the next as well as over space.

3 Framework

This section presents a simplified model of parliamentary policy making, where parties state their policy preferences on two policy dimensions. Once the seat allocation realises, parties enter the stage of coalition bargaining as a result of which policy outcomes are determined.

Defining parties political power in a framework of post-electoral bargaining makes sense, since in proportional electoral systems, it is not *ex ante* clear which of the parties enter the governing coalition. Note, however that the aim is not to provide a full-fledged model of coalition formation, but to illustrate the importance of parties' agenda setting in the political process and on the final policy outcomes. Furthermore, the simple model in this section does not discuss the allocation of government posts or the division of surplus between the coalition members.

3.1 Description of the political environment

There are $k = 1, \ldots, m$ political parties in the national parliament, and each party has a two-fold policy choice to make. First, each party is located at some point along a left to right continuum according to its overall political ideology. Party $k's$ position on this front-line policy dimension B^k relates to its preferred size of the government G^k, as will be shown later. The policy space comprises of n individual items b_i, $i = 1, \ldots, n$ so that $G = \sum b_i$. Each b_i represents one ideologically different policy area, for example defence, trade policy, development aid, arts, etc. The secondary policy choice then relates to one of these ideological policy items, namely the environmental policy, denoted by b_e.

The ideological difference between two parties j and k is measured as their distance on the left-right scale $d_{jk} = |B_j - B_k|$, which is 1 at maximum for parties at the opposite ends of the left-right spectrum. The closer any two parties are, the more likely is a coalition to form between them, which is given by the probability of coalition formation $P_{jk} = 1 - d_{jk}$. This idea follows the intuition of Snyder et al. (2005) that the coalitions form that are the cheapest. The 'price' of the coalition can be regarded as the ideological similarity between two parties; forming a coalition with an ideologically close party has smaller cost by not forcing either party to make significant ideological compromises.

To clarify the importance of agenda-setting, the preferences stated in the pre-electoral state are assumed to hold at the bargaining stage. In other words, parties have to stick to their election manifestos after the realisation of the seat shares, and policy positions cannot be changed until the next election. The idea is that when a party's policy preferences on the two policy dimensions are independent of each other, it can strategically position itself on either one of these dimensions, depending on the underlying conditions.

I study the strategic behaviour of a minor green party in two scenarios. In the first, the general interest in environmental issues is very low or non-existent, such as when the economy is doing bad, unemployment is increasing, etc. In the second case the environmental interest is high, for instance due to a natural disaster, or a break-down of a nuclear power plant, and the green minor party can utilise its environmental policy dimension as a bargaining tool. The role of the environmental party is obvious, for instance, when none of the other parties can credibly assure the voters that the ruling government is doing its best to deal with the environmental disaster unless the greens are part of that coalition.

3.2 Timing

For each electoral term the timing is the following.

1. State of the environment is determined by an exogenous shock, $E = \{0, 1\}$

2. Parties observe E, write down their party manifestos; define their policy positions on the frontline and secondary policy dimensions (B^k and σ_e^k).

3. A second exogenous shock (=election) takes place, as a result of which seat shares are realised and observed by parties.

4. Parties enter post-electoral bargaining stage, bargain over frontline policy.

5. Parties observe the formed coalition, and the policy outcome; they can update electoral manifestos for the next round of coalition bargaining.

3.3 Policy preferences

A framework of budgetary decision making following Brauninger (2005) is utilised. He models partisan effects on public finance when political actors have different preferences on the size of the government expenditure and on its allocation to different budget categories. Here, parties state their preferences on the total amount of tax revenue, based on their left-right position, B^k, and preferences on the individual tax categories b_i based on their ideological preferences. The preferences on the two dimensions are determined independently of each other, and are described by the following utility function.

$$u^k = (1 - B^k) \sum_{i=1}^{n} \sigma_i^k \ln b_i - B^k \sum_{i=1}^{n} b_i \tag{1}$$

The first term represents the utility generated for k of each tax category b_i. The ideological importance of each b_i is denoted by σ_i^k, which is the weight the party k attaches to it, and $\sum \sigma_i^k = 1$. Finally, $0 < B^k < 1$ is a parameter by which parties weigh gains and losses of increasing the size of the government. A party that prefers larger government gives B^k values closer to zero, relating it to the left-end of the frontline policy spectrum, whereas a party preferring smaller government gives values closer to one, relating it to the right-end of the spectrum.

By taking a partial derivative of this utility function with respect to a budget item b_i and equating it to zero gives

$$\frac{\partial u^k}{\partial b_i} = \frac{(1 - B^k)\sigma_i^k}{b_i} - B^k = 0 \tag{2}$$

and rewriting

$$b_i^k = \frac{(1 - B^k)\sigma_i^k}{B^k} \tag{3}$$

The budget item space for k then is $b^k = (b_1^k, \ldots, b_n^k)$, its preferred total size of the government is

$$G^k = \frac{1 - B^k}{B^k} \tag{4}$$

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which relates k's left-right position directly to its preference for the size of the government. The preference for the budget share for the environmental policy b_e is simply b_e^k/G^k, i.e. σ_e^k. It is easy to see that a party's preferences on these two policy dimensions are determined independently of each other, which is important regarding the strategic behaviour of parties.

3.4 Post-electoral bargaining

To simplify matters, the seat allocation in the parliament is determined by an exogenous shock (the election). None of the parties holds a majority of the seats, so once the seat allocation is realised, parties enter the stage of coalitional bargaining. The utility for party k of being in the governing coalition with j is defined as

$$v_c^k = P_{jk}(1 - \hat{B}_k^{jk} + \sigma_e^{jk}E + r) \tag{5}$$

where $P_{jk} = (1 - d_{jk}) = (1 - |B^k - B^j|)$ as defined earlier, so the utility of being in the governing coalition increases linearly in the ideological closeness to other coalition parties. Parties entering coalition bargaining stage negotiate front-line policy between their bliss points $B^{jk} \in [B^j, B^k]$. The further away the negotiated policy outcome is from k's bliss point, the less utility k gets from it, denoted by $\hat{B}_k^{jk} = |B^{jk} - B^k|$. $E \in \{0,1\}$ is the state of the environment determined by an exogenous shock, and σ_e^{jk} denotes the sum of environmental expertise of the coalition parties[8]. The usual rents in office are denoted by a fixed parameter r.

The utility of non-governmental parties is not completely discounted[9], so that k's utility of being left outside of the coalition comprises of the rents of office

$$v_{nc}^k = r \tag{6}$$

The largest party is the coalition formateur[10], and proposes a coalition to its most preferred coalition partner(s), who can accept or reject the offer. To simplify, the final policy outcomes are determined by the parties entering the coalition, so that the expected policy outcomes are

$$E(G) = \frac{1 - B^{jk}}{B^{jk}} \text{ and } E(b_i) = \sum_{k=1}^{c} \frac{\sigma_i^k}{c}$$

i.e. the frontline policy is determined as a result of coalition bargaining, and individual budget items are determined by policy preferences of the parties entering the coalition. The difference of being

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[8]Note that now the parties' policy positions on the environmental dimension correspond to their expertise in the policy matter.

[9]Kedar (2005, 188) discusses this more broadly; proposal making power, veto power.

[10]As is quite standard in the literature, as well the current practise in some countries.

in the governing coalition to being in the opposition, is that coalition parties can affect policy directly through their preferences. The opposition parties enjoy only the rents of holding office.

In the following, two-party coalition formation is illustrated in detail. Then, I discuss the case when at least three parties are needed to form a winning coalition, to see how the number of parliamentary parties affects the minor party's political power, and the policy outcomes.

2-party coalitions

Now, the existence of four parties is assumed; two major parties (R and L) and two minor parties (G and X) with the following seat shares; $P(R) = \bar{\alpha} + \eta$, $P(L) = \bar{\alpha} - \eta$, $P(G) = P(X) = \underline{\alpha}$, with $\bar{\alpha} > \underline{\alpha}$ and η with a symmetric distribution over $[-e, e]$, and $e > 0$ so that η determines which of the major parties is the largest. Furthermore, $\bar{\alpha} + \underline{\alpha} = \frac{1}{2}$, and $\bar{\alpha} - \underline{\alpha} > e$ so that no party wins a majority on its own[11], but a major party can form a winning coalition with one of the minor parties, or with the other major party. This example corresponds to party systems in e.g. Austria and Germany.

Parties have the following policy positions on the front-line policy at the beginning of the game; $B^G = 0$, $B^L = \frac{1}{2} - \lambda$, $B^R = \frac{1}{2} + \lambda$, and $B^X = 1$. The major parties can be described as moderate, whereas minor parties have more extremist overall policy positions. Furthermore, when $\lambda < \frac{1}{6}$, the two major moderate parties are ideologically closer to each other than to either of the minor parties, and when $\frac{1}{6} \leq \lambda < \frac{1}{2}$, L is ideologically closest to G, and R is ideologically closest to E. Furthermore, the policy positions for all the other parties are fixed, and only the green party (G) is let to change it policy positions to see the dynamics of the game.

Figure 1:
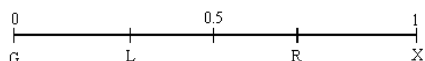
A. No environment

First, let us look at the case when $E = 0$, i.e. bargaining is based only on the frontline policy positions. Whenever $\eta < 0$ L is largest party, and therefore the coalition formateur. For L the question is whether to propose a coalition to R or to G. Let us assume L starts by proposing a coalition to R. Knowing its power to propose any policy $B^{LR} \in [B^L, B^R]$, L always proposes its own bliss point B^L, whereas R can only accept or reject the proposed policy. The maximum distance

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[11]Following Bordignon et al. 2010, p. 4-5.

to R the formateur L considers proposing to is solved from

$$P_{LR}(1 - \hat{B}_l^{LR} + r) \geq r \tag{7}$$

Noting that $\hat{B}_l^{LR} = |B^L - B^L| = 0$ gives $P_{LR} \geq \frac{1}{1+r}$. Normalising $r = 1$, shows that the formateur proposes a coalition only to parties within distance of half at maximum

$$d_{LR} \leq \frac{1}{2} \tag{8}$$

Whenever $\lambda < \frac{1}{6}$, two moderate major parties are closest to each other on the left-right scale. L always proposes B^L to party R over party G since whenever $P_{LR} > P_{LG}$ holds, the utility for L of forming a coalition with R is always greater than with G.

Party R, in turn, accepts the proposal whenever its utility of being in the governing coalition with L is greater than being in the opposition

$$P_{LR}(1 - \hat{B}_r^{LR} + r) \geq r \tag{9}$$

since $P_{LR} = 1 - d_{LR}$ and $\hat{B}_r^{LR} = |B^L - B^R| = d_{LR}$ the maximum distance between L and R is

$$d_{LR} \leq \frac{3 - \sqrt{5}}{2} \tag{10}$$

which is strictly less than $\frac{1}{2}$. For any coalition to form in this one-dimensional case, the maximum frontline policy distance between the formateur and a potential coalition partner is determined by (10), so that both benefit being in the governing coalition instead of being in the opposition. It easy to conclude that in the case of $\eta > 0$, no coalition would form between G and R, since $d^{RG} > \frac{1}{2}$. Instead, R would consider a coalition with L or the other minor party X.

Now in this scenario, the green party cannot use its environmental expertise as a bargaining tool. G knows the the formateur chooses a coalition partner based only on the frontline policy position, as well as how its own utility is dependent on its left-right position if asked to form a coalition (9). Since the government is formed of only non-environmental parties, the expected environmental policy outcome is not expected to greatly differ from zero. Therefore, at times of no general interest in environmental issues, the green party can re-position itself for the next electoral term on the left-right scale from $B^G = 0$ to $B^{G'} = \lambda + \varepsilon$ to become a more attractive coalition party to L than R is, and to have some impact on environmental policy outcomes. Assuming that the two major parties have fixed frontline policy positions, $B^L = \frac{1}{2} - \lambda$ and $B^R = \frac{1}{2} + \lambda$, the case of no environment can be summed up as

AI. When $\lambda < \frac{1}{6}$ and $B^G = 0$, $B^X = 1$, $P_{LR} > P_{LG}$ and $P_{RL} > P_{RX}$ hold. No coalitions form between major and minor parties, L and R form a coalition. Whenever $\eta < 0$, expected policy outcomes

are $E(G) = \frac{1-B^L}{B^L}$ and $E(b_e) = \frac{\sigma_e^{LR}}{2} \approx 0$, and whenever $\eta > 0$, $E(G) = \frac{1-B^R}{B^R}$ and $E(b_e) = \frac{\sigma_e^{LR}}{2} \approx 0$.

AII. When $\lambda > \frac{1}{6}$, or $B^G = \lambda + \varepsilon$ and $B^X = 1 - (\lambda + \varepsilon)$ coalitions form between a major and a minor party. Whenever $\eta < 0$, $P_{LG} > P_{LR}$ holds and L forms a coalition with G. Expected policy outcomes are $E(G) = \frac{1-B^L}{B^L}$ and $E(b_e) = \frac{\sigma_e^{LG}}{2} \approx \frac{\sigma_e^{G}}{2} > 0$. Whenever $\eta > 0$, $P_{RX} > P_{RL}$ holds and R forms a coalition with X. Expected policy outcomes are $E(G) = \frac{1-B^R}{B^R}$ and $E(b_e) = \frac{\sigma_e^{RX}}{2} \approx 0$.

B. Environment

Next, let us include the environmental dimension through $E = 1$. Assume that R is still the ideologically closest party to L, so that $P_{LR} > P_{LG}$ continues to hold. Party G has environmental policy expertise more than any of the other parties, expressed in its preference for the environmental policy σ_e^G. First, the inclusion of environmental dimension changes possibilities for coalition formation in comparison to the no-environment case (7) for the formateur (L) and a potential coalition partner (G)

$$P_{LG}(1 - \hat{B}_l^{LG} + r + \sigma_e^{LG}) \geq r \qquad (11)$$

For any positive value of σ_e^G, the frontline policy distance is clearly greater than half

$$d_{LG} \leq \frac{1 + \sigma_e^G}{2 + \sigma_e^G} \qquad (12)$$

Whenever G is the only party having environmental expertise sufficiently greater than zero, whereas the combined environmental expertise of L and R is not essentially different from zero, we get the condition when L proposes to G over R even though G's frontline position would be unchanged

$$P_{LG}(1 - \hat{B}^{LG} + r + \sigma_e^{LG}) \geq P_{LR}(1 - \hat{B}^{LR} + r + \sigma_e^{LR}) \qquad (13)$$

which reduces to

$$d_{LG} \leq \frac{2d_{LR} + \sigma_e^G}{2 + \sigma_e^G} \qquad (14)$$

or expressed in terms of the minimum level of environmental expertise of G

$$\sigma_e^G \geq \frac{2(d_{LG} - d_{LR})}{1 - d_{LG}} > 0 \qquad (15)$$

Party G, in turn, accepts L's proposal if

$$P_{LG}(1 - \hat{B}^{LG} + r + \sigma_e^{LG}) \geq r \qquad (16)$$

13

and rewriting and solving d^{LG}

$$d^{LG} \leq \frac{(3 + \sigma_e^G) - \sqrt{5 + 2\sigma_e^G + \sigma_e^{G2}}}{2} \qquad (17)$$

For G to accept the coalition proposal, the maximum distance to the formateur is increased from (10) to (17) by the inclusion of the environmental dimension. Expressed in terms of G's environmental expertise

$$\sigma_e^G \geq \frac{3d_{LG} - d_{LG}^2 - 1}{1 - d_{LG}} \qquad (18)$$

we see that the further away the two coalition parties are on the frontline dimension, the higher the minimum level of environmental expertise of G that is required for a coalition to form. Now, for high enough environmental expertise, even R might propose a coalition to G, over its ideologically closer parties L and X. This is because the more green expertise there is in the government, the higher is the utility for all coalition parties, as stated by (5). To sum up the case for bargaining over the two policy dimensions

B. Independent of λ and B^G, even if $P_{LR} > P_{LG}$ holds, whenever $\sigma_e^G > 0$ is sufficiently high, L and G form a coalition. Expected policy outcomes are $E(G) = \frac{1 - B^L}{B^L}$ and $E(b_e) = \frac{\sigma_e^G}{2}$. Furthermore, a positive increase in the environmental policy is expected in comparison to case AII.

3-party coalitions

The coalition formation process is now discussed in the case when at least three parties are needed to form a minimal winning coalition. Since the analytical description of the coalition formation process becomes considerably more complicated once the amount of parties is increased, I describe the process with the help of examples. The idea is to compare policy outcomes to the two-party case.

Assume the seat shares are such that at least two major parties are required to form a winning coalition with the help of one minor or major party. As an illustrative example, consider the following case of of three major parties and three minor parties. The parties' frontline policy positions are as in the previous case, except now there is the centre party C, whose position is exactly in the centre of the left-right policy spectrum, and there is a third minor party which is either leftist Y', or rightist Y''.

First, look at the case when L is the formateur. A natural coalition party would be the centre party C. Then a minor party is needed to turn the coalition into a winning coalition. L considers proposing

Figure 2:
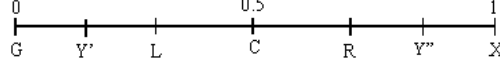
to either Y' or to G. L compares its utility under coalition $Y'LC$ to GLC[12], and proposes to G over Y' if the following holds

$$d_{GC} \leq \frac{d_{Y'C} + \sigma_e^G}{2 + \sigma_e^G})$$ (19)

If the assumption that other parties' environmental expertise is not essentially greater than zero still holds, the condition can be restated in terms of the optimal amount of environmental expertise of G

$$\sigma_e^G \geq \frac{2(d_{GC} - d_{Y'C})}{1 - d_{GC}}$$ (20)

Which is now greater than (15) whenever $d_{Y'C} > d_{LR}$ since $d_{GC} > d_{GL}$. In other words, to be an eligible coalition partner the more environmental expertise G has to bring to the governing coalition, if the coalition options regarding the frontline policy are increased as a result of increasing the number of parties.

Next, consider the case when R is the formateur. If there is a rightist minor party Y'' close to R, the condition that R would propose a GCR coalition over CRY' can be reformulated from (14) as

$$d_{GR} \leq \frac{d_{CY''} + \sigma_e^G}{2 + \sigma_e^G})$$ (21)

which gives

$$\sigma_e^G \geq \frac{2(d_{GR} - d_{CY''})}{1 - d_{GR}}$$ (22)

From this it easy to see that the minimum level of environmental expertise is increased in comparison to the two-party case if $d_{CY''} < d_{LR}$.

To sum up, since the number of potential coalition partners increases as the number of parliamentary parties increases, the more environmental expertise G has to bring to the government. Furthermore, forming coalition with right-wing parties, the more important role the green's environmental policy expertise plays.

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[12]Note, that the weight on the coalition P_{jk} is now determined by the maximum distance between any two coalition parties.

4 European green parties and environmental policies

Looking at party manifestos of the European green parties reveals that there has been considerable variation in the environmental policy positions in the past twenty years, as well as notable changes in their overall left-right policy positions from one electoral term to the next. Moreover, there has been yearly variation in governmental environmental policy measures.

To empirically test the role of minor parties on policy outcomes, I use a sample of 9 European countries with proportional electoral systems; Austria, Belgium, Finland, Germany, Iceland, Ireland, Luxembourg, the Netherlands and Sweden. Time period is 1990 to 2010 during which there have been altogether 55 national parliamentary elections, and in each country there has been an environmental party (almost) throughout this period.

4.1 Data

First, environmental data from Eurostat is used as an indicator of the national environmental policy. The main dependent variable I use is the share of environmental taxation of total revenues from taxes and social contributions (TSC), since it most closely corresponds to the model of the theoretical section. Descriptive statistics of this and other available environmental variables can be found in the appendix.

Data for parliamentary election results, and for parties' policy positions is from the Comparative Manifesto Project (CMP)[13]. Previous literature has employed alternative ways to define parties' political ideology. One approach is to classify ideology according to political family groups, and to use dummy variables to indicate which of these groups has been in the lead of the government (Osterlah & Debus 2012). When considering multidimensional policy environments, this approach however turns out to be insufficient. A second approach is provided e.g. by Folke (2011, 16-18), who uses survey data to map the policy positions of parties, as well as the importance parties attach to various policies. However, for the environmental policy and immigration policy he has data only for the election year 1994. Therefore, he relies on the assumption that policy positions on these ideological dimensions have not changed from one electoral period to the next. However, since this present paper is arguing the importance of strategic changes in policy position, this approach is not sufficient.

The CMP data is quantitative content analysis of party manifestos. There are fifty-six categories that are grouped under seven major policy areas. Each data entry represents the percentage of (quasi)sentences of the total length of the manifesto. Recent papers

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[13]Volkens et al. (2011)

using CMP data are e.g. Jensen & Spoon (2011), Osterloh & Debus (2012), Brauninger (2005) and Neumayer (2003, 2004). The benefit of the CMP data is that it allows comparisons across time and space. For instance, social democratic parties in different countries may have different emphasis on certain policy objectives, or, a party's stress of policy objectives might change over time (Osterlah & Debus 2012).

To capture the front-line policy position of a party this paper uses CMP category *Rile*[14]. The secondary policy dimension, a party's environmental policy position is captured by the CMP variable *Environmental Protection*[15] (per 501). One criticism against CMP data is the reliability of party manifestos in defining parties' policy positions; the party elites writing them may have multiple objectives in mind. However, the party manifestos as strategically written official documents, and in case of failing to deliver what has been promised in them party leaders can be held responsible (Budge and Garry 2000). Furthermore, the party manifestos provide a history of how a party's policy positions have changed over time. As a final remark, it is important to note the difference between *policy emphasis* and *policy position*. Two parties may have different positions on a policy dimension, but still have the same emphasis on this policy matter (Budge and Garry 2000). Even though the CMP data is in terms of policy emphasis, there are some coding categories that deal more directly with positional issues, such as the category for environmental protection. A party not promoting environmental values does not put any emphasis on environmental policies in its manifesto - no party surely puts policy emphasis on the degradation of nature.

The data on the coalition government compositions is gathered from the Political Data Yearbooks published annually by the European Journal of Political Research.

4.2 Empirical strategy

First, as the main explanatory variable a measure for political power is used. This is constructed by weighting the normalised Banzhaf index by the probability of coalition formation between the coalition parties. Following Freier and Odendahl (2011), the political power of party k is defined as

$$WBI = \beta_k^w = \frac{\eta_k^w}{\sum \eta_n^w}$$

where η_k^w is now the number of coalitions where party k is pivotal weighted by the likelihood of coalition formation, i.e. the distance between k and the other coalition parties. What is novel here, is that

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[14]"Right-left position of a party as given in Laver & Budge eds. (1992). This is calculated as a share of sentences having a right-wing connotation minus the share of sentences having a left-wing connotation.

[15]"Preservation of countryside, forests, etc.; general preservation of natural resources against selfish interests; proper use of national parks; soil banks, etc.; environmental improvement".

the overall policy positions are let to change from one electoral period to the next, unlike Freier and Odendahl who take parties' left-right positions to be fixed over time and space[16]. To explain the model, the power index for the green party is used, denoted by WBI^g.

Second explanatory variable is the green party's policy position on the environmental policy, ENV^g. The dependent variable is the environmental policy variable, $E_{i,t}$ (Etax) in country i in year t. The basic model to be estimated then reads as

$$E_{i,t} = \alpha + \beta_1 WBI^g_{i,t-1} + \beta_2 ENV^g_{i,t-1} + \beta_3 \mu_i + \varepsilon_i \qquad (23)$$

where μ_i is an election period fixed effect.

Since government budgets are usually decided in the previous year, I use the explanatory variables in year $t-1$ to predict the impact on the dependent variable in year t. For example, to see the effect of the green party's political power on the environmental policy in year 1990, the political power it has 1989 (in effect based on the seat share in the last election that has taken place before the year 1990) is used, as well as the ideological emphasis to environmental protection at the last election. Furthermore, since the budgets are decided every year, whereas parliamentary elections are held every three to five years, the political power measure based on the seat share for every year between two consecutive elections is used.

Furthermore, in addition to the two main explanatory variables, the impact of the number of parties in the parliament, the number of parties holding cabinet posts, as well as the presence of the green party in the governing coalition can be tested.

4.3 Results

Results of the linear regression containing electoral period fixed effects are presented in tables 1 and 2. In the first, the dependent variable is total environmental tax revenue as a share of total revenues from taxes ans social contributions, and in the latter as a share of the GDP.

First, in table 1 column (1) presents the results for the basic regression, which show a positive and significant coefficient for the main explanatory variable WBI. However, the coefficient for the green party's environmental position is negative, although statistically insignificant. Adding a dummy for the greens in the governing coalition (2) does not change these results. Adding the number of parties (3) in the governing coalition does not change the results significantly, however, when also the number of parties in the parliament is added (4) and ((5), the coefficient for WBI becomes smaller and insignificant.

The results for in table 2 confirm the results of table 1, expect that the coefficient for WBI is significant at least at the 5% level in all regressions.

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[16]Freier and Odendahl take policy positions for German parties as derived in F.U. Pappi & G. Eckstein (1998) *Public Choice*, 97(3).

Table 1: Dependent variable=ETR as % of TSC.

	(1)	(2)	(3)	(4)	(5)
WBI	0.458***	0.458***	0.376***	0.277	0.202
	(0.122)	(0.122)	(0.068)	(0.224)	(0.192)
ENV	-0.031	-0.031	-0.005	- 0.021	0.006
	(0.031)	(0.029)	(0.035)	(0.034)	(0.037)
N gov't parties			0.001		0.001
			(0.001)		(0.001)
N parl. parties				0.002	0.002
				(0.002)	(0.002)
Dummy greens in gov't	no	yes	yes	yes	yes
Election period FE	yes	yes	yes	yes	yes
R-squared	0.93	0.93	0.93	0.93	0.93

Std. error in parenthesis. *** p<0.001, ** p<0.01, * p<0.05

4.4 Discussion on the empirical strategy

Since the problems of estimating party representation effects on policy outcomes with a linear regression are well-known due to the difficulty of differentiating the underlying voter preferences from the actual policy choices, I discuss briefly the identification problem. When it comes to environmental policy, for instance, it might not be the increased share of seats for the green party that has a positive impact for an increase in environmental protection measures undertaken; instead it might be a result of the voters becoming greener thereby affecting policy choices by all parties, not only environmental parties. The problems of reverse causality or omitted variables are more broadly discussed in Folke (2011), Freier & Odendahl (2012), and Fiva et al. (2013).

Potential ways to overcome the identification problem are based on the idea that the closest one can get in separating exogenous variation in political power from exogenous variation in voter preferences is by finding out which elections were in fact close, and which were not. Folke (2011) provides an analytical solution by using a seat allocation function to measure the minimum amount of votes needed to change the seat allocation. Freier & Odendahl (2012) propose a numerical simulation by perturbating the vote vector repeatedly for each observation by adding a random variable, and simulating a new seat allocation. The resulting power distribution tracks whether the voting power of parties has changed, and elections are considered close if the power distribution changes often. Fiva et al. (2013) use a 2SLS design, where in the first stage, they utilise the closeness of elections to measure the impact of changes in seat shares on the policy position indicator, which is assumed to be otherwise stable over

Table 2: Dependent variable=ETR as % of GDP.

	(1)	(2)	(3)	(4)	(5)
WBI	0.273***	0.273***	0.220***	0.251*	0.200*
	(0.054)	(0.054)	(0.030)	(0.099)	(0.085)
ENV	-0.001	-0.010	-0.001	-0.014	-0.000
	(0.014)	(0.014)	(0.016)	(0.015)	(0.017)
N gov't parties			0.000		0.000
			(0.000)		(0.000)
N parl. parties				0.000	0.000
				(0.001)	(0.001)
Dummy greens in gov't	no	yes	yes	yes	yes
Election period FE	yes	yes	yes	yes	yes
R-squared	0.88	0.88	0.88	0.88	0.88

Std. error in parenthesis. *** p<0.001, ** p<0.01, * p<0.05

time. At the second stage, they replace the treatment variables with the fitted policy position index to estimate the party representation effects on the actual policy outcome.

In summary, Folke (2011) and Fiva et al. (2013) estimate the effect of changes in the seat allocation on the policy outcomes. Furthermore, they both assume that parties' policy positions to be invariant over time and space. I make two departures from Folke (2011) and Fiva et al. (2013) i) instead of measuring changes in the political power by relying on the closeness of elections, I use a measure based on the seat allocation and parties' ideological closeness, and ii) instead of assuming fixed policy positions, I let them vary both across time and across countries. Due to differences in the questions this paper wishes to answer, as well as to the smaller sample size available, the empirical strategy in this paper has relied on linear estimation.

5 Concluding remarks

This paper has studied parliamentary politics from the perspective of a minor party's policy positions. In the theoretical part of the paper, I show that in a two-dimensional policy framework, where the two dimensions are independent of each other, the minor party can utilise its front-line policy position to increase its attractiveness as a coalition party in years when the secondary policy dimension plays no role, i.e. when the role of environmental policy is overruled by general economic policies. When the secondary dimension becomes of importance, due to an adverse environmental shock, the minor party's secondary policy expertise becomes valuable to other coalition parties as well. By observing the state of the environment prior

to setting its policy positions, the green party can choose them strategically to increase its chances of being in the governing coalition.

In the empirical part of the paper I test the importance of green parties' policy positions with data in 9 European countries for a twenty year period by calculating a measure for political power by weighing the normalised Banzhaf index by the ideological closeness of the coalition parties. A linear regression shows a positive and significant coefficient for the weighted BI in explaining changes in environmental policy outcomes when controlling for election period fixed effects. The direct effect through the green party's environmental policy position proves to have an insignificant impact.

These empirical results support the theoretical part of the paper on the significance of the minor party's policy positions, especially the importance of the overall policy position in determining its political power in relation to other parties. Furthermore, since the environmental policy position of the green party seems to have an insignificant impact on the policy outcomes, it supports the hypothesis that changes in the green party's environmental policy position are not due to changes in the importance the party attaches to it, but a strategic move to gain bargaining power.

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APPENDIX

The upper part of table 3 presents descriptive statistics for environmental policies in the sample countries. Data for environmental taxation covers time period 1990 to 2010, and it is expressed either as a share of total revenues from taxes and social contributions (TSC), or as a share of GDP. The lower part of the table presents descriptive statistics for environmental/green parties in the sample countries. The weighted Banzhaf index (WBI) is in practice calculated as follows. First, based on realised seat allocation, all the potential winning coalitions are counted using the simple majority rule. Then the number of potential coalitions where a party is a critical player is divided by all the potential winning coalitions (normalised BI). Finally, all these coalitions are weighed by the probability of coalition formation between the parties. In case of three or more parties, the ideological distance between the two parties that are ideologically the farthest from each other is used.

Table 3: Descriptive statistics environmental taxation and green parties in sample countries

	N	Mean	Std. dev.	Min	Max
ETR % of TSC	184	6.8	1.6	4.0	10.5
ETR % of GDP	184	2.8	0.6	1.6	4.0
Green party vote share	55	6.8	3.2	1.2	21.7
Green party seat share	55	6.2	3.4	0	22.2
Weighted BI	55	6.6	6.7	0	33.6
Share of (%) manifesto sentences on environmental protection	55	17	10	3	40
Position on the left-right scale 0=left, 100=right	55	42	6	31	60

Table 4: Average no. of parties in parliament (1), average no. of parties in governing coalition (2), no. of times greens in the government (3).

	(1)	(2)	(3)		(1)	(2)	(3)
Austria	4.5	2.6	0	Ireland	6.2	2.3	1
Belgium	10.2	4.3	1	Luxembourg	5.6	2	0
Finland	8	4.5	3	Netherlands	7	2.6	0
Germany	4.8	2	2	Sweden	7	2.2	0
Iceland	5	2.2	1				

Figure 3: The share of sentences on environmental protection issues by green parties in 8 European countries, vertical axis=% (CMP).
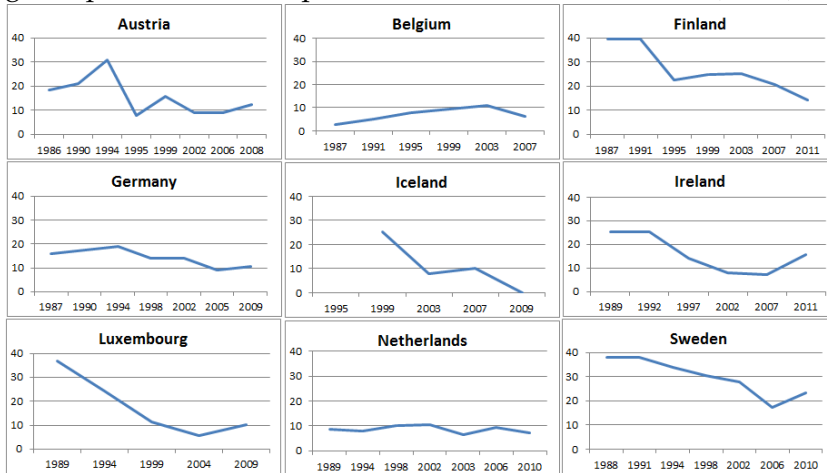

Figure 4: Left-right programmatic position of green parties in 8 European countries. 0=left, 1=right (CMP).
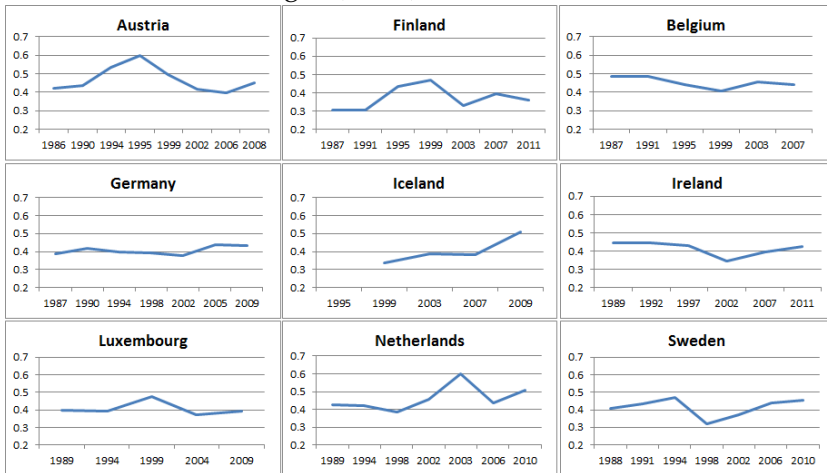
Table 5: CMP classification of parties and party families in sample countries. In parenthesis no. of elections in 1986-2009Number of coalition parties and number of times greens in the governmetn

Party type Party family	Ecology 10	Communist 20	Soc.Dem. 30	Liberal 40	Christ.Dem. 50	Conservative 60	Nationalist 70	Agrarian 80	Ethn.& Reg. 90	Spec.issue 95
Austria (8)	x	x*	x	x	x	-	x	-	-	-
Belgium (6)	x	-	x	x	x	-	-	-	x	-
Finland (6)	x	x	x	x*	x	x	x	x	x	-
Germany (7)	x	x	x	x	x	-	-	-	-	-
Iceland (4)	x	x	x	x	-	x	x	x	-	x
Ireland (6)	x	x	x	x	x	x	-	-	-	x
Luxembourg (5)	x	x	x	x	x	-	-	-	x	-
Netherlands (7)	x	x	x	x	x	-	x	-	-	-
Sweden (6)	x	x	x	x	x	x	x	x	-	x

*) data excl.
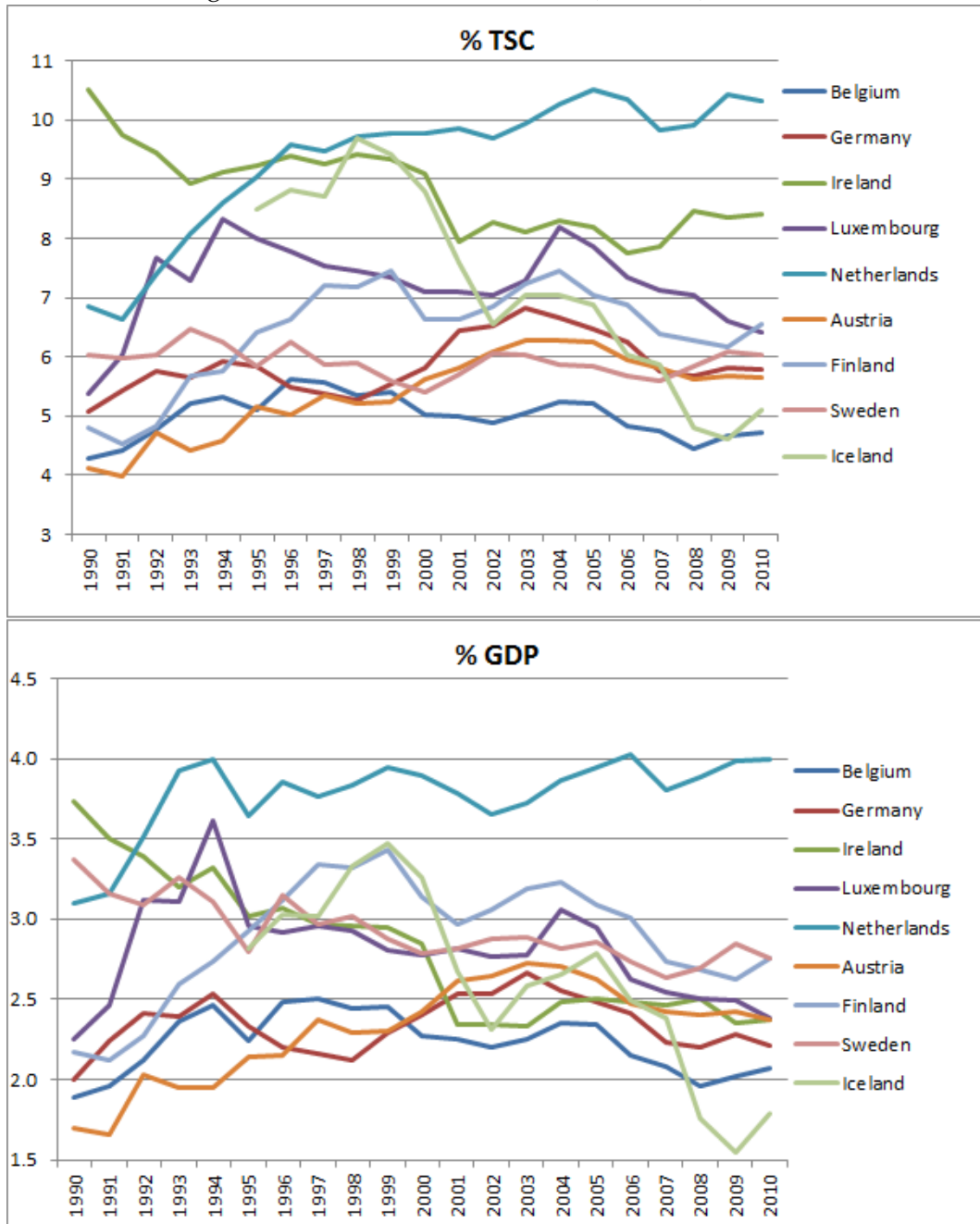
27

Figure 5: Environmental taxation (Eurostat).

Figure 6: Environmental expenditure, general government (Eurostat).
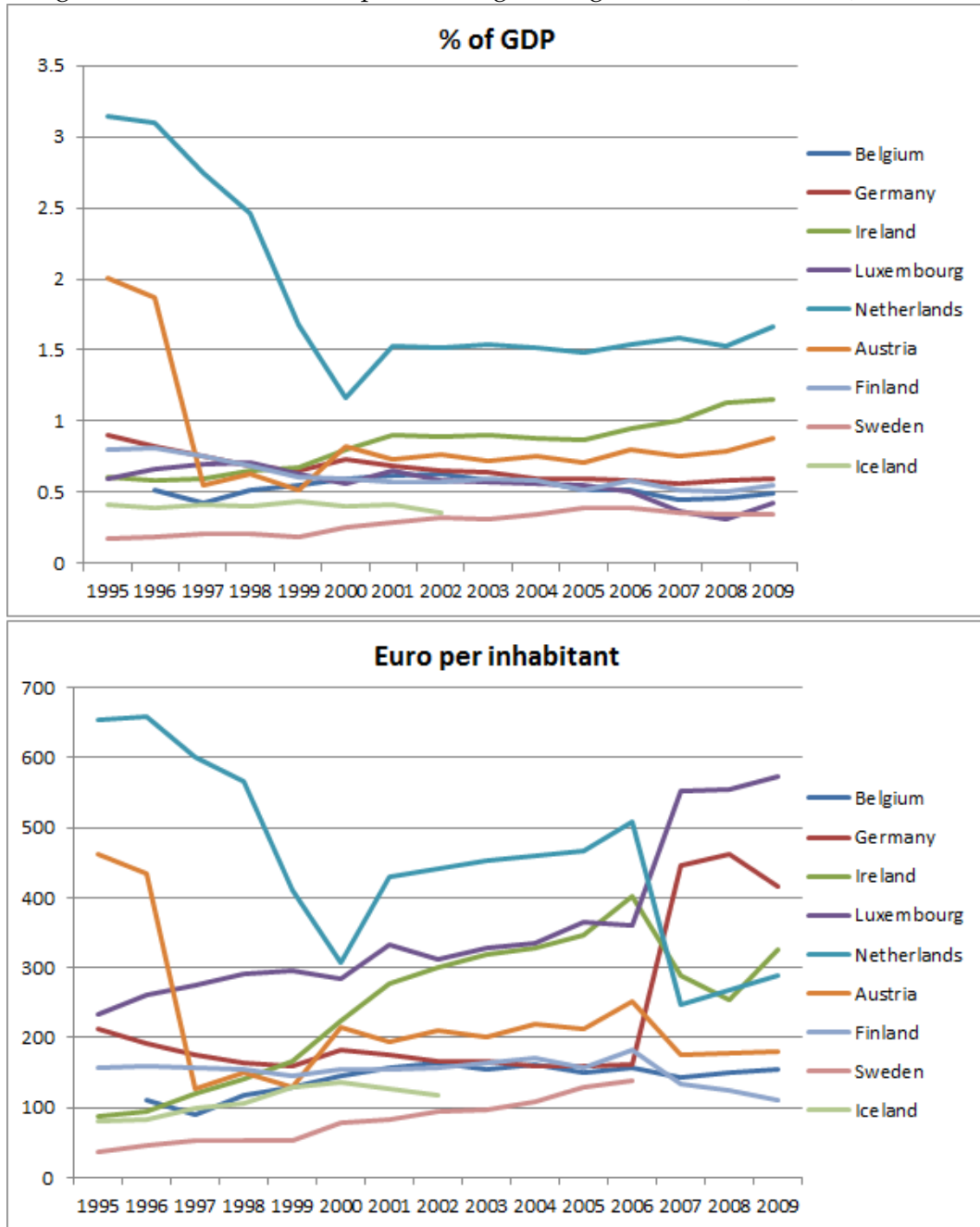
Figure 7: Total environmental expenditure and environmental taxation (Eurostat).