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INTERNATIONAL ENVIRONMENTAL AGREEMENTS AND DOMESTIC POLITICS

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International Environmental Agreements and Domestic Politics

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Abstract

The aim of this paper is to explain why governments with low environmental concerns sign international environmental agreements (IEAs), despite the significant loss of autonomy in policy-making such a commitment implies. Our model shows that committing to an IEA may positively impact a non-green government's probability of winning the next elections. In equilibrium, its decision results from a trade-off between the electoral benefit and the autonomy loss of commitment. We derive conditions under which the benefit outweighs the loss and the non-green government commits to the IEA. In addition, the analysis reveals that an incumbent government with high environmental concerns may decide not to commit to an IEA.

JEL Classification: Q56, P48, D72.

Key words: international environmental agreement, domestic politics, electoral concern.

1 Introduction

In the past few decades, environmental concerns have increased their importance in worldwide politics. Evidence of this growing relevance can be found by noticing that more than 400 international environmental agreements (IEAs) have been signed and ratified in the past 40 years (UNEP, 2012). IEAs' participation has captured the interest of environmental scientists, especially the identification of variables that impact domestic governments' benefits from joining IEAs (Congleton, 2001). Despite the great deal of effort in analysing it, there is still a lot of uncertainty on which factors affect the likelihood of a country to commit to an IEA (Fredriksson et al., 2007). Moreover, the majority of these analyses focus on the empirical side and few studies have been devoted to theoretical modelling. Therefore, we want to help bridge this gap in the theoretical literature and analyse the impact of domestic partisan politics on IEAs' ratification choice.

There is general consensus on the importance of domestic institutions on IEAs' ratification. Congleton (1992) was the first to model and estimate the role of democracy; after it, a number of other studies (Murdoch and Sandler, 1997; Fredriksson and Gaston, 2000; Neumayer, 2002; Beron et al., 2003) confirmed Congleton (1992)'s finding that democratic countries are more likely to join IEAs. Therefore, we narrow our research area and focus on the role of domestic political parties' environmental concerns on IEAs' ratification decision in democratic countries. In contrast with previous studies, whose analyses of domestic politics mainly focussed on the impact of environmental and industrial lobbying groups (Conconi, 2002, 2003; Neumayer, 2002; Fredriksson and Ujhelyi, 2006) or corruption (Fredriksson and Svensson, 2003; Pellegrini and Gerlagh, 2006; Fredriksson et al., 2007) or left-right dichotomy (Jahn, 1998; Neumayer, 2003, 2004; Knill et al., 2010), we introduce electoral concerns. We shall see that, when electoral concerns are introduced into the model, counter-intuitive results are found. In addition, the body of research on partisan politics has centred its attention on domestic environmental policy (Neumayer, 2003; List and Sturm, 2006); our model extends those analyses and shows that domestic parties' preferences have an impact on international commitment as well.

The aim of the paper is to explain why a government may decide to renounce the freedom to choose its own environmental policy. Indeed, if it joins an IEA, in the future it will have to comply with its rules (policy cost). The starting point of our analysis is that citizens differ in their environmental concern, which is distributed according to a known density function. In the economy there are two competing political parties, which differ for their environmental policy preferences. Political parties care about the environmental policy implemented in the country and about the rents from being elected. Our framework is based on a two-period probabilistic voting framework à la Lindbeck and Weibull (1987). Comaner (1976) and Hinich (1977) pioneered in the application of probabilistic voting theory to the analysis of unidimensional policy issues. They both proved that, when voters' preferences are single-peaked, setting a policy equivalent to the median voter's preferences may not be an equilibrium. Subsequently, Hinich (1978) extended Hinich's analysis to multidimensional policy spaces. Amongst the most notable characteristics of probabilistic voting models is the uncertainty about voters' behaviour, which is modeled by using a probabilistic distribution over voters' behaviour. Several papers in the empirical literature attempted to test the capability of probabilistic voting models to correctly predict real world voters' behaviour. For example, Fiorina (1981), Enelow and Hinich (1984), Merrill and Grofman (1999) and Enelow, Hinich, and Mendell (1986), challenge the predictive power of deterministic voting models and, by means of empirical tests, argue that probabilistic voting models possess a better explanatory power. In Lindbeck and Weibull (1987), the utility function of the voters has two components. The first depends upon the policy implemented by the incumbent political party or candidate. The second accounts for all the other factors that might impact on voter's preferences for different candidates.

Following probabilistic voting theory, in our framework parties differ not only in regard to their preferred environmental policy platform, but also in

another dimension, unrelated to the environmental dimension. The latter can be interpreted as voters' ideology or sympathy towards a specific political party. Indeed, voters care about the policy platform offered by the party along with the ideology. Furthermore, they differ in the way ideology or sympathy is evaluated. An important feature that our model shares with probabilistic voting theory is that voters close to the swing voter are targeted by office-seeking politicians, who modify their policy in order to gain votes.

In addition, our framework applies the standard probabilistic voting model to a setting where an environmental agreement is in place at the international level. In the first period the incumbent government decides on the level of commitment to the IEA. By level of commitment we refer to the opportunity that an international agreement's signatories have to choose to what extent they commit to its rules (e.g. Mattes 2012). For instance, escape clauses, designed in order to increase flexibility and encourage membership of the agreement (Pelc, 2009), constitute a typical mechanism through which governments limit their commitment to IEAs. Indeed, they allow signatories to temporarily get round the terms of the agreement or even to completely withdraw from it (Rosendorff and Milner, 2001). This is the main argument of Rosendorff (2005) and Johns and Rosendorff (2009). Both papers focus on international trade agreements and the Dispute Settlement Procedure (DSP) in particular. Indeed, they argue that the Dispute Settlement Procedure (DSP) is a flexibility mechanism that increases countries' participation and, by allowing them to temporarily not comply with the terms of the agreement, has the merit of avoiding the collapse of international trade agreements. Kucik and Reinhardt (2008) support a similar argument and find that the use of flexibility mechanisms has a positive impact on international cooperation. According to Koremenos (2005) policymakers introduce flexibility mechanisms within international agreements in order to reduce uncertainty about future situations that could impact on their payoffs. Hafner-Burton, Helfer, and Fariss (2011) use the same argument, applied to human rights treaties violations. An example relevant to our IEAs' case refers to the Kyoto Protocol (1997), where there are several flexible mechanisms: the clean development mechanism, joint implementation and emission trading (Karp and Zhao, 2007). We take this feature into account by modelling the level of commitment as the probability that the period-2 government will have to comply with the terms of the IEA. A level of commitment equal to zero is interpreted as the government deciding not to join the IEA. This in turn implies that the party in power in the second period will be able to implement its ideal policy, unbound by international commitments. On the other extreme, when the level of commitment is equal to unity, the period-2 government will have to comply with the terms of the IEA with a probability of one. All the intermediate values represent situations where the incumbent has joined the agreement, but with the possibility of not complying to it in the future. In the second period, elections takes place and the period-2 government implements its environmental policy possibly constrained by the IEA joined in period 1.

The aim of the paper is to analyse incumbent governments' choices of commitment level. The incumbent government chooses the level of commitment that

maximises its own expected payoff. The expected payoff depends on the probability of victory weighted by the utility gain or loss engendered by the policy implemented in period 2. This is the approach developed by Wittman (1973), whose seminal paper introduced policy preferences into political parties' objectives. Indeed, before its publication, the main model of electoral competition was that of Downs (1957), in which political parties were only office-motivated and did not care about the implemented policy. Our model differs from the traditional partisan theory based on Downs (1957) because parties' payoffs include two components: one is Downs's (1957) rents from being in power; the other one the utility derived from the implemented policy.

Thus, one of the main features of our model is that period-1 incumbents' decisions are driven by two types of incentives: policy and electoral incentives. According to the former, parties want their ideal policy to be implemented. This is the only effect present in our benchmark case, where probabilities of victory are exogenously fixed. In this case, there are no electoral incentives as incumbent governments cannot affect their parties' probability of winning the elections. The main result in this benchmark case is that the non-green party always chooses a level of commitment equal to zero; that is, it never commits to the IEA. This results from the fact that the non-green party wants to be able to implement its ideal policy if re-elected. On the other hand, the green party's optimal level of commitment is one, that is it always fully commits. Indeed the green party wants to constrain the period-2 government policy choice and make it as green as possible — i.e. as close as possible to its own ideal policy.

When we endogenize the probability of victory and the proportion of green citizens is large enough, the non-green party's (green party) probability of victory increases (decreases) with commitment. Indeed, an increase in commitment makes the green citizens better off in case of party 1's victory and, consequently, more likely to vote for it. Therefore, when this proportion is sufficiently large, party 1's probability of winning the election increases with the level of commitment κ. The reverse is true for party 2. Therefore, parties can affect their own probability of winning the elections. This introduces electoral incentives into the model. Owing to these electoral incentives, parties will try to increase their probability of victory, in order to enjoy the benefits from being in office. For both parties there is a trade-off between policy and electoral incentives, reflected in the fact that a marginal increase in the level of commitment has two opposing effects on their payoffs.

Let us first consider the non-green party's payoff. The first effect is positive and is due to the fact that a marginal increase in the level of commitment increases its probability of winning the elections. Indeed, when the proportion of the population with high environmental concern is high enough, an increase in the non-green government's commitment level increases the probability that period-2 environmental policy will be stricter and so closer to the green population's policy preferences. The second effect is negative and represents the utility loss due to the cost of commitment. When choosing a strictly positive level of commitment, the non-green party increases the probability that, if re-elected, it will have to choose a policy different from its ideal one in period-2. Conse-

quently, the non-green party chooses a level of commitment that is greater than zero when the electoral incentive is bigger than the policy incentive. These results are in contrast with those obtained with exogenous probabilities of victory, showing that electoral concerns may be the main reason for a non-green party to join an IEA.

Considering now the case of a green incumbent party, a marginal increase in the level of commitment has a positive impact on the green party's payoff. This effect is due to the fact that the non-green party will be constrained if elected and hence it will have to implement a greener policy — closer to the green party's ideal policy — with positive probability. The negative effect is given by the fact that a marginal increase in the level of commitment decreases the green party's probability of victory. Consequently, the green party will choose not to fully commit to protect the environment when the electoral gains exceed policy gains.

The rest of the paper is organised as follows: Section 2 introduces the model. In Section 3, the optimal choice of the level of commitment is derived with both exogenous and endogenous probabilities of victory. Finally, Section 4 concludes. Before introducing the model, the next subsection shall discuss the main relevant literature.

Related Literature

This paper is related to two main strands of literature. Within the first strand, a number of political science papers acknowledge that an important role is played by incumbent governments' incentives to constrain future policymakers' decisions (Mattes, 2012). Those papers argue that precommitting future leaders enables current incumbents to maintain their preferred policies in the long run. For example, this is the thesis supported by Lipson (1991) and Abbott and Snidal (2000) with regard to alliance treaties. Along this line Moravcsik (2000) empirically tests the same hypothesis, but with regard to the creation of human rights international organizations. His argument is that the creation of international organizations is a strategic way in which incumbents try to prevent future governments from becoming dictatorships. This is true in particular for newly democratized countries, where the incumbent wants to avoid the anti-democratic drift. He uses data on the negotiation of the European Convention for the Protection of Human Rights and Fundamental Freedoms (ECHR) and his findings fully support his argument. Mansfield and Pevehouse (2006, 2008) use a similar argument and argue that countries self-bind in order to increase the costs associated with going back to a non-democratic situation. Mattes (2012) empirically tests the reliability of democratic countries as military allies. She distinguishes between defence pacts and consultation pacts, and analyses when each of them is more likely to be signed. Defence pacts are more structured military cooperation alliances, whilst consultation pacts are less structured. The argument is that governments decide to sign a defence pact if polarisation of policy preferences between the incumbent and the potential successor is high and if the associated political costs are low. On the other hand, governments sign

consultation pacts when the policy preferences are less polarised. This analysis uses the Alliance Treaty Obligations and Provisions (ATOP) data between 1945 and 2003 and the findings are consistent with the tested hypotheses.

In the economic literature, Brett and Keen (2000) apply a similar argument to earmarking of environmental taxes. They suggest that the incumbent may earmark the revenues from environmental taxes in order to constrain future governments and avoid a dissipation of the revenues. Moreover, North and Weingast (1989) apply this argument to the analysis of the evolution of institutions in England in the seventeenth century. Incumbent's strategic behaviour in constraining its successors is the topic of Persson and Svensson (1989) and Alesina and Tabellini (1990). They argue that the incumbent strategically decides to bind the future government in presence of differences in policy preferences: differences in levels of public expenditure for Persson and Svensson (1989) and differences in its composition for Alesina and Tabellini (1990).

The second strand in the literature is based on the idea that pre-committing future leaders is considered a strategic behaviour to increase the chances of being re-elected. There is a well-known line of research that analyses political business cycles, that is the empirical evidence according to which next to the elections, the incumbent decides to cut taxes and expand public expenditure. Along this line are the papers by Rogoff and Sibert (1988) and Rogoff (1990). They aim at building the theoretical foundations to explain this empirical evidence. Their analyses shows that the incumbent government uses policy instruments to signal to the voters that its competency shock is high and gain an electoral advantage. Anesi (2006) also belongs to this second strand and focusses on tax earmarking using a probabilistic voting model à la Lindbeck and Weibull (1987). Anesi's (2006) argument is that the incumbent government might increase its probability of winning the elections by the means of earmarking. This might happen when a high proportion of citizens has preferences over the public good valued less by the incumbent. The mechanism is that binding future governments to provide this public good will positively impact on the incumbent's probability of victory. Therefore, Anesi (2006) shows the importance of electoral incentives with regard to tax earmarking decisions.

The present paper differs from the existing literature in two respects. First, it focuses on IEAs. Second, and more importantly, it combines the arguments developed in the two strands of literature discussed above: as in the first strand, our model captures incumbent governments' incentives to constrain future policymakers; as in the second strand, it captures incumbents' incentives to use current policies to affect electoral outcomes in their favour.

2 The Model

Economic Setting. Consider a two-period economy with two sectors. The first one is a green sector that produces the numeraire good c without emissions. The second is a polluting sector that produces good x. Both goods are produced and consumed in the second period. The economy is populated by a large num-

ber of citizens — i.e. a continuum of size 1 — who act both as consumers and as voters. They differ according to their environmental concern $\alpha \in [0,1]$, which is distributed according to a continuous, positive density function f with full support. The consumers derive utility from consuming the two goods and experience disutility from environmental degradation associated with production activities. Individuals of type α are assumed to maximise the following utility function:

$$c + u(x) - \alpha X \tag{1}$$

where c and x are individual consumption of the numeraire and the polluting good, respectively. X stands for aggregate consumption of the polluting good. All the agents have the same taste for individual consumption of good x, which is represented by the continuous function u. This function is at least twice differentiable and has the following properties: $u' > 0$, $u'' < 0$. Both goods are produced at a constant marginal cost, normalized to unity. Markets are perfectly competitive, so that prices are equal to unity.

Assume further that all citizens have the same (exogenous) income I. At the start of the second period, the government in office implements an environmental tax on the consumption of the polluting good, $t \in [0,1]$, the proceeds of which are redistributed lump sum to all citizens. Consumers of type α choose their consumption levels of both goods by maximizing (1) subject to the private budget constraint

$$c + (1+t)x \leq I + T$$

where T represents the lump sum transfer from the government. Hence, the type-α consumer chooses x to maximise:

$$\max_{x \geq 0} I + T - (1+t)x + u(x) - \alpha X \tag{2}$$

From the first order condition of the consumer's maximization problem (2), we obtain that each consumer's demand for the polluting good, x, satisfies

$$u'(x) = 1 + t \tag{3}$$

Let $x(t)$ be the unique solution of equation (3); that is $x(t)$ is the consumption of the polluting good as a function of the environmental tax t. It is readily checked that citizens will reduce consumption of good x as the tax increases: $x' < 0$. Tax revenues are used to finance the lump sum transfer T to all citizens. Hence, the government budget constraint is

$$T = tX \tag{4}$$

Each agent consumes the same quantity of the good x; hence $X = x(t)$. This is due to the quasi-linearity of preferences and the fact that average consumption is not affected by the small size of individual consumption.

Plugging (3) into (1) and using (4), we obtain the policy preferences of a type-α citizen:

$$v(t,\alpha) \equiv u(x(t)) - (1+\alpha)x(t) \tag{5}$$

Differentiating v with respect to t yields

$$\frac{\partial v}{\partial t} = [u'(x(t)) - 1 - \alpha]\, x'(t) = (t - \alpha)x'(t) \tag{6}$$

We know from (3) and (6) that $x'(t) < 0$ and $\partial v/\partial t = 0$ at $t = \alpha$. Consequently, when $(t - \alpha) < 0$, function (5) is increasing. When $t - \alpha > 0$, function (5) is decreasing. Moreover, when $t-\alpha < 0$ $(t-\alpha > 0)$, the above derivative is positive (negative); so that $v(\cdot, \alpha)$ increases (decreases). We have thus established that $v(\cdot, \alpha)$ is single-peaked with a peak at $t = \alpha$. Hence, the ideal policy of type-α citizens is $t = \alpha$.

Policy is chosen through electoral competition between parties 1 and 2, whose policy preferences are exogenously given by $v(\cdot, \alpha_1)$ and $v(\cdot, \alpha_2)$, respectively. Party $i = 1, 2$ thus shares the same policy preferences of a citizen of type α_i. We assume, without loss of generality, that $\alpha_1 < \alpha_2$.

Timing. The timing is as follows:

(1) In the first period, the incumbent party has a chance to join an international environmental agreement (IEA), which requires the signatories to maintain their emissions below some exogenous level $\bar{x}$. The incumbent decides whether to commit to the IEA and chooses the level of commitment κ the period 2 government will have to commit to.

(2) At the start of the second period, elections take place.

(3) The elected party takes office and sets the environmental tax t for period 2.

When constrained by the IEA (i.e. with probability κ), the period 2 government must choose an environmental tax $t \geq u'(\bar{x}) - 1 \equiv \tau$. In order to avoid trivialities, we assume the following throughout: $\tau \in (\alpha_1, \alpha_2)$.

Before we proceed any further, an explanation of the predictions of the model when $\tau < \alpha_1$ or $\tau > \alpha_2$ is in order. Let us consider the scenario where $\tau < \alpha_1$ first. When $\tau < \alpha_1$, regardless of who the incumbent is, if the IEA is signed, both parties will choose to set their preferred policy, if elected. As a consequence, in this scenario electoral incentives do not play a role for parties' choice of level of commitment. Therefore, there is no need to analyse this scenario specifically within the paper, given that its outcome will coincide with that of the benchmark case. Let us now consider the scenario where $\tau > \alpha_2$. In this case, regardless of who will be elected, if the IEA is signed, the policy will be set equal to τ. Therefore, signing an IEA has no impact on the electorate's choice and so, when $\tau > \alpha_2$, the party with the highest ideological bias will win the elections.

Electoral Competition. We assume that parties cannot make credible commitments before the election. As a consequence, the elected party will implement its deal policy in $[\tau, 1]$ with probability κ, and its ideal policy in $[0, 1]$ with probability $(1 - \kappa)$. Hence, party 1 (if elected) implements τ with probability

κ and α_1 with probability $(1-\kappa)$. On the other hand, given that we assumed $\tau < \alpha_2$, party 2 (if elected) always implements its ideal policy α_2.

Following Lindbeck and Weibull (1987), we use a probabilistic framework to model electoral competition between the two parties. Parties not only differ with regard to their policy platforms, but also with respect to specific characteristics. We assume that citizens differ in the way they evaluate those party-specific characteristics. The utility received by a voter of type α when party 1 is elected is given by

$$V^1(\kappa, \alpha) \equiv \kappa v(\tau, \alpha) + (1-\kappa) v(\alpha_1, \alpha) + (b_\alpha + r) \tag{7}$$

where b_α is an individual-specific parameter that measures a voter's ideological bias in favour of party 1. This represents the idiosyncratic component of the noise and it is distributed independently throughout the electorate. For every $\alpha \in [0,1]$, we assume that b_α is distributed according to a strictly positive, continuous density function g_α, with support $[-\beta, \beta]$, where $\beta > 0$ is an arbitrarily large parameter. A positive value of b_α stands for a positive bias towards party 1 and the reverse for a negative value. If $b_\alpha = 0$ for some type-α voter, then she only cares about the policy platform offered by the party. The parameter r can be interpreted as party 1's relative (average) popularity or sympathy within the population. We assume it is distributed according to a continuous density function h with support $[-\rho, \rho]$, where $\rho > 0$ is an arbitrarily large parameter. This term represents average voter's preferences, it is common throughout the electorate and unknown. The parameter r plays an extremely important role in our model, because it constitutes a source of uncertainty over voters' behaviour and thus, over the elections' outcome. From a more technical point of view, the parameter r guarantees uncertainty by making the probability of victory stochastic.

In this setting, voters care about the policy platform along with other dimensions unrelated to environmental policy. Therefore, these two terms might be considered as accounting for all the not explicitly modeled factors that impact on voter's preferences for different candidates. According to an alternative interpretation, these components summarise voters' preferences over parties' characteristics, like parties' competences, image, personality and likeability, the way they handle electoral campaigns or even scandals. An extensive political literature has been developed on these components, defined as candidate's valence advantage. For example, Groseclose (2001) defines it as superior character, charisma, name recognition or intelligence; Snyder and Ting (2002) as party discipline and Bruter et al. (2010) as vestigial party loyalties. In the literature, a great deal of attention has been devoted to the study of candidate's valence advantage and how the uncertainty faced by political parties affects their decisions. A number of papers reached the finding that, within this setting, the median voter position does not represent an equilibrium. As a consequence, if the electorate is biased against a party, it should avoid to choose the median voter position (Ansolabehere and Snyder, 2000; Groseclose, 2001; Aragones and Palfrey, 2002; Carrillo and Castanheira, 2008; Ashworth and Bueno de Mesquita, 2008).

After the period-1 decision is taken and just before the elections, the actual value of r is realized. Hence, when the incumbent decides whether or not to join the IEA in period 1, there is still uncertainty on the future winner of the elections.

The utility received by a type-α citizen when party 2 is elected is given by

$$V^2(\kappa, \alpha) \equiv v(\alpha_2, \alpha) \tag{8}$$

Given the value of κ inherited from period 1, each voter compares the payoff expected upon re-electing the incumbent to that following the election of the challenger. Given κ, a type-α citizen votes for party 1 if and only if $V^1(\kappa, \alpha) > V^2(\kappa, \alpha)$ or, equivalently, from (7) and (8):

$$b_\alpha > v(\alpha_2, \alpha) - \kappa v(\tau, \alpha) - (1-\kappa)v(\alpha_1, \alpha) - r \equiv \Delta(\kappa, \alpha, r)$$

The proportion of type-α citizens who vote for party 1 is therefore

$$p_1(\kappa, \alpha, r) \equiv \int_{\Delta(\kappa,\alpha,r)}^{\beta} g_\alpha(b) db \tag{9}$$

so that the total vote share going to party 1 is:

$$P_1(\kappa, r) \equiv \int_0^1 p_1(\kappa, \alpha, r) f(\alpha) d\alpha$$

Finally, we obtain party 1's probability of victory as the probability that $P_1(\kappa, r) \geq 1/2$. Given that $P_1(\kappa, r) = 1/2$ is a zero-probability event, we can restrict our attention to the case when $P_1(\kappa, r) > 1/2$ and party 1's probability of victory becomes

$$\pi_1(\kappa) \equiv \int_{\{r \in [-\rho, \rho] : P_1(\kappa, r) > 1/2\}} h(r)\, dr \tag{10}$$

Party 2's probability of victory is then $\pi_2(\kappa) \equiv 1 - \pi_1(\kappa)$ for all $\kappa \in [0, 1]$.

Party $i \in \{1, 2\}$ seeks to maximise:

$$\Omega_i(\kappa) \equiv \pi_1(\kappa) \left[\kappa v(\tau, \alpha_i) + (1-\kappa) v(\alpha_1, \alpha_i)\right] + \pi_2(\kappa) v(\alpha_2, \alpha_i) + \pi_i(\kappa) R \tag{11}$$

where $R \geq 0$ stands for the office-holding rents received by the winner of the election.

Alternative Setting. Before we proceed any further, a remark on the way we model commitment to the IEA is in order. As we discussed in the introduction, the probability κ must be thought of as the extent to which the period-1 government constrains future governments to abide to the terms of the IEA. It is worth noting, however, that alternative ways of modeling commitment would yield similar conclusions. For instance, we could instead assume that the period-1 government signs a completely binding IEA, but chooses (i.e. commits future

governments to) the period-2 environmental tax τ. In this alternative setting, the party in power in the second period would be compelled to implement the environmental tax prescribed by the IEA (i.e. the tax chosen by the period-1 government). It is readily checked that this alternative approach would yield exactly the same conclusions as ours. Indeed, increasing κ in our model has the same impact on parties and citizens' expected payoffs as increasing τ in the alternative model. This is mainly a matter of relabeling.

3 Political Equilibrium

In this section we characterise commitment levels κ in subgame perfect equilibria — simply referred to as "equilibria" in what follows — of the political game introduced in the previous section. Therefore, equilibrium values of κ are obtained by maximising incumbent parties' objective functions in (11) with respect to $\kappa \in [0, 1]$. The existence of an equilibrium follows directly from the application of Weierstrass' Theorem (Chiang, 2005).

3.1 Benchmark: Exogenous Probabilities of Victory

Our aim is to analyse the effect of electoral competition on the incumbent's party decision to join the IEA. It is therefore useful to start with the benchmark case in which probabilities of victory are exogenously fixed, so that parties are not able to modify their probability of winning the election. In this case, the period-1 decision is not influenced by future electoral prospects. Let $\overline{\pi}_i \in (0, 1)$, with $i \in \{1, 2\}$, be party i's exogenous probability of victory. Party $i \in \{1, 2\}$ chooses its level of commitment to an IEA κ by maximizing the following

$$\Omega_i(\kappa) = \overline{\pi}_1 [\kappa v(\tau, \alpha_i) + (1 - \kappa) v(\alpha_1, \alpha_i)] + \overline{\pi}_2 v(\alpha_2, \alpha_i) + \overline{\pi}_i R \qquad (12)$$

Here, we need to distinguish between the two parties. Indeed, the derivative with respect to κ of party 1's objective function (12) is

$$\frac{\partial \Omega_1(\kappa)}{\partial \kappa} = \overline{\pi}_1 [v(\tau, \alpha_1) - v(\alpha_1, \alpha_1)] \qquad (13)$$

Given that party 1 strictly prefers α_1 to τ, it immediately follows that function (13) is lower than zero and, therefore, that (12) is strictly decreasing in κ. Consequently, the solution of the maximization problem for party 1 is $\kappa = 0$. This means that with fixed probabilities of victory, party 1 never chooses to constrain future policy choice by joining an IEA.

The reverse holds for party 2: the derivative of its objective function is

$$\frac{\partial \Omega_2(\kappa)}{\partial \kappa} = \overline{\pi}_1 [v(\tau, \alpha_2) - v(\alpha_1, \alpha_2)] \qquad (14)$$

Given that party 2 strictly prefers τ to α_1, it immediately follows that the righ-hand side of equation (14) is positive and, therefore, that (12) is strictly

increasing in κ. As a consequence, the solution of the maximization problem for party 2 is $\kappa = 1$. This means that party 2 always chooses to join an IEA with probability one when the probabilities of victory are exogenous.

We record this as

Proposition 1 *If parties' probabilities of victory are exogenously fixed — and therefore independent of the period-1 decision — then:*
(i) Party 1 *always chooses* $\kappa = 0$*; and*
(ii) party 2 *always chooses* $\kappa = 1$*.*

3.2 The Probability of Victory Functions

The result stated in Proposition 1 is intuitive: only the party with a higher environmental concern chooses to join an IEA. However, the above analysis does not take into account the fact that voters' preferences over candidates may be affected by parties' behaviour, thus influencing the probabilities of victory. In what follows we will show that endogenizing these probabilities may impact our previous result. To this end, we first need to establish a key result on the probability of victory functions.

Henceforth, we will refer to citizens whose types α exceed τ as "green citizens". Let us define the green citizens as

$$\gamma \equiv \int_{\tau}^{1} f(\alpha)\, d\alpha \tag{15}$$

with $\gamma \in (0,1)$.

Lemma 2 *There exists* $\bar{\gamma} \in (0,1)$ *such that the following is true if* $\gamma > \bar{\gamma}$*: party* 1*'s probability of victory* π_1 *is strictly increasing in* κ*; and party* 2*'s probability of victory* π_2 *is strictly decreasing in* κ*.*

Proof: Brief inspection of (10) reveals that π_1 is strictly increasing whenever $P_1(\cdot, r)$ is strictly increasing for all $r \in [-\rho, \rho]$. To analyse the shape of this function, it is convenient to begin with the analysis of $p_1(\cdot, \alpha, r)$. Applying Leibniz Integral Rule to (9), we obtain:

$$\begin{aligned}\frac{\partial p_1(\kappa,\alpha,r)}{\partial \kappa} &= -\frac{\partial \Delta(\kappa,\alpha,r)}{\partial \kappa} g_\alpha(\Delta(\kappa,\alpha,r)) \\ &= \left[v(\tau,\alpha) - v(\alpha_1,\alpha)\right] g_\alpha(\Delta(\kappa,\alpha,r))\end{aligned}$$

As $g_\alpha(\Delta(\kappa,\alpha,r)) > 0$, this derivative is non-negative if and only if $v(\tau,\alpha) \geq v(\alpha_1,\alpha)$. Therefore, $p_1(\cdot,\alpha,r)$ is increasing in κ if and only if the type-α citizens prefer τ to α_1.

Now let

$$D^-(\kappa, r) \equiv \min_{\alpha \in [0,\tau]} \frac{\partial p_1(\kappa,\alpha,r)}{\partial \kappa} < 0$$

$$D^+(\kappa, r) \equiv \min_{\alpha \in [\tau,1]} \frac{\partial p_1(\kappa,\alpha,r)}{\partial \kappa} > 0$$

We then have

$$\begin{aligned}\frac{\partial P_1(\kappa,r)}{\partial \kappa} &\equiv \int_0^1 \frac{\partial p_1(\kappa,\alpha,r)}{\partial \kappa} f(\alpha)d\alpha \\ &= \int_0^\tau \frac{\partial p_1(\kappa,\alpha,r)}{\partial \kappa} f(\alpha)d\alpha + \int_\tau^1 \frac{\partial p_1(\kappa,\alpha,r)}{\partial \kappa} f(\alpha)d\alpha \\ &\geq \int_0^\tau D^-(\kappa,r) f(\alpha)d\alpha + \int_\tau^1 D^+(\kappa,r) f(\alpha)d\alpha \\ &= D^-(\kappa,r)\int_0^\tau f(\alpha)d\alpha + D^+(\kappa,r)\int_\tau^1 f(\alpha)d\alpha\end{aligned}$$

By definition of γ, we consequently have

$$\frac{\partial P_1(\kappa,r)}{\partial \kappa} \geq D^-(\kappa,r)(1-\gamma) + D^+(\kappa,r)\gamma > 0$$

if and only if

$$\gamma > \frac{-D^-(\kappa,r)}{D^+(\kappa,r) - D^-(\kappa,r)} \equiv \hat{\gamma}(\kappa,r) \in (0,1)$$

(recall that $D^-(\kappa,r) < 0$, so that $-D^-(\kappa,r) > 0$).

Finally, we define $\bar{\gamma}$ as

$$\bar{\gamma} = \max\{\hat{\gamma}(\kappa,r) : \kappa \in [0,1] \ \& \ r \in [-\rho,\rho]\}$$

Observe that, from Weierstrass' Theorem, $\bar{\gamma}$ is well-defined. Indeed, $\hat{\gamma}$ is a continuous function and $[0,1]\times[-\rho,\rho]$ is compact in R^2_+. We have thus proved that $P_1(\cdot,r)$ is strictly increasing for all r and, therefore, that π_1 is strictly increasing whenever $\gamma > \bar{\gamma}$.

As $\pi_2 \equiv 1 - \pi_1$, this in turn implies that π_2 is strictly decreasing whenever $\gamma > \bar{\gamma}$.

□

As previously discussed, the utility of a type-α citizen is determined by the winner of the elections. Recall that party 2 always implements its ideal policy α_2 if elected. Therefore, the utility obtained by type-α citizen if party 2 is in power, that is $V^2(\kappa,\alpha)$, is not affected by the level of commitment chosen by the incumbent in stage 1. However, switching from no commitment (i.e. $\kappa = 0$) to a positive level of κ does impact the type-α voter's utility if party 1 is in power, that is $V^1(\kappa,\alpha)$. In particular, $V^1(\kappa,\alpha)$ is increasing in κ for all $\alpha > \tau$ and decreasing in it for $\alpha < \alpha_1$. To see this, recall that citizens have single-peaked preferences, $v(\cdot,\alpha)$, with a peak at $t = \alpha$. As $\alpha_1 < \tau$, this implies that all types $\alpha \geq \tau$ strictly prefer policy τ to policy α_1: $v(\tau,\alpha) > v(\alpha_1,\alpha)$. Put differently, an increase in the commitment variable κ makes the green citizens — namely those whose environmental concern α exceeds τ — better off in case of party 1's victory and, consequently, more likely to vote for it. Recall that

the proportion of the population who shows such a high environmental concern has been defined in (15) as γ. When this proportion γ is sufficiently large — that is, higher than a certain threshold $\overline{\gamma}$ — party 1's probability of winning the election increases with the level of commitment κ. This result will have important implications when we turn to the analysis of the incumbent's choice of commitment level.

Henceforth, we make the following assumption:

A1: $\gamma > \overline{\gamma}$**.**

3.3 A Non-Green Incumbent May Commit to Protect the Environment

In this subsection we investigate under which conditions party 1 — the party with low environmental concerns — decides to commit to protect the environment. Suppose party 1 is the incumbent. Differentiating (11) with respect to κ when $i = 1$ reveals that a marginal increase in κ has two opposing effects on party 1's expected payoff:

$$\begin{aligned}\frac{\partial \Omega_1(\kappa)}{\partial \kappa} &= \pi_1'(\kappa)\left[\kappa v(\tau,\alpha_1) + (1-\kappa)v(\alpha_1,\alpha_1) - v(\alpha_2,\alpha_1) + R\right] - \\ &\quad \pi_1(\kappa)\left[v(\alpha_1,\alpha_1) - v(\tau,\alpha_1)\right]\end{aligned}$$

The first term represents the positive effect; that is the electoral gain from increasing κ. As previously shown, this is due to the fact that, by raising its level of commitment κ, party 1 can increase its chances of re-election. This increase in its probability of victory is weighted by the utility gain from being in office. The second term is negative and shows the policy cost of committing to environmental protection in period 1. Indeed, when the incumbent chooses a positive level of commitment it constrains the period-2 government policy choice. Consequently, if party 1 is re-elected (i.e. with probability $\pi_1(\kappa)$), it will have to set a policy different from its ideal one, thus incurring a utility loss of $v(\alpha_1,\alpha_1) - v(\tau,\alpha_1)$. In equilibrium, party 1 chooses the level of commitment $\kappa \in [0,1]$ that maximises its objective function (11). The expression above thus shows the trade-off between policy preferences and electoral incentives faced by party 1 in period 1.

From the above argument, in equilibrium party 1 commits to protect the environment — i.e. chooses $\kappa > 0$ — in period 2 if the (marginal) gains from increasing the probability of winning the elections exceed the (marginal) policy loss:

$$\pi_1'(0)\left[v(\alpha_1,\alpha_1) - v(\alpha_2,\alpha_1) + R\right] > \pi_1(0)\left[v(\alpha_1,\alpha_1) - v(\tau,\alpha_1)\right] \tag{16}$$

Inspection of the left-hand side of inequality (16) reveals that two factors are conducive to commitment. First, the polarization of parties' preferences (i.e. the difference between α_2 and α_1) increases the expected gain from re-election, as $v(\cdot,\alpha_1)$ is strictly decreasing on the interval (α,α_1). Second, an increase in the rent from holding office R similarly raises the gains from re-election.

Inspection of the right-hand side of inequality (16) reveals that two factors have a negative impact on the non-green party's commitment level. First, the higher the IEA requirements (i.e. the level of taxation τ the period-2 government will have to set in order to comply with the emissions reductions) the higher the distance between the tax τ and the party's ideal policy α_1. Second, an increase in party 1's initial chances of re-election, $\pi_1(0)$, raises the probability of incurring the utility loss $v(\alpha_1, \alpha_1) - v(\tau, \alpha_1)$.

Proposition 3 *Suppose party* 1 *is the period-*1 *incumbent. It commits to protecting the environment if and only if condition (16) holds. Hence, party* 1 *is more inclined to commit to the IEA terms when:*

(i) polarization of policy preferences among the two parties increases;

(ii) the rents from holding office increase; and

(iii) the IEA's requirements decrease.

Proposition 3 describes the factors that can make incumbent party 1 commit to protect the environment despite its low environmental concern. This stands in sharp contrast to the result stated in Proposition 1, where the probabilities of victory were exogenous. Introducing electoral concerns into the model has allowed us to identify factors that may drive a non-green government to commit to an IEA. In subsection 3.3.5, we will use numerical simulations to show that there exist parametric configurations of the model such that the non-green incumbent actually chooses positive commitment levels (i.e. $\kappa > 0$).

3.4 A Green Incumbent May Not Commit to Protect the Environment

Let us now turn to the case where the incumbent is party 2; that is the green party. In this subsection we want to analyse the impact of endogenizing the probabilities of victory on party 2's choice of the commitment level. In particular, we want to see whether, in contrast to the case without electoral concerns, this party may choose not to fully commit the future government to protect the environment. To this end, let us consider the impact of a marginal increase in κ on party 2's expected payoff by differentiating (11) when $i = 2$:

$$\begin{aligned}\frac{\partial \Omega_2(\kappa)}{\partial \kappa} &= \pi_1(\kappa)\left[v(\tau, \alpha_2) - v(\alpha_1, \alpha_2)\right] + \\ &\quad \pi_2'(\kappa)\left[v(\alpha_2, \alpha_2) + R - \kappa v(\tau, \alpha_2) - (1-\kappa)v(\alpha_1, \alpha_2)\right]\end{aligned}$$

As previously, this expression shows a trade-off between policy preferences and electoral incentives. The first term represents the expected benefit from constraining party 1 if the latter wins the elections. This term is positive due to the fact that party 1, if elected, will have to choose a policy $\tau \in [\alpha_1, \alpha_2]$ closer to party 2's ideal policy. The second term represents the electoral cost of committing party 1 to protect the environment. Indeed, as stated in Lemma 2, increasing the level of commitment κ reduces party 2's probability of victory

(by $\pi_2'(\kappa)$) when $\gamma > \overline{\gamma}$. This effect is weighted by the utility gain from staying in office.

In equilibrium, party 2 chooses a positive level of commitment κ such that the objective function (11) is maximised. Hence, party 2 will not fully commit to protect the environment — i.e. will choose a value $\kappa < 1$ — if:

$$\pi_1(1)\left[v\left(\tau,\alpha_2\right)-v\left(\alpha_1,\alpha_2\right)\right] < -\pi_2'(1)\left[v\left(\alpha_2,\alpha_2\right)-v\left(\tau,\alpha_2\right)+R\right] \tag{17}$$

Inspection of the left-hand side of equation (17) shows that party 1's chances of re-election under full commitment, $\pi_1(1)$ have a negative impact on party 2's likelihood of full commitment. Recall that $\pi_2(1) = 1 - \pi_1(1)$. Hence, party 2's probability of re-election under full commitment, $\pi_2(1)$ has a positive impact on its likelihood of full commitment.

Inspection of the right-hand side of equation (17) shows that two factors reduce party 2's optimal commitment level. First, party 2 is less likely to choose full commitment (i.e. $\kappa = 1$) the higher are the rents from holding office, R. Second, when party 1's consideration for the environment increases (i.e. α_1 becomes closer to α_2) its electoral gain also increases.

This leads to the following result:

Proposition 4 *Suppose party* 2 *is the period-*1 *incumbent. It does not fully commit to protecting the environment if and only if condition (17) holds. Hence, party* 2 *is less inclined to fully commit to the IEA terms when:*

(i) polarization of policy preferences among the two parties decreases; and

(ii) the rents from holding office increase.

The effect of the IEA's requirements is ambiguous.

Proposition 4 shows that when electoral motives are taken into account, party 2's choice of the level of commitment κ may differ from the result obtained when the probabilities of victory are exogenous. In the next subsection, we show that this can actually be the case in equilibrium.

3.5 Numerical Simulations

The previous subsections described how the various exogenous variables of the model affect incumbents' choices of κ. In this subsection we check that is actually possible for a non-green incumbent (resp. a green incumbent) to choose a value of κ greater than zero (resp. smaller than one) in period 1. To this end we use a simple numerical example. We concentrate on one specific functional form, assuming the utility function takes the form:

$$u\left(x\right) = 10x - \frac{1}{2}x^2$$

The model is simulated assuming that $\beta = 3$ and $\rho = 5$ in (9) and (10), respectively, and then varying the values of our main variables: the policy preferences, α_1 and α_2; and the rents from being elected, R. We also assume that b and r

α_1	α_2	R	κ
0.12	0.6	5.5	0.652 15
0.1	0.6	5.5	0.829 90
0.08	0.6	5.5	0.967 01
0.1	0.6	5.45	0.582 99
0.1	0.6	5.4	0.336 08

Table 1: Choice of level of commitment for non-green incumbent

are all uniformly distributed on their respective supports. The environmental concern $\alpha \in [0,1]$ is distributed according to the following density function

$$f(\alpha) = \begin{cases} \phi & \text{if } 0 < \alpha < \tau \\ \frac{1-\tau\phi}{1-\tau} & \text{if } \tau < \alpha < 1 \end{cases} \tag{18}$$

where parameter ϕ allows us to control for $\overline{\gamma}$. From (15) and (18) it immediately follows that a large value of ϕ represents a small value of $\overline{\gamma}$. In this example, we will take $\phi = 0.9$ to show that the results can hold even when $\overline{\gamma}$ is small. (The condition on $\overline{\gamma}$ in the propositions is sufficient, but not necessary.)

Table 1 shows the level of commitment κ chosen by party 1 — the non-green incumbent — according to different levels of type-α_1 policy preferences and rents from being elected, R.

These results confirm that non-green incumbents can choose high levels of commitment to environmental protection. In addition, they confirm that when polarization between the policy preferences increases — that is when the distance between parties' policy preferences increases — the level of commitment chosen by party 1 also increases. Moreover, the level of commitment κ chosen by party 1 increases with the rents. This is consistent with our theoretical results.

We now test the predictions of the model regarding party 2 — the green incumbent — choice of level of commitment κ. Table 2 shows that the green incumbent may choose small levels of commitment. In addition, the level of commitment κ is chosen by party 2 according to different levels of α_2 and R. When the polarization between the policy preferences decreases — that is, when party 1's concerns for the environment increase — the level of commitment chosen by party 2 decreases. Moreover, when the rents from being elected, R, decrease, the level of commitment chosen by party 2 also decreases.

4 Conclusion

The starting point of our analysis was the increasing importance of IEAs in international politics and the subsequent necessity to identify the factors affecting domestic governments' choice of joining IEAs. To the best of our knowledge, very few papers have analysed the impact of domestic partisan politics on IEAs'

α_1	α_2	R	κ
0.1	0.6	6.7	0.627 88
0.11	0.6	6.7	0.421 55
0.12	0.6	6.7	0.187 64
0.1	0.6	6.65	0.425 86
0.1	0.6	6.6	0.223 84

Table 2: Choice of level of commitment for green incumbent

ratification choice. Moreover, they have mainly focussed on a limited set of issues, namely the impact of the degree of democracy and civil liberties, corruption and environmental lobbies' strength. In addition, the majority of papers have followed the traditional partisan theory, based on Downs (1957). Therefore, our model tries to fill this gap by applying to IEAs the framework that extends Downs' (1957) theory by introducing political parties' electoral concerns.

The aim of the paper is to explain the reasons behind the choice of commitment to an IEA. Using a probabilistic framework à la Lindbeck and Weibull (1987), this paper analyses how electoral concerns affect the choice of the level of commitment to an IEA in a framework where parties maximise their expected payoffs and choose the level of commitment to an IEA. Political parties' choices are driven by policy and electoral incentives. The former kind of incentive results from the utility obtained by the political party when a policy is implemented and depends on its policy preferences. The latter results from the ability the incumbent has to enhance its probability of winning the elections by increasing the commitment level to the IEA. We first derive the level of commitment chosen by the incumbents — non-green and green — when the probabilities of victory are exogenous. This eliminates the electoral incentive and the main findings are not surprising. On the one hand, a non-green incumbent never commits to an IEA; that is, the level of commitment chosen is always null. On the other hand, a green incumbent always commits to an IEA; that is, the level of commitment chosen is always equal to unity.

We then derive the level of commitment that maximises the incumbent's expected payoff when the probabilities of victory are endogenous. Endogenizing the probabilities of victory introduces electoral incentives into the framework. The main results interestingly differ from the predictions obtained in the previous case. Indeed, they highlight that non-green parties may choose a strictly positive level of commitment if, by doing so, the electoral gain — i.e. the increase in the probability of victory — exceeds the policy loss — i.e. the fact that period-2 government is constrained in its policy choice. We also show that a green government's level of commitment to the IEA may be less than 1 if the electoral cost of commitment — i.e. the decrease in its probability of victory — exceeds the policy gain — i.e. constraining the non-green party.

Our model has enabled us to better understand the domestic-politics incentives that drive policymakers to join IEAs. Nonetheless, there are undoubtedly other factors that can affect such a decision. First, we have ignored that small

countries might be obliged to sign the IEA in order to please important economic partners. Indeed, incumbent governments would gain from having a powerful ally supporting them. This would result in small countries having a higher level of commitment — i.e. high value of κ — independently of their governments' electoral incentives. For example, the candidate member states of the EU have to commit to the so-called acquis communautaire, that is the entire body of EU legislation published in the Official Journal of the European Union. Therefore, they are forced to commit to all the IEAs in place, regardless of policy and electoral incentives.

Second, the paper does not account for the costs of not complying to the IEA. We can broadly identify two types of costs associated with non-compliance: explicit and reputational costs. The former regards actual expenditures to be incurred instead of cutting own emissions. For instance, the Clean Development Mechanism within the Kyoto Protocol (1997) allows signatories to fund emissions abatement projects in developing countries in order to earn certified emission reduction (CER) credits that will be equivalent to domestic emissions reductions (UNFCCC, 2006). This flexibility mechanism is based on the assumption that abating in developing countries is less costly that in developed countries, but still costly. The latter is related to the cost due to the exclusion from future international treaties when a country is labelled as an unreliable partner. DeSombre's (2006) analysis focuses on the shipping industry and the incentives linked to exclusion. Her findings show that compliance with IEAs' requirements increases when the culprits of violating them are excluded from valuable services — i.e. club goods.

Third, we focussed on the individual country's decision without analysing the strategic interactions with other governments. Indeed, each country's choice of level of commitment will impact the levels of commitment chosen by the other signatories and therefore, the value of the IEA. For example, the Kyoto Protocol (1997) could only have a positive impact on environmental quality if at least 55 countries, representing at least 55 percent of the base-year carbon-dioxide emissions, would have ratified it. When the USA decided to withdraw from the treaty, the other signatories, especially the EU, had to engage in a series of negotiations with Russia in order to convince it to commit. Otherwise, the Kyoto Protocol (1997) would have been void.

References

Abbott, K. W., Snidal, D., 2000. Hard and Soft Law in International Governance. International Organization 54, 421–456.

Alesina, A., Tabellini, G., 1990. A Positive Theory of Fiscal Deficits and Government Debt. Review of Economic Studies 57, 403–414.

Anesi, V., 2006. Earmarked Taxation and Political Competition. Journal of Public Economics 90, 679–701.

Bernhard, W., Broz, L., Clark, W. R., 2002. The Political Economy of Monetary Institutions. International Organization 56, 693–723.

Beron, K. J., Murdoch, J. C., Vijverberg, W. P. M., 2003. Why Cooperate? Public Goods, Economic Power and the Montreal Protocol. Review of Economics and Statistics 85, 286–297.

Brauninger, T., 2005. A Partisan Model of Government Expenditure. Public Choice 125, 409–429.

Brett, C., Keen M., 2000. Political Uncertainty and the Earmarking of Environmental Taxes. Journal of Public Economics 75, 315–340.

Chiang, A. C., 2005. Fundamental Methods in Mathematical Economics. New York, McGraw-Hill.

Clark, W. R., 2002. Partisan and Electoral Motivations and the Choice of Monetary Institutions Under Fully Mobile Capital. International Organization 56, 725–749.

Conconi, P., 2002. Green and Producer Lobbies: Competition or Alliance? In Murshed, S. M. (Ed.), Issues in Positive Political Economy. London: Routledge.

Conconi, P., 2003. Green Lobbies and transboundary Pollution in large open Economies. Journal of International Economics 59, 399–422.

Conconi, P., Perroni, C., 2009. Do Credible Domestic Institutions Promote Credible International Agreements? Journal of International Economics 79, 160–170.

Congleton, R. D., 1992. Political Institutions and Pollution Control. Review of Economics and Statistics 74, 412–421.

Congleton, R. D., 2001. Governing the Global Environmental Commons: the Political Economy of International Environmental Treaties and Institutions. In Schulze, G. G., Ursprung, H. (Eds.), International Environmental Economics: a Survey of the Issues (pp. 241–263). Oxford: Oxford University Press.

DeSombre, E. R., 2006. Flagging Standards: Globalization and Environmental, Safety, and Labor Regulations at Sea. Cambridge, Mass.: MIT Press.

Downs, A., 1957. An Economic Theory of Democracy. New York: Harper and Brothers.

Duso, T., Seldeslachts, J., 2010. The Political Economy of Mobile Telecommunications Liberalization: evidence from the OECD Countries. Journal of Comparative Economics 38, 199–216.

Fredriksson, P. G., Gaston, N., 2000. Ratification of the 1992 Climate Change Convention: What determines Legislative delay? Public Choice 104, 345–368

Fredriksson, P. G., Neumayer, E., Ujhelyi, G., 2007. Kyoto Protocol Cooperation: Does Government Corruption facilitate Environmental Lobbying? Public Choice 133, 231–251.

Fredriksson, P. G., Svensson, J., 2003. Political Instability, Corruption and Policy formation: the Case of Environmental Policy. Journal of Public Economics 87, 1383–1405.

Fredriksson, P. G., Ujhelyi, G., 2006. Political Institutions, Interest Groups and the Ratification of International Environmental Agreements. Unpublished Manuscript.

Geys, B., Nuscheler, R., 2010. Public Health Care Spending in the OECD: the Role of Partisan Cycles and Campaign Promises, Unpublished Manuscript. Wissenschaftszentrum Berlin.

Hafner-Burton, Emilie M., Laurence R. Helfer, and Christopher J. Fariss. 2011. Emergency and Escape: Explaining Derogations from Human Rights Treaties. International Organization 65, 673–707.

Imbeau, L. M., 2009. Do They Walk Like They Talk? Speech and Action in Policy Processes. Springer, Heidelberg.

Jahn, D., 1998. Environmental Performance and Policy Regimes: explaining Variations in 18 OECD Countries. Policy Sciences 31, 107–131.

Jensen, C., Spoon, J., 2011. Testing the "Party Matters" Thesis: Explaining Progress towards Kyoto Protocol Targets. Political Studies 59, 99–115.

Johns, L., Rosendorff, B. P., 2009. Dispute Settlement, Compliance, and Domestic Politics. In Trade Disputes and the Dispute Settlement Understanding of the WTO: An Interdisciplinary

Assessment, Frontiers of Economics and Globalization, Vol. 6, edited by James C. Hartigan, 139–64. Bingley, UK: Emerald Group.

Karp, L., Zhao, J., 2008. A Proposal for the Design of the Successor of the Kyoto Protocol. CUDARE Working Papers.

Knill, C., Debus, M., Heichel, S., 2010. Do Parties Matter in Internationalised Policy Areas? The Impact of Political Parties on Environmental Policy Outputs in 18 OECD Countries, 1970–2000. European Journal of Political Research 49, 301–336.

Koremenos, B., 2005. Contracting Around International Uncertainty. American Political Science Review 99, 549–565.

Kucik, J., Reinhardt, E., 2008. Does Flexibility Promote Cooperation? An Application to the Global Trade Regime. International Organization 62, 477–505.

Lindbeck, A., Weibull, J. W., 1987. Balanced-Budget Redistribution as the Outcome of Political Competition. Public Choice 52, 273–297.

Lipson, C., 1991. Why are Some International Agreements Informal? International Organization 45, 495–538.

List, J. A., Sturm, D. M., 2006. How Elections Matter: Theory and Evidence from Environmental Policy. The Quarterly Journal of Economics 121, 1249–1281.

Lohmann, S., 1992. Optimal Commitment in Monetary Policy: Credibility versus Flexibility. The American Economic Review 82, 273–286.

Mansfield, E. D., Pevehouse, J. C., 2006. Democratization and International Organizations. International Organization 60, 137–167.

Mansfield, E. D., Pevehouse, J. C., 2008. Democratization and the Varieties of International Organizations. The Journal of Conflict Resolution 52, 269–294.

Mattes, M., 2012. Reputation, Symmetry, and Alliance Design. International Organization 66, 679-707.

Moravcsik, A., 2000. The Origins of Human Rights Regimes: Democratic Delegation in Postwar Europe. International Organization 54, 217–252.

Murdoch, J. C., Sandler, T., 1997. A voluntary Provision of a Pure Public Good: the Case of reduced CFC Emissions and the Montreal Protocol. Journal of Public Economics 63, 331–349.

Neumayer, E., 2002. Do Democracies exhibit stronger International Environmental Commitment? A cross-country Analysis. Journal of Peace Research 39, 139–164.

Neumayer, E., 2003. Are Left-wing Party Strength and Corporatism Good for the Environment? Evidence from Panel Analysis of Air Pollution in OECD Countries. Ecological Economics 45, 203–220.

Neumayer, E., 2004. The Environment, Left-wing Political Orientation and Ecological Economics. A Commentary. Ecological Economics 51, 167–175.

North, D. C., Weingast, B. R., 1989. Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth-Century England. The Journal of Economic History 49, 803–832.

Osterloh, S., Debus, M., 2012. Partisan Politics in Corporate Taxation. European Journal of Political Economy 28, 192–207.

Pelc, K. J., 2009, Seeking Escape: The Use of Escape Clauses. International Studies Quarterly 53, 349–368.

Pellegrini, L., Gerlagh, R., 2006. Corruption, Democracy, and Environmental Policy: an Empirical Contribution to the Debate. The Journal of Environment and Development 15, 332–354.

Persson, T., Svensson, L. E. O., 1989. Why a stubborn Conservative would run a Deficit: Policy with Time-Inconsistent Preferences. The Quarterly Journal of Economics 104, 325–345.

Roemer J. E., 2000. Political Competition. Theory and Applications. Harvard University Press.

Rogoff, K., 1985. Can International Monetary Policy Cooperation be Counterproductive? Journal of International Economics 18, 199–217.

Rogoff, K., Sibert, A., 1988. Elections and Macroeconomic Policy Cycles. The Review of Economic Studies 55, 1–16.

Rogoff, K., 1990. Equilibrium Political Budget Cycles. NBER Working Paper No. 2428.

Rosendorff, B. P., Milner, H. V., 2001. The Optimal Design of International Trade Institutions: Uncertainty and Escape. International Organization 55, 829–857.

Rosendorff, B. P., 2005. Stability and Rigidity: Politics and Design of the WTO's Dispute Settlement Procedure. American Political Science Review 99, 389–400.

Tabellini, G., Alesina, A., 1990. Voting on the Budget Deficit. American Economic Review 80, 37–39.

UNFCCC, 2006. Report of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol on its first session, held at Montreal from 28 November to 10 December 2005.

Volkens, A., Lehmann, P., Merz, N., Regel, S., Werner, A., with Lacewell, O. P., Schultze, H., 2013. The Manifesto Data Collection. Manifesto Project (MRG/CMP/MARPOR). Berlin: Wissenschaftszentrum Berlin: Sozialforschung (WZB).

Wittman, D. A., 1973. Parties as Utility Maximizers. The American Political Science Review 67, 490–498.

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