

Policymakers' Horizon and the Sustainability of International Cooperation*

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Abstract

This paper examines the impact of policymakers' horizon on the sustainability of international cooperation. We describe a prisoners' dilemma game between two infinitely-lived countries run by policymakers. We show that re-election incentives can act as a discipline device, making it easier to sustain cooperation between policymakers with finite but potentially renewable mandates than between infinitely-lived policymakers. We also show that, when voting suffers from a recency bias, policymakers may have incentives to "collude" to get re-elected and term limits may help international cooperation.

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1 Introduction

In the absence of a supranational authority with direct powers to punish violations, governments can only be expected to comply with international agreements if they perceive that doing so is in their self interest. Even when a country can gain in the short term by cheating on its partners, it will behave honestly for fear of future punishments. The increasingly vast literature on self-enforcing international agreements shows how cooperation among different countries can be sustained by credible threats among the parties involved as long as they engage in long-term relationships.¹

Achieving international cooperation through repeated interaction may, however, be particularly difficult given that, although countries may live on indefinitely, they are run by policymakers who have a shorter tenure. This problem has been completely disregarded by the existing literature on self-enforcing international agreements, where policymakers are assumed to share the same infinite horizon as their countries.

This paper examines how international cooperation can be sustained between policymakers with finite but potentially renewable mandates.

Putnam (1988) was the first to stress that domestic and international politics are fundamentally intertwined. Subsequent studies have investigated the impact of domestic electoral considerations on international cooperation in various policy areas, including fiscal (Tabellini, 1990), monetary (Lohmann, 1993) and trade policy (Grossman and Helpman, 2005; Ornelas, 2005). However, somewhat surprisingly given the importance of enforcement problems in international relations, none of the existing studies has examined how policymakers' horizon affects the sustainability of international cooperation, which is the focus of the present paper.

We describe international relations by means of a repeated prisoners' dilemma game² between two ongoing organizations (countries) that are run by agents (policymakers) with finite but potentially renewable mandates. In this general setup, we examine under what conditions the efficient cooperative equilibrium is sustainable—if at all—under the three scenarios in which an agent's life span is infinite, endogenously determined or finite, depending

¹See, for example, Bagwell and Staiger (1997), Maggi (1999), and Bond and Park (2002) on trade agreements and Conconi and Perra (2006) on environmental agreements.

²Many problems linked to the provision of public goods such as a clean environment or international security are characterized by the basic incentive structure of a prisoner's dilemma: although every country prefers the provision of the public good, it has an incentive to free-ride on the efforts of the other players; hence, the good will not be provided, or at least not in an efficient amount.

on whether the renewal of her mandate is certain, possible or impossible.

We consider first a scenario in which policymakers are assumed to share the same *infinite* horizon as their countries. This is the benchmark case of the existing literature on self-enforcing international agreements and is equivalent to a situation in which policymakers' mandates are automatically renewed. In this framework, we solve for the minimum degree of patience which guarantees that the efficient cooperative equilibrium is sustainable.

We then examine the case in which re-election is possible but not certain. In particular, we assume that voters behave retrospectively, deciding whether or not to re-elect their leader on the basis of her performance during the previous mandate. In this case, the horizon of an agent is *endogenously determined* by her actions. There is indeed ample empirical evidence showing that the likelihood that a policymaker is re-elected at the end of her mandate depends of the economic benefits she managed to bring to her constituency during her previous term in office (e.g., Fiorina, 1981; Besley and Case, 1995; Lohmann *et al.*, 1997; Lewis-Beck and Stegmaier, 2000).

We show that, when re-election depends on past performance, cheating on a foreign partner generates two effects which are not present when re-election is certain: a short-term “re-election boost” effect, which tends to decrease the severity of the punishment for defecting from cooperation; and a long-run “re-election penalty” effect, which works in the opposite direction. If the latter effect dominates, the minimum discount factor which allows to sustain cooperation over time will be lower when policymakers have finite but renewable mandates than in the case of policymakers who stay in power forever. Therefore re-election incentives can discipline policymakers and make it easier to sustain international cooperation.³ The general result is that “mortality”, or rather the threat of losing office, can be good for cooperation: on one hand, “mortal” agents—who are subject to contract renewal—have shorter expected life spans than “immortal” agents—whose renewal occurs with certainty—and are thus less prone to cooperate; on the other hand, their “fear of dying” and losing the benefits from holding office can make them less likely to defect from agreed-upon policies.

We then look at the case in which politicians' life span is *exogenously fixed*. This happens whenever policymakers cannot be re-elected because they face term limits. We build on the existing literature on the sustainability of cooperation between organizations run by agents

³The literature on electoral business cycles has emphasized the electoral boost effect (see for instance Nordhaus, 1975; Rogoff, 1990; and Rogoff and Sibert, 1988). However, in these models, there are no long-term negative consequences of politicians' strategic behavior.

with finite tenures (e.g., Crémer, 1986; Salant, 1991; Kandori, 1992; Smith, 1992). The fundamental novelty of our paper is that we allow for agents' re-election, considering not only the case of exogenously-fixed mandates but also the case of endogenously-determined life spans. Conventional economic wisdom would lead to the conclusion that term limits impede policymakers to engage in long-term relationships and thus hinder the degree of international cooperation that they can sustain. We show that term limits can indeed be detrimental to international cooperation, since they eliminate the discipline effect of electoral incentives. However, term limits may actually be desirable if voting exhibits a recency bias, i.e., if voters attach more importance to recent events when deciding whether or not to re-elect a politician.

Our analysis contributes to the relatively small literature that has tried to explain the existence of term limits. This literature has mainly been concerned with legislative term limits rather than with term limits imposed on a country's executives. Dick and Lott (1993) argue that voters have incentive to re-elect their representative given that seniority brings bargaining power in Congress. This is not efficient since this leads to a bias towards re-electing inefficient incumbents and even gives bad incentives to politicians. Term limits can thus be beneficial, since they reduce the effect of seniority. Glazer and Wattenberg (1996) argue that term limits would shift the incentives of politicians towards more efficient policies and away from pork barrel legislation that brings electoral success. Glaeser (1997) describes a model in which a right-wing and a left-wing party have an equal probability of winning the first election. However, an exogenous incumbency advantage ensures that the party which wins the first election is also re-elected for further terms in office. In this setting, term limits may be self-imposed by risk-averse voters, who prefer cycling between left and right wing candidates to a once-and-for-all election that imposes a candidate on the entire electorate.

We provide a new rationale for executive term limits: we argue that, if country leaders have staggered mandates and their re-election chances depend significantly on their recent performance, they will have incentives to "collude" to get re-elected, at the expense of cooperation between their countries. In particular, a policymaker in one country who is not facing an election in the short run (whose current performance has little effect on her future chances of re-election) will accommodate a defection by a policymaker in the other country who is up for re-election (whose current performance has a crucial impact on her immediate chances of re-election), expecting to receive a similar concession later in her mandate. In this case, we show that the introduction of term limits may actually help to achieve more international cooperation.

The remaining of the paper is organized as follows. In Section 2, we describe a prisoners’ dilemma game between two infinitely-lived countries. Section 3 considers the case in which policymakers’s mandate are automatically renewed. Section 4 looks at the case of policymakers with renewable mandates and examines the impact of re-election incentives on the sustainability of international cooperation. Section 5 examines the case of policymakers with exogenously fixed tenures. Finally, Section 6 concludes.

2 A Model of International Cooperation

In this section, we describe international relations by means of a repeated prisoners’ dilemma (PD) game between two countries, A and B , each represented by a policymaker with a finite but potentially renewable tenure. This general model can be used to capture international negotiations in areas such as trade, environment or security.

As in any standard prisoners’ dilemma, each country can choose between two moves, either “cooperate” or “defect”, and failure to cooperate reduces the welfare of the two countries. Countries’ payoffs are given in Table 1. Each country gains when both cooperate, but if only one of them cooperates, the defecting country gains more. If both defect, both lose (or gain very little), but not as much as the “cheated” country whose cooperation is not returned. The following inequalities must thus hold: $\Pi^D > \Pi^C > \Pi^N > \Pi^P$. In particular, we shall assume that international relations are a pure prisoner’s dilemma. This implies that universal cooperation is jointly efficient, so that players do better by cooperating on every round than they would do by “taking turns”—you cooperate while I defect and then I cooperate while you defect—i.e., $2\Pi^C > \Pi^D + \Pi^P$.

The model is thus a standard two-person repeated PD game with the exception that the actual players at each date are the policymakers of the countries.⁴ Our main objective is to examine the sustainability of international cooperation, when policymakers’ life spans are endogenously determined by their actions. We want to be able to directly compare our analysis with the two existing theoretical approaches: that of the literature on self-enforcing international agreements (e.g., Bagwell and Staiger, 1997; Maggi, 1999), which assumes that policymakers share the same per-period payoff and the same infinite horizon

⁴We assume that the history of play is either perfectly observed or costlessly verified by all the players. See Bhaskar (1998) and Lagunoff and Matsui (2004) for an analysis of the role of memory and communication in games between ongoing organizations.

Table 1: Prisoners' Dilemma—Countries' Payoffs

		A	
		C	D
B	C	(Π^C, Π^C)	(Π^P, Π^D)
	D	(Π^D, Π^P)	(Π^N, Π^N)

as their countries; and that of the literature on repeated games with overlapping generations of players (e.g., Kandori, 1992; Smith, 1992), which focuses on agents (policymakers) who share the same payoff of their organizations (countries) while in power, but have exogenously fixed life spans. For this purpose, we define the payoff of policymaker k in country i as the sum of the payoffs of her country while she is in office:

$$W_i^k = \sum_{t=0}^{\infty} \delta^t I_t^k \Pi_{i,t} \tag{1}$$

where $\delta \in (0, 1)$ is the factor by which the policymaker discounts future payoffs, $\Pi_{i,t}$ is the country's payoff at time t , and I_t^k is an indicator variable which takes the value 1 if the incumbent policymaker is in office at time t and zero otherwise. Equation (1) can be interpreted as implying that policymakers derive some rents from being in office, which are proportional to their countries' welfare. Policymakers are thus driven by their self-interest, and only care about their countries' payoffs when they are in office.⁵

The main advantage of the above formulation of policymakers' objectives is that it allows us to focus on the impact of their *horizon* on the sustainability of cooperation between their countries. Notice that equation (1) can capture policymakers' incentives in the three scenarios of interest: the case of infinitely-lived policymakers considered by the literature on self-enforcing international agreements (I_t^k is equal to unity for all t); the case of policymakers

⁵We normalize the payoff of a policymaker who is not in power to be equal to zero. The thrust of the analysis would not be affected if we allowed for some fixed office rents (see Conconi and Sahuguet, 2005) or assumed that policymakers care about their countries after they leave office (see Conconi *et al.*, 2008).

who cannot be re-elected considered by the OLG literature in repeated games (I_t^k is equal to one for the periods of the mandate of the policymaker and is equal to zero otherwise); and the case of re-electable policymakers, which is the focus of our analysis (I_t^k equals one for policymakers in power and zero for policymakers who fail to get re-elected, which happens with positive probability and depends on the past history of the game).

Each mandate lasts T periods. At the end of a term in office, each policymaker may face “contract renewal”. Since, as stressed above, we are interested in examining the role of policymakers’ horizons, we assume that all politicians are of the same “type”, i.e., they have the same preferences and abilities; therefore, if a policymaker is not re-elected at the end of her mandate, she is replaced by an identical new player.

In what follows, we investigate the conditions under which a common cooperative choice can be supported as part of a subgame-perfect equilibrium in Nash-reversion punishment strategies, whereby any deviation from C is followed by permanent reversion to the Nash equilibrium of the stage game, in which both policymakers act non-cooperatively.

3 Cooperation with No Elections

In this section, we focus on the case in which policymakers share the same infinite horizon as their countries. This is the benchmark case of the literature on self-enforcing international agreements and is equivalent to a situation in which policymakers hold office forever, i.e., their mandates are automatically renewed. In this framework, we shall examine how, in the absence of an international authority able to directly punish violations, international cooperation between sovereign nations can be sustained over time, so that each government always prefers to comply with the agreement rather than deviate.

The value of sustaining cooperation for a policymaker who stays in power forever can be written as

$$V_I^C \equiv V(\Pi^C, \delta) = \frac{\Pi^C}{1 - \delta}, \quad (2)$$

where the subscript I refers to the infinite horizon of the agents. The value of reverting to non cooperation is instead given by

$$V_I^N \equiv V(\Pi^N, \delta) = \frac{\Pi^N}{1 - \delta}. \quad (3)$$

A defection from cooperation at any point in time yields one-period deviation gains equal to $\Pi^D - \Pi^C$ but leads to reversion to the non-cooperative payoffs equilibrium Π^N forever after.

The punishment associated with Nash reversion can thus be written as

$$\Omega_I \equiv \Omega(\Pi^C, \Pi^N, \delta) = V_I^C - V_I^N. \quad (4)$$

Therefore a common choice of C can be supported by Nash-reversion punishment strategies as long as the following incentive constraint is satisfied:

$$\Pi^D - \Pi^C \leq \delta \Omega_I. \quad (5)$$

It follows that when policymakers are in power forever, they will be able to sustain international cooperation over time as long as their discount factor exceeds the following critical value:

$$\delta_I = \frac{\Pi^D - \Pi^C}{\Pi^D - \Pi^N}. \quad (6)$$

This critical discount factor represents a measure of the difficulty to sustain international cooperation: the lower is δ_I , the less weight policymakers need to attach to future periods for the efficient cooperative equilibrium to be sustainable by threat of Nash reversion.⁶

4 Cooperation when Mandates are Renewable

One of the main features of representative democracies is periodic re-elections. At the end of each term voters have the opportunity to reward the incumbent politician with re-election or to replace him with a challenger.⁷

In this section, we examine how re-election incentives affect the sustainability of international cooperation. In particular, we will compare the benchmark case considered in Section 3, in which policymakers are not subject to re-election, with the case of policymakers who face periodic re-elections. In general, the ability of voters to hold an incumbent accountable

⁶Behaving cooperatively over time is obviously only one of the possible equilibria. However, it could be argued that, if the discount factor exceeds δ_I , the agents will realize that this equilibrium is in their own interest and that it is reasonable to assume that they will coordinate on it.

⁷The impact of electoral incentives in shaping a country's economic policies has long been recognized by the literature on political business cycles (e.g., Nordhaus, 1975; Rogoff, 1990; and Rogoff and Sibert, 1988). Most studies have focused on the determination of policy issues which tend to be at the "frontline" in national elections, such as government spending or the degree of income and wealth redistribution; others have examined the impact of electoral incentives on the determination of "secondary" policy issues, such as trade or environmental policy (e.g., Grossman and Helpman, 2005; List and Sturm, 2006).

for her policy choices should act as a powerful incentive instrument for politicians to conduct policies that voters reward with re-election. However, re-electable policymakers have shorter expected life spans than policymakers whose mandate are automatically renewed; in turn, this tends to make it harder to engage in long-term relationships and hence to hinder the degree of international cooperation that can be sustained. For simplicity, we will focus on a scenario in which each player's term lasts $T = 2$ periods, though our analysis can be readily generalized to terms lasting N periods.

4.1 When re-election does not depend on past actions

Consider first the case in which policymakers face an exogenous re-election probability \bar{p} . Compared to the case considered in Section 3, allowing for re-election has a similar effect as adding an additional discount factor that is applied every T periods. Also, it can easily be shown that the punishment for deviating is always more severe in the case of infinitely-lived policymakers (equivalent to $\bar{p} = 1$) than in a scenario in which policymakers can be re-elected with some given probability $\bar{p} < 1$, implying that the minimum discount factor $\delta_{\bar{p}}$ which allows to sustain cooperation is always larger than δ_I . It follows that

Result 1 *The efficient cooperative equilibrium is more difficult to sustain when policymakers face exogenous re-election probabilities than when they are automatically re-elected.*

Proof: The punishment for deviation when policymakers face an exogenous re-election probability \bar{p} can be written as

$$\Omega_{\bar{p}}(\Pi_C, \Pi_N, \delta, \bar{p}) = \frac{(1 + \delta)\bar{p}(\Pi^C - \Pi^N)}{1 - \delta^2\bar{p}}. \quad (7)$$

It is straightforward to verify that the above expression increases with \bar{p} , so the maximum punishment for a defection is achieved under automatic re-election ($\bar{p} = 1$). \square

Therefore, when policymakers face an exogenous probability of re-election $\bar{p} < 1$, sustaining cooperation over time is harder than in the case in which re-election is certain. This result is in line with the presumption that, in a repeated game between two long-lasting organizations, cooperation should be easier to achieve the longer the horizon of the agents running these organizations. A direct corollary of this result is that increasing the length of the mandates is good for cooperation. Longer mandates are always good for cooperation everything else being equal. In the next subsection, we will see that this very intuitive result

does not hold anymore when the probability of getting re-elected is endogenous and depends on past actions by the policymaker.

4.2 When re-election depends on past actions

Let us now consider the more interesting and realistic scenario in which the life span of an agent is endogenously determined. Following a vast political science literature dating back to Fair (1978) and Fiorina (1981) (see Lewis-Beck and Stegmaier (2000) for a review), we assume retrospective voting: voters base their decision on whether or not to keep their leader in office upon her past performance.

In particular, we shall assume that an incumbent's chances of re-election depend on the benefits she managed to bring to her country during her previous term in office. The re-election probability at period j , $p(\Pi_{j-1}, \Pi_j)$, is strictly increasing in its two arguments and is differentiable. We also assume that voters attach equal importance to the performance in each of the periods, implying $p(\Pi_{j-1}, \Pi_j) = p(\Pi_j, \Pi_{j-1})$.⁸

For a policymaker facing re-election at the end of her mandate, the value of sustaining cooperation over time can be written as

$$V_R^C \equiv V(\Pi^C, \delta, p^C) = \frac{(1 + \delta)\Pi^C}{1 - \delta^2 p^C}, \quad (8)$$

where $p^C \equiv p(\Pi^C, \Pi^C)$ is the probability of being re-elected when both policymakers have cooperated in the two previous periods. Indefinite reversion to non-cooperation yields a continuation payoff

$$V_R^N \equiv V(\Pi^N, \delta, p^N) = \frac{(1 + \delta)\Pi^N}{1 - \delta^2 p^N}, \quad (9)$$

where $p^N \equiv p(\Pi^N, \Pi^N)$ is the probability of being re-elected during the Nash-reversion punishment phase.

Comparing equations (8)-(9) with equations (2)-(3), we can see that re-election incentives decrease the continuation payoffs of the agents: the value of sustaining cooperation falls from $\frac{\Pi^C}{1-\delta}$ with automatic re-election to $\frac{(1+\delta)\Pi^C}{1-\delta^2 p^C}$ with endogenous re-election; similarly, the value of remaining in the non-cooperative equilibrium decreases from $\frac{\Pi^N}{1-\delta}$ to $\frac{(1+\delta)\Pi^N}{1-\delta^2 p^N}$. Thus, agents

⁸The simplest way to model this feature would be to assume that the re-election probability at j is a function of $(\Pi_{j-1} + \Pi_j)$. The case of a “recency bias”, in which voters put more weight on (Π_j) than on (Π_{j-1}) is considered in Section 5.

whose re-election depends on past performance discount more the future and have *shorter expected life spans* than agents who are re-elected with certainty. The presumption is that “more myopic” policymakers will be more likely to cheat on a foreign partner. In what follows, we shall show that this might not be the case and that electoral incentives might actually help to sustain international cooperation. The intuition behind this result is that endogenous re-election leads to *relative* changes in the continuation payoffs of cooperation and noncooperation.

Notice that a deviation in the second period leads both to a higher per-term payoff for the country ($\Pi^C + \Pi^D > \Pi^D + \Pi^N$) as well as a higher probability of re-election for the policymaker ($p(\Pi^C, \Pi^D) > p(\Pi^D, \Pi^N)$). In what follows, we can thus ignore the first-period incentive constraint and focus on the second-period constraint.⁹ The punishment associated with a second-period deviation from cooperation can be written as

$$\Omega_R \equiv \Omega(\Pi^C, \Pi^N, \delta, p^C, p^N, p^D) = p^C V_R^C - p^D V_R^N, \quad (10)$$

where $p^D \equiv p(\Pi^C, \Pi^D)$ is the probability of being re-elected when defecting in the last period of the mandate when the other country is cooperating. Notice that the severity of the punishment decreases with p^D and p^N and increases with p^C . A common choice of C can be supported by Nash-reversion punishment strategies as long as the following incentive constraint is satisfied:

$$\Pi^D - \Pi^C \leq \delta \Omega_R, \quad (11)$$

which identifies a critical discount factor δ_R above which the efficient cooperative equilibrium can be sustained under endogenous re-election.

The assumption of retrospective voting implies that, by defecting at the end of her mandate, a policymaker can increase the payoff of his country during the current mandate; in turn, this entails a better performance and thus higher chances of immediate re-election ($p^D > p^C$). However, cheating on the foreign partner today implies that there will be no

⁹The purpose of this section is to show that re-election incentives can allow to sustain the efficient cooperative equilibrium even when the discount factor is below δ_I . It can easily be shown that for that critical value of the discount factor the value of a defection in the first period is smaller than the value of deviation in the second period since $\Pi^C + \delta_I \Pi^D > \Pi^D + \delta_I \Pi^N$ and $p(\Pi^C, \Pi^D) > p(\Pi^D, \Pi^N)$. Our analysis is thus valid for values of the parameters for which the first-period incentive constraint is not binding. Notice, however, that when the discount factor is low enough, a defection might still occur in the first period.

cooperation forever after, leading to lower future payoffs and thus lower chances of being re-elected again ($p^C > p^N$).

Since re-election probabilities have no effect on the short-run deviation gains—which are equal to $\Pi^D - \Pi^C$ as in the previous scenarios—we can focus our analysis on the comparison between the punishment that can be inflicted for cheating on a foreign partner under endogenous re-election (Ω_R in equation (10)) and under automatic re-election (Ω_I in equation (4) above). In the remaining of this section, we shall show that the former can be more severe than the latter, implying that re-election incentives can help to discipline policymakers.

When the likelihood of policymakers’ re-election depends on their past performance, a deviation from cooperation generates two new effects which are not present when re-election occurs with certainty. On the one hand, introducing re-election incentives gives rise to a short-term “re-election boost” effect, since a deviation in the last period of a policymaker’s mandate increases not only her flow payoff, but also her probability of immediate re-election. This effect decreases the punishment for defecting, thus making cooperation less appealing. On the other hand, endogenous re-election lowers the probability of holding office in the future, decreasing the expected life span of politicians. As shown below, this can generate a “re-election penalty” effect, which increases the punishment for cheating on a foreign partner, thus helping to sustain international cooperation.

To see whether re-election increases or decreases the long-term punishment of defecting, we must compare the relative changes in the continuation payoffs. We can show that, if p^N is low enough compared to p^C , the long-term consequences of a deviation will be worse for policymakers whose renewal depends on their past performance than for policymakers who are automatically re-elected. In particular, we can solve for the critical re-election probability $\tilde{p}^N(p^C, \Pi^C, \Pi^N, \delta)$ below which retrospective voting creates a long-run re-election penalty effect:

$$\tilde{p}^N(p^C, \Pi^C, \Pi^N, \delta) = \frac{\Pi^N - \Pi^C(1 - p^C) - \delta^2 \Pi^N p^C}{\Pi^N - \delta^2(\Pi^C(1 - p^C) + \Pi^N p^C)}. \quad (12)$$

It follows that re-election incentives can enhance international cooperation if the long-run re-election penalty effect is positive (i.e., $p^N < \tilde{p}^N(p^C, \Pi^C, \Pi^N, \delta)$) and more than offsets the short-term re-election boost effect.

Proposition 1 *Re-election incentives can make it easier to sustain the efficient cooperative equilibrium between policymakers with finite but renewable mandates than between infinitely-lived policymakers.*

Proof: A sufficient condition for this result to hold is to have $p^D = 1$, p^C approaching p^D and p^N approaching zero. Notice that this is the scenario which maximizes the punishment under retrospective voting, where the chances of an agent's re-election increase in the payoff obtained by her organization during the previous two periods mandate. In this limit case, there is no re-election boost effect and the re-election penalty effect is maximized, implying that the punishment from defecting from cooperation is more severe than in the case of automatic re-election:

$$\Omega_R - \Omega_I = \frac{\delta^2(\Pi^N(1 - p^N))}{(1 - \delta)(1 - \delta^2 p^N)} > 0. \quad (13)$$

More generally, we can look at the relative size of the re-election boost and re-election penalty effects for which Proposition 1 is satisfied. To do so, let us set $p^D = 1$ and $\delta = \delta_I$ as in the infinitely-lived case; by applying the implicit function theorem to (11), we can then find the extent to which p^N must decrease (i.e., the re-election punishment must increase) when p^C decreases (i.e., the re-election boost increases) so as to keep the incentives constraint satisfied:

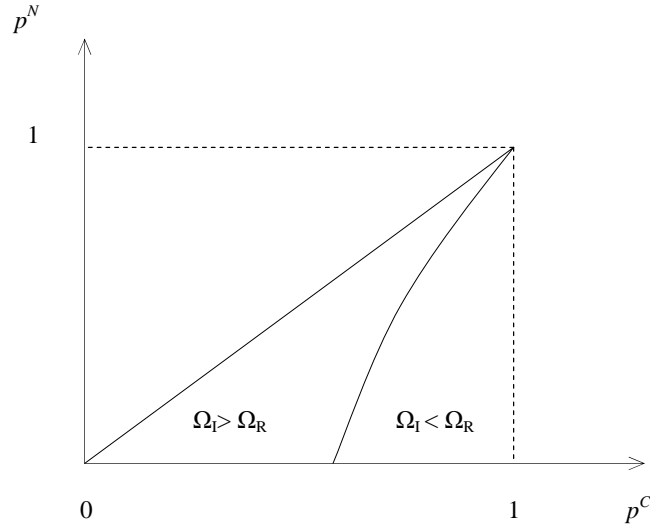
$$\frac{dp^N}{dp^C} = \frac{\Pi^C(\delta_I^2 p^N - 1)^2}{\delta_I^2 \Pi^N(\delta_I p^C - 1)^2} > 0. \quad (14)$$

Expression (14) implicitly defines the locus of points $\tilde{p}^N(p^C, \delta_I)$ for which the re-election boost and the re-election penalty effects exactly offset each other and thus the critical discount factor is the same as in the case of infinitely-lived policymakers. This implies that electoral incentives can play a disciplining role on policymakers and thus foster international cooperation whenever $p^N < \tilde{p}^N(p^C, \delta_I)$. \square

Notice that re-election can only discipline policymakers if they have something to lose from being fired compared to remaining in office in the non-cooperative equilibrium. Therefore, given that we have normalized the payoff of not being on office to zero, for Proposition 1 to hold, we must have $\Pi^N > 0$.

Figure 1 depicts the incentive constraints for the case of automatic re-election and for the case of endogenous re-election. The automatic re-election case is represented by the forty-five degree line, along which $p^D = p^C = p^N = 1$, while the endogenous-horizon case is captured by the curve $\tilde{p}^N(p^C, \delta_I)$ on the right, as defined above. The area in between the curves represents scenarios in which automatic renewal of the mandate is better for international cooperation, while the area to the left of the $\tilde{p}^N(p^C, \delta_I)$ locus captures scenarios under which endogenous re-election is better.

Figure 1: Incentive Constraints under Automatic and Endogenous Re-election



5 The Impact of Term Limits

In the previous two sections we have focused on the problem of sustaining international cooperation when policymakers's re-election is either certain or possible. In this section, we consider a third alternative scenario, one in which re-election is ruled out by the existence of term limits. Indeed, many countries impose term limits on the executive power. For example, the US constitution and many Latin American constitutions prohibit the re-election of the president, or set to two the maximum number of consecutive terms an incumbent can serve.

Common intuition about economic transactions suggests that term limits, although justifiable from a domestic point of view¹⁰ by reducing policymakers' horizons, will impede them from entering into long-term relationships and may thus hinder the degree of international cooperation that they can sustain. The objective of the analysis carried out in this section is

¹⁰Historically, term limits arose to avoid the excessive power of the executive. In the US, for example, constitutional limits were only put into place in 1951, after Franklin Roosevelt occupied the presidency for four consecutive terms. Before that, an informal two-term tradition existed. This custom goes back to Washington, who set a precedent of not seeking a second re-election. Behind this two-term tradition in the US was the principle of rotation in office, so the government would not depend too much on a particular person, which could hinder the development of strong political institutions.

to show that this presumption may actually be wrong: if voters attach more importance to recent events in their decision of whether or not to re-elect an incumbent, the introduction of term limits may actually allow to sustain more international cooperation.

5.1 The last-period effect of term limits

Recall that an agent's payoff has been defined as the sum of the payoffs of her organization while she is in office. Under this assumption, an agent facing term limits will always have incentives to defect in the last period of the mandate, given that she cannot be punished for doing so. Therefore, when the agents' life spans are exogenously fixed the equilibrium set of the repeated PD game does not include the outcome in which agents act cooperatively over time. It follows that *the efficient cooperative equilibrium is not sustainable when policymakers face term limits*.

Notice that, if the beginning and the end of the agents' mandates *coincide*, the equilibrium set of the repeated game will only include the Nash equilibrium of the stage game and cooperative behavior should never be observed. In this case, term limits will always hinder international cooperation. However, as shown below, some degree of cooperation is achievable, despite the finiteness of the agents' horizon, when their life spans overlap.

5.2 Cooperation with staggered mandates

In the remaining of this section, we consider situations in which policymakers' of different countries have *staggered*.¹¹ Indeed, there is usually no single date at which there is a complete turnover of the leadership in all countries, and each policymaker normally overlaps with different generations of policymakers from other countries.

Consider again the setting in which each player's term lasts $T = 2$ periods. When terms last two periods and do not coincide, we have the simplest possible OLG structure, in which there is only one period of overlap between the leaders of the two countries. Policymakers belong to two different generations: at any point in time one player is "young" and the other is "old". This term structure is described in Figure 2 below, in which $(A, 1)$ represents the policymaker of country A who is in office starting at period 1. This means that during her

¹¹This is the type of setup considered in the literature of OLG repeated games (e.g., Crémer, 1986; Salant, 1991; Kandori, 1992; Smith, 1992).

mandate in periods 1 and 2 she will face both an “old” and a “young” policymaker from the other organization, $(B, 0)$ and $(B, 2)$ respectively.

Figure 2: Policymakers with Two-Period Mandates and One-Period Overlaps

		Time						
Policymakers	...	1	2	3	4	5	6	...
A	...	$(A, 1)$	$(A, 1)$	$(A, 3)$	$(A, 3)$	$(A, 5)$	$(A, 5)$...
B	...	$(B, 0)$	$(B, 2)$	$(B, 2)$	$(B, 4)$	$(B, 4)$	$(B, 6)$...

Clearly, in this setting, there is no equilibrium in which a policymaker in the terminal year of her life span will choose to cooperate with the other country, so the efficient equilibrium along which the two countries cooperate over time cannot be sustained.

However, we can show that there exists a subgame-perfect equilibrium in which policymakers play C in the first period and D in the second period, and any deviation from equilibrium is punished by reversion to the static Nash equilibrium. Along this equilibrium path, countries can attain a higher payoff than under no cooperation.¹²

The outcome path of this equilibrium is illustrated in Figure 3 below. Along this equilibrium path, a policymaker is rewarded with a “bonus” or punished when “old”, depending on her performance when “young”.¹³ If an agent in Organization A deviates when young, she is punished by the next person in Organization B , who switches her action from C to

¹²In a prisoners’ dilemma as in Table 2 above, the average (per term) payoff that can be achieved along this equilibrium path is above the Nash-reversion payoff since $(\Pi^P + \Pi^D)/2 > \Pi^N$.

¹³This is in line with results obtained by the literature on OLG repeated games. For example, Crémer (1986) considers the internal organization of a firm in which workers, in each period of their lives, can choose to work or shirk. He shows that it is possible that all players, except those in the last period of life, exert effort even though exerting no effort is a dominant strategy in the one-shot game. In this equilibrium, young players work hard and enjoy the fruit of their labor later in life. Old agents (“retirees”) are not expected to work hard but do gain from the labors of the young.

D . It follows that under this strategy profile no policymaker has incentives not to punish a defector, since playing D is better when equilibrium strategies have reverted to the static Nash Equilibrium.¹⁴

Figure 3: Cyclical Equilibrium Path

		Time							
Policymakers and Actions		...	1	2	3	4	5	6	...
A		...	$(A, 1)$	$(A, 1)$	$(A, 3)$	$(A, 3)$	$(A, 5)$	$(A, 5)$...
		...	C	D	C	D	C	D	...
B		...	$(B, 0)$	$(B, 2)$	$(B, 2)$	$(B, 4)$	$(B, 4)$	$(B, 6)$...
		...	D	C	D	C	D	C	...

For a policymaker not to have incentives to deviate from C to D when young, the following condition must hold:

$$\Pi^N + \delta\Pi^N \leq \Pi^P + \delta\Pi^D. \quad (15)$$

A necessary and sufficient condition for this outcome to be achieved is that players are sufficiently patient, i.e., that the discount factor exceeds the following critical value:

$$\delta_F = \frac{\Pi^N - \Pi^P}{\Pi^D - \Pi^N}. \quad (16)$$

We can thus state the following result:

Result 2 *In the presence of term limits, the best sustainable equilibrium is one in which policymakers cooperate when “young” and defect when “old”.*

¹⁴Notice that the equilibrium payoffs would be the same if cooperation would start afresh after a deviator has been punished. This would not change the incentives of a potential deviator, since renewed cooperation would only happen after she has left office.

Looking at the example of Table 2 above, we can see that the critical degree of patience which allows policymakers with non-renewable mandates to sustain the cyclical cooperative equilibrium described in Figure 3 is equal to $\delta_F = 0.8$.¹⁵

Interestingly, in our repeated prisoner’s dilemma setup, it is the very existence of term limits that gives rise to policy cycles. Notice that this is exactly the opposite of what is predicted by the literature on political business cycles, according to which term limits should eliminate policy cycles (e.g., Rogoff, 1990).

It should also be stressed that the cyclical nature of the patterns of international relations in the presence of term limits would be attenuated if we were to extend the length of the agents’ mandate and of their overlaps. Indeed, the theoretical literature on OLG repeated games shows that, if the stage game is repeatedly played by overlapping generations of finitely-lived players, any payoff stream that exceeds individually rational payoffs is sustainable as a subgame-perfect equilibrium as long as individuals are patient enough, and the length of the overlaps between individuals is long enough.¹⁶

5.3 Can term limits improve cooperation?

In this subsection, we consider the possibility that term limits increase cooperation between policymakers. We show that this can indeed be the case if citizens suffer from a *recency bias* in their voting decisions. As stressed by an increasingly vast literature in political science, voters often behave according to the so-called “what have you done for me lately?” principle, attaching more importance to recent events in their appraisal of politicians’ performance (e.g., Ferejohn, 1986; Sarafidis, 2007). Many studies have found evidence of this voting distortion in national elections in the United States (e.g., Lewis-Beck and Stegmaier, 2000; Eisenberg and Ketcham, 2004) and in other countries (e.g., Lohmann *et al.*, 1997).¹⁷ For example,

¹⁵As in standard infinitely-repeated games, in infinitely-repeated OLG games there are multiple equilibria. The equilibrium described by Result 2 is the most efficient of the possible equilibria.

¹⁶Folk-theorem results for OLG repeated games have been proved by Salant (1991), Kandori (1992) and Smith (1992). See Benoit and Krishna (1999) for a review.

¹⁷In behavioral economics, recency effects are a cognitive bias that results from disproportionate salience of recent stimuli or observations, often attributed to limited memory. If time erodes memories, then politicians should release newsworthy items, referred to as successes or good news, close to the re-election date (Sarafidis, 2007). Recency bias can also arise in scenarios with fully rational voters that learn over time about the competency of politicians. If information is revealed over time, it is then optimal for voters to react to recent

Eisenberg and Ketcham (2004), using data for national US elections from 1932 to 2000, find that only the most recent year of economic performance significantly determines the incumbent’s party’s vote share. In the remaining of this section we will show that, when the chances that a policymaker will be re-elected depend crucially on her recent performance—rather than on her overall past performance—term limits may paradoxically *help* to achieve more cooperation between countries.

We first introduce recency bias in the model and see its impact on policymakers’ incentives to cooperate. We show that this gives policymakers incentives to collude to improve their electoral prospects. In particular, they can take turn defecting just before elections when voters pay the most attention to the results. This can lead to inefficiencies that term limits can help eliminate.

Consider again the simple setup in which mandates last $T = 2$ periods and assume the existence of a recency bias: voters attach more importance to second-period events than to first-period events when deciding whether to re-elect an incumbent. In particular, let us focus on the most extreme case of recency bias, in which the probability of re-election depends only on the second-period’s performance, i.e., $p(\Pi_{j-1}, \Pi_j) = p(\Pi_j)$. Then, if policymakers cooperate during both the first and second period of their mandates, they obtain the following continuation payoff:

$$V^C(\Pi^C, \delta, p_{RB}^C) = \frac{\Pi^C(1 + \delta)}{1 - \delta^2 p_{RB}^C}. \quad (17)$$

where p_{RB}^C corresponds to the probability of getting re-elected when the country’s payoff in the last period of the mandate is Π^C . However, under recency bias, sustaining international cooperation over time—the efficient equilibrium from the perspective of the countries—might not be the best equilibrium from the point of view of policymakers. To verify this, consider the alternative equilibrium in which the two policymakers collude to increase their chances of re-election, by playing C in the first period and D just before re-election. This yields them

$$V^D(\Pi^D, \Pi^P, \delta, p_{RB}^D) = \frac{\Pi^P + \delta \Pi^D}{1 - \delta^2 p_{RB}^D}, \quad (18)$$

where p_{RB}^D is the probability of getting re-elected when the country’s payoff in the last period of the mandate is Π^D . Notice that the presence of a strong recency bias reinforces the short-term re-election boost effect, when the difference $p_{RB}^D - p_{RB}^C$ is larger than the difference

information. See Rogoff and Siebert (1988) for a model along those lines.

$p(\Pi^C, \Pi^D) - p(\Pi^C, \Pi^C)$. This result follows immediately from the comparison between (17) and (18):

Result 3 *In the presence of a recency bias in voting, policymakers of different countries may have incentives to help each other to get re-elected, at the expense of cooperation between their countries.*

Proof: Whenever $V^D(\Pi^D, \Pi^P, \delta, p_{RB}^D) > V^C(\Pi^C, \delta, p_{RB}^C)$, policymakers will have incentives to collude to get re-elected. It is straightforward to verify that this condition will be satisfied if and only if

$$p_{RB}^D > \frac{(1 + \delta)\Pi^C + (\Pi^P + \delta\Pi^D)(\delta^2 p_{RB}^C - 1)}{\delta^2(1 + \delta)\Pi^C}. \quad (19)$$

Condition (19) defines situations in which policymakers are willing to accommodate a defection in the first period—since being cheated upon and obtaining a payoff of Π^P when young does not affect their re-election probability when old—in exchange for being able to attain a defection payoff Π^D in the second period—since this maximizes their re-election chances.¹⁸

□

Therefore, if voting is strongly biased in favor of recent performance, re-election incentives are less effective in disciplining policymakers. The intuition behind this result is that this distortion in the voting behavior allows policymakers to trade political concessions across different time periods.

Notice that in the simple case in which $T = 2$ collusion between re-electable policymakers gives rise to the same policy cycle described by Figure 3 above for the case of term limits, in which policymakers play C in the first period of their mandate and D in the second period. However, policymakers have opposite reasons to play the same equilibrium strategies: if their mandates are non-renewable, they defect in the last period because they cannot be re-elected; if instead their life spans are endogenously determined and voting exhibits a strong recency bias, they defect in the last period precisely because they want to maximize their chances of re-election.

Our analysis of the simple case in which mandates last two periods shows that endogenous re-election in the presence of a recency bias can be as bad for international cooperation as

¹⁸For example, in the PD game in which countries' payoffs are given by Table 2 above, policymakers will have incentives to collude to get re-elected only if the re-election probability associated with a second-period defection is larger than $\frac{6 - 4\delta + 9\delta^3 p_{RB}^C}{6\delta^2(1 + \delta)}$.

term limits. If, however, we extend the length of the mandates to $T > 2$, we can easily find situations in which the introduction of term limits might actually allow to achieve more international cooperation.

Consider the following example, in which mandates last for $T = 4$ periods, with two-period overlaps. This term structure is captured by Figure 4 below.

Figure 4: Policymakers with Four-Period Mandates with Two-Period Overlaps

	Time							
Policymakers	...	1	2	3	4	5	6	...
A	...	(A, 1)	(A, 1)	(A, 1)	(A, 1)	(A, 5)	(A, 5)	...
B	...	(B, -1)	(B, -1)	(B, 3)	(B, 3)	(B, 3)	(B, 3)	...

Let us assume that the re-election probability depends only on the performance of a policymaker over the last two periods of her mandate. In this scenario, we can show that, if policymakers are patient enough (i.e., δ approaching unity), they might have incentives to collude by playing C during the first two periods and D over the last two periods. Along this equilibrium, they will obtain a per-term payoff equal to

$$V^{DD}(\Pi^D, \Pi^P, p^{DD}) = \frac{2(\Pi^D + \Pi^P)}{1 - p^{DD}}, \quad (20)$$

where p^{DD} is the probability of getting re-elected when the country's payoffs in the last two periods of the policymaker's mandate are equal to Π^D . This must be compared with what policymakers could achieve by sustaining cooperation over time, i.e., by playing C in all four periods of their mandates:

$$V^{CC}(\Pi^C, p^{cc}) = \frac{4\Pi^C}{1 - p^{CC}}, \quad (21)$$

where p^{CC} is the probability of getting re-elected when the payoffs of the country in the last two periods of the mandate are given by Π^C . This must also be compared with what they

could attain by deviating in the last period only:

$$V^{CD}(\Pi^C, \Pi^D, \Pi^P, p^{CD}) = \frac{2\Pi^C + \Pi^D + \Pi^P}{1 - p^{CD}}, \quad (22)$$

where p^{CD} is the probability of getting re-elected when the country's payoffs in the last two periods in which the policymaker is in office are Π^C and Π^D . It is straightforward to verify that, if the chances of re-election when obtaining a payoff of Π^D in the last two periods are much higher than those associated with obtaining $2\Pi^C$ or $\Pi^C + \Pi^D$, then policymakers will gain by colluding.¹⁹ From the point of view of the countries, the collusive equilibrium yields a per-term payoff of $2(\Pi^D + \Pi^C)$. Notice that is not only lower than the payoff that they could attain if voting did not suffer from a recency bias ($4\Pi^C$), but also than the payoff they could achieve if mandates were non-renewable ($2\Pi^C + \Pi^D + \Pi^P$).

We summarize this discussion in the following proposition:

Proposition 2 *In the presence of a recency bias in voting, the introduction of term limits may help to sustain international cooperation.*

The analysis presented in this section suggests that, if voters display a strong recency bias in their appraisal of politicians' performance, we should expect policymakers of different countries to collude, trading political concessions across different time periods. In this case, re-election incentives can hinder international cooperation and the introduction of term limits may actually be beneficial. Our analysis of how re-election incentives could affect international cooperation in the presence of a recency bias could help to explain, for example, why Prime Minister Tony Blair was accused of using British troops in Iraq to assist President Bush' re-election campaign: "So many people believe that the request for a redeployment of British troops has little or nothing to do with operational needs, and everything to do with political ones. Nothing to do with Iraqi re-elections, and everything to do with American re-elections . . . Ahead of a British re-election next May, Blair is hoping President Bush will return the favor by helping him in his second term" (BBC News, 22 October, 2004).

¹⁹For example, when the payoff structure of the PD game is described by Table 2 above, policymakers will play C during the first two periods and D over the last two periods if $p^{DD} > \frac{1}{4}(1 + 3p^{CC})$ and $p^{DD} > \frac{1}{7}(1 + 6p^{CD})$.

6 Conclusion

In this paper we have examined the impact of electoral incentives on the sustainability of cooperation between two infinitely-lived organizations (countries) that are run by agents (policymakers) with finite but potentially renewable mandates.

In general, our analysis shows that making the contract of the agents endogenously renewable can help to sustain cooperation between their organizations. On one hand, “mortal” agents have shorter expected life spans than “immortal” agents and this makes them less prone to cooperate; on the other hand, the “fear of dying” and losing the benefits associated with holding office can have a disciplining effect, making “mortal” agents less likely to defect from agreed-upon policies.

Our results suggest that both the degree of international cooperation sustainable between countries and the nature of the policy patterns—stationary or cyclical—should depend crucially on the following domestic political features: the type of political regime of the countries involved (democratic or autocratic); whether or not country leaders face term limits; and the way voters evaluate the past performance of incumbents when deciding on their re-election.

Our analysis also contributes to the debate over the desirability of term limits. The presumption is that term limits will impede policymakers to engage in long-term relationships and thus hinder the degree of international cooperation that they can sustain. The analysis carried out in this paper shows that this presumption may be wrong if the chances that incumbent policymakers get re-elected depend on the recent economic performance of their countries; in this case, the introduction of term limits may actually allow to sustain more cooperation between countries, by eliminating policymakers’ incentives to “collude” to get re-elected.

The theoretical model presented in this paper can be applied to study differences in the patterns of international cooperation between dictatorships—in which leaders are not subject to re-election—and democracies—in which incumbent leaders are subject to re-election. It would be interesting to consider various aspects of international relations, such as negotiations between heads of state on trade, transboundary pollution or arm controls, though some policy areas may be more responsive to electoral incentives than others. Our analysis could also be applied to the study different types of ongoing organizations managed by individuals with shorter tenures. For example, one could examine the sustainability of collusion between oligopolistic firms run by managers, under alternative assumptions about the renewal of the managers’ contracts.

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