International Cooperation, Parties and Ideology - Very preliminary and incomplete

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Abstract

I combine a model of international cooperation with a model of domestic politics with primaries and national elections between candidates of two different parties. International cooperation is modeled as a repeated prisoner’s dilemma game between two countries. I compare four different types of equilibria. In the country specific grim trigger equilibrium, domestic politics does not affect international cooperation and the standard results for the repeated prisoner’s dilemma game apply. The second equilibrium is based on McGillivray’s and
Smith’s (2008) idea of leader specific punishment. If a prime minister cares sufficiently about staying in office, the threat of replacing him in a primary if he does not cooperate internationally can change a politician’s incentives and make a larger maximum equilibrium level of cooperation possible. I introduce two new types of strategic interaction to the literature that are specific to my model. In the case of party specific punishment without international dominance, as punishment for a deviating on the international level, prime ministers are not only replaced, but in addition the party to which the prime minister belongs loses power. This increases the severity of punishment and consequently increases the maximum possible level of international cooperation. However, voters are only able to commit to such a strategy if maximum equilibrium level of international cooperation is large enough to justify replacing a popular prime minister. In the case of party specific punishment with international dominance, the voters always reelect a prime minister who cooperates internationally, even if they prefer the candidate of the other party ideologically. In this setting, a deviating politician loses office forever instead of keeping it forever. Consequently, the maximum achievable level of international cooperation is very large, but elections no longer lead to the victory
of the candidate preferred by the majority of voters. JEL F5 D72

1 Introduction

Under what conditions is international cooperation possible when the participating countries have incentives to deviate from their promises? With the current problems in the governance of the European Union this important question has new relevance not only for political scientists, but also for economists. Under what conditions are international treaties credible and enforceable and under what conditions can we predict their demise within a short period of time? This question is not only important to understand the failures of past agreements as for example the Maastricht treaty but also to valuate the future enforceability of a European banking union.

(Add something on liberal theory of international cooperation and other earlier theories and if possible some work by economists)

In a series of papers and a book (McGillivray and Smith 2008) McGillivray and Smith (short MS) develop a theory of international cooperation using a simple repeated prisoner’s dilemma setup. They show that the fact that countries are run by elected politicians who are agents of the voters gives
credibility to international cooperation where it would not be an equilibrium without elections. The reason is that a country’s leader can be punished with the loss of his office what is often a much harder punishment for a politician than the loss of the advantages of a continuation of international cooperation. Voters, who are in the MS model indifferent between potential prime ministers, have the incentive to punish their leaders to restore international cooperation even when these leaders defection is actually in the voters interest when it occurs.

I present a model of international cooperation that includes more institutional features of domestic politics than the MS model but includes the MS model of leader specific punishment as a special case. MS assume that a leader can be replaced (at a one-time cost) by a similar leader. This possibility also exists in my model. In addition to the possibility to replace a prime minister by a new but in all important features identical candidate, I allow the prime ministers to be replaced in a general election between two candidates of two different parties. In a two-party system the victory of the opposition party has an impact on domestic policies. MS do not distinguish between different ways of leader replacement and thus have no possibility to consider the potential additional costs and benefits in terms of domestic
policies. For a prime minister, it is a harsher punishment to be replaced by a prime minister of a different party. There are two potential reasons for this. First, a prime minister from a different party pursues different policies for ideological reasons. Second, even a prime minister who has lost his office can still profit financially from his party being in office because this is likely to increase the value of his political connections. Consequently, leaders for whom the threat of losing office is not harsh enough to ensure international cooperation might be able to commit credibly to international agreements when they are threatened by the loss of office to a candidate who is supported by a different political party.

In spite of assuming a democratic two-party system, my model is nonetheless flexible enough to deal with non-democracies by assuming that the cost of a switch of party in power goes to infinity for the median voter in such a system.

I show that international cooperation becomes more difficult when a country's electorate is more ideologically divided and/or the preferences of the median voter change more often. On the other hand, when party leaders care more about office because politicians are more ideological this can support international cooperation because the threat of being replaced by the leader
of the other party becomes more severe for the incumbent prime minister.

If the preferences of the median voter change the leader will lose his job even without a threat of punishment by other countries. This means that the incentives to cooperate to keep office are diminished. However, when a party changes its candidate for the office of prime minister before an election this comes very close to what MS describe as leader change. I have the alternative "party specific punishment" strategy. Cooperation is only resumed if not only the prime minister is exchanged but the leader of the ruling party is replaced as party leader.

Another new result is that domestic policies can be captured by the overwhelming importance of international cooperation. In this case, elections do not longer change domestic policies because the median reelects the incumbent prime minister to ensure international cooperation even when she prefers the candidate of the opposition party.

2 The Model

There are two countries $j = 1, 2$ with two competing political parties in both country, $L_j$ and $R_j$. In every period $t$ a party has a party leader. The leader
of party $L_j$ is denoted $l_{j,t}$ and the leader of party $R$ is denoted by $r_{j,t}$. The party leader whose party wins the elections in period $t$ becomes (or stays) prime minister and decides about the countries contribution to international cooperation in period $t+1$.

The median voter in country $j$ in period $t$ is called $m_{j,t}$ and prefers either party $L$ or party $R$ depending on her type. Her type is either $l$ if she prefers party $L$ or $r$ if she prefers party $R$.

The utility of the median voter in country $j$ of type $i$ in period $t$ is:

$$u_{j,i,t}^m = \sum_{s=t}^{\infty} \beta^{s-t} (p_{j,s} + b \cdot o_{j,i,s}),$$

with $i = l, r$.

$p_{s,j}$ is the payoff from international cooperation that country $j$ receives in period $s$. The variable $o_{j,i,s}$ takes the value 1 if party $i$ is in power in country $j$ in period $s$, otherwise it takes the value 0. Thus, $b_{j,t} > 0$ is a payoff that the median voter receives if she shares the ideology of the party in power in period $t$. We assume that a median voter is infinitely long lived and thus also cares about all future periods while his preferences for one of the parties do not change. However, the identity of the type of the median voter changes
between periods with probability \((1 - \alpha)\), presumably because not the same voters participate in every election or additional new voters are born.

The utility function of a (potential) party leader is:

\[
    u_{j,i,t}^l = \sum_{s=t}^{\infty} \beta^{s-t} (p_{j,s} + v^p \cdot o_{j,i,s} + v^l \cdot o_{j,i,s,l})
\]

Party leaders profit from the benefits of international cooperation just as voters do. In addition, a party leader has utility \(v^p\) from his party being in power in period \(s\). Moreover, the variable \(o_{j,i,s,l}\) takes the value 1 if leader \(l\) of party \(i\) is prime minister in country \(j\) in period \(t\). Thus, a leader has an additional utility \(v^l\) in a period in which he serves as prime minister. The potential leaders of party \(i\) in country \(j\) are all identical in their preferences. However, they derive utility \(v^l\) only from being in office themselves.

The utility function of a median party member is:

\[
    u_{j,i,t}^p = \sum_{s=t}^{\infty} \beta^{s-t} (p_{j,s} + v^p \cdot o_{j,i,s} - k \cdot r_{j,i,s}),
\]

where \(r_{j,i,s}\) takes the value 1 when the prime minister who is a member of party \(i\) in country \(j\) is removed in period \(s\) and 0 otherwise. Thus, \(k\) is the one-time cost of outing an incumbent prime minister before the elections.
Payoffs from international cooperation  We model international cooperation as a prisoner dilemma problem with continuous levels of cooperation. The larger the level of cooperation, the more tempting a deviation from cooperation becomes.

In a standard prisoner dilemma problem we would have 4 possible payoffs $p_{j,t}$ of international cooperation in country $j$. Both countries receive the payoff $p^{cc}$ if both countries play cooperate. If one country plays cooperate and the other country plays not cooperate the cooperating country receives $p^{cd}$ and the noncooperating country $p^{dc}$. If neither country cooperates, both receive $p^{dd}$. The players face a prisoner’s dilemma if:

$$
p^{cd} < p^{dd},
$$

$$
p^{cc} < p^{dc},
$$

$$
p^{cc} > p^{dd}.
$$

If the game was played only once, both players had a dominant strategy of not cooperating because $p^{cd} < p^{dd}$ and $p^{cc} < p^{dc}$. Whatever the other player does, a player is better off if she does not cooperate. The only Nash equilibrium in the one-shot game is that both players play noncooperation
and receive both $p^{dd}$. What makes the game a prisoner’s dilemma is the fact that $p^{cc} > p^{dd}$, both players would be better off if they somehow could agree to cooperate instead of both of them playing noncooperation.

To endogenize the level of international cooperation I allow for different levels of cooperation $c$ to take place.

We assume that the 4 payoffs describe a prisoner’s dilemma situation for any level of $c$:

$$p^{cd}(c) < p^{dd}(c),$$

$$p^{cc}(c) < p^{dc}(c),$$

$$p^{cc}(c) > p^{dd}(c).$$

Where now $p^{cc}(c)$ denotes the payoff from cooperation if both players play $c$. $c$ can be any nonnegative number. Returns from cooperation are increasing in $c$ so that $p^{cc}(c) > 0$ for all $c$. Thus, if international cooperation were a one-shot game the only equilibrium would be noncooperation by both countries.

To simplify things further I assume that the functional form is more specifically given by:
\[ p^{cc}(c) = \sqrt{c}, \]
\[ p^{dc}(c) = c + \sqrt{c}, \]
\[ p^{cc}(c) > p^{dd}(c). \]

Consequently, \( p^{dd} = p^{cc}(0) = 0 \) and there is no need for any additional assumption on \( p^{cd}(c) \) besides \( p^{cd}(c) < p^{dd}(c) \).

**The order of moves** International cooperation allows for the repeated interaction of countries. Because it is unknown at what point of time a country will cease to exist the stage game is repeated infinitely many times.

In every period \( t \):

1. The level of international cooperation is decided simultaneously by the prime ministers in the two countries.

2. The prime ministers’ parties in both countries decide if they replace their prime minister by a different party leader. If a party does this it has to pay a cost \( k \).

3. Nature chooses the identity of the median voter. With probability \( \alpha \) she has the same type as the incumbent party, with probability \( 1 - \alpha \) she is
of the other type.

4. Elections take place, in both countries median voter decides which of
the two candidates in each country becomes or remains prime minister. If
the prime minister loses office he is automatically replaced as party leader
(without an additional cost for his party).

5. All players receive their per-period utility for period $t$.

When the players have received their per period utility, period $t$ is over
period $t + 1$ begins. Whoever was prime minister or party leader at the end
of period $t$ has this function also in the beginning of period $t + 1$.

2.1 Solving the model

As usual in infinitely repeated games there is not just one subgame perfect
equilibrium of the game. Consequently, I will first derive the conditions
for subgame perfect equilibria and use them to derive maximum achievable
levels of cooperation depending on the parameter values for the 4 types of
equilibrium that I present. Then, I compare the different equilibria and check
under what conditions what type of equilibrium allows for the maximum level
of cooperation.
2.1.1 Finding subgame perfect equilibria

This section is a short reminder of some well-known results.

Suppose that a strategy profile does not constitute a subgame perfect equilibrium in an infinitely repeated game. Then there is a player and a subgame in which this player has a strictly profitable deviation that differs in only one stage of the game from the given strategy of the player. See for example (Fudenberg and Tirole 1991).

2.2 International cooperation with country specific grim trigger strategies.

The standard theory not only of international cooperation, but of all kinds of cooperation in an repeated prisoner’s dilemma setting shows that cooperation is possible if the prisoner’s dilemma stage game is repeated infinitely many periods if the future is valued sufficiently (that is if $\beta$ is large) even without any principal-agent relationship between politicians and voters or party members. Consequently, it is not surprising that if voters and party members ignore international cooperation in their decision-making, it is nonetheless rational for prime ministers of different countries to agree on some cooperation.
The basic idea goes back to (Axelrod and Keohane 1985).

2.2.1 The strategies of the players in an equilibrium with country specific grim trigger strategy

We divide the game in two phases to facilitate the description of the strategies. The phases are cooperation and noncooperation. The game begins in phase cooperation and switches to noncooperation as soon as one of the prime ministers offers a level of cooperation below the agree level of cooperation $c^a$. Once the game has entered the noncooperation phase there is no return to cooperation.

The strategy of the prime ministers Both prime ministers play an agreed level of cooperation $c^a$ so that that $p_{j,s} = c^a$ as long as the game is in phase cooperation. In phase noncooperation they play both $c = 0$ so that $p_{j,s} = 0$ if period $s$ is in a noncooperative phase.

The strategy of the parties Parties never replace their leaders.

The strategy of the median voters Median voters always elect the party leader of their own type.
2.2.2 Conditions that need to hold for an equilibrium with country specific grim trigger strategies

Neither voters nor parties have any influence on either the level of international cooperation. Consequently, by deviating from the given equilibrium strategies they would only end up with a Prime Minister they like less or paying the cost of a leader replacement without changing anything else.

The one condition that has to hold for a country specific grim trigger strategy to hold is that the gain from a deviation in the current period for a prime minister $p^{dc}(c) - p^{cc}(c)$ is not larger than the punishment of Nash reversion forever or receiving $p^{dd}(c)$ forever instead of $p^{cc}(c)$ or:

$$p^{dc}(c) - p^{cc}(c) \leq \frac{\beta}{1 - \beta} (p^{cc}(c) - p^{dd}(c)),$$

or, given the functional form we assumed: $c + \sqrt{c} - \sqrt{c} \leq \frac{\beta}{1 - \beta} \sqrt{c}$.

Solving for $c$, the highest level of cooperation achievable with country specific grim trigger strategies turns out to be: $c_{cs}^* = \left(\frac{\beta}{1 - \beta}\right)^2$.
2.2.3 Discussion of the country specific grim trigger equilibrium

In the country specific grim trigger equilibrium, international cooperation is rewarded by future cooperation, whereas noncooperation is punished by reversion to the one period Nash equilibrium forever. Thus, the prime ministers play cooperate if all prime ministers have always played cooperate in the past, otherwise they play noncooperate. The parties never replace a prime minister and the median voter always elects the candidate of her own type. Voters, parties and politicians in the punishment phase of the game play strategies that are obviously optimal.

2.2.4 Examples for the country specific grim trigger strategy

Country specific grim trigger strategies are the only available strategies for cooperation between pure dictatorships without any leader removal and pure democracies where the median voter becomes de facto a dictator.

2.3 Leader specific grim trigger strategy equilibrium

The equilibrium that I call purely leader specific punishment uses what Mcgillivray and Smith (2008) call leader specific punishment. If a prime minister deviates, cooperation is resumed if he is replaced by a different leader as
prime minister by his own party whom the voters perceive as identical. Such a replacement is not only possible in an US style system with primary elections, but rather more often observed in countries where the Prime Minister depends on a majority in Parliament.

There are only few, if any, examples for a leadership change because of considerations with respect to international cooperation. However, it is important to keep in mind that in my model all that matters is the possibility of a replacement, the replacement itself actually never happens in equilibrium.

**Phases of the game** There are now three phases of the game. The first phase is *cooperation*, the second phase *cheat* and the third phase *noncooperation*. Again, the only function of the phases is to facilitate the description of the strategies of the players. When the game begins we are in phase *cooperation*. When the leaders decide about cooperation when the game is in phase *cooperation* and both leaders play cooperate (that is they play a level of cooperation of at least the agreed level $c^a$) the game stays in phase *cooperation*, otherwise the game switches to the phase *cheat*. If the game is in phase *noncooperation* when the leaders decide it stays in phase noncooperation forever. If the game is in phase *cheat* and all leaders who deviated
in phase cooperation are replaced, the game switches back from cheat to cooperation. Otherwise, the game switches from cheat to noncooperation and stays in phase noncooperation forever. If the game is in phase cooperation or in phase noncooperation when the parties decide if they should replace their leaders, it stays there independently of the decision of the parties. If the median voter in at least one country elects a prime minister who is not of his own type in phase cooperation, the game switches to phase noncooperation.

Once in phase noncooperation the game stays there forever.

The strategy of the prime ministers The prime ministers play cooperate (that is they play a certain level $c^a$ that is the minimal level of $c$ that is seen as cooperation) as long as the game is in phase cooperation and play noncooperation ($c = 0$) in phase noncooperation.

The strategy of the parties A party replaces its leader if the game is in phase cheat and its leader has not cooperated in the last period. Otherwise, the party leader is confirmed.

The strategy of the median voters The median voters always elects the party leader of their own type.
2.3.1 Conditions for the leader specific punishment equilibrium

Again, we can use the single-deviation principle.

**Conditions for the prime ministers** Given the strategy of the other players a prime minister would gain $p^{dc}(c) - p^{cc}(c)$ on the international cooperation dimension by deviating in phase cooperation by playing noncooperate while the prime minister in the other country plays cooperate. Given the strategies of the other players he would then lose office forever while the changes of his own party of regaining office are not influenced in any way. If a current prime minister does not deviate his chance of keeping office are $\alpha$ in the next election in the current period, $\alpha^2$ in the next period and so on.

The reason is that when we can only be in state cooperation if the prime minister who is preferred by the median voters in his country is in office. Thus, the leaders expected loss of utility from office would be $\frac{\alpha}{1-\alpha\beta} v_l$ and consequently in the case of leader specific punishment a prime minister is willing to cooperate as long as:

$$p^{dc}(c) - p^{cc}(c) \leq \frac{\alpha}{1-\alpha\beta} v_l.$$
This condition holds also off the equilibrium path because $\alpha$ gives the incumbency advantage. Consequently, it does not matter if the office was gained by a leader who was preferred by the median voter (as is always the case in equilibrium) or by a deviation in the previous period. Using our functional form assumption $p^{de}(c) = c + \sqrt{c}$ and $p^{ce}(c) = \sqrt{c}$ the condition can be written as:

$$c \leq \frac{\alpha}{1 - \alpha \beta} v_l.$$

And therefore the maximum sustainable level of cooperation for leader specific punishment is given by:

$$c_{ls}^* = \frac{\alpha}{1 - \alpha \beta} v_l$$

**Conditions for the parties**  In phase cooperation not switching the leader is obviously optimal. It remains to check under what conditions a party is willing incur the cost $k$ to switch its leader before an election if the phase is cheat. If the party changes its leader in all future periods it achieves $p^{cc}(c)$ instead of $p^{dd} = p^{cc}(0) = 0$ from international cooperation in exchange for a
one-time cost of leader removal $k$. We find the following condition:

$$k \leq \frac{\beta}{1-\beta}(p^{oc} - p^{dd}) \text{ or } k \leq \frac{\beta}{1-\beta} \sqrt{c_{ls}} = \frac{\beta}{1-\beta} \sqrt{\frac{\alpha}{1-\alpha\beta}} v_l$$

If the cost of leader replacement is too high for the parties a leader specific grim trigger equilibrium is not possible.

**Conditions for the median voter strategy** Because given the other players strategies the median voter has no influence on international cooperation and always gets maximum utility on the domestic policy dimension the median voters’ strategy is optimal for all possible parameter values.

### 2.4 Party specific grim trigger equilibrium without international dominance

Again, I distinguish between 3 phases of the game, cooperation, cheat and noncooperation. Again the game begins in phase cooperation. If the game is in phase cooperation and both leaders play cooperate, the game stays in phase cooperation. Otherwise, the game switches to the phase cheat. If it in phase noncooperation when the prime ministers make their decision it always stays in phase noncooperation. The parties decision to replace a leader or
not have no influence on the phase of the game. If the game is in phase cooperation or noncooperation when the voters cast their votes the game stays in phase cooperation respectively noncooperation independently of the elections result. If the game is in phase cheat when the voters elect the new prime minister voters vote for their favorite candidate only if he has not deviated when last deciding over international cooperation. The game switches from phase cheat back to phase cooperation if all prime minister who deviated are replaced, otherwise it switches from phase cheat to phase noncooperation. Once the phase noncooperation begins the game stays in noncooperation forever.

The strategy of the prime ministers  The prime ministers play cooperate as long as the game is in phase cooperation and play noncooperation in phase noncooperation.

The strategy of the parties  A party leader is always confirmed.

The strategy of the median voters  In phase cooperation, the median voters elect the party leader of their own type. In phase cheat, the voters vote against the incumbent if the incumbent or a prime minister from the
same party has played noncooperation in the last decision over international cooperation.

**Condition for prime ministers**  Clearly, playing noncooperate in phase noncooperation is optimal. It remains to show that a prime minister would not want to deviate in phase cooperation. When a prime minister deviates by playing noncooperation in phase cooperation he gets an additional \( p^{dc}(c) - p^{cc}(c) \) for one period from international cooperation. He loses the chance that his party will stay in office in the period in which he is cheating what is an expected loss of \( v_p \frac{\alpha}{1+\beta-2\alpha\beta} \). Moreover, he losses his own office forever for sure instead of getting an expected value of \( \frac{\alpha v_l}{1-\alpha\beta} \).

So the condition we find is that:

\[
p^{dc} - p^{cc} < \alpha \frac{v_p}{1 + \beta - 2\alpha\beta} + \frac{\alpha v_l}{1 - \alpha\beta}
\]

The condition is somewhat weaker than in the case of leader specific punishment because now the leader is punished harder. This is especially relevant if \( v_p \) is large and \( \beta \) small.

Using our functional form we find that the maximum possible level of
cooperation is given by:

$$c^*_p = \alpha \frac{v_p}{1 + \beta - 2\alpha \beta} + \frac{\alpha v_l}{1 - \alpha \beta}$$

Calculating the value of being in office (put into Appendix) Let $V_P$ be the value of a part of being in office and $V_N$ be the value of being out of office.

In a Period in which a party is in office it receives $v_p$ and it has a chance of $\alpha$ of being in office in the next period and a chance of $(1 - \alpha)$ of being out of office if the other players follow their equilibrium strategies. Thus:

$$V_P = v_p + \beta \alpha V_P + \beta (1 - \alpha) V_N$$

The value of being out of office on the other side is:

$$V_N = \beta \alpha V_N + \beta (1 - \alpha) V_P$$

Solving this system with two unknowns in two equations we find $V_N$ and $V_P$ depending only on the parameters of the model:

$$V_N = \frac{\beta (1 - \alpha)}{(1 - \beta)(1 - 2\alpha \beta + 1)} v_p$$

$$V_P = \frac{1 - \alpha \beta}{(1 - \beta)(1 - 2\alpha \beta + 1)} v_p$$

And finally the difference between being in and out of office is:

$$V_P - V_N = \frac{1 - \alpha \beta}{(1 - \beta)(1 - 2\alpha \beta + 1)} v_p - \frac{\beta (1 - \alpha)}{(1 - \beta)(1 - 2\alpha \beta + 1)} v_p = \frac{1}{1 + \beta - 2\alpha \beta} v_p$$

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Condition for the median voter  In equilibrium, voters either vote for their favorite candidate or replace a candidate who has deviated in the past. In the first case voting for their favorite is obviously optimal for the voter. In the second case the voters can vote against their favorite in equilibrium if their gain \((p^{cc}(c) - p^{dd}(c))\) forever and thus the present discounted value of \(\frac{p^{cc} - p^{dd}}{1 - \beta}\) is larger than voting for the prime minister whom they favor. The cost of the latter is not only the direct cost \(b\), but also the lower chances of winning office in later periods.

From not supporting a deviating prime minister he otherwise prefers a median voter gains:

\[
\frac{\beta}{1 - \beta}(p^{cc} - p^{dd})
\]

and loses:

\[
\frac{\alpha}{1 + \beta - 2\alpha\beta} b
\]

(The calculations are almost identical to calculating the value of office for a prime minister in the previous section.)

Thus, we have a strategy of the voter that is consistent with equilibrium as long as:

\[
\frac{\beta}{1 - \beta}(p^{cc} - p^{dd}) \geq \frac{\alpha}{1 + \beta - 2\alpha\beta} b
\]
Given the functional form assumptions this gives a maximum sustainable level of cooperation of:

$$\sqrt{c_{ps}^*} = \sqrt{\frac{\alpha v_p}{1 + \beta - 2\alpha\beta} + \frac{\alpha v_l}{1 - \alpha\beta}} \geq \alpha \frac{1 - \beta}{\beta} \frac{b}{1 + \beta - 2\alpha\beta}$$

2.5 Party specific grim trigger with international dominance and punishment of voters.

Again, I distinguish between 3 phases of the game, cooperation, cheat and noncooperation. Again, the game begins in phase cooperation. If the game is in phase cooperation and both leaders play cooperate, the game stays in phase cooperation. Otherwise, the game switches to the phase cheat. If it was in phase noncooperation the game stays in phase noncooperation. The parties have no influence on the phase of the game. If the game is in phase cooperation and one or both of the prime ministers are replaced the game enters the phase noncooperation. If the game is in phase cheat and either a prime minister who has cooperated in the last period is not reelected or a prime minister who has not cooperated in the last period is reelected the game enters the phase noncooperation. Otherwise, the game switches from cheat to cooperation.
The strategy of the prime ministers  The prime ministers play cooperate as long as the game is in phase cooperation and play noncooperation in phase noncooperation.

The strategy of the parties  A party leader is always confirmed.

The strategy of the median voters  In phase cooperation, the median voters reelect the incumbent prime minister. In phase cheat, the voters vote against the incumbent if the incumbent or a prime minister from the same party has played noncooperation in the current period. In phase noncooperation, voters elect their preferred candidate.

Condition for prime ministers  The gain from a deviation for a prime minister is as before $p^{dc}(c) - p^{cc}(c)$.

The loss is now given by the present value of losing office forever instead of keeping it forever:

$$\frac{1}{1 - \beta} (v_l + v_p)$$

A Prime Minister is consequently now willing to play cooperate as long as:

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Consequently, the highest level of cooperation achievable with party specific punishment and international dominance is, given the assumed functional form:

\[ p_{dc} - p_{ce} \leq \frac{1}{1-\beta} (v_l + v_p) \]

\[ c_{psi} = \frac{1}{1-\beta} (v_l + v_p). \]

Conditions for parties  None

Conditions for voters  Cooperation is restored respectively remains in place only as long as voters reward a cooperating incumbent and punish a deviating one.

If I vote against the party that I prefer it will stay out of office forever because future median voters also follow the equilibrium strategy of reelecting incumbents. If I deviate and vote for my preferred party, because of the reversion to noncooperation internationally this party will only be in power whenever it is preferred by the median voter. I denote the present discounted value of having my preferred party in power in this case with \( V_O \).

\( V_O \) consists of two parts: The current advantage of having my favorite
party in power $b$ and the expectations about future benefits:

\[ V_O = b + \beta (\alpha V_O + (1 - \alpha)V_N) \]

Where $V_N$ is the discounted present value of seeing the nonpreferred party in office. This value can be constructed the same way as $V_O$:

\[ V_N = \beta ((1 - \alpha)V_O + \alpha V_N) \]

Thus for $\beta < 1$:

\[ V_N = \beta \frac{1 - \alpha}{1 - \alpha\beta} V_O \]

And consequently:

\[
V_O = b + \beta (\alpha V_O + (1 - \alpha)V_N) = b + \beta (\alpha V_O + (1 - \alpha)\beta \frac{1 - \alpha}{1 - \alpha\beta} V_O) \\
= \frac{b}{1 - \beta \left( \frac{(1 - \alpha)^2}{1 - \alpha \beta} \right)} = \frac{1}{1 - \beta} \frac{1 - \alpha \beta}{1 - \beta - 2\alpha \beta + 1} b = \frac{1}{1 - \beta} \frac{1 - \alpha \beta}{1 + \beta - 2\alpha \beta} b
\]

Thus, the condition that makes voters willing to support the equilibrium is:
\[ \frac{\beta}{1 - \beta}(p^{cc} - p^{dd}) = \frac{\beta}{1 - \beta} \sqrt{\frac{1}{1 - \beta}(v_l + v_p)} \geq \frac{1}{1 - \beta} - \frac{1 - \alpha \beta}{1 + 2\alpha \beta + b} \]

2.6 A comparison of the different equilibria

The maximum achievable levels of cooperation in the 4 different types of equilibrium are:

\[ c_{cs}^* = \left( \frac{\beta}{1 - \beta} \right)^2 \]

\[ c_{ls}^* = \frac{\alpha}{1 - \alpha \beta} v_l \]

\[ c_{ps}^* = \frac{\alpha v_l}{1 - \alpha \beta} + \frac{\alpha v_p}{1 + \beta - 2\alpha \beta} \]

\[ c_{psi}^* = \frac{1}{1 - \beta} (v_l + v_p) \]

While \( c_{cs}^* \) could be larger or smaller than the level of cooperation achievable in any other equilibrium, \( c_{ls}^* \leq c_{ps}^* \leq c_{psi}^* \) does always hold. However, the parametric conditions that have to hold to make the equilibria and the corresponding levels of cooperation attainable that were derived before:
\[ CS : \text{None} \]

\[ LS : \frac{\beta}{1-\beta} \sqrt{\frac{\alpha}{1-\alpha \beta}} v_t \geq k \]

\[ PS : \frac{\alpha v_p}{1+\beta-2\alpha \beta} + \frac{\alpha v_t}{1-\alpha \beta} \geq \frac{\alpha - \alpha \beta}{\beta} \frac{b}{1+\beta-2\alpha \beta} \]

\[ PSI : \beta \sqrt{\frac{1}{1-\beta} (v_t + v_p)} \geq \frac{1 - \alpha \beta}{\beta - 2\alpha \beta + 1} b \]

So that the maximum attainable level of cooperation between two countries will is a highly nonlinear function of the different parameter of the model.

3 Conclusion

I have shown that ideological differences between parties on domestic policy issues and incumbency advantage matter for the sustainable level of international cooperation. Perhaps Hungary can serve example for less cooperation because of ideological division within a country. Orban cannot be
punished for noncooperation with the European Union because voting for the left would just be too costly for the median voter and his party does not oust him because his grip on the party is huge and this would just be very costly. An example for international dominance on its elections could be provided by Finland under Keikonen at a time when the relations to the Soviet Unions was of great importance. A further example could be provided by West Germany under Adenauer in the first years after the Second World War. The voters were reluctant to get rid off Adenauer because he seemed important for the relationship with foreign powers.

However, it is difficult to empirically distinguish between equilibrium play in the international dominance scenario and the desire to just to retain an experienced political leader. Left for future theoretical research is the analysis of cooperation between asymmetric countries.

4 Appendix

Solving for the value of having my favorite politician in power.

\( V_O \) consists of two parts: The current advantage of having my favorite party in power \( b \) and the expectations about future benefits:
\[ V_O = b + \beta (\alpha V_O + (1 - \alpha)V_N) \]

Where \( V_N \) is the discounted present value of seeing the nonpreferred party in office. This value can be constructed the same way as \( V_O \):

\[ V_N = \beta ((1 - \alpha)V_O + \alpha V_N) \]

Thus for \( \beta < 1 \):

\[ V_N = \beta \frac{1 - \alpha}{1 - \alpha \beta} V_O \]

And Consequently:

\[
\begin{align*}
V_O &= b + \beta (\alpha V_O + (1 - \alpha)V_N) = b + \beta (\alpha V_O + (1 - \alpha)\beta \frac{1 - \alpha}{1 - \alpha \beta} V_O) = \\
&= \frac{b}{1 - \beta \left(\frac{1 - \alpha}{\beta + (1 - \alpha) \beta}\right)} = \frac{1}{1 - \beta \frac{1 - \alpha \beta}{\beta - 2 \alpha + 1}} b = \frac{1}{1 - \beta \frac{1 - \alpha \beta}{(\beta - \alpha \beta)}} b
\end{align*}
\]

Thus, the condition that makes voters willing to support the equilibrium is:

\[ p^{cc} - p^{dd} \geq \frac{b}{1 - \beta \left(\frac{1 - \alpha}{\beta + (1 - \alpha) \beta}\right)} b \]
References

