

Methodological Appendix

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The Actors and Events of Brazilian Environmental Foreign Policy Database

- Present data and detail procedures
- Database coverage for the period (which events? % of failure in collection)

Ministries centrality and influence

As described in the main document, we use the *Actors and Events of Brazilian Environmental Foreign Policy* database to compute centrality scores for the Ministry of Foreign Affairs and for the Ministry of Environment. As we are interested in the agencies' capacities for coordinating the policy community, we selected the ministries' betweenness centrality (in the network of organizations) as our measure of interest.

Betweenness is given by $B_k = \sum g_{i,k,j} / g_{i,j}$, where $g_{i,k,j}$ means the number of shortest paths linking i and j passing through k and $g_{i,j}$ the total number of shortest paths linking i and j . In our case, shortest paths also consider edge weight, which measures the strength of the connection between the organizations (the number of events in which they co-participate). Betweenness centrality was calculated and normalized through R package *igraph* (Csardi and Nepusz 2006). To compute normalized betweenness B^n , *igraph* uses $B^n = \frac{2B}{(n-1)(n-2)}$, where B represents raw betweenness and n is the number of vertices in the graph. As *igraph* considers edge weights as costs and, in our case, weight represents strength of the connection, we used inverse weights for the calculation.

As we try to uncover the relational capacities of the ministries, when generating the networks of organizations we assume interactions in events last over time. This is also important as multilateral environmental events have different periodicity (e.g., climate COPs occur every year; CBD MOPs every two years) and this can make centrality scores computed for annual networks too erratic, even if the underlying patterns in which we are interested remain stable. Exactly how long these interactions should last, however, is up for debate.

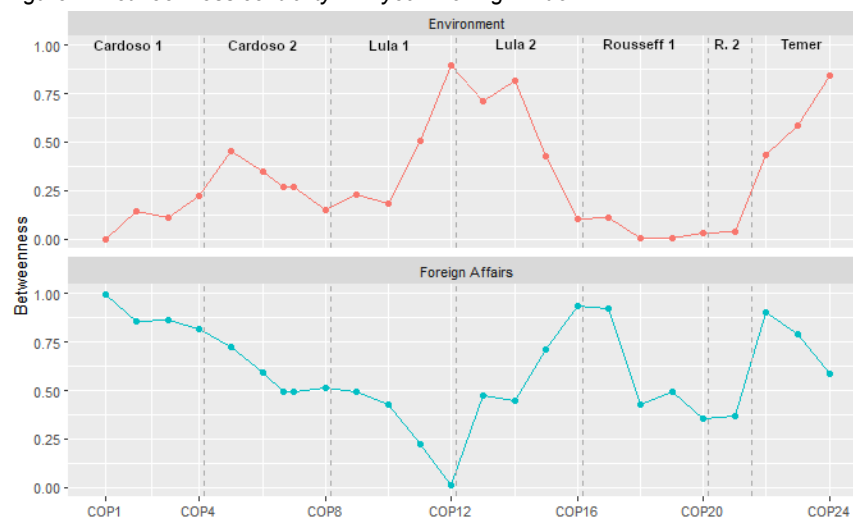
In the main document, we reported betweenness centrality scores based on a 4-year moving window, as this corresponds to the duration of a presidential term in Brazil. This allows us to compute annual betweenness centrality scores while maintaining some stability in our measure. As robustness checks, we present betweenness scores for both shorter and longer thresholds in the moving window, as well as the results for when we compute betweenness separately for each presidential term. Finally, we show how these results are also consistent with qualitative accounts of ministerial influence, as discussed in the Brazilian climate policy literature.

Alternative thresholds for the moving window

Figure 1 below, presented in the main document, shows actors' betweenness centrality in a network based on a 4-year moving window. This means that, for year T , the network encompasses all events between $T-3$ and T (both included). As discussed in the main document, in the last half of Lula's first administration, we see a sharp rise in MoE centrality and a decline in MFA centrality. In Lula's second administration, this trend is inverted, and the ministries change place.

Comentado [MM1]: NR 10: The timing and direction of these changes broadly coincide with qualitative and historical accounts of Brazilian climate politics (Viola and Franchini 2017). Results are also robust to other ways of assessing the ministries' weight, such as using static term-wise comparisons or differing moving window sizes for calculating betweenness centrality, or qualitatively assessing who holds formal coordinating positions (see Appendix for data and discussion).

Figure 1. Betweenness centrality in 4-year moving window



Figures 2 and 3 below show betweenness centrality for 5- and 3-year moving windows, respectively. As one can see, the timing and direction of changes coincide with those seen in the 4-year moving window.

Figure 2. Betweenness centrality in 5-year moving window

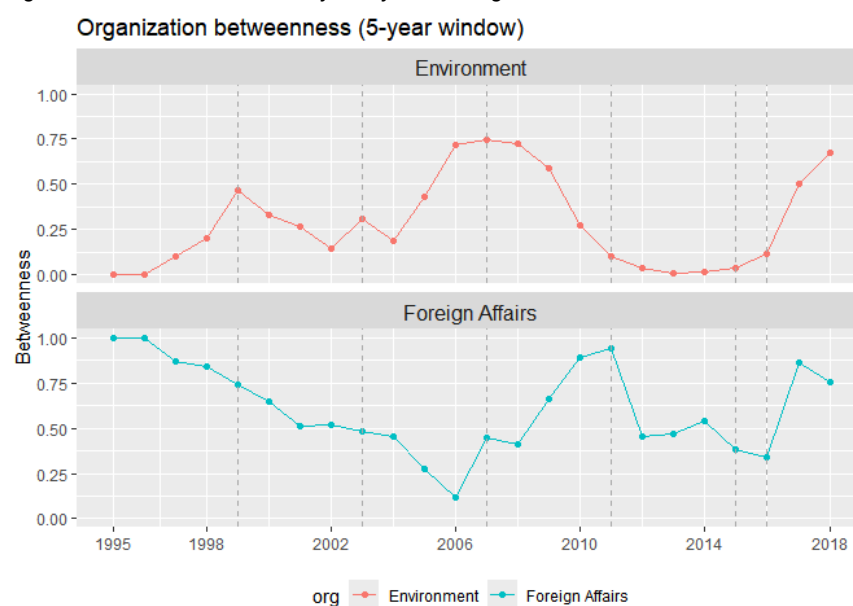
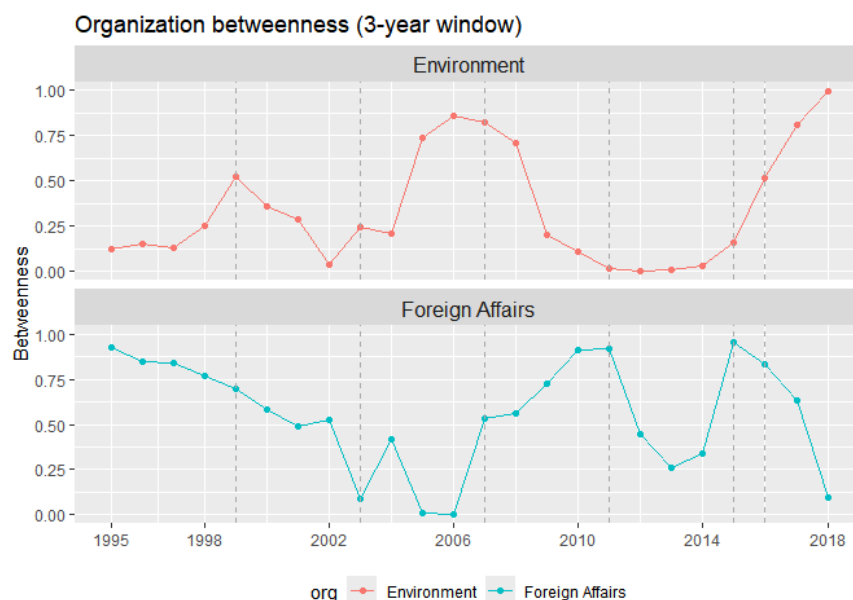


Figure 3. Betweenness centrality in 3-year moving window



Term-wise data on agency centrality

- Present and discuss data

Table 1. Betweenness centrality for selected ministries, per presidential administration

	Cardoso 1	Cardoso 2	Lula 1	Lula 2	Rousseff 1	Rousseff/Temer
	1995-1998	1999-2002	2003-2006	2007-2010	2011-2014	2015-2018
Foreign Affairs	0.82	0.51	0.01	0.10	0.36	0.59
Science	0.27	0.48	0.34	0.00	0.00	0.00
Environment	0.22	0.15	0.9	0.94	0.03	0.84
Average centrality	0.05	0.02	0.01	0.01	0.00	0.01

Qualitative evidence and formal coordination positions

- Apresentar as posições e explicar
- Discussão dos dados – destacar que MRE é reconhecido como aliado do MCT durante todo o período, compartilham posições, etc.

Table 2. Heads of Brazilian delegation and speakers at UNFCCC High-Level Segment

Year	Conference	Head of Delegation	Speaker at High-Level Segment
1995	COP1	José Israel Vargas <i>Minister of Science and Technology</i>	José Israel Vargas <i>Minister of Science and Technology</i>
1996	COP2	José Israel Vargas <i>Minister of Science and Technology</i>	José Israel Vargas <i>Minister of Science and Technology</i>
1997	COP3	José Israel Vargas <i>Minister of Science and Technology</i>	José Israel Vargas <i>Minister of Science and Technology</i>
1998	COP4	José Israel Vargas <i>Minister of Science and Technology</i>	José Israel Vargas <i>Minister of Science and Technology</i>
1999	COP5	Ronaldo Sardenberg <i>Minister of Science and Technology</i>	Ronaldo Sardenberg <i>Minister of Science and Technology</i>
2000	COP6	Ronaldo Sardenberg <i>Minister of Science and Technology</i>	Ronaldo Sardenberg <i>Minister of Science and Technology</i>
2000	COP6-2	Ronaldo Sardenberg <i>Minister of Science and Technology</i>	Everton Vieira Vargas <i>Director of Special Issues, Ministry of Foreign Affairs</i>
2001	COP7	Ronaldo Sardenberg <i>Minister of Science and Technology</i>	Ronaldo Sardenberg <i>Minister of Science and Technology</i>
2002	COP8	Vera Barrouin Machado <i>Ambassador to India, Ministry of Foreign Affairs</i>	Vera Barrouin Machado <i>Ambassador to India, Ministry of Foreign Affairs</i>
2003	COP9	Claudio Langone <i>Vice-Minister of Environment</i>	Claudio Langone <i>Vice-Minister of Environment</i>
2004	COP10	Eduardo Campos <i>Minister of Science and Technology</i>	Eduardo Campos ¹ <i>Minister of Science and Technology</i>
2005	COP11	Marina Silva <i>Minister of Environment</i>	Marina Silva <i>Minister of Environment</i>
2006	COP12	Marina Silva <i>Minister of Environment</i>	Luis Manoel Rebelo Fernandes <i>Vice-Minister of Science and Technology</i>
2007	COP13	Celso Amorim <i>Minister of Foreign Affairs</i>	Celso Amorim <i>Minister of Foreign Affairs</i>
2008	COP14	Carlos Minc <i>Minister of Environment</i>	Carlos Minc <i>Minister of Environment</i>
2009	COP15	Luiz Inácio Lula da Silva <i>President of Brazil</i>	Luiz Inácio Lula da Silva <i>President of Brazil</i>
2010	COP16	Izabella Teixeira <i>Minister of Environment</i>	Izabella Teixeira <i>Minister of Environment</i>

¹ Although Eduardo Campos was responsible for Brazil's High-Level segment speech, in our content analysis we analysed Marina Silva's speech at the High-Level roundtable on Adaptation, as this was the one found in the UNFCCC Archive.

2011	COP17	Izabella Teixeira <i>Minister of Environment</i>	Izabella Teixeira <i>Minister of Environment</i>
2012	COP18	Luiz Alberto Figueiredo Machado <i>Secretary for Environment, Energy, Science, and Technology, Ministry of Foreign Affairs</i>	Izabella Teixeira <i>Minister of Environment</i>
2013	COP19	Luiz Alberto Figueiredo Machado <i>Secretary for Environment, Energy, Science, and Technology, Ministry of Foreign Affairs</i>	Izabella Teixeira <i>Minister of Environment</i>
2014	COP20	Izabella Teixeira <i>Minister of Environment</i>	Izabella Teixeira <i>Minister of Environment</i>
2015	COP21	Dilma Rousseff <i>President of Brazil</i>	Dilma Rousseff <i>President of Brazil</i>
2016	COP22	José Sarney Filho <i>Minister of Environment</i>	José Sarney Filho <i>Minister of Environment</i>
2017	COP23	José Sarney Filho <i>Minister of Environment</i>	José Sarney Filho <i>Minister of Environment</i>
2018	COP24	Edson Duarte <i>Minister of Environment</i>	Edson Duarte <i>Minister of Environment</i>
2019	COP25	Ricardo Salles <i>Minister of Environment</i>	Ricardo Salles <i>Minister of Environment</i>
2021	COP26	Leonardo Cleaver de Athayde <i>Director of Department of Environment, Ministry of Foreign Affairs</i>	Joaquim Leite <i>Minister of Environment</i>
2022	COP27	Leonardo Cleaver de Athayde <i>Director of Department of Sustainable Development, Ministry of Foreign Affairs</i>	Joaquim Leite <i>Minister of Environment</i>

Information compiled from UNFCCC Official participant lists, reports, and speeches available at the UNFCCC Archive. Heads of delegation were inferred from first name in the participant list, as the position is not explicit for Brazil in the UNFCCC lists.

Cooperation data

To measure the timing and direction of changes in actors' positions at the UNFCCC, we use Castro's (2017) *Relational Data Between Parties to the UNFCCC*, which covers negotiations from 1995 to 2013. This database compiled countries' negotiation interactions from detailed descriptions of negotiations published in the *Earth Negotiation Bulletin* reports, identifying various types of interaction between country dyads and classifying them. We use the database's most straightforward classification scheme, a binary variable (*cooperation*) that assigns interactions as cooperative or conflictive.

From this data, we compute, for each year, an average score of cooperation between Brazil and the country groupings of interest—for the results presented in the main document, we selected the European Union, G-77+China, and AOSIS (here, we also report variations with different groupings as robustness checks). The cooperation index for year t and group G can be computed by:

$$Index_{G,t} = \frac{\sum_i^G (Coop_{i,t} - Conf_{i,t})}{Int_t},$$

where i is any country that pertains to group G , $Coop$ is the sum of cooperative interactions between that country and Brazil in year t , $Conf$ is the sum of conflictive interactions between that country and Brazil, and Int is the total number of interactions Brazil during year t .

After computing cooperation indices for the various groupings, we proceed to aggregate them via Principal Component Analysis (PCA). We favor the PCA over the separate indices to minimize the fact that, as we use data on dyadical interactions, variation might be more reflective of changes in the other countries' positions than in Brazil's. Still, we include the data on cooperation with the EU, AOSIS, and G-77 as robustness checks below. Following standard procedures for PCA, we standardize the data (using R's *scale()* function) before extracting principal components (using R *stats princomp()* function). We then analyze the most relevant dimensions, the proportion of explained variance, and the contribution of each variable to the dimension.

For the PCA index reported in the main document, we then proceeded to aggregate the main components by multiplying each for its proportion of explained variance and summing them, as described below.

PCA Diagnostics for the aggregation of Brazil's cooperation indices with EU, AOSIS, and G77+China

To assess the structure of the underlying dimensions captured by the PCA, we present here key diagnostic results. Table 3 reports the standard deviation and the proportion of explained variance for each principal component, allowing an evaluation of the relative contribution of each component to the total variance in the data.

Table 3. Summary information – PCA for EU, AOSIS, and G77+China

	Standard deviation	Proportion of variance	Cumulative proportion
Component 1	1.38	0.67	0.67

Component 2	0.78	0.21	0.88
Component 3	0.58	0.12	1.00

Figure 4 provides a biplot of the first two principal components, which together capture 88% of the variance. The arrows represent the variable loadings and the circles the distribution of observations. Analyzing the biplot, we can note how, in line with our theoretical framework, conflict is mostly explained by the first dimension, which opposes cooperation with the G77 in one direction and cooperation with the EU and AOSIS in the opposite direction.

Figure 4. Biplot – PCA for EU, AOSIS, and G77+China

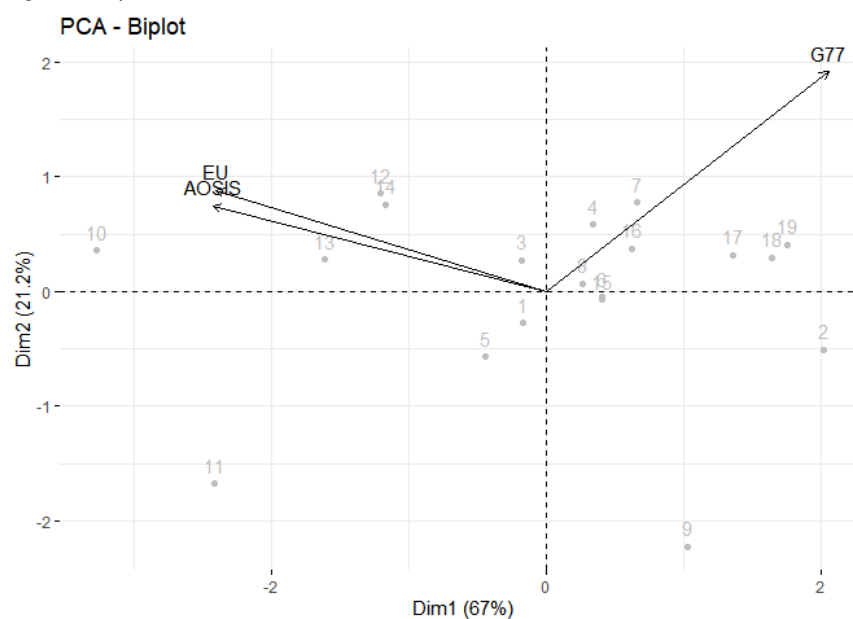
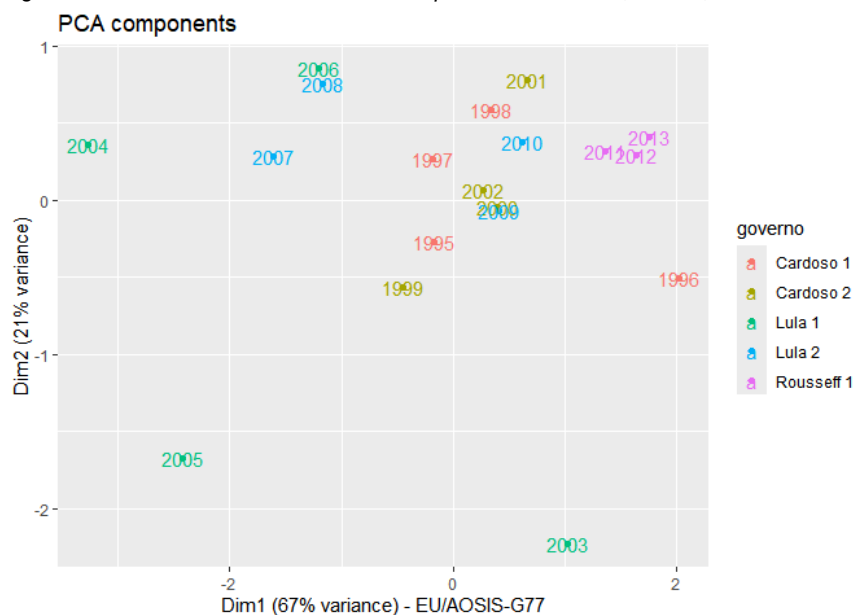


Figure 5 plots the observations along the two main dimensions, identifying the year and presidential term associated with each point.

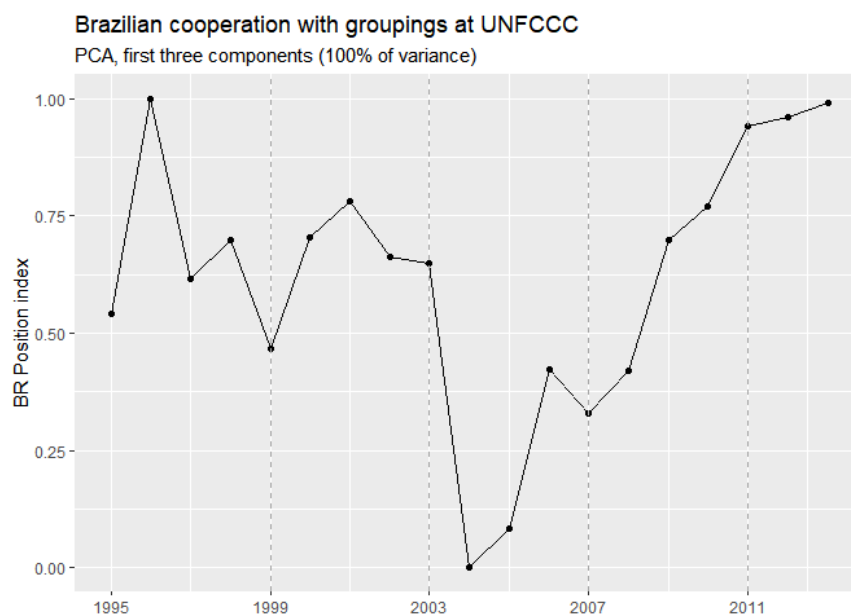
Figure 5. Observations in two-dimensional space – PCA for EU, AOSIS, and G77+China



We can see how, in line with our analysis in the main document, the 1st Lula administration is the period with most within-term variation, with Brazilian position initially approaching those of AOSIS and EU countries.

For the final index, [presented in the main document](#), we aggregated the three relevant components using the following formula: $FinalIndex_{year} = 0.67 * Comp.1_{year} + 0.21 * Comp.2_{year} + 0.12 * Comp.3_{year}$. [Figure 6](#) presents the index evolution over time.

Figure 6. Final cooperation index – PCA for EU, AOSIS, and G77+China



Alternative specifications for the PCA

[Why alternative specifications? Might be driven by changes in other countries' positions; might be specificities of the selected groupings and not necessarily the dimension we intended to analyze. Thus, we also computed the index for Brazilian cooperation with other groupings]

Including BASIC countries in the PCA

[describe BASIC and why include – maybe argument could be 'structural' similarity of the position between the countries?]

[results are rounded]

Table 4. Summary information – PCA for EU, AOSIS, G77+China, and BASIC

	Standard deviation	Proportion of variance	Cumulative proportion
Component 1	1.39	0.51	0.51
Component 2	1.12	0.33	0.84
Component 3	0.6	0.09	0.93

	Standard deviation	Proportion of variance	Cumulative proportion
Component 4	0.5	0.06	1.00

In the paper, we advanced the notion that cooperation with AOSIS, EU and the G77 serves as a proxy for a specific line of conflict in the negotiations—the disputes around responsibility and the CBD R principle. In line with our expectations, cooperation with BASIC countries seems to answer to a different logic from cooperation with AOSIS/EU/G77. In the biplot, we can see that the 1st dimension is mainly driven by convergence with AOSIS/EU/G77, while the second dimension is mostly related to convergence with BASIC.

Figure 7. Biplot – PCA for EU, AOSIS, G77+China, and BASIC

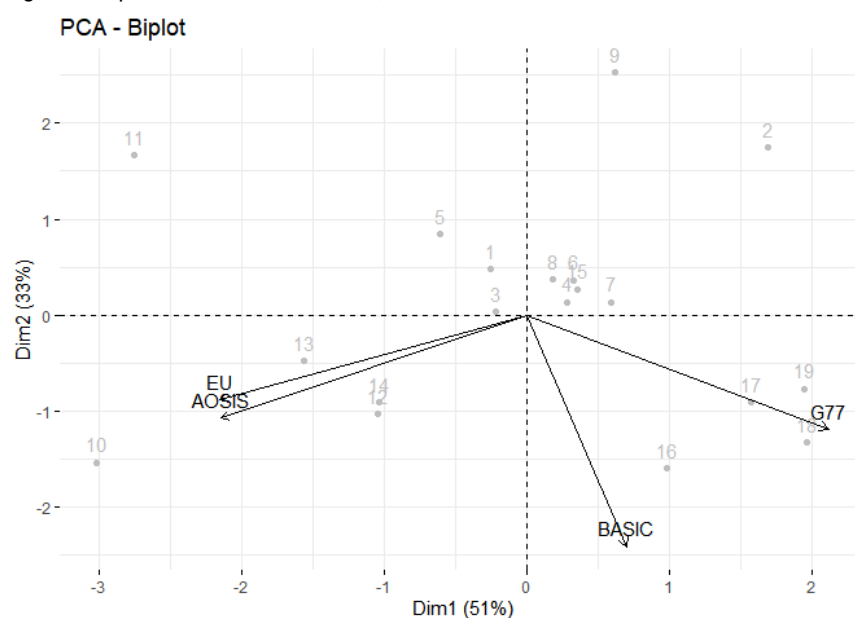
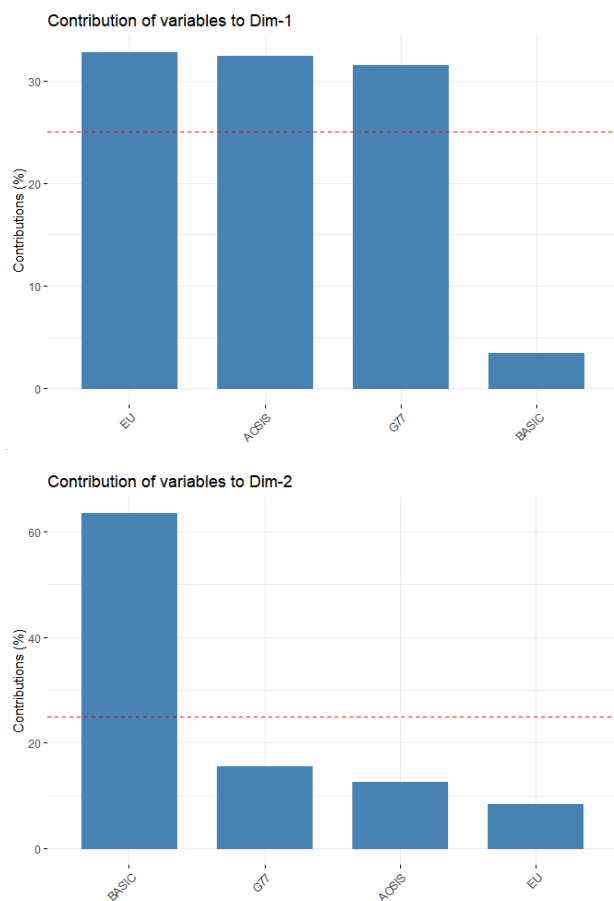


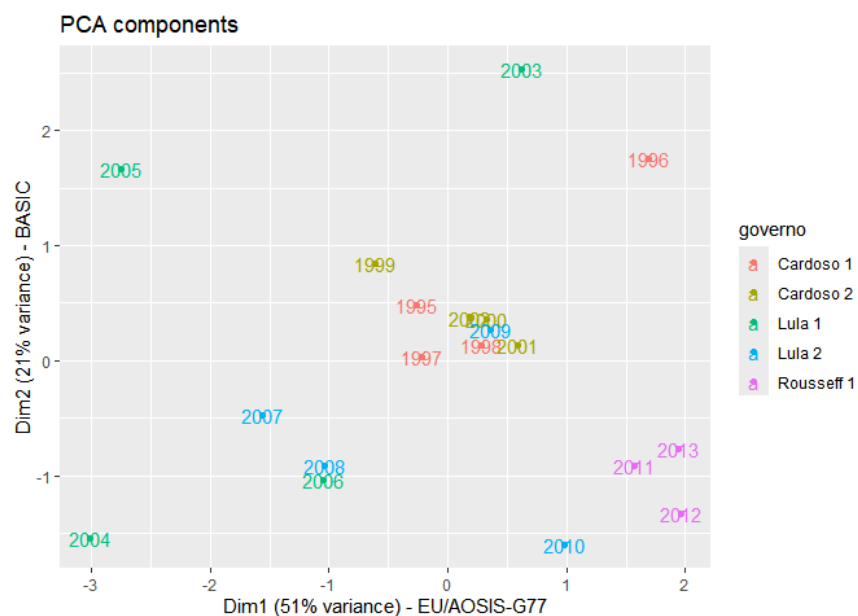
Figure 8. Contribution to 1st and 2nd dimensions – PCA for EU, AOSIS, G77+China, and BASIC



Comentado [MM2]: Contribution plot with both dimensions in same figure (do facet? Não dá pra só jogar lado a lado porque escala é distinta)

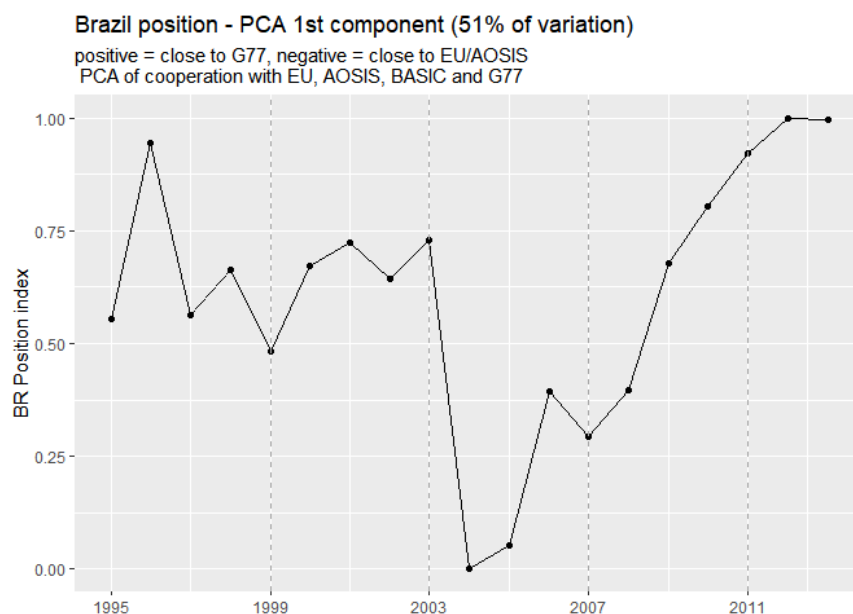
Figure 9 plots the observations along the two main dimensions, identifying the year and presidential term associated with each point. We note how the 1st Lula administration is still the period with most within-term variation, as we see a significant movement in the 1st dimension, initially approaching the EU/AOSIS pole and, afterwards, moving in the opposite direction.

Figure 9. Observations in two-dimensional space – PCA for EU, AOSIS, G77+China, and BASIC



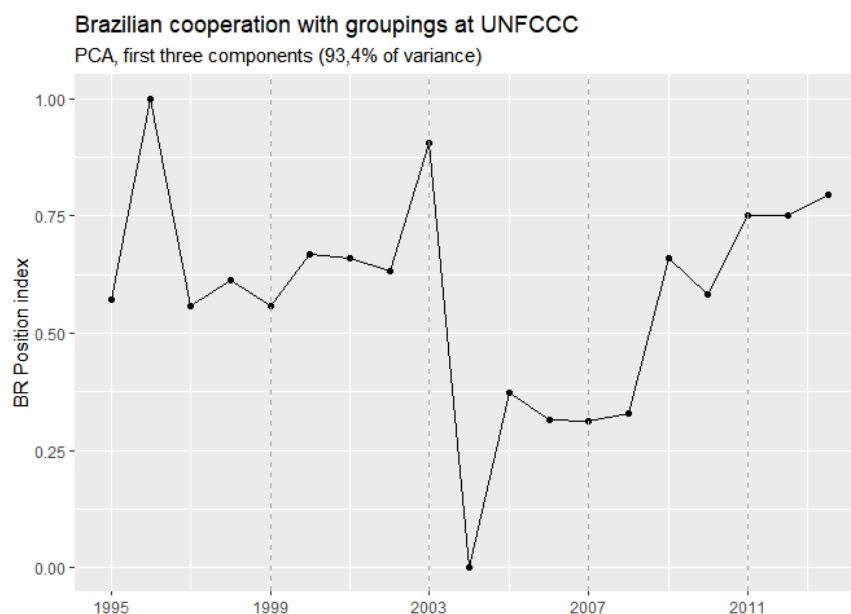
If we plot the first dimension over time, we can see it closely resembles our results for the PCA index presented in the main document. Timing and direction of changes remains roughly the same as in the original specification.

Figure 10. First component over time – PCA for EU, AOSIS, G77+China, and BASIC



If we aggregate the first three components, we also see roughly the same pattern of changes in the Brazilian position. For this, we aggregated the three relevant components using the following formula: $FinalIndex_{year} = \frac{(0.51 * Comp.1_{year} + 0.33 * Comp.2_{year} + 0.09 * Comp.3_{year})}{0.93}$. Figure 11 presents the index evolution over time.

Figure 11. Final index over time – PCA for EU, AOSIS, G77+China, and BASIC



Expanding the PCA to include all country groupings

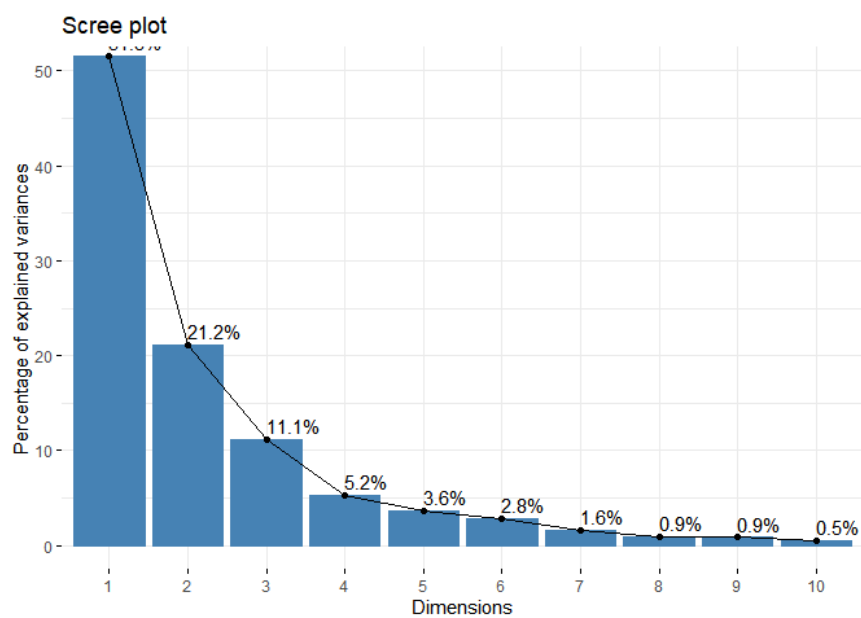
[Include all country groupings for which we were able to compute cooperation scores with Brazil using Castro's database. We cannot run with all coalitions, as we need more units (19) than variables (25). 10 coalitions show NA results (Why? Did they not interact with Brazil?), so we can disconsider them. So we run now PCA with coop for all coalitions but COMIFAC, CaribbeanC, CentralAm, CentralG11, EITs, G9, Mountain, OPEC, SAfricaDC, Visegrad

Thus, the list includes: EU, AOSIS, G77, BASIC, Independent Association of Latin America and the Caribbean (AILAC), ALBA, Umbrella Group, Environmental Integrity Group, Arab Group, African Group (what else???)

Table 5. Summary information – PCA for all available groupings

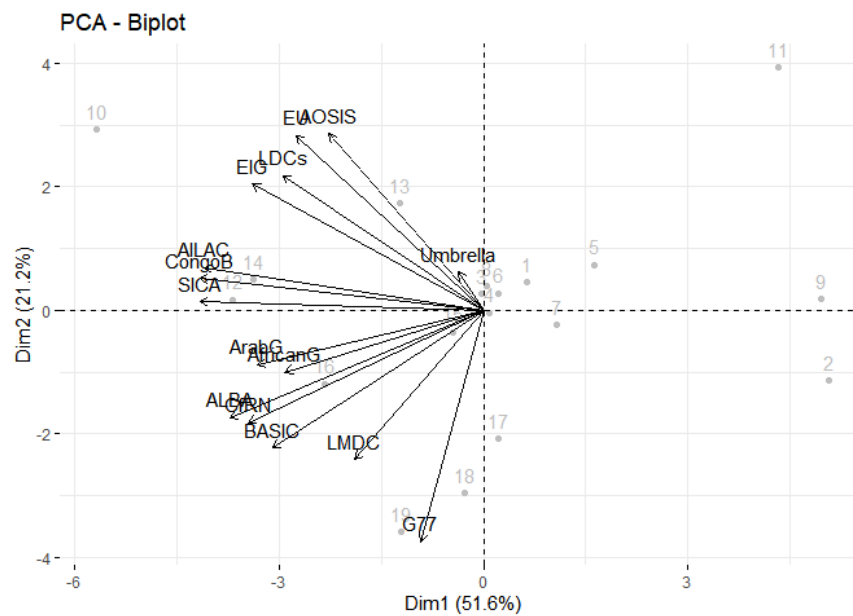
	Standard deviation	Proportion of variance	Cumulative proportion
Component 1	2.71	0.516	0.516
Component 2	1.73	0.212	0.728
Component 3	1.26	0.111	0.839
Component 4	0.86	0.052	0.891

	Standard deviation	Proportion of variance	Cumulative proportion
Component 5	0.72	0.362	0.928
Component 6	0.63	0.028	0.956
Component 7	0.48	0.016	0.972
Component 8	0.36	0.009	0.981
Component 9	0.35	0.009	0.989
Component 10	0.25	0.005	0.994
Component 11	0.22	0.003	0.997
Component 12	0.14	0.001	0.999
Component 13	0.11	0.000	0.999
Component 14	0.05	0.000	0.999
Component 15	0.01	0.000	1



Comentado [MM3]: Remake with title not in the way?

Figure 12. Biplot – PCA for all country groupings



[While not as clear as in the other specifications, we can still see that the G77, AOSIS, and the EU correspond to the most 'extreme' values in a single dimension of conflict—in this case, Dim2.]

Figure 13. Observations in two-dimensional space – PCA for all country groupings

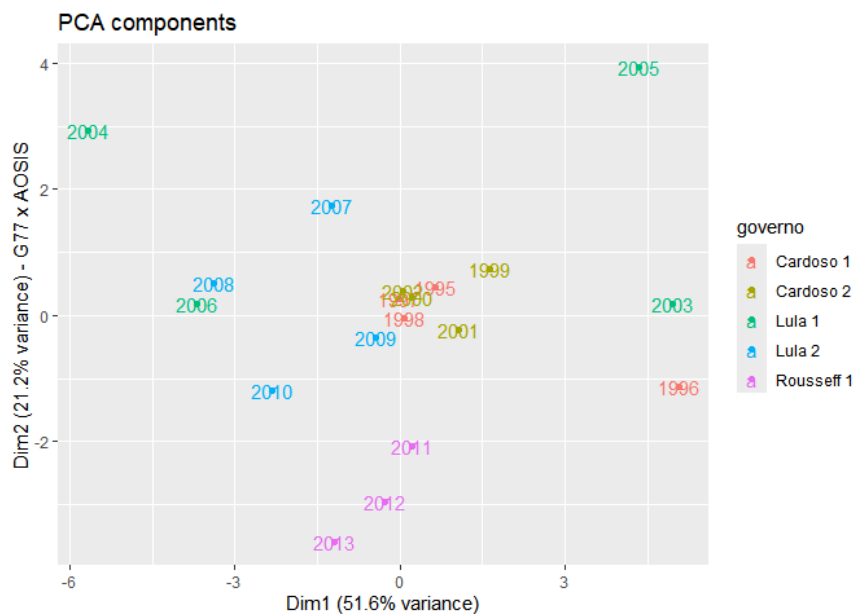
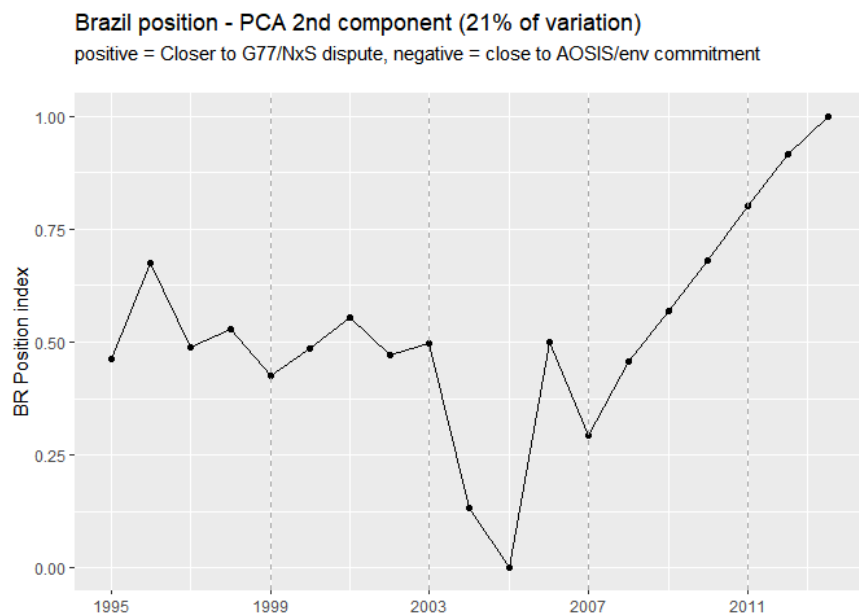


Figure 14. Second component over time – PCA for all country groupings



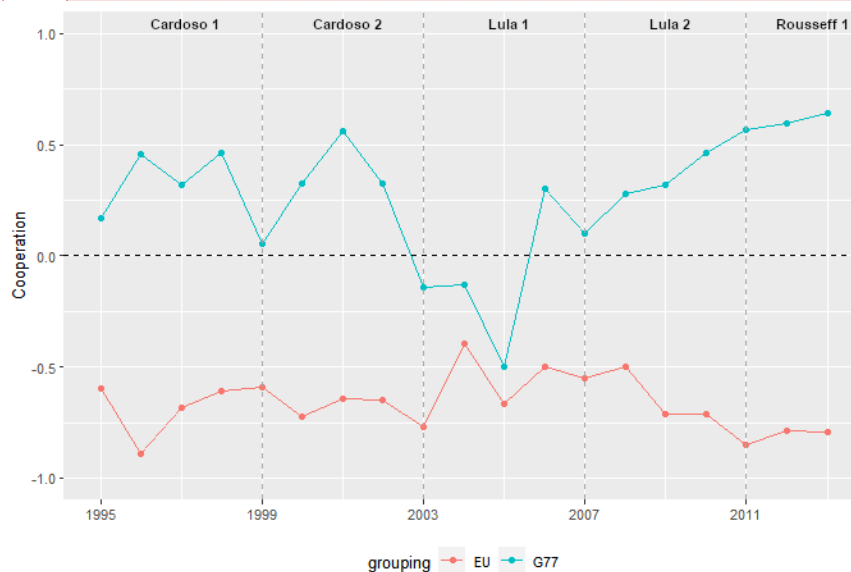
[what is similar and what is different? Similar timing and direction for changes; post 2011, in the other specifications, we see relative stability while here we see continuing trend]

Disaggregated cooperation data

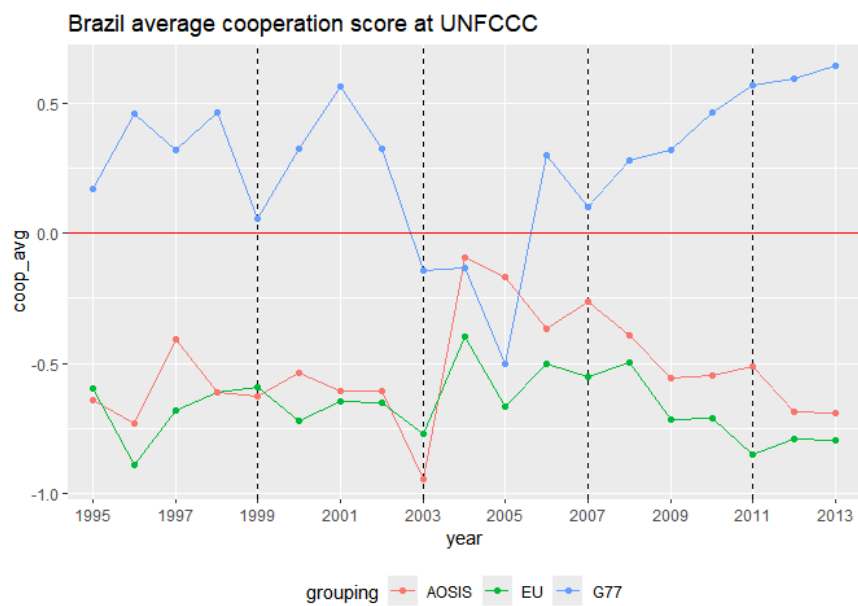
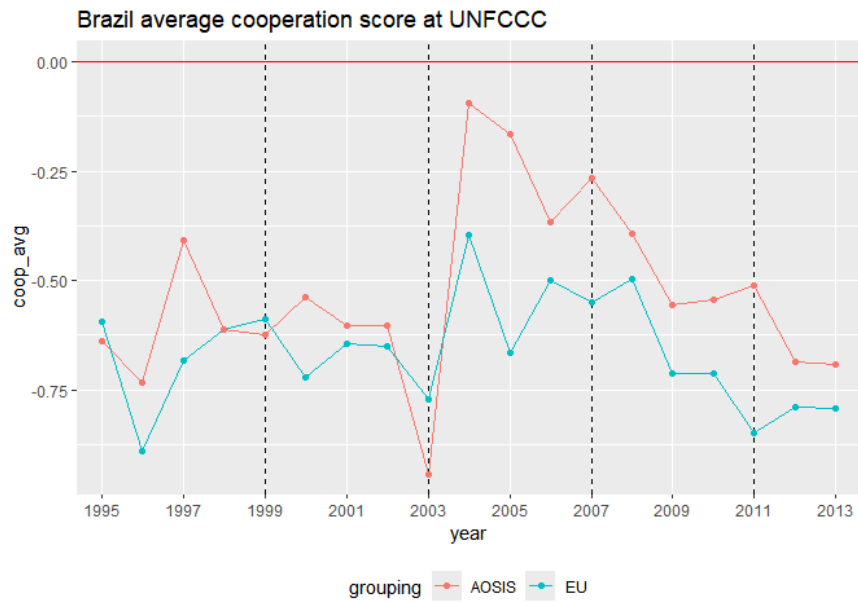
- Separate data: cooperation with EU, AOSIS, G-77.
- Frame as robustness check → is timing and direction the same as when we look at PCA?
- Other countries as a 'placebo'

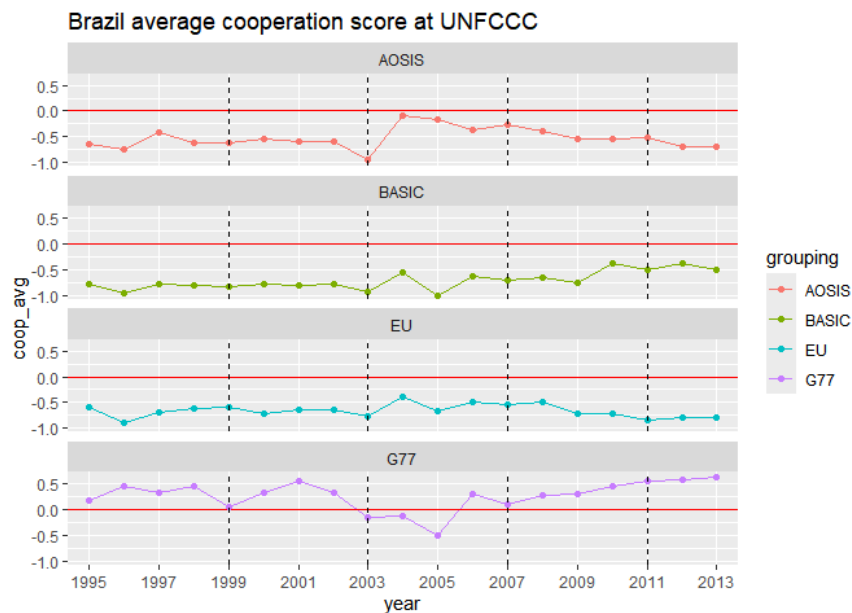
Figure 15 below shows how Brazilian cooperation with the European Union (red line) and with the G77 (blue line) varies over time. Positive scores mean, on average, Brazil tends to agree with statements by grouping members and/or grouping members tend to disagree with Brazilian statements. Values range from -1 (disagreement is manifested for every statement in the negotiation) to +1 (agreement is manifested for every statement).

Figure 15. Brazilian cooperation with G77 and EU at UNFCCC



Comentado [MM4]: Refazer só G77, EU e AOSIS com facet. Ou todos separados, vamos ver qual fica o melhor pra visualizar





The figure shows how Brazilian positions are consistently closer to the G77's than to the EU's. Nonetheless, we still see relevant variation over time, which allows us to test our hypotheses.

Cooperation with the EU shows little variation over time, being relatively stable but for a peak growth in cooperation in 2004. Cooperation with the G77, on the other hand, follows a more erratic trajectory. From 1995 to 2001, the overall tendency is towards growth, although this is not linear. A period of disengagement ensues from 2002-2005, followed by a peak growth in 2006 and timid growth from 2008 onwards.

Credibility check – Placebo test using other countries' cooperation with EU, AOSIS, and the G77+China

Should discuss the idea of a placebo test here as credibility check: we do not have data or design to allow causal identification. Positions are confounded by overall negotiation dynamics (agenda, changes in other countries' positions, etc). We should expect other countries' positions to be affected by this as well.

If the pattern we saw of association between the Brazilian position and agency centrality was primarily driven by these confounding variables, we should see similar patterns emerging in other countries' cooperation indices with the G77, AOSIS, and the EU.

Thus, we compute the cooperation indices for **XXXXX**. (Why these countries? Would we have different results with other countries? Check Argentina and India as well)

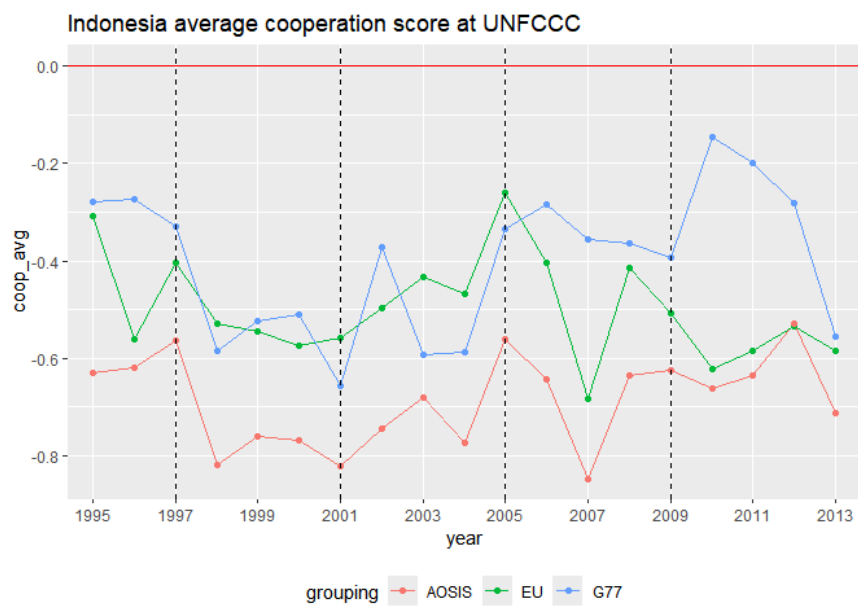
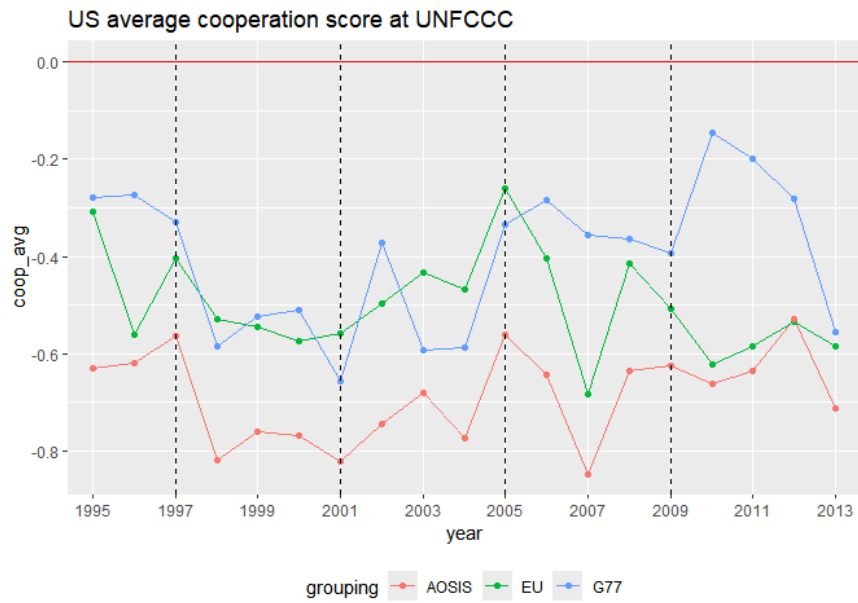
You **can't claim causality**, but you **can show patterns** that appear *systematic* rather than *random*.

A **placebo test** (e.g., testing whether Brazil's internal capacities "predict" the positions of other countries) helps you **rule out some alternative explanations**—namely, that your result reflects **general negotiation trends**, rather than something specific about Brazil's domestic structure.

In short, the placebo test **strengthens the plausibility** that there is a meaningful empirical relationship, even if you can't identify it causally.

"To assess whether the observed association between ministerial capacity and Brazilian positions might simply reflect broader negotiation dynamics, I conduct a placebo test using the positions of other countries as an outcome. Since Brazilian domestic institutions should not shape the negotiation stances of unrelated countries, a lack of association here provides modest support that the pattern observed in Brazil is not purely driven by global trends or agenda cycles."

(note how trend is not the same as we see in Brazil. Probably not driven by broader negotiation dynamics)



Content Analysis data?

- Instances of codes in each speech