Determinants of Environmental Agreement Ratification: The Role of Executive Leaders' Personal Preferences

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Resumo: Este estudo examina a influência das preferências pessoais dos chefes de estado em relação ao meio ambiente na decisão de ratificação de acordos internacionais ambientais, tal como o Acordo de Paris. Preferências individuais de líderes do poder executivo não foram previamente exploradas pela literatura. Utilizando um painel composto por 172 acordos climáticos de 1990 a 2015, aplicamos modelos de probabilidade linear e uma abordagem de *multilevel survival analysis* para avaliar como as preferências por sustentabilidade dos líderes políticos impactam as decisões de ratificação. Talvez surpreendentemente, os resultados indicam que preferências mais acentuadas por sustentabilidade estão associadas a menores probabilidade e *hazard rate* de ratificação, com efeito particularmente relevante entre chefes de estado com opiniões proambientais excepcionalmente fortes. Especialmente em países mais democráticos, as preferências sobre questões ambientais anunciadas pelos líderes políticos estão inversamente relacionadas com a probabilidade de participação em um acordo ambiental, evidenciando efeitos de atritos políticos entre os poderes executivo e legislativo sobre a decisão de ratificação. O estudo também testa e não encontra evidências que sustentem a hipótese de que líderes com preferências mais extremas por sustentabilidade consideram certos acordos como insuficientemente rigorosos, e por isso não os ratificam. Os resultados apresentados por esta pesquisa ressaltam a complexa interação entre preferências políticas, instituições democráticas e políticas ambientais.

Palavras-chave: acordos internacionais ambientais, preferências ambientais, fricção política, chefe de estado.

Código Jel: Q58, F53.

Abstract: This study investigates whether and how political leaders' personal preferences on environmental issues matter for the ratification of international environmental agreements like the Paris Climate Agreement. Individual preferences of political leaders have previously remained unexplored in the literature. Using a panel dataset of 172 environmental agreements from 1990 to 2015, I apply linear probability models and a multilevel survival approach to examine how leaders' sustainability preferences affect ratification decisions. Perhaps surprisingly, I find that stronger preferences for environmental issues are associated with a lower probability of signing international environmental agreements, with this effect being particularly pronounced among leaders with exceptionally strong pro-environmental views. Especially in relatively more democratic countries, the leaders' stated preferences for environmental issues are inversely related to the probability of signing international environmental agreements, highlighting effects of political

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friction between executive and legislative branches over the ratification of environmental agreements. The study also tests and finds no evidence supporting the hypothesis that leaders with more extremists preferences for sustainability perceive certain agreements as insufficiently stringent. My results highlight the complex interplay between political preferences, democratic institutions, and environmental policy.

Key-words: international environmental agreements, environmental preferences, political friction, executive leader.

Jel code: Q58, F53.

1 Introduction

Environmental agreements have emerged as crucial instruments for coordinating global efforts to address the environmental issue. These agreements are designed to facilitate collective action by setting targets for emission reductions, fostering cooperation among nations, and promoting sustainable development practices. Their significance lies not only in their potential to mitigate the adverse impacts of climate change but also in their role in mobilizing financial resources and technology transfers to support vulnerable countries.

Understanding the factors that influence the ratification of these agreements is essential for enhancing their effectiveness. By identifying the determinants of ratification decisions, policymakers can better address barriers to agreement adoption and improve the implementation of climate policies, ultimately strengthening global commitment to environmental sustainability.

Empirical literature identifies various factors that influence this decision, such as the presence of environmental or industrial lobbying, climate vulnerability, natural capital endowment, commercial interests, and the relations between countries in positions of potential agreement ratifiers (BELLELLI; AFTAB; SCARPA, 2023; BELLELLI; SCARPA; AFTAB, 2023; SPILKER; KOUBI, 2016; LEINAWEAVER, 2012; BERNAUER; BÖHMELT; KOUBI, 2013; STEIN, 2008; BERNAUER et al., 2010). However, there is no evidence regarding the impact of the personal environmental preferences of executive leaders on the decision to ratify the agreements.

This article aims to explore how the stated personal preferences of heads of state affect the ratification of international environmental agreements. Understanding the impact of these preferences on the ratification process can provide crucial information for policy formulation and may assist in the development of more effective strategies for negotiating and advancing environmental agreements by aligning approaches with the preferences and political pressures of national leaders.

This study utilizes a panel dataset comprising 172 environmental agreements

spanning from 1990 to 2015. To analyze the effects of personal preferences on the ratification decision, the research employs both linear probability models and a multilevel survival approach. Additionally, an Oaxaca-Blinder decomposition is conducted to further investigate the underlying influence factors. These methodological approaches provide a comprehensive framework for understanding how the personal environmental preferences of executive leaders impact the decision-making process regarding international environmental agreements.

I find that stronger preferences for sustainability are associated with both lower probability and hazard rate of ratification. This effect is particularly pronounced for leaders exhibiting exceptionally strong sustainability preferences, which could be attributed to a lack of political support within legislative bodies for ratifying environmental agreements. My evidence substantiates this finding and provides additional insights into the political pressures surrounding ratification in relation to natural capital endowment.

This study is structured as follows. Section 2 presents a comprehensive literature review, focusing on examining empirical findings on international environmental agreements, factors that influence the ratification decision and the political processes involved. Section 3 details the methodology and data utilized in this study. Section 4 discusses the empirical results obtained from these analyses. Finally, Section 5 concludes.

2   Literature Review

International environmental agreements consist of documents outlining objectives for environmental preservation, often accompanied by strategies to achieve these goals, monitoring and enforcement systems, as well as mechanisms for financial or technological contributions among nations to attain the established objectives.

The process of formulating and ratifying international agreements involves several crucial stages. Initially, participating nations convene at international conferences and summits, such as those organized by the United Nations, to discuss global environmental challenges and negotiate the terms of the agreements. During these negotiations, environmental objectives, strategies for achieving them, monitoring and enforcement systems, as well as mechanisms for financial and technological contributions, are defined.

Once the text of the agreement is formulated, it must be formally adopted by the participating nations. Subsequently, each country initiates the ratification process, which generally requires legislative approval. This process can vary significantly between countries, depending on their political and legal structures. Once ratified by a sufficient number of countries, the agreement comes into force, becoming legally binding for the signatories that have ratified it. The process of adhesion of an international agreement for which the country did not take part in the negotiations is called accession. Throughout this study, I follow Bellelli, Aftab e Scarpa (2023) and use the term ratification to address

both ratification and accession.

According to Spilker e Koubi (2016), the more stringent a country's formal constitutional requirements for treaty ratification, the lower the likelihood of ratification. Constitutions typically delineate whether approval from one or both legislative houses is necessary and specify the required voting threshold, whether a simple majority or a supermajority. The main reason for this is that an increased number of veto players, or legislators whose approval is necessary and who may have differing preferences over environmental issues, heightens the probability of policy deadlock, ultimately leading to the failure of ratification (SPILKER; KOUBI, 2016; FREDRIKSSON; GASTON, 2000; FREDRIKSSON; UJHELYI, 2006; TSEBELIS, 2002).

Although legislative approval is required for ratification, the initial decision rests with the executive leader. Ultimately, the ratification of an international environmental agreement occurs when it aligns with the head of state's personal judgment. While this leader may consider socioeconomic factors in their decision-making, personal preferences regarding environmental issues can significantly influence participation in agreements. To the best of my knowledge, this aspect has not been addressed in the existing literature. However, as emphasized by Leinaweaver (2012), it is crucial to enhance the understanding of how democracy and domestic political issues influence the ratification of environmental agreements.

Böhmelt (2019) acknowledges the primary responsibility of the head of state in the participation on international agreements and examines the effects of replacing the executive leader with a new one who depends on different social groups for support. The author identifies significant differences between cases with and without this leadership turnover, arguing that this type of change has a considerable impact. However, this study does not focus on environmental agreements nor does it consider personal preferences.

Böhmelt (2022), on the other hand, accounts for political ideology on the left-right spectrum, and finds an association between leftist ideology in democracies and agreement legalization on the environmental matter. In a study analyzing environmental messages on Twitter from UK politicians, Greenwell e Johnson (2023) discovered that, controlling for party affiliation, politicians who more frequently tweet about environmental issues are more inclined to break party ranks and vote in favor of environmental measures.

Bellelli, Aftab e Scarpa (2023) conducts an extensive literature review on the empirical studies related to the ratification of international environmental agreements. The review underscores that various additional factors, including those linked to income, have a significantly positive impact on the ratification process (SEELARBOKUS, 2014). Notably, evidence supports the existence of an environmental Kuznets curve, which depicts a bell-shaped relationship between environmental degradation, measured by emissions of specific pollutants, and per capita income levels. This indicates that at higher income levels, countries exhibit a stronger preference for environmental improvements (COLE,

2004; STERN, 2005).

The design of the agreement is also critical. More stringent agreements encompass formal obligations for the parties, monitoring and enforcement mechanisms, dispute resolution processes, assistance mechanisms, and organizational structures (BERNAUER; BÖHMELT; KOUBI, 2013). Spilker e Koubi (2016), Bernauer, Böhmelt e Koubi (2013), and Stein (2008) argue that agreements with stricter legal obligations are less likely to be ratified due to the challenges of compliance. However, Bernauer, Böhmelt e Koubi (2013) asserts that more rigorous monitoring and enforcement do not decrease the likelihood of ratification, while technology transfers and financial assistance can enhance the treaty's abatement levels without deterring participation.

Fredriksson, Sharma e Wollscheid (2024) provides additional evidence, suggesting that civil law countries tend to favor binding obligations in international agreements, whereas common law countries prefer non-binding obligations. Moreover, Bellelli, Scarpa e Aftab (2023), Böhmelt, Bernauer e Koubi (2015), and Fredriksson, Neumayer e Ujhelyi (2007) examine the effects of lobbying on the ratification of environmental agreements. The environmental lobby, typically measured by the presence of Environmental Nonprofit Organizations (ENGO), increases the likelihood of ratification. Fredriksson, Neumayer e Ujhelyi (2007) indicates that this effect is more pronounced in countries with higher levels of corruption, as this allows lobby groups to exert greater influence over policymakers.

International relations also play a significant role in the ratification decision, given the importance of commercial and financial interests. Sauquet (2014) finds that ratification by trading partners or green investors positively influences the domestic decision. According to Egger, Jeßberger e Larch (2011), wealthier countries with a strong inclination towards trade and investment liberalization are more inclined to voluntarily commit to environmental standards. Furthermore, Hugh-Jones, Milewicz e Ward (2018) argues that the signature of an agreement by other countries can serve as a signaling mechanism, encouraging participation.

Interdependence among countries can also mitigate the free-riding problem prevalent in environmental matters (BERNAUER et al., 2010). Additionally, Bellelli, Aftab e Scarpa (2023) argues that shared economic, diplomatic, or cultural ties can influence the decision on participation in such agreements. The authors' findings indicate that regional agreements are two and a half times more likely to be ratified than the global counterparts.

In light of this literature, I concur with Leinaweaver (2012) that although ratification is a domestic process, it is fundamentally anchored in the international context and influenced by the design of the treaty. Consequently, all these factors must be considered to enable a more thorough and precise analysis, even if my focus lies on the effects of executive leaders' personal preferences on environmental matters.

3   Method and Data

The primary data source for this study Bellelli, Aftab e Scarpa (2023), who compiled annual cross-country time-series from 1950 to 2017 for the ratification status of 263 international environmental agreements. By accounting for all potential ratifiers, this dataset guarantees us the avoidance of a significant source of bias in estimating the probability of agreement endorsement. Since my main goal is to analyze the possible effects of the personal environmental preferences of executive leaders, I merged this dataset with a measure of those preferences provided by the Manifesto Project (LEHMANN et al., 2023). The Manifesto Project conducts an examination of political parties' election platforms to investigate their policy stances. These data are compiled and made available online for public access[1]. After merging the data, the final sample comprises 172 agreements from 1990 to 2015.

Table 1 presents the descriptive statistics of all variables used in the analysis. My contribution to the literature is to examine the effect of the *sustainability* variable on the *ratification* indicator. The *sustainability* index ranges from 0 to 10, where higher values indicate a stronger announced preference for sustainable economic development. For easier interpretation, I used the *sustainability* variable in z-score form. The *politydemocracy* variable is crucial in this context, as the executive leader whose environmental preferences I am interested in does not hold absolute power in a democratic country and is, therefore, not solely responsible for the decision to endorse agreements.

Variable	Mean	SD	Min.	Max.	n	Definition
ratification	0.02	0.15	0	1	10165	Binary variable that takes value 1 on the year the country ratifies the treaty and 0 otherwise
sustainability	2.16	2.47	0	8.95	10165	Advocacy for sustainable economic development, opposing growth that leads to environmental or societal damage
politydemocracy	8.65	1.41	4	10	10165	Democracy component from Polity index. Higher scores are associated with more democratic regimes
logincome	9.20	0.96	7.37	11.54	10165	Natural logarithm of GDP per capita in current USD from UN National account estimates
logforest	8.18	2.42	5.04	13.19	8209	Natural logarithm of the area of the country covered in forest
ratregion	0.19	0.23	0	1	10165	Share of countries in the same region that ratified the agreement
frameworkagreement	19.47	14.40	0	65	10165	Dummy variable that takes the value of 1 if the agreement is a framework agreement
t	0.62	0.48	0	1	10165	Number of years in the risk set for ratification

Tabela 1: Descriptive Statistics

The examined literature also provides robust evidence regarding the importance of income, international agreement dynamics, and a country's natural capital in these

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[1]https://manifesto-project.wzb.eu.

decisions. Additionally, I account for the number of years during which the agreement was open for ratification, t. Due to various factors, a significant proportion of ratifications occur shortly after this period. Finally, *frameworkagreement* refers to agreements that usually have with non-binding obligations and was used to check further developed hypothesis.

Since the sample remains considerably wide after merging my two main source databases, I begin by estimating the basic linear probability model depicted in Equation (1), due to coefficients consistency property under this estimation method and its straightforward interpretation:

$$y_{ij}(t) = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \alpha_3 t^3 + \beta S_{it} + \boldsymbol{\gamma} \mathbf{C}_{ij}(t) + u_{ij}(t), \qquad (1)$$

where i, j, and t indicate country, agreement, and year, respectively. y is the *ratification* binary variable, $\mathbf{C}$ is a set of controls for country, agreement, and year, S is the sustainability index for each country and year, transformed into a z-score and β and $\boldsymbol{\gamma}$ are the respective parameter vectors. For years with changes in the executive leader, I have a single observation for each leader, where the characteristics of the country and the agreement remain the same, but the environmental preference measured by sustainability is observation-specific. The number of years spent in the risk set is also taken into account, to control for the effect of ratification occurring in the early periods when the agreement was first made available for ratification.

As robustness checks, I also estimated this model with fixed effects to account for the heterogeneity of the agreements, as well as the original specification with two different sample restrictions: more recent data, from 2005 onwards, and only the largest agreements, those with more than the median number of ratifying countries.

I also estimated a multilevel survival model, shown in Equation (2). This method offers the benefit of integrating data regarding both the event of ratification and the temporal aspect. Furthermore, its estimations maintain robustness in the presence of right-censoring. The outcome of this model is the hazard rate $h_{ij}(t)$, defined by the *cloglog* transformation of the probability of observing the ratification occurrence during the time interval t, conditional to no earlier ratification.

$$cloglog[h_{ij}(t)] = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \alpha_3 t^3 + \boldsymbol{D}_i(t)\boldsymbol{\beta} + \boldsymbol{I}_{ij}(t-1)\boldsymbol{\gamma} + \boldsymbol{T}_j(t)\boldsymbol{\lambda} + u_i + u_j, \quad (2)$$

$$u_i \sim N(0, \sigma_{u_i}^2) \text{ and } u_j \sim N(0, \sigma_{u_j}^2),$$

where $\boldsymbol{D}$, $\boldsymbol{I}$, and $\boldsymbol{T}$ are vectors containing domestic, international, and treaty explanatory variables, respectively, and $\boldsymbol{\beta}$, $\boldsymbol{\gamma}$, and $\boldsymbol{\lambda}$ are their corresponding parameter vectors. Since

this is an baeysian model, I followed the priors and the method proposed by Bellelli, Scarpa e Aftab (2023). The cubic form for the hazard function $h(t)_{ij}$ proposed by Carter e Signorino (2010) have good properties and is widely used even within the previously cited literature (BELLELLI; SCARPA; AFTAB, 2023; BÖHMELT; BERNAUER; KOUBI, 2015; LEINAWEAVER, 2012; SPILKER; KOUBI, 2016). A Markov chain Monte Carlo (MCMC) was estimation used, due to its robustness property and good performance when normality assumptions of the random effects are violated.

4 Results

	ratification	ratification	ratification	ratification	ratification	*multilevel*
	OLS	*felm*	*OLS*	*OLS*	*OLS*	*survival*
	(1)	(2)	(3)	(4)	(5)	(6)
z_sustainability	−0.01**	−0.01***	−0.004**	−0.01***		−0.36**
	(0.002)	(0.002)	(0.002)	(0.004)		(0.17)
sustainability					−0.002**	
					(0.001)	
logincome	−0.08*	0.13***	0.01	−0.03	−0.08*	−1.29
	(0.04)	(0.04)	(0.05)	(0.10)	(0.04)	(2.81)
sqlogincome	0.004*	−0.01***	−0.001	0.002	0.004*	0.07
	(0.002)	(0.002)	(0.003)	(0.01)	(0.002)	(0.15)
logforest	0.002**	0.004***	0.002	0.004**	0.002**	0.23**
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.12)
ratregion	0.08***	0.02	0.07***	0.08***	0.08***	1.83***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.0000)
politydemocracy	0.01***	0.01***	0.01***	0.01***	0.01***	0.84***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.22)
t	−0.01***	−0.0000	−0.01***	−0.01***	−0.01***	0.06*
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.47)
t^2	0.0002***	−0.0001	0.0002***	0.0002***	0.0002***	−0.009***
	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.002)
t^3	−0.0000***	0.0000*	−0.0000***	−0.0000*	−0.0000***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Constant	0.35*		−0.06	0.12	0.35*	−6.86
	(0.21)		(0.23)	(0.45)	(0.21)	(13.50)
Observations	8,209	8,209	6,699	3,121	8,209	8,209
R^2	0.04	0.17	0.04	0.05	0.04	
Adjusted R^2	0.04	0.15	0.04	0.05	0.04	
Residual Std. Error	0.16	0.15	0.14	0.19	0.16	
F Statistic	39.86***		29.32***	18.95***	39.86***	

Note: *p<0.1; **p<0.05; ***p<0.01

Tabela 2: Linear probability, fixed affects and multilevel survival estimations

The estimates using the linear probability model, fixed effects, and multilevel survival model are presented in Table 2. The probability of ratifying an environmental agreement increases by 1% given a marginal increase in the level of democracy. This

estimate is significant across all specifications and has the same value for all the linear models. A marginal increase in forest area also shows a small, positive, and significant effect on the likelihood of ratification. The increase in the share of potential ratifiers within the same region also has a positive and significant impact on the probability of ratification, ranging from 2% to 8%. These findings are consistent with the literature. Additionally, on the fixed effects specification, I can observe significant income effects following the Kuznets curve prediction.

The impact of *politydemocracy*, *logforest* and *ratregion* on the ratification hazard is similarly positive and significant at the 5% level. The share of countries in the same region that ratified the agreement has the largest effect (183%), followed by the strength of democracy (84%) and the log of forest area (23%). Income effects were not significant. The time effect is also significant in five of the six models of Table 2, but it is negative for the probability of ratification and positive for the hazard rate. This finding is consistent with the fact that the primary ratification period for an agreement is shortly after the opening of this possibility.

The coefficient associated with the environmental preference is very close to -1% in the first three estimates. Although it is closer to zero in the other two linear estimates, it remains negative and significant at the 5% level. This implies that an increase of one standard deviation in the sustainability preference of the executive leader results in a decrease of about 1% in the probability of ratifying an international environmental agreement. It is important to note that ratification is a rare event, with only about 2% of observations in this dataset being ratification occurrences. Consequently, predicted probabilities of ratification are inherently quite small. In the multilevel survival analysis, the estimated coefficient is approximately -36%, indicating that a one-standard-deviation increase in the environmental preference of the executive leader corresponds to a 36% reduction in the hazard rate of ratifying the agreement.

At first glance, these results may seem counterintuitive, as one might expect an executive leader with higher sustainability preferences to be more inclined to ratify an environmental agreement. However, this result may arise from political conflicts surrounding the ratification decision, which often requires approval from legislative bodies. A politician with strong sustainability preferences may be perceived as an extremist, potentially reducing support from legislative branch. To test this hypothesis, I estimated the models presented in Table 3.

The first column of Table 3 replicates the original specification from Table 2, for comparison. In the second column, instead of using the z-scored sustainability measure, I categorized the sample into three bins (0-3, 3-7, and 7-10), with the middle category serving as the base. The estimated coefficient showed a negative sign for both extremes: the least and most environmentally inclined executive leaders. Thus, being an extremist in either direction might reduce the marginal probability of ratifying an international

	Dependent variable:					
	ratification	ratification	ratification	ratification	ratification	ratification
	(1)	(2)	(3)	(4)	(5)	(6)
z_sustainability	−0.01**		−0.004*	−0.001	−0.005**	−0.01***
	(0.002)		(0.002)	(0.004)	(0.002)	(0.003)
sustainability 0-3		−0.0002				
		(0.01)				
sustainability 7-10		−0.02**				
		(0.01)				
logincome	−0.08*	−0.06	−0.09*	−0.08*	−0.08*	−0.08*
	(0.04)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)
sqlogincome	0.004*	0.003	0.005*	0.004*	0.004*	0.004*
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
logforest	0.002**	0.002*	0.003***	0.002	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ratregion	0.08***	0.08***	0.08***	0.08***	0.08***	0.08***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
politydemocracy	0.01***	0.01***		0.01***	0.01***	0.01***
	(0.002)	(0.002)		(0.002)	(0.002)	(0.002)
weaker_democracies			−0.03***			
			(0.01)			
stronger_democracies			0.02***			
			(0.004)			
z_sus × democracy				−0.005		
				(0.004)		
frameworkagreement					0.01***	
					(0.004)	
z_sus × framework						0.01
						(0.003)
t	−0.01***	−0.01***	−0.01***	−0.01***	−0.01***	−0.01***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
t^2	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
t^3	−0.0000***	−0.0000***	−0.0000***	−0.0000**	−0.0000**	−0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Constant	0.35*	0.26	0.45**	0.37*	0.34*	0.35*
	(0.21)	(0.22)	(0.21)	(0.21)	(0.21)	(0.21)
Observations	8,209	8,209	8,209	8,209	8,209	8,209
R^2	0.04	0.04	0.04	0.04	0.04	0.04
Adjusted R^2	0.04	0.04	0.04	0.04	0.04	0.04
Residual Std. Error	0.16	0.16	0.16	0.16	0.16	0.16
F Statistic	39.86***	36.02***	35.01***	36.02***	37.44***	36.13***

Note: *p<0.1; **p<0.05; ***p<0.01

Tabela 3: Further estimations on ratification

environmental agreement. However, the coefficient is significant only for the 7-10 bin, indicating that more environmentally inclined executive leaders play a major role in shaping the negative coefficient for sustainability.

In the third column of Table 3, I categorized countries based on the democracy index, including indicators for the most extreme categories and once again using the middle category as the base. Results indicate that the marginal probability of ratification is positive for the most democratic countries (index from 9 to 10) and negative for the less democratic ones (index from 0 to 5), with both estimates being small but significant. This aligns with the positive coefficient for the democracy index found in all previous estimates: more democratic countries are more likely to ratify environmental agreements.

In the fourth column of this table, I controlled for the original democracy index while including an interaction between the higher-quality democracies dummy and the z-scored sustainability measure. The coefficient showed a negative sign, suggesting that executive leaders with stronger environmental preferences in more democratic countries have a lower chance of ratifying environmental agreements.

The non-significance of this coefficient is likely related to multicollinearity, as the two interacting variables are also not significant in this specification and have a correlation of about 30%. An F-test showed that the three parameters are, in fact, jointly significant at 1%. However, the sign in on the fourth model of Table (3) may also reflect a confounding effect, as executive leaders with more power, such as dictators, may not need to position themselves as environmentalists. In other words, this could be due to differences in democracy endowments between groups with distinct preferences for sustainability.

Finally, in the last two columns I tested an alternative hypothesis to explain the negative signal obtained in the estimates of Table 2: are the more extreme environmentalists considering some agreements too weak to be ratified? The coefficient associated with *frameworkagreement* is positive and significant, meaning that more non-binding agreements are more prone to be ratified, as evidenced by Spilker e Koubi (2016). Furthermore, the interaction between this variable and the s-zcored sustainability index was not significant. The correlation between this two variables was only about 4%, in such a way that there is no reason to believe that the lack of significance here is also due to an possible multicollinearity problem.

Hence, the results presented in Table 3 support the stated hypothesis: executive leaders with more extreme environmental preferences receive less support from legislative bodies. Consequently, in democratic regimes, where ratification decisions are less autonomous, the marginal probability of ratifying an environmental agreement is lower when the preference for sustainability is higher.

To further investigate this result, I conducted a Oaxaca-Blinder decomposition between the executive leaders with above-average sustainability preferences and those with below-average preferences. The results are illustrated in Figure 1. This method decompo-
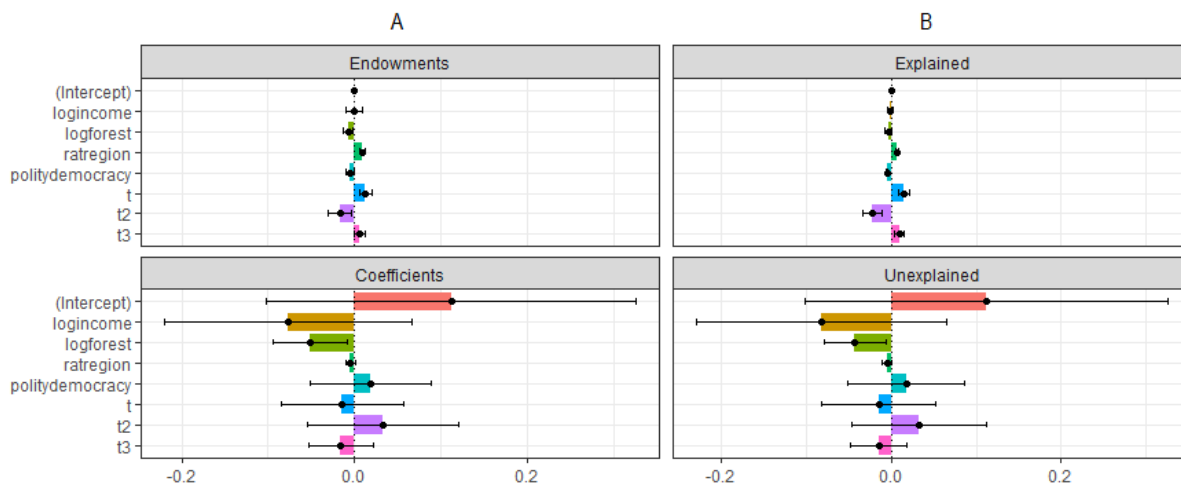
Figura 1: Oaxaca-Blinder decomposition. Panel (A) presents the decomposition between endowments and coefficients effect and panel (B) presents the decomposition between explained and unexplained differences in the probability of ratification.

ses the differences in outcomes into two main components: endowments and coefficients. The endowments component reflects the differences in observable characteristics between groups. In contrast, the coefficients component captures the differences in the effects of these characteristics, which are attributed to the differing impacts of these characteristics on the outcome variable.

Additionally, the decomposition distinguishes between explained and unexplained components. The explained component, derived from endowments and coefficients, represents the portion of the outcome differential that can be attributed to differences in observed characteristics and their associated impacts over the outcome. The unexplained component, on the other hand, accounts for the part of the differential that cannot be attributed to observable characteristics alone, often reflecting disparities due unobserved variables.

Panel A of Figure 1 presents the decomposition between endowments and coefficients, and reveals no significant difference between the above-average and below-average environmentalists regarding the level of democracy and in which extent it explains variations in the probability of ratifying environmental agreements. However, Panel B reveals that democracy plays a significant role in explaining this difference. Thus, I observe that the finding from the third model in Table 3 is, indeed, not due to environmentalist executive leaders being concentrated in less democratic countries, or to a similar phenomena. Instead, the lack of absolute power in ratification decisions and the consequent reliance on legislative approval may be driving my main finding.

An additional result can be drawn from this decomposition. As illustrated in Figure (1), the only significant difference between the two groups due to coefficients pertains to the natural capital endowment variable, *logforest*. This finding indicates that *logforest*

is particularly influential in the ratification decision within the group with below-average sustainability preferences. One possible explanation for this is external political pressure. For instance, if Brazil is governed by an executive leader with very low preferences for sustainability but is confronted with a potential environmental agreement, strong external pressure for ratification may arise due to international concerns about the Amazon Rainforest.

It is also noteworthy that there is no significant difference in endowment effects between the two groups regarding *logforest*, while the unexplained component of the difference is significant. Although further investigation into this matter is beyond the scope of this paper, future research could explore the impact of external political pressure on the ratification of environmental agreements in relation to natural capital endowment. This connects with the findings of Fredriksson e Ujhelyi (2006) and Bellelli, Aftab e Scarpa (2023), which indicate that environmental lobbying has a positive and significant effect on the probability of ratification. However, this literature refers to domestic lobby, while effects of international environmental lobby and political pressure remains unexplored.

Altogheter, my analysis reveals that higher environmental preferences among executive leaders are associated with a reduced probability of ratifying international environmental agreements. This counterintuitive result may be attributed to domestic political conflicts and the perception of such leaders as extremists, potentially diminishing their support from legislative bodies. The robustness checks further substantiate this finding, indicating that the observed negative effect is not merely an artifact of the data or model specifications.

Moreover, the interaction between democracy and environmental preferences underscores the complexity of political dynamics affecting ratification decisions, where more democratic regimes exhibit a lower likelihood of ratification when executive leaders hold stronger sustainability preferences. These insights, together with the possible evidence for external pressure over executive chiefs with below-average environmental preferences, highlight the nuanced relationship between political preferences, democratic institutions, and environmental policy-making, suggesting that broader political and institutional contexts play a crucial role in the adhesion to environmental agreements.

5   Conclusion

Environmental agreements play a crucial role in coordinating global responses to environmental challenges. Understanding the factors that influence the ratification of these agreements is essential for enhancing their effectiveness. Identifying these determinants enables policymakers to address barriers to adoption and improve the implementation of climate policies, thereby strengthening global commitment to sustainability. While existing empirical literature highlights various influencing factors, the impact of execu-

tive leaders' personal environmental preferences on ratification decisions has remained unexplored until now. This research aims to address this gap in the literature.

My findings reveal that an increase of one standard deviation in preferences for sustainable economic development is associated with a 36% reduction in the hazard of international climate agreement ratification and a 1% decrease in the probability of ratification. Further analysis indicates that this effect is particularly pronounced among executive leaders with strong pro-environmental preferences, possibly due to insufficient political support from legislative bodies for more extreme leaders.

Supporting evidence suggests that politicians with stronger sustainability preferences in more democratic countries face lower chances of ratifying environmental agreements. An Oaxaca-Blinder decomposition rules out significant differences in democracy endowment between executive leaders with above-average and below-average environmental preferences. I also show that, despite this, democracy plays a significant role in explaining the differences in ratification between these two groups. The alternative hypothesis that leaders with strong pro-environmental preferences may consider certain agreements too weak for ratification was tested. However, the evidence did not support this claim.

Additionally, the Oaxaca-Blinder decomposition revealed that the only notable difference between the two groups in terms of coefficients is related to the natural capital endowment. This finding highlights the significant role of natural capital in the ratification decisions among political leaders with below-average sustainability preferences. Notably, there is no significant difference in endowment effects between the two groups for this variable, though the unexplained component of the difference is significant.

The results provided by this investigation underscore the complex interplay between political preferences, democratic institutions, and environmental policy, highlighting the importance of political and institutional contexts in shaping ratification decisions. Future research should delve deeper into these relationships to further elucidate their implications for climate policy and international agreements. Additionally, exploring the impact of external political pressure on ratification decisions, particularly in relation to natural capital endowments, would provide valuable insights.

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