How has the Brazilian Amazon been constructed as a problem:presidential speeches and transnational politics since 1985

Livio Silva-Muller   Henrique Sposito*

23 September 2022

Abstract

Presidential speeches can influence the ways people think and act towards the environment , but they are understudied. We propose a framework to investigate how the Brazilian Amazon has been constructed as a problem across time and space. Using supervised machine learning, we classify statements about the Amazon in 6130 transnational presidential speeches since 1985. We find that national and international events drive the frequency at which the topic of the Amazon is mentioned in presidential speeches inside and outside Brazil. While constructing the Amazon as a problem of economic integration are the most common until the mid-2000s, environmental conservation and social development constructions temporarily surpass economic integration from 2010 to 2015. In turn, constructing the Amazon as an issue of sovereignty increases since 2010. Lastly, the farther away presidents are from the Amazon itself, the more likely they are to construct the Amazon as an issue of environmental conservation.

Keywords: discourse analysis, transnational governance, environmental policy, Brazilian Amazon, supervised learning, deforestation

Word Count: 8299 (including abstract, text, references, and footnotes)

This is a working version, please do not share or cite without the authors' permission.

---

*Both co-authors contributed equally to the article. Names are ordered alphabetically. Livio is a PhD Candidate in Anthropology and Sociology at the Geneva Graduate Institute and affiliated to the Albert Hirschman Centre on Democracy. Henrique is a PhD Candidate in International Relations and Political Sciences at the Geneva Graduate Institute and affiliated to the Centre for International Environmental Studies.
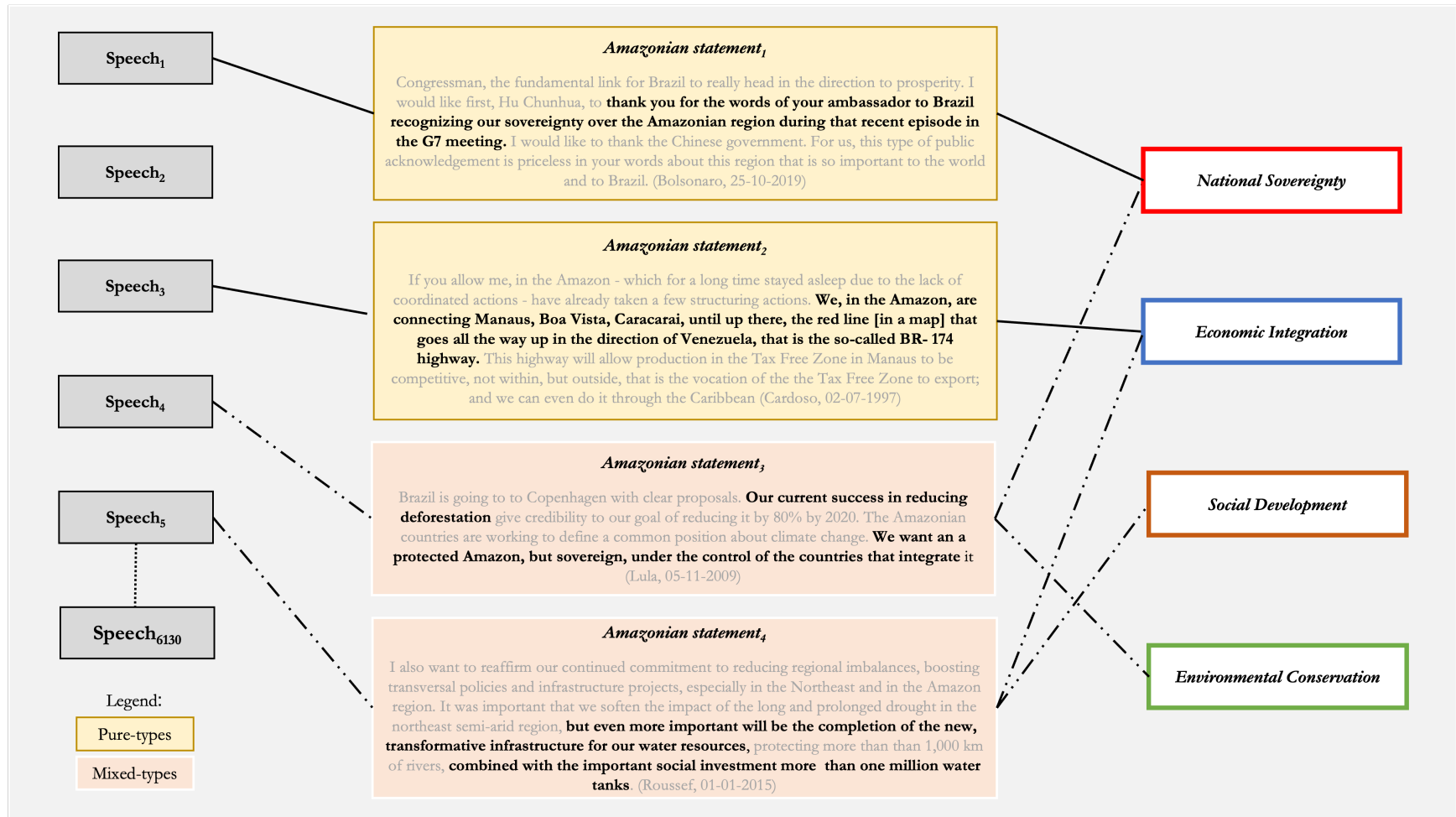
3 Methods

3.1 Problem-construction

3.2 Data and Operationalization

To analyze how presidents construct the Amazon as a problem, we build upon Cezar's 2020 dataset, which contains all official speeches by Brazilian Presidents from 1985 to 2019 scrapped from the archives of the Brazilian Presidential Library. We update the dataset by scraping and adding all official speeches from 2020 and 2021. The final dataset encompasses 6130 speeches. We, then, proceed to identify speeches that refer to the Amazon as a region, people, or forest. We do so by detecting all speeches in which the stem "amazon" appears. In Portuguese, the stem captures terms such as "Amazonia", "Amazonica", "Amazonidas", "Amazonense(s)", "Amazonas", among others. We find that 946 speeches are, at least partially, about the Amazon.

Using the poldis R package (Sposito 2021), we extract two sentences before and after the sentence in which the stem "amazon" appears. We opt for picking two sentences around, rather than words, because sentences usually contain a cohesive idea. When two or more matches of the stem "amazon" appear in successive sentences, we get two sentences before the first match and two sentences after the last match. This is how our unit of analysis, Amazonian statements, are generated. Amazonian statements represent text portions that are meaningful for our specific purpose. This process yields 2014 unique Amazonian statements about the Amazon. On average, an Amazonian statement contains 123 words.

Our approach to coding Amazonian statements is threefold. First, we follow the Amazonian historiography literature to develop a codebook to identify Amazonian problem-constructions (see codebook in appendix). In their conceptualization, each problem-construction is mutually exclusive; that is, they cover different forms of constructing the Amazon as a problem. However, an Amazonian statement can be coded as referring multiple problem constructions. A statement can, for example, construct the Amazon as a problem of sovereignty and a problem of economic integration, or a problem of social development and conservation. Amazonian statements, thus, can be pure-type statements (i.e. constructs the Amazon as a single problem) or mixed-types (i.e. constructs the Amazon as multiple issues). Figure 1, below, portrays this operationalization strategy.

Figure 1: Operationalization of problem-constructions

Speech₁

Speech₂

Speech₃

Speech₄

Speech₅

Speech₆₁₃₀

Legend:

Pure-types

Mixed-types

Amazonian statement₁

Congressman, the fundamental link for Brazil to really head in the direction to prosperity. I would like first, Hu Chunhua, to **thank you for the words of your ambassador to Brazil recognizing our sovereignty over the Amazonian region during that recent episode in the G7 meeting.** I would like to thank the Chinese government. For us, this type of public acknowledgement is priceless in your words about this region that is so important to the world and to Brazil. (Bolsonaro, 25-10-2019)

Amazonian statement₂

If you allow me, in the Amazon - which for a long time stayed asleep due to the lack of coordinated actions - have already taken a few structuring actions. **We, in the Amazon, are connecting Manaus, Boa Vista, Caracarai, until up there, the red line [in a map] that goes all the way up in the direction of Venezuela, that is the so-called BR- 174 highway.** This highway will allow production in the Tax Free Zone in Manaus to be competitive, not within, but outside, that is the vocation of the the Tax Free Zone to export; and we can even do it through the Caribbean (Cardoso, 02-07-1997)

Amazonian statement₃

Brazil is going to to Copenhagen with clear proposals. **Our current success in reducing deforestation** give credibility to our goal of reducing it by 80% by 2020. The Amazonian countries are working to define a common position about climate change. **We want an a protected Amazon, but sovereign, under the control of the countries that integrate** it (Lula, 05-11-2009)

Amazonian statement₄

I also want to reaffirm our continued commitment to reducing regional imbalances, boosting transversal policies and infrastructure projects, especially in the Northeast and in the Amazon region. It was important that we soften the impact of the long and prolonged drought in the northeast semi-arid region, **but even more important will be the completion of the new, transformative infrastructure for our water resources,** protecting more than than 1,000 km of rivers, **combined with the important social investment more than one million water tanks**. (Roussef, 01-01-2015)

National Sovereignty

Economic Integration

Social Development

Environmental Conservation

Second, with the codebook in hand, each one of the authors separately hand-coded 1007 randomly selected Amazonian statements. This amount refers to 50% of all the Amazonian statements identified. We chose to hand code half of the observations because there are several nuances in how presidents talk about the Amazon over time, and as a problem. As well, the size of the training set should increase with the number of categories (Grimmer, Roberts, and Stewart 2022). Hand coding 50% of the statements mean we have a robust and reliable number of observations to be used for the training, and the validation, of the automated model. The average intercoder agreement for hand-coded categories was 85%. For each non-matching coded observation, the authors discussed and sorted their disagreements, which were subsequently specified in the codebook.

Third, the hand-coded data is randomly divided into a training set, containing 80% of the data (806 observations), and a validation set, containing the remaining 20% of the data (201 observations). We employ a support-vector machine (SVM) algorithm, a non-probabilistic linear classifier for binary categories, to label texts (Meyer et al. 2021; Noble 2006). To validate the model, the SVM algorithm is trained using the hand-coded training set and then employed to classify observations in the validation set. The trained SVM model was, on average, 82%, accurate in coding observations in the validation set. The SVM model is, then, tuned, re-trained using all the 1007 hand-coded observations, and used to automatically code the remaining 1007 Amazonian statements. As a final robustness check, the authors also randomly select 100 Amazonian statements automatically coded and find that the automated model is 97% accurate in coding these statements. The final dataset for analysis, excluding false positive matches, contains 1895 coded Amazonian statement [1]. Automating the coding of half of the observations is estimated to have saved the authors over one month of work in comparison to manual coding.

3.3 Analysis and Limitations

To analyze our data, we model the share of a specific pure problem-construction, as the dependent variable, relative to the settings in which a particular speech happens, as our independent variable. This means we predict the probability of a president constructing the Amazon as an issue of (1) environmental conservation, (2) economic integration, (3) social development, and (4) national sovereignty, separately, and in relation to the remaining problem-constructions (see table 1 below). We focus on pure problem constructions to provide unambiguous interpretation and more robust findings. We divide settings in terms of non-Amazonian Brazilian states, Amazonian states within Brazil, Brasilia, Amazonian countries, and international. The level aggregation refers to geo-political settings that make sense in light of the Amazon, as a policy object. This aggregation combines different expectations presidents might have about transnational audiences in these settings. Brasilia is separated as a setting due to its' unique geolocation and since most presidential speeches are delivered in Brasilia. The model controls for yearly deforestation rates, inflation, election

---

[1]We also trained the model to identify false positive Amazonian statements. These are statements in which the stem "Amazon" is matched but the statements is not meaningful in relations to the policy object. For example, cases in which a president acknowledges the presence of the governor of the Amazon state, but is not really speaking about the Amazon.

years, and peak years for Amazon in presidential speeches. The analysis also plots Amazonian statements and problem-constructions over time and by setting. We interpret the models and plots considering the literature, Amazon-related events, and policies over the last 40 years.

Models Description	Dependent variables	Independent Variables	Controls
Fixed-effects logistic regressions indexed by president (controlling for time and ideology).	Pure environmental conservation; pure economic integration; pure social development; and pure national sovereignty.	Amazonian states within Brazil (reference category); non-Amazonian Brazilian states; Brasilia; Amazonian countries; and international.	Yearly deforestation rates lagged by one year; average annual inflation; election years; and peak years for Amazon appearing year in presidential speeches (footnote).

Table 1: Model description

The main limitations of our approach are threefold. First, related to our sub-setting and coding strategies, we classify statements as Amazonian based on a dictionary composed of a single lexicon stem: "amazon". We chose to do so knowing that a few speeches about the Amazon might not contain the lexicon "Amazon", for example, when the president says, "the forest" or "deforestation". Hence, we might be missing statements about Amazon that do not refer to it. However, we consider this safer as we cannot be sure that mentions of the forest or deforestation do not correspond to other biomes such as the Cerrado or the Atlantic Forest. Moreover, our codebook is developed using specific Amazon related vocabulary. For example, a statement will be coded as economic integration if it is meaningful support for the tax-free zone of Manaus or a dam in the Amazon. However, the economy is generally a topic that presidents speak about frequently. Hence, the high incidence of economic integration in Amazonian statements could also be related to the higher importance of this problem-construction in Brazil overall.

Second, our dataset covers only what is considered an official speech. Presidents, though, give interviews, appear in debates, talk at campaign rallies, and, more recently, post on social media. Problem-construction within presidential discourse, thus, happens in different public and private venues for which we do not account in this paper. We believe that setting remains an important factor in changing expectations about audiences, especially for a historical analysis. Although we recognize that this, arguably, has begun to change with the advancement of communication technologies. Furthermore, we aggregate levels to socio-political-cultural settings that make sense in light of the policy object in question. Therefore, we are aware that a category as "international", for instance, encompasses speeches delivered by presidents in a wide variety countries and institutions to a wider variety of audiences, which are not differentiated.

Third, employing lagged deforestation as a control variable has several constraints. We assume presidential discourse, policies, and outcomes are co-constitutive. We lag annual deforestation one year since data for the year usually gets publicly released later and, frequently, there is a time difference to when discourses might refer to certain deforestation rates. We do think discourses capture general problem constructions that can be used to introduce,

discuss, and justify policy and outcomes. Throughout the analysis we carefully discuss how presidential discourses might relate to deforestation rates and outcomes by pointing to the patterns and correlations, without making causality claims.
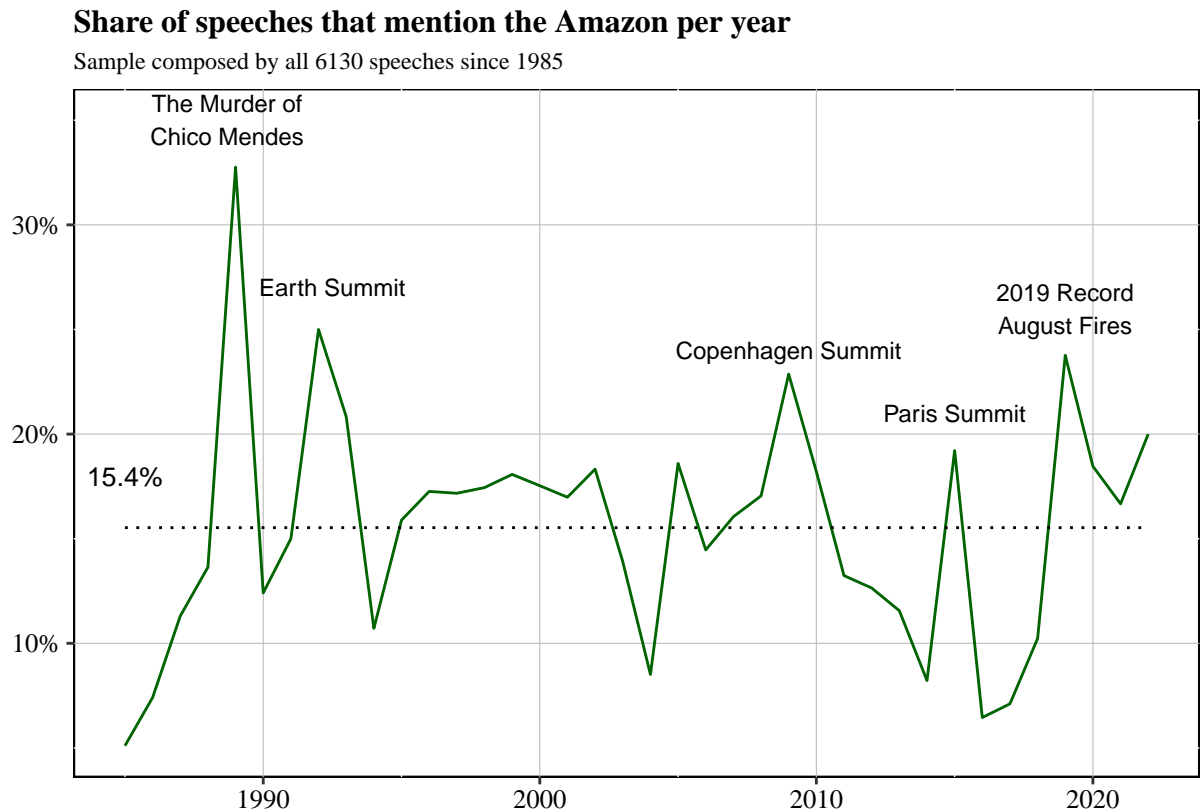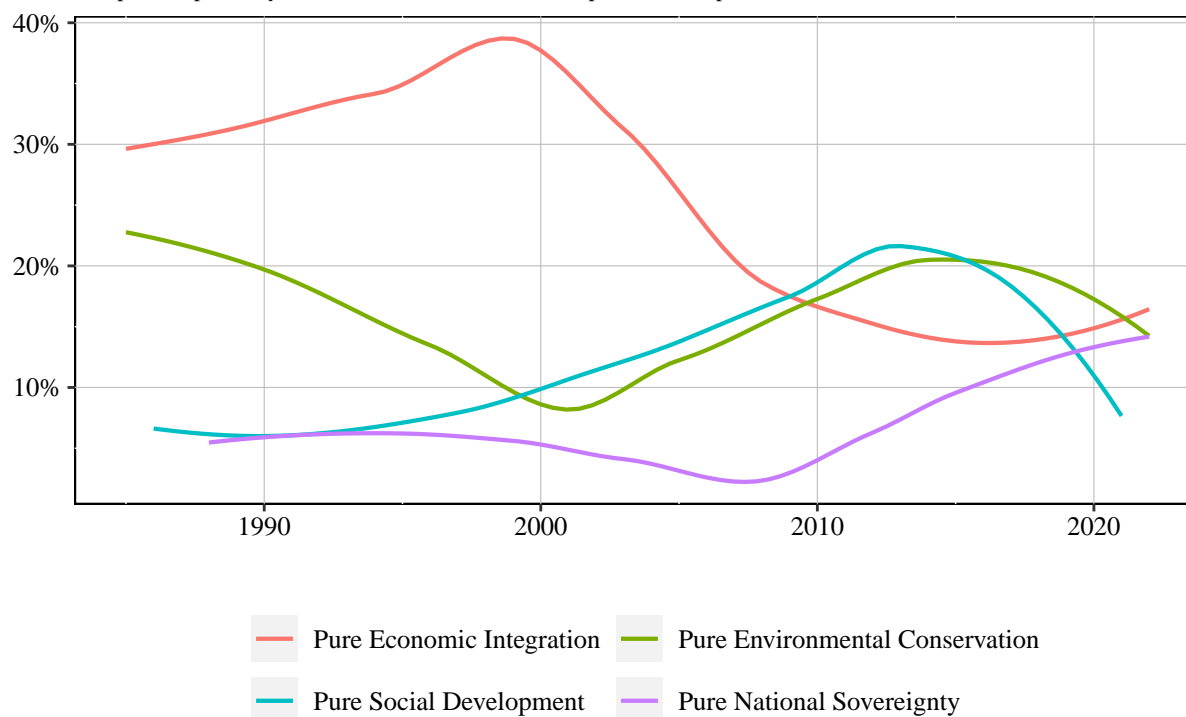
4 Analysis

Figure 2: Amazonian speeches in time

Share of speeches that mention the Amazon per year

Sample composed by all 6130 speeches since 1985

Share of each pure–type problem–construction by year

Sample composed by 1895 Amazonian statements in presidential speeches since 1985
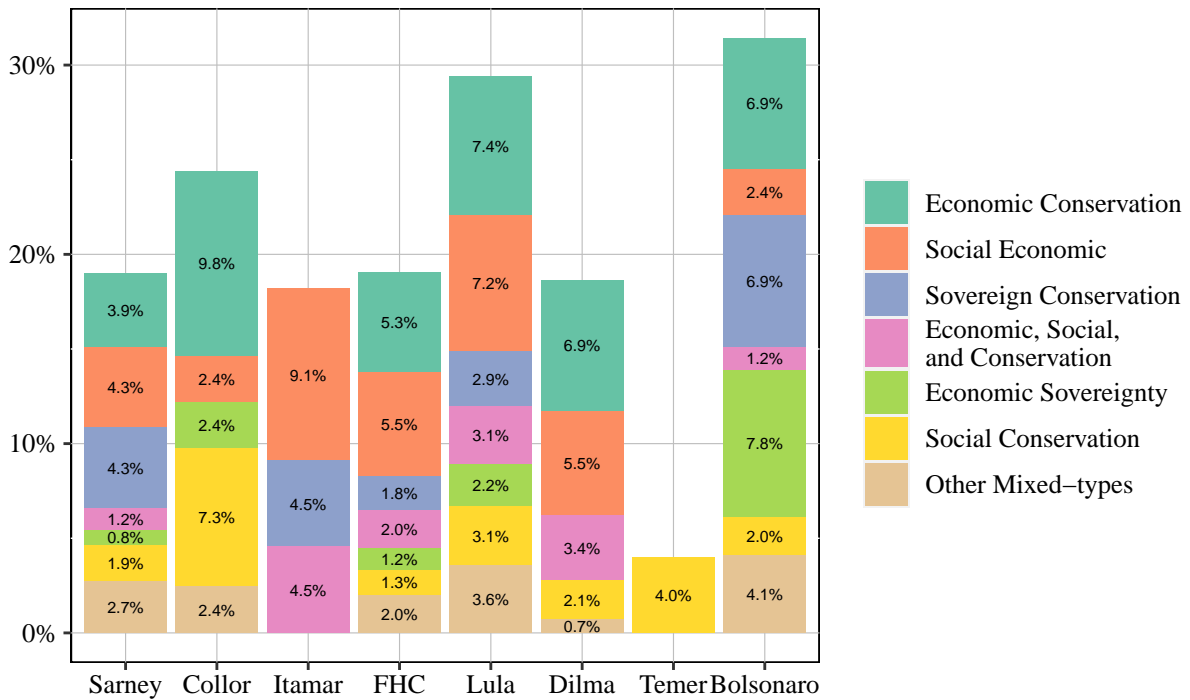

Legend:
- Pure Economic Integration
- Pure Environmental Conservation
- Pure Social Development
- Pure National Sovereignty

Curves in the plot were smoothed using loess method.

Share of each mixed−type problem−constructions by president

Sample composed by 1895 Amazonian statements in presidential speeches since 1985

	Dependent variable:			
	Environmental Conservation	Economic Integration	Social Development	National Sovereignty
	(1)	(2)	(3)	(4)
Non Amazonian States	0.043*	−0.001	0.003	0.036**
	(0.023)	(0.028)	(0.020)	(0.015)
Brasilia	0.119***	−0.070***	−0.027	0.027*
	(0.022)	(0.026)	(0.019)	(0.014)
Amazonian Countries	0.019	0.094**	−0.101***	−0.002
	(0.033)	(0.040)	(0.029)	(0.022)
International	0.222***	−0.051	−0.061**	−0.006
	(0.032)	(0.039)	(0.029)	(0.021)
Deforestation	−0.004**	0.012***	−0.002	−0.0002
	(0.002)	(0.002)	(0.002)	(0.001)
Inflation	0.0001**	−0.0001***	0.00004	0.00000
	(0.00003)	(0.00004)	(0.00003)	(0.00002)
Election Year	0.045**	0.004	0.005	−0.010
	(0.022)	(0.027)	(0.020)	(0.015)
High-profile Events	0.006	−0.012	−0.010	0.070***
	(0.027)	(0.032)	(0.024)	(0.018)
Observations	1,836	1,836	1,836	1,836
R^2	0.046	0.034	0.012	0.017
Adjusted R^2	0.038	0.026	0.004	0.009
F Statistic (df = 8; 1820)	10.858***	7.974***	2.793***	3.859***

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

Table 2: Fixed-effects logistic regressions by president with controls

Acknowledgements

The authors are extremely grateful to Matias López, Graziella Moraes Silva, and James Hollway for their support. The authors would also like to thank the Mario, Federico, Rodrigo, and Anna for valuable comments on earlier drafts of this paper.

Disclosure Statement

The authors report there are no competing interests to declare.

References

Appendix

problem-construction	Description	Example
National Sovereignty	This code constructs the Amazon region and/or forest as an issue of national sovereignty. We understand claims of sovereignty as a particular problem-construction that touches on imaginaries of external threats to territory. Relatedly, we also understand sovereignty as raising concerns about wrong perspectives and criticism from foreign and non-state actors about government action related to the Brazilian Amazon. In all, it advances the view that the Amazon is Brazilian, foreign, and non-state presence in the region needs to be monitored closely.	Congressman, the fundamental link for Brazil to really head in the direction to prosperity. I would like first, Hu Chunhua, to thank you for the words of your ambassador to Brazil recognizing our sovereignty over the Amazonian region during that recent episode in the G7 meeting. I would like to thank the Chinese government. For us, this type of public acknowledgement is priceless in your words about this region that is so important to the world and to Brazil. (Bolsonaro 25/10/2019)
Economic Integration	This code constructs the Amazon region and/or forest as an issue of economic integration. It advances the view that the Amazon needs to be developed and connected to the national economy. This includes expanding the agricultural frontier through incentives, creating a diverse set of infrastructure (roads, dams, internet, radio, energy), fostering differing industries (tourism, mining, cattle, agriculture and so on) through tax-free zones, as well as facilitating the exploitation of natural resources for developmental purposes.	If you allow me, in the Amazon - which for a long time stayed asleep due to the lack of coordinated actions - have already taken a few structuring actions. We, in the Amazon, are connecting Manuas, Boa Vista, Caracarai, until up there, the red line [in a map] that goes all the way up in the direction of Venezuela, that is the so-called BR-174 highway. This highway will allow production in the Tax Free Zone in Manaus to be competitive, not within, but outside, that is the vocation of the the Tax Free Zone to export; and we can even do it through the Caribbean (Cardoso 02/07/1997)
Social Development	This code constructs the Amazon region and/or forest as an issue of social development. It advances the view that Amazon is full of citizens who should have their rights guaranteed. This refers to the construction of schools and universities (right to education), of hospitals (right to health), and of housing (right to house). This also includes guarantees of a dignified life with decent employment, access to water and sanitation, as well as access to electricity, internet, radio, and light. Finally, this includes referrals to culture and the right to vote.	The state does not work for profits, the state needs to guarantee dignity, we find that a citizen who lives in the riverside of the Amazon river, 600 kilometers from Manaus, has the right to have the electricity in their house, to owe a fridge, to owe a television where to watch the soap operas. We have invested over 14 billion reais in this program, in three and a half years. Do you know how many electrical lines we have already built? One million kilometers of lines. (Lula 20/11/2009)
Environmental Conservation	This code constructs the Amazon region and/or forest as an issue of conservation. This problem-construction focuses on the value of a standing forest and of the preserved ecosystem in the region. The conservationist narrative advances the view that Amazon should be preserved, deforestation should be halted, and the practices of indigenous and traditional populations should be maintained and fostered. It advances the view that the emission of greenhouse gasses should be halted, that renewable energy should be supported, and that protected areas should be created.	I have put in place emergency measures, I have suspended the exports of wood logs, I have suspended the fiscal incentives and credits to projects that could damage the environment in the amazon and I have made a license mandatory to gold mining that prohibits utilizing mercury in the process. This began the restructuring of the governmental system of control and preservation of the environment, I have created the Brazilian Institute for the Environment and Natural Resources [IBAMA], which will be headed by Dr. Mesquita (Sarney 20/07/1989)

Table 3: Amazonian Problem-Construction Codebook