How has the Brazilian Amazon been constructed as a problem? An analysis of presidential speeches since 1985

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Abstract

This paper ...

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1 Introduction

The Amazon needs to be protected from foreign interests. The Amazon needs to be exploited for its natural resources. The Amazon needs to be preserved as a standing ecosystem. Historically, different Brazilian federal government proposed diverse policies to deal with the Amazon. Each of these policies contain an implicit assumption of what needs to be solved, or in other words, it represents the region, the forest, or its peoples as a particular problem. In the three examples above, the Amazon is represented as an issue of national sovereignty, economic integration, and environmental conservation, respectively. Each of these constructions, and their proposed solutions, have been described as policy cycles of Brazilian governments (Acker 2014; Hecht and Cockburn 1990; Hochstetler and Keck 2007). However, policy cycles are usually represented monolithically, advancing a view that specific governments see the Amazon as an instance of only one specific problem. Albeit the current calls to understand the environment as a social-cultural construction and to identify the effect of culture on environmental outcomes (Waroux et al. 2021), we lack empirical accounts of how the Brazilian Amazon has been constructed as a problem over time, by geographical location, and between and within governments

In this article, we investigate how the Brazilian Amazon has been constructed as a problem in political discourses. Building on Hirschman (1963) concept of chosen problems in policy making, we propose a framework to identify how problem-construction. Although problem-construction takes place in a series of instances (e.g. policy committees, legislative bodies, media, etc.), we analyze the case of political discourse by Brazilian presidents since 1985. We opt for presidential speeches for three reasons. First, political discourses at the top have the power to introduce and justify public policy, as well as shape its perception to broad audiences (Zarefsky 2004). In turn, policy perception is key for policy adoption and implementation (Alesina and Giuliano 2009; López et al. 2020). The literature has shown that deforestation rates in Brazil are more responsive to the government's environmental policy than exogenous factors as market fluctuations (Assunção, Gandour, and Rocha 2015; Capobianco 2019, 2021). Thus, understanding how policy comes about discursively is important. Second, environmental discourse at the top can help expand or restrict what types of behaviors are accepted in the ground. When Brazilian presidents speak about the Amazon it not only makes headlines, nationally and internationally(Brice and Smith 2021; Harris 2021; Miranda 2021), but also incites responses, shapes expectations, and feeds into the behavior of many actors involved in the Amazon, from investors to agribusiness to local farmer. This is especially pertinent for deforestation as previous research found that policy expectations, generated from material and discursive governmental practices, are a crucial factor in decisions to deforest at the ground (Capobianco 2019; Campbell 2015). Unpacking discourse at the top might help us raise hypotheses about environmental outcomes that are culturally situated. Finally, as our theoretical framework suggests, problem-construction varies by geographic location. Presidential discourses take place in a series of sites with diverse audiences: from launching a new bridge in a small municipality in the middle of the Amazon, to a keynote speech in a business association in São Paulo, to the UN general assembly in New York. Working with presidential discourses allows us to identify this variation in meaningful ways and better how the Amazon is socially constructed.

To investigate how the Brazilian Amazon has been constructed as a problem in political discourses, we create a dataset containing 6130 official presidential speeches by all Brazilian presidents since 1985. We subset the dataset by identifying Amazonian related statements within these speeches. We find that 2014 sections in these discourses refer to the Amazon at least once. We then develop a codebook grounded on Amazonian historiography to code how each of these statements constructs the Amazon as a particular problem. We use this codebook to manually code a randomly selected training set of the Amazonian related statements. Using R, we then train a supervised machine-learning model in the hand-coded set and automatically label the remaining set of Amazonian statements. We then conduct a descriptive and inferential analysis of this data, tying our findings to endogenous and exogenous events related to deforestation.

Our findings are threefold. First, endogenous events as the death of Chico Mendes, the 1992 Earth Summit, the 2009 Copenhaguen Summit, the 2015 Paris Summit, and the 2021 London Summit drive generally the interest in the Amazon. That seems to be the case even after controlling share of annual speeches mentioning the Amazon for deforestation, inflation, and speaker. Second, there was a sharp decrease in economic related problem-constructions from the late 1990 to 2010, matched by an increase in speeches that construct the

Amazon as a problem of social development and environmental conservation. This trend is reversed in the late 2010s, with the twist of sovereignty making a strong comeback. Finally, using a multinominal model, we find that the farthest away the speaker is from the Amazon, be it within the country in non-Amazonian States or outside Brazil, the more likely the speaker is to construct the Amazon as a problem of environmental conservation than economic integration or social development.

This article proceeds as follows: first, we review Amazonian literature to identify the main policy-cycles and their underlying problem construction. We then propose a theoretical framework to understand problem-construction and discourse. In the methodology section, we operationalize our framework and present the codebook. Section four portrays our main results. Finally, we conclude by discussing our findings and proposing future research.

2 Amazonian policy-cycles, discourse, and problem-construction

2.1 Literature Review: policy-cycles in the Amazonian literature

For the purposes of this article, we understand Amazonian literature as the body of research by social and environmental scientists that tells the story of diverse policies adopted to solve problems in the region. The three main policy-cycles we identify in Amazonian literature are: national sovereignty, economic integration, and environmental conservation. We tie each one of them to a specific problem and consequently a solution. We close the sub-section reviewing the relationship between policy, presidential discourse, and environmental problems.

2.1.1 National sovereignty

In The Fate of the Forest: Developers, Destroyers, and Defenders of the Amazon, Hecht and Cockburn write that all over the world tropical forests are destroyed, but "what imbues the case of the Amazon with such passion is the symbolic content of the dreams it ignites" (1990, 1). It started with the first natural history of the New World, by Oviedo in 1535, who recounts the stories of conquest of local populations and gold hoarders. The dream of fortunes to be found in the Eldorado composed the imaginaries of *bandeirantes*[1] from the southeast of Brazil and colonizers from everywhere else. It rendered the territory the venue for aspiration and object of an intense scramble in the subsequent centuries, defined as "a (...) form of nation building (...)" (Hecht and Cockburn 1990, preface). The Portuguese empire and subsequently the Brazilian monarchy were concerned with establishing their territory. In the process of securing Amazonian borders, Brazil thwarted "the imperial ambitions of France, Britain, the United States, Belgium, Bolivia, and Peru" (Hecht 2013, 8), and when the dust settled and the scramble was over, half of the Amazon emerged Brazilian. While Brazilian military diplomacy was very successful, the process did not come without its traumas. A significant experience were the negotiations with Bolivia in 1902 to secure the Amazonian state of Acre, during which they found out about American attempts to trick Brazil(Hecht and Cockburn 1990). This case was still part of the memory of the generals who led the country during the military dictatorship of 1964 and wanted to protect Brazil's sovereignty over the Amazon from the communist threat during the Cold War(Garfield 2013).

As we move from a world where non-state actors gain importance in environmental governance and international politics generally (Silva-Muller and Faul 2022; Andonova 2014; Westerwinter 2021), the sovereignty problem becomes more varied. Multiple non-state actors (NGOs, foundations, IOs, and so on) join the conversation about Amazonian policies more substantially as the military dictatorship starts to end (Hochstetler 2021; Capobianco 2019; Franchini and Viola 2019). Threads to national sovereignty, consequently, can be interpreted as coming from a different set of actors than before. Allegedly false claims about the Brazilian Amazon in international and domestic fora, for instance, are often tied to strategies of 'internationalizing'

[1] *Bandeirantes* means "flag-carriers", the word is used to designate Portuguese colonials and later Brazilian explorers, expanding the Brazilian territory beyond what the Tordesillas Treaty established. The treaty allocated almost the whole Amazonian territory to the Spanish Empire, the bandeirantes took much of the territory afterwards.

the Amazon. This might come both from foreign actors as well as domestic non-state actors. Relatedly, mentions of Amazonian myths which have been debunked as the 'Earth of the Lungs', are also tied to internationalizing strategies.

The sovereignty problem advances the view that the Brazilian Amazon is Brazilian and foreign presence, non-state presence and alleged lies are part of a broader strategy to internationalize the region. The policy solutions relate to close monitoring of the borders, strict regimes related to entry in the region, and combating alleged disinformation about the Amazon nationally and internationally.

2.1.2 Economic integration

The Vargas dictatorship (1937-46) and the military dictatorship (1964-89) took over the task of modernizing the Amazon. In 1966, the Brazilian Military launched Operation Amazon, a policy to modernize the region based on a set of assumptions (Acker 2014). First, nature should be conquered by men. Second, exploiting natural resources would render the Amazon region a global powerhouse. Third, such a project would integrate the region with the rest of the country. Concretely, this meant a series of infrastructure projects, such as roads and dams, incentives for settlers to develop ranches and expand the agricultural frontier, as well as establishing tax free zones to attract industry. The capital to conduct such changes, paradoxically, came from national and international sources (Acker 2014), leading to a series of national and international enterprises settling in the Amazon region. Capobianco (2019) describes the period from the 1950-80 in a similar fashion, referring to a wider range of policies of economic integration: the 1953 Plano de Valorização Econômica da Amazônia; the 1966 Superintendência do Desenvolvimento da Amazônia; the 1967 Superintendência da Zona Franca de Manaus; the 1970 Plano de Integração Nacional; the 1975 Programa Polamazônia; the 1980s Programa Grande Carajás and Programa Calha Norte; among others.

The economic integration problem advances the view that the Brazilian Amazon needs to be developed and modernized. The policy solution relates to the creation of a series of policies, often centralized by the federal government and thus external to the region (Becker 2005), that have at its core the development of the necessary infrastructure (physical, fiscal, or monetary) to integrate the region in the national and international economy.

2.1.3 Environmental conservation

The rapid economic changes in the region in the 1960s, 1970s, and 1980s were matched with the birth of environmental institutions such as the New Forest Code (1964), the Secretary of Environment (1973), and the National Environment Law (1980) (Drummond and Barros-Platiau 2006). A common explanation for these institutions in the Amazonian literature is the impression of lack of control after years of centalized economic integration policies (Acker 2021; Capobianco 2021; Hecht and Cockburn 1990). As deforestation, fires, and violence rose in the region, catching international attention, the military government deemed as necessary the establishment of an environmental bureaucracy. This process accelerated in the late 1980s, with the birth of modern environmentalism epitomized in the 1992 Earth Summit in Rio de Janeiro (Hochstetler 2021; Capobianco 2021). Hochstetler and Keck (2007) argue that during preparations for the summit, a new form of Brazilian environmentalism emerged: socio-environmentalism. They define it as an emphasis on local livelihoods of people while protecting nature. Capobianco (2019) argues in a similar line, establishing socio-environmentalism as the main government response in the 1990s and early 2000s in a series of policies: the 2001 Sistema Nacional de Unidades de Conservação; the 2003 Programa Amanônia Sustentavel; the 2004 Plano de Ação para a Prevenção e Controle do Desmatamento na Amazônia Legal; the 2004 Plano BR-163 Sustentável; the 2010 Lei Nacional das Mudanças Climáticas; among others.

The conservationist problem-construction advances the view that Amazon should be preserved, deforestation should be halted, and the sustainable practices of indigenous and local peoples should be maintained through protection of their territories and rights to self-determination (Hochstetler and Keck 2007). The policy solution implies more investment in command-and-control infrastructure (as remote-sensing technology for environmental outcome measurement), more investment in the valuation of standing ecosystems through incentive schemes, and more policies facilitating indigenous environmental practices.

2.1.4 Policy and discourse

Different authors have proposed similar periodization for policy-cycles in the Amazon: a focus on sovereignty until the military dictatorship of 1964, followed by strong economic integration policies until the mid 1980s, and finally a shift to conservation after the 1992 Earth Summit. At the macro-historical level, the wider Amazonian vision of the 1964 military dictatorship, encompassed by the whole group of policies they adopted, for instance, did favor economic integration. Nevertheless, at the level of policies adopted, there is more variation than these periods would suggest. For example, the 1980 Programa Calha Norte did contain elements to ensure sovereignty, integrate the region to the country's economy, and preserve the forest. Framing this policy as an issue of economic integration, then, can be seen as a choice.

Hence, while the literature might represent governments as coherent proponents of a particular policy retroactively, political actors might have adopted strategies that outline problem-constructions of policies differently. For historical inquiry, it is important to periodize policy cycles comprehensively. We largely agree with what the literature assigns to previous governments. However, the possibility of varied portrayals of the same policy opens up an understanding agenda-setting and policy-adoption that is less linear.

Problem-construction at the level of discourse is also more varied. They are not monolithic in time, across location, or even by the same speaker. While governmental discourses in Brazil have been studied for topic such as inflation or race relations [2], we only find one systematic analysis of Amazonian discourse. Barros (2020) investigates Amazonian discourse in the Brazilian Congress with the objective of identifying the arguments put forth by congressmen. The main finding is that the economic value of the Amazon for the cattle industry is the most salient narrative, leading the author to conclude there is a mismatch between the international debate (which focuses on preservation) and the national debate (which focuses on economic development).

We also find several analyzes of environmental discourse in American presidential speeches. Calderwood (2019) examines 2919 mentions of climate change in American official presidential speeches since 1989. Among various findings, one that stands out is that American presidents frequently side-step the environmental aspects of climate change (ibid). He also identifies a shift from economic to security framing of climate issues, side-lining its environmental aspects. In another article, Calderwood (2020) tests the effect of geographic location and type of communication regarding climate change. Building prominently on Putnam (1988) but also others, he hypothesizes that presidents are more likely to mention climate change in foreign locations, and that location influences the specific discursive approach and tone they adopt. He finds evidence in support of his hypothesis, suggesting American presidential discourse at the top on climate change does change based on location. Another example is Bevitori (2015), who investigates how the 'environment' has been constructed in American presidential discourse since 1960 using a more automated approach. The author finds that mentions of the environment are typically co-selected with the pronoun 'our', as well as with 'economy', 'clean', and 'preserve'.

While these findings hold for the US, they suffice to argue that presidents can raise different points about the Amazon at local, national, or international settings, depending on who they assume their audience is at that specific instance. That entails the same president can combine, substitute, or change how they talk about the Amazon and these views can reflect, or not, the current political scenario, issues in the agenda, or talk to a different policy cycle at times.

2.2 Theoretical framework: problem-construction and presidential discourse

In "Journey towards Progress", Hirschman (1963) analyzes three policy problems in three different Latin American countries. The author draws a conceptual distinction between pressing problems (pressured from outside parties to the government) and chosen problems (chosen by the government at their own discretion). Pressing problems can be either privileged or neglected depending on the degree of pressure exercised by the

[2] For an overview on how inflation and political discourse in Brazil see Porto (2007), Malheiros-Poulet (2012), and Fonseca et al. (2021). For a few studies on racist and anti-racist discourses in Brazil see Htun (2004), Silva and Larkins (2019) and Dijk (2020).

interested group. Problems can change from pressing to chosen across time and in space as a function of solutions becoming available, changing level of government control in society, or top policymakers shifting interests (Hirschman 1963, 388–91). Choosing a problem, though, entails a decision on how to represent it (Bacchi 2009). As Bacchi puts "policy has a cultural dimension. It takes shape within specific historical and national or international contexts" (2009, 10). The existence or proposal of a policy generally implies that there is a (public) problem that needs (governmental) action to be fixed. The alleged problem is not always explicitly stated in policy. Hirschman exemplifies chosen problems with the case of the construction of Brasilia (1975, 388). But building Brasilia can solve a problem of regional inequality, a problem of a dormant economy without state investment, a problem of political representation, or all three. How to represent a policy is a matter of choice. And different representations speak to different audiences.

We understand that depending on how the problem is represented to be, it can be a solution of problems that are considered pressing. Different problem-constructions can address the demands of different constituencies and it is up to the discretion of the political actor to construct a particular problem in a particular way given context. Problem-construction takes place in different sites: national media, legislative bodies, international fora, policy committees, among others. What eventually becomes policy is a product of a multi-faceted process in all these different sites. One avenue through which governments can emphasize the representations of a problem is discourse. We assume that problem-construction at the level of discourse is varied. They are not monolithic in time, across location, or even by the same speaker.

We argue that presidents can employ specific problem-constructions that build objects as specific problems depending on the context. In the specific case of the Brazilian Amazon, we contend that Amazonian problem-construction connect the region to issues of sovereignty, economic integration, social development, or environmental conservation. Presidents choose to represent the region as a particular problem. As Bacchi (2009), we argue that problem-constructions touch on shared meanings about the region that are available to the speaker as part of larger social-cultural history. Thus, the ways a president speaks are culturally and historically mediated and need to be embedded in the wider history of the region and country. We consider this an advancement in relation to scholars looking at American presidential speeches, as they just count mentions to climate change (Calderwood 2019, 2020; Brown and Sovacool 2017) or environment (Bevitori 2015) without embedding them in the histories of the issue in the country.

These are the cornerstones of our framework: while governments are sometimes portrayed as proponents of a specific policy-solution, the way they construct the Amazon as a problem varies. The specific problem-constructions that we propose are embedded in Amazonian historiography and connect presidential speeches to Brazilian larger social-cultural history. We propose a framework to understand variation in problem-construction as a choice that is responsive to geographic location, time, and speaker.

3 Research Design

To operationalize our theoretical framework, we adopt a mixed-methods approach using manual coding and supervised machine learning. We explain our research design and each step of the procedure in this section.

3.1 Data and modeling: operationalizing Amazonian problem construction

We build upon the dataset provided by (Cezar 2020) 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 for all the presidents of Brazil since 1985. We then identify all speeches about the Amazon as a region, peoples, or forest out of the 6130 speeches. 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 from the 6130.

Using the poldis R package, we proceed to extract two sentences before and two sentences after the sentence in which the stem "amazon" appears. We opt for picking two sentences before and two sentences after, rather than words, because sentences usually contain a cohesive idea. By doing so we create our unit of analysis: an Amazonian statement. We use Amazon statements as our unit of analysis for two main reasons. First, working at the level of statements allows us to identify only passages that are meaningful for our specific purpose. Second, it increases the number of our observations and its variety meaningfully, allowing for more specificity in our analysis. This process yields 2014 unique Amazonian statements across the 946 speeches about the Amazon identified. When an Amazonian statement contains two or more matches of the stem "amazon", we get two sentences before the first match and two sentences after the last match. On average, an Amazonian statement contains 123 words.

After revising the literature (section 2), we selected a random sample of these Amazonian statements to develop a codebook for identifying how the Amazon is constructed as a problem in presidential discourse (see Table 1 below). We understand Amazonian problem-constructions as Weberian ideal types, that is, an unified analytical construct portraying a 'pure' version of a phenomenon. This serves the purpose of allocating empirical observations within a range of possibilities. We identify the three problem-constructions derived from the literature (national sovereignty, economic integration, and environmental conservation) in the sample of Amazonian statements. However, in addition to them, we inductively identified a fourth problem construction that the literature does not explicitly cover: social development. Presidents sometimes opt to emphasize the lack of hospitals, sanitation, and schools in relation to peoples' constitutional rights when speaking about the Amazon. We saw this code category as substantially different from the other three, hence, we created the code category 'social development'. In their conceptualization, each code is mutually exclusive in its conceptualization, meaning that they cover different forms of constructing the Amazon as a problem, though each Amazonian statement might be assigned to one or more codes. 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 either coded as a pure-types or mixed-types.

Problem_Construction	Description
National Sovereignty	This code constructs the Amazon region and/or forest as an issue of national sovereignty. W
Economic Integration	This code constructs the Amazon region and/or forest as an issue of economic integration. It
Social Development	This code constructs the Amazon region and/or forest as an issue of social development. It a
Environmental Conservation	This code constructs the Amazon region and/or forest as an issue of conservation. This prob

With the codebook in hands, each one of the authors, separately, hand-coded the same set of 1007 randomly selected Amazonian statements. This amount refers to 50% of all the Amazon Statements identified. Inter-coder agreement for each of the four main categories was 85%, on average. For each non-matching coded observation, the co-authors discussed and sorted their disagreements. Statements that mention the stem "amazon", but are not about the Brazilian Amazon, for example, might a greeting to the Governor of the Amazonas, were coded as false positives. The manually coded data is then randomly divided into a training set, containing 80% of the hand-coded observations (806 observations), and a validation set, containing the remaining 20% of the hand-coded data (201 observations). The training set is used to train the supervised machine-learning model that automatically classifies observations while the validation set is used to make sure the model fit is appropriate.

We chose to employ a support-vector machine (SVM) algorithm to label texts, that is, a non-probabilistic linear classifier that classifies documents by assigning points in mapped space to maximize the gap between binary categories [Meyer et al. (2021); Noble (2006)][3]. After the SVM model is trained and tuned, and the model shows to appropriately fit the validation set, we use the model to automatically code the remaining

[3]For more information on this please see the extended methodology. The document includes a detailed discussion of how the SVM algorithm was chosen over other algorithms based on evaluation of performance of trained models for labeling the validation set. The extended methodology also includes a more detailed codebook table with further coding guidelines.

1007 Amazonian statements. The model was also trained to identify false positive observations, which we chose to delete for analysis since these are not meaningful statements about the Amazon. The final dataset for analysis contains 1895 coded Amazonian statements. Finally, we use poldis once more to extract locations for all speeches in the data. These locations represent the Brazilian state in which certain speech was given or an international country.

3.2 Analysis and limitations

To analyze our data, we first present a series of different plots on proportions of Amazonian statements and problem-constructions over time and by presidents. We control proportions for factors that might affect the incidence of the Amazon in speeches and portray both real and controlled curves. To test whether different problem constructions change according to location, we run a multinomial regression model in which different problem constructions (as categories) are the dependent variable and location is the independent variable. We also control for annual deforestation rates, annual inflation rates, and election years in the model. We interpret the plots and model considering multiple Amazon related events and policies over the last 30 years, as well as their correlations with different presidents and locations, while embedding problem-construction in contemporary happenings.

These procedures come with its limitations. Our codebook is developed using specific Amazon related vocabulary. For example, a statement will be coded as economic integration if it is a meaningful support to the Zona Franca of Manaus or a Dam in the Amazon. However, the economy is generally a topic that presidents speak about. Hence, high incidence of economic integration in Amazonian statements can also be related to the higher importance of this problem-construction in Brazil in time. Moreover, 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 Mata Atlantica. Nevertheless, our dataset covers only what is considered an official remark. Presidents, though, give interviews, appear in debates, talk at campaign rallies, and more recently start to appear in social media. Problem-construction within presidential discourse, thus, also happens in different sites for which we do not account for in this paper.

4 How has the amazon been constructed as a problem?

This section presents the three main findings of our analysis. We open with a broad overview of the evolution of the incidence of Amazon in all presidential speeches since 1985. In section 4.2, we focus on speeches that mention the Amazon, introducing the specific problem-constructions we presented in section 2.1. Finally, we run a multinomial model to show how problem constructions change as the speaker moves further away from the Amazon region.

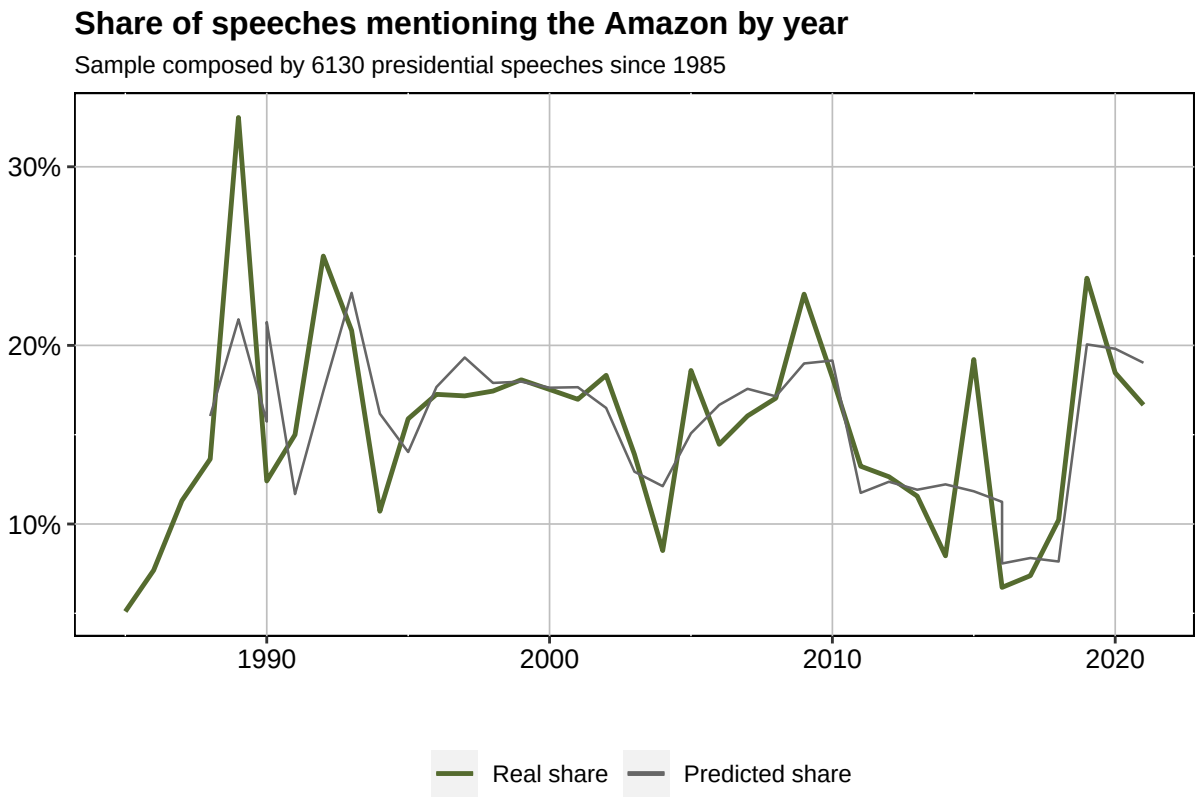
4.1 The rises and falls of the Amazon as a topic in presidential speeches

Figure 1 shows the proportion of speeches that mentions the Amazon in relation to all speeches in each year. The predicted share curve controls incidence for deforestation[4], economic situation, and speaker (see

[4]The reasoning here is that knowledge of high or low deforestation rates might drive presidents to speak about the Amazon. Nevertheless, matching deforestation with speech dates is a complicated endeavor. INPE published consolidated deforestation data with almost two years of delay until 2005 (Capobianco 2021, 60). Preliminary data was published earlier, but with lower degrees of confidence in the findings. For the subsequent years, the consolidated figures for a given year came out in August of the subsequent year. However, it also seems to be the case that the executive government have access to the data before everyone else. In addition, other sources indicating if deforestation is going up or down, as fire data or lower resolution deforestation data (DETER for example), or even other sources, circulated within the year the data covered. The year of 1988 is particularly

appendix for methodological details). We observe various local maxima: 1989, 1992, 2005, 2009, 2015, and 2019. These points coincide with exogenous events that helps us explain the rises and falls of the Amazon in presidential discourse.

First, we observe a steady increase from about 5% in 1985 to 32% 1989. This is the period when the Brazilian Constitution was being written. Indigenous and traditional populations were instrumental in advocating for constitutional environmental rights and protection of their territories (Hecht and Cockburn 1990). These were eventually enshrined in article 225, which gives all Brazilians a right to a balanced environment, and in article 231, which grants indigenous and traditional populations a right over their territory. Two other factors are likely to explain this increase: in 1988 Chico Mendes was brutally murdered and the New York Times published an article with pictures of the Amazon burning (Simons and Times 1988). Both incidents caught unprecedented international attention. President Sarney responded to these publicly, and proposed a new set of policies to address, named Nossa Natureza (Capobianco 2021).



While in 1990 there was a decrease to about 12.4%, we observe a novel increase to 15% and 25% in 1991 and 1992 respectively. The driver of this increase is likely to be the 1992 Earth Summit, which was being prepared by various state and non-state actors in the region and brought international attention to environmental topics in Brazil. One of the big announcements was the consolidation of the first transnational partnership for the Amazon, the G7 Pilot Programme, which brought a high number of financial resources to the region for public policy implementation (Capobianco 2021). During the Cardoso years (1994-2002), Amazonian speeches averaged at about 16% without strong variation. There were no big international or domestic events that drove the topic up. At the level of policy, though, we saw the birth of the National System of Protected Areas in 2001, and of the Amazon Regional Protected Areas Program. While the former created the legal framework for different types of protected areas to be created, the latter established a transnational

indicative of these complications: a report dating 1988 was circulating with deforestation and fire figures(Fearnside 1990), and a New York Times article about the issue with deforestation rates for 1988 was written with comments by an INPE scientist (Simons and Times 1988). Hence, we believe the most appropriate way of matching is without any lags on deforestation.

partnership to finance the implementation of protected areas in the Amazon (Andonova 2014).

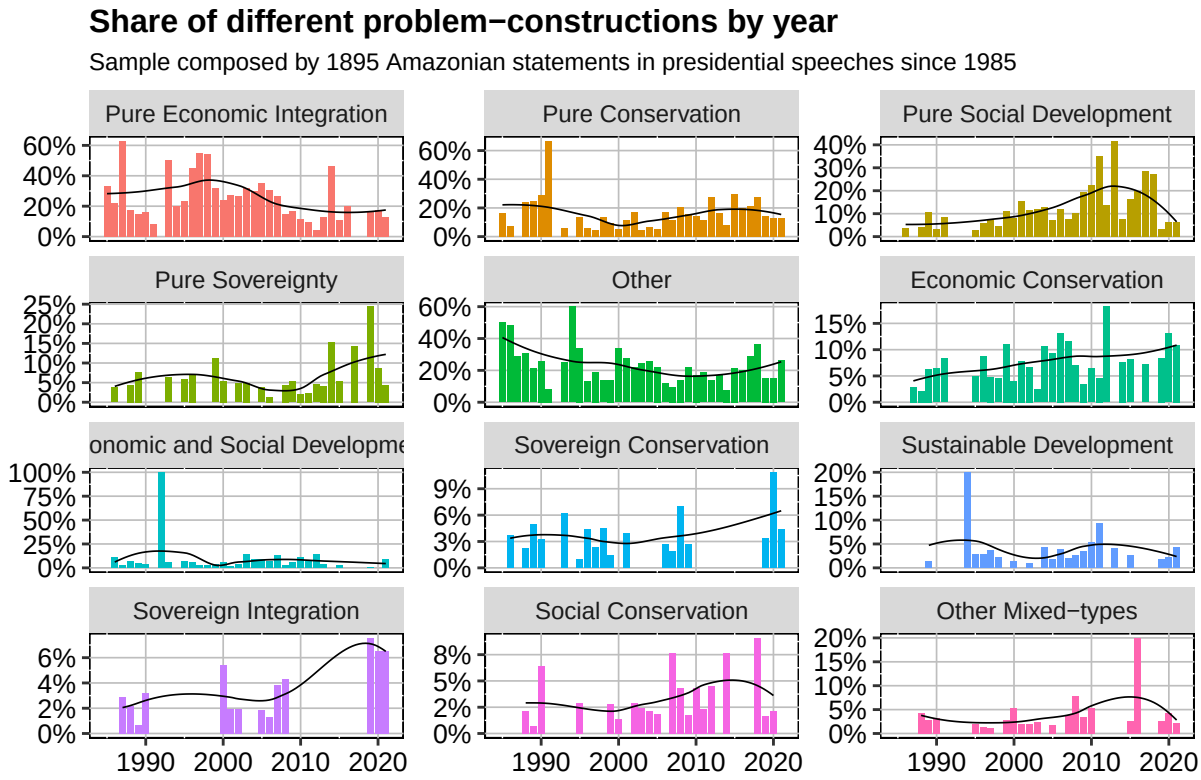
We observe an increase from 8.5% in 2004 to 22.8% in the year of the Copenhagen Summit, 2009. This coincides with the Presidency of Lula and the steepest decrease in deforestation rates in Brazilian history. Lula led the delegation to Copenhagen with a self-image of "we do not promise, we deliver" (Franchini and Viola 2019), when stakes about climate change were high. A somewhat different pattern can be identified in the lead up to the 2015 Paris COP, which was also building up to become a key-turn in climate politics after the failures of Copenhagen. From 2010 to 2014, we identify a steady decrease from 18.2% to 8.2%, which is followed by a sharp increase in the year of the COP, reaching 19.2%. These are the years when Brazil entered a long period of political and economic instability that lingers until today. Brazil went to the COP in Paris with deforestation numbers slightly higher than Copenhagen, and a perception that there was a turn towards less conservation after the 2011 Forest Code was adopted and former environmental minister Marina Silva ended her alliance with the worker's party because of disagreements related to the priority of environmental policy.

We subsequently observe a steady increase from 6.4% in 2016 to almost 24% in the first year of Bolsonaro's presidency, 2019. As the narrative of the climate crisis picks up in the late 2010s, international media attention about the Amazon blasts, reaching unprecedented coverage. Pictures of the Amazon on fire and of the red sky afternoon in São Paulo circulated in social media and international media outlets in 2019. President Bolsonaro engages in an international debacle with President Macron and others, which drove the topic up strongly in the presidential agenda. President Bolsonaro retrieves Brazil's hosting status for COP25, and a strong process of dismantling of environmental governance starts taking place.

We do find evidence that deforestation rates, economic situation, elections, and simply presidential preferences affect the incidence of Amazon in speeches: the smoothed curve portrays lower proportions overall. However, international events and media coverage also correlate with local maxima of our curve, suggesting presidents do speak more about the Amazon in preparation or reaction to these events. We are yet to inspect, though, whether specific problem constructions about the Amazon change over time.

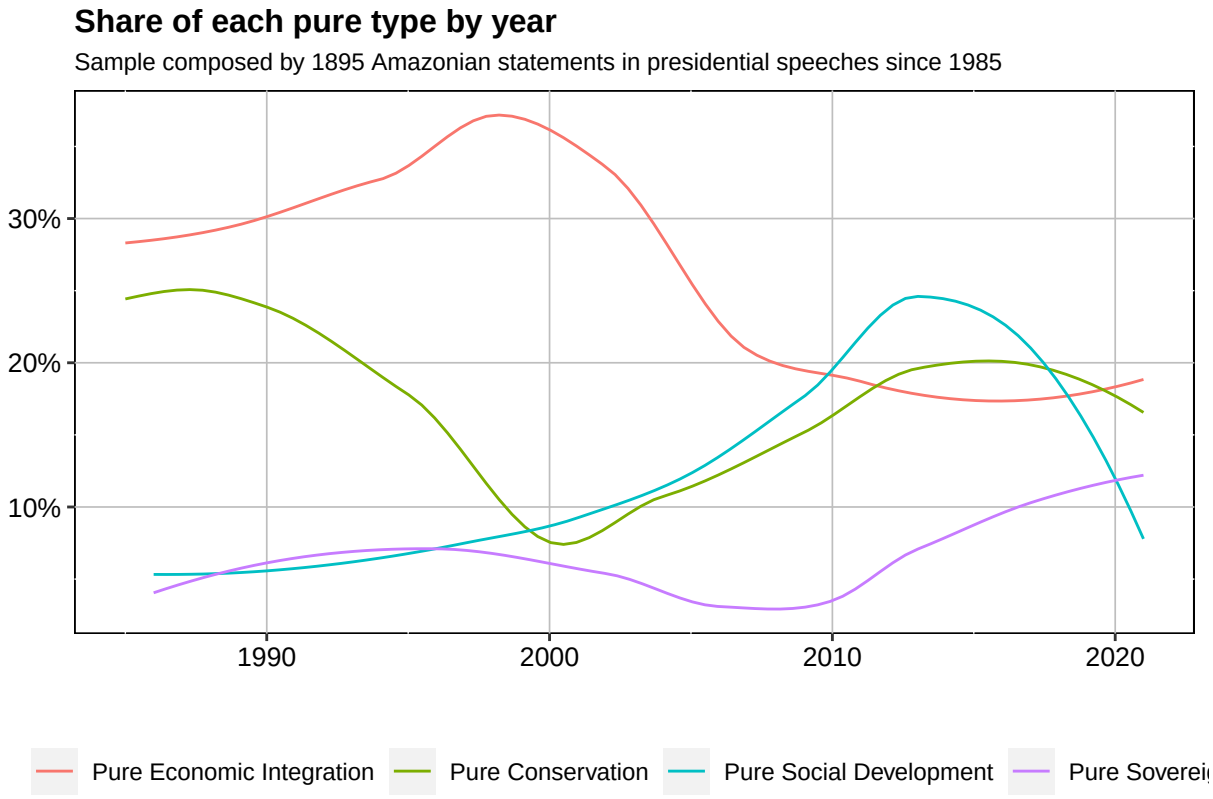
4.2 Amazonian problem-construction in time

Figure 2 portrays plots with the proportions of different problem constructions over time. We conceptualize four problem constructions: sovereignty, economic integration, social development, and conservation. At the level of the Amazonian statement, though, presidents might mix two or more together. These are what we call mixed types, in opposition to pure types. There are 16 mix types in total, and figure 2 portrays the most frequent of them. Pure problem constructions dominate, with their joint average at 55.8%. Among the four pure types as well as the mixed types, we observe a strong variation over time, suggesting the narratives do respond differently to factors that affect Amazonian statements discussed in the section above.



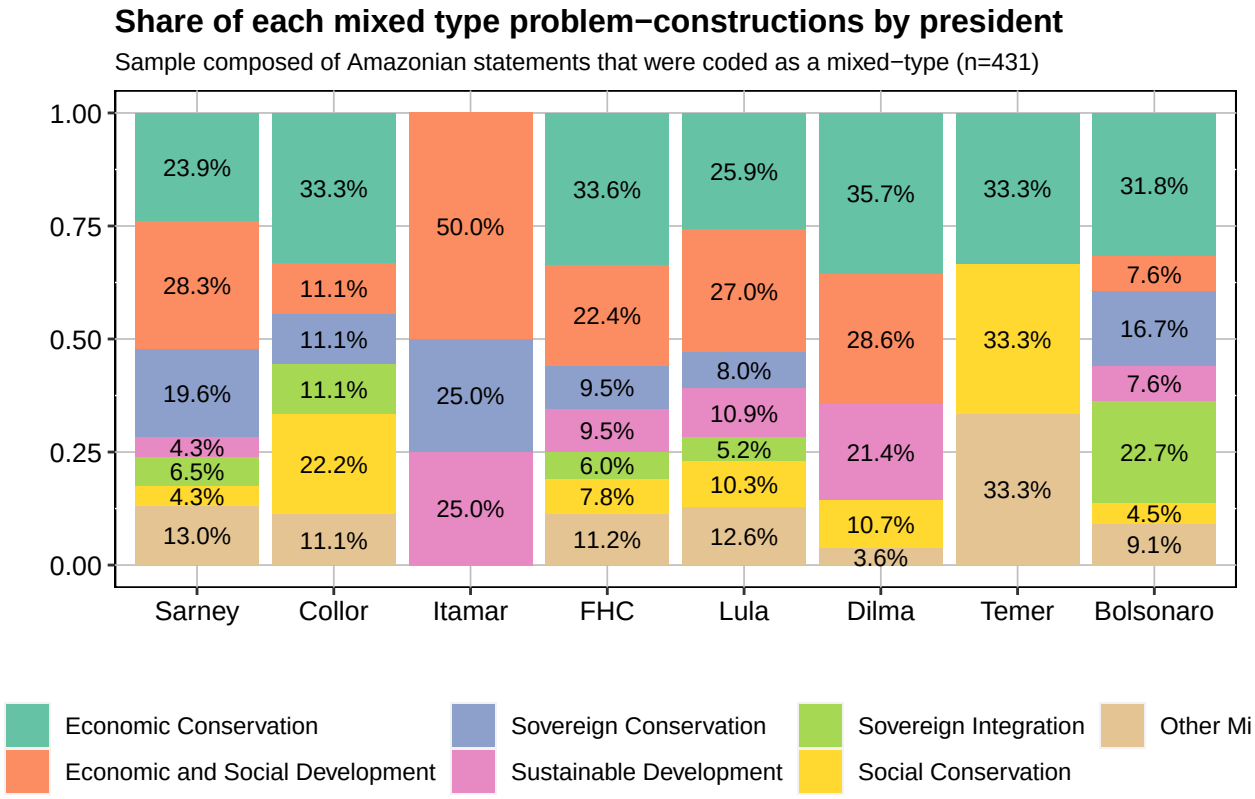
The plots reveal several trends. We start by pure-types. Pure economic integration statements, which were dominant, decreased in incidence as of the late 1990s. Concurently, pure conservation as well as pure social development increased; both surpassing the proportion of economic integration problem-construction in 2010. Capobianco (2021) argues that the unprecedented decrease in deforestation we observed from 2004 to 2012 was a product of an increase in the perception of stronger federal policies and presence in the Amazon region, which in turn engendered a perception of higher risk of being caught and fined for deforestation. This correlates with our findings: a higher incidence of the Amazon as a topic overall can generate a perception of more attention from the top, and a shift from economic integration to conservation can generate a perception of higher change of being caught for illegal deforestation. As of the mid 2010s, we observe a reversal of the trend with a twist: economic integration starts picking up again in detriment of conservation and social development problem constructions, but with sovereignty increasing steadily.

Figure 3 (below) shows these shift and reversal more clearly and highlights the decrease of economic integration and increase of social and conservation problem constructions preceding Lula's presidential mandate. Relatedly, figure 3 also shows that while the reversal precedes the mandate of President Bolsonaro, it was with him and his dismantling of social and environmental policies that sovereignty and economic integration appears the most, in detriment of social development and environmental conservation. The starkest decrease relates to social development construction between Temer's and Bolsonaro's administration.



We now move to mixed types, which average at 17.7% for all presidents in our sample: overall, presidents prefer pure problem-constructions. While there is some variation in time for each single mixed type, some of them have low counts and interpretations are not adequate. We focus our discussion on those with higher incidence. First, the most frequent mix overall is that of economic integration with environmental conservation, which averages at 29.15% in relation to mixed types only, and at 6.8% in relation to all Amazonian statements. Overall, we observe an increase along time, reaching its pike in the early 2010. President Dilma was the most frequent user of this mix. A close second is economic and social development being used together in about 22.9% of all mixed type statements and 5.4% of all statements.

All other mixed types appeared less than 2.6% on average in relation to all statements. We can also interpret mixed types, though, by looking at what compose them the most along time. Mixed types using conservation were quite frequent in the lead up and aftermath of the 1992 Earth Summit. This includes the mix type we label sustainable development, which constructs the Amazon as a problem of economic integration, social development, and environmental conservation. We interpret the appearance of mixed types as more complex understandings of Amazonian problems. This follows a global agenda of understanding interconnections of social, environmental, and economic domains. As we show that Amazonian incidence in discourse does respond to global issues, this is not a surprise given agendas as Millennium Development Goals and the Sustainable Development Goals. Nevertheless, as in pure types, we also observe the comeback of sovereignty being used in mixed types, mostly in detriment of conservation social development. This becomes more apparent in a comparison between Lula and Bolsonaro, the two presidents that mix the most with proportions 11% above presidential averages: 29.4% and 31.3% respectively. While the former frequently mixed conservation with other problem constructions, the latter prefers mixing with sovereignty. The combination of sovereignty with economic integration, which was also characteristic of the military dictatorship policies for the region, reaches its highest level with Bolsonaro: 22.7% of all mixed types.



Pacheco (2019) proposes that we see the Amazon frontier as a key analytic category to understand the Brazilian state and democracy. Specifically, the author states that the natural richness of the region has been instrumentally transformed in political support through resource exploration by different governments over the last centuries. The costs for said economic and political benefits are the livelihoods of indigenous and traditional populations and the ecosystems they reside in. Political stability, thus, can be seen as a product of the trade-off between both. Policies during the military dictatorship were strongly geared towards integrating the Amazon to the national territory and international economy. With the strengthening of environmentalism in the 1990s, its most strong form being the policies adopted in the 2000s, we can interpret the fall of economic integration and the rise of social and conservation problem constructions as a new relationship between granting local livelihoods their rights and economic exploitation.

While unprecedented, this new balance was not long-standing. Democratic decay is slow and the embryo of Bolsonaro's Amazonian discourse was breeding half a decade before he took office. We observe the decrease in conservation related statements in the mid 2010s, and the soft increase of sovereignty both pure and in mixes already late 2000s (figure 3) . The hard increase in sovereignty comes in the early 2010s. As we conceptualize and operationalize sovereignty as boundary-making vis-à-vis internal and external perceived threats to the Amazon, we interpret this increase as attacks to indigenous and traditional populations. At the policy side, the Itaipu Dam in the late 2000s and the 2011 Forest code are seen as a turning point: political opposition to conservation got particularly organized and managed to lobby the executive and conquer this policy wins, which were largely opposed by environmentalists.

This is not to say that those who preceded President Bolsonaro are like him. They are not, and we have shown how he is different from others already. But the political forces in Brazilian democracy that drive these changes in problem-construction were long in the making, as the earlier and softer shifts in discourse suggest. Bolsonaro's problem-construction is the strongest form of this shift. Now that we've inspected and developed pure and mixed types, we can check if these specific problem constructions vary depending on where the president is speaking.

4.3 An Amazonian three-level game? Boasting policy outside, talking to people inside

Figure 5, below, illustrates the share of pure-type problem construction by locations in Brazil. We divide locations into Amazonian states (i.e. all the Brazilian states in which the Amazon biome is present), non-Amazonian states (other brazilian states), Brasilia (the capital city in Brazil), and international (countries outside of Brazil). Notice that, consistently, presidents construct the Amazon as an issue of pure economic integration within Amazonian states more often than all other constructions in time. Alternatively, we see that pure conservation becomes increasingly less frequent in time for Amazonian states. As well, pure social development constructions, which were fairly frequent from the early-2000s and onwards, disappeared around 2015 after the mid-2010s in Amazonian states. Nonetheless, we see a large increase from the mid-2000s to the mid-2010s in the frequency in which presidents constructed the Amazon as an issue of pure social development in Brasilia and non-Amazonian states. In Brasilia, also, pure conservation constructions went down drastically during the 1990s, but increased steadily from the mid-2000s onwards. Interestingly, presidents most often constructed the Amazon as an issue of pure environmental conservation internationally only from the mid 2000s until the mid-2010s. Moreover, pure sovereignty constructions did appear in international settings until the mid-2000s.

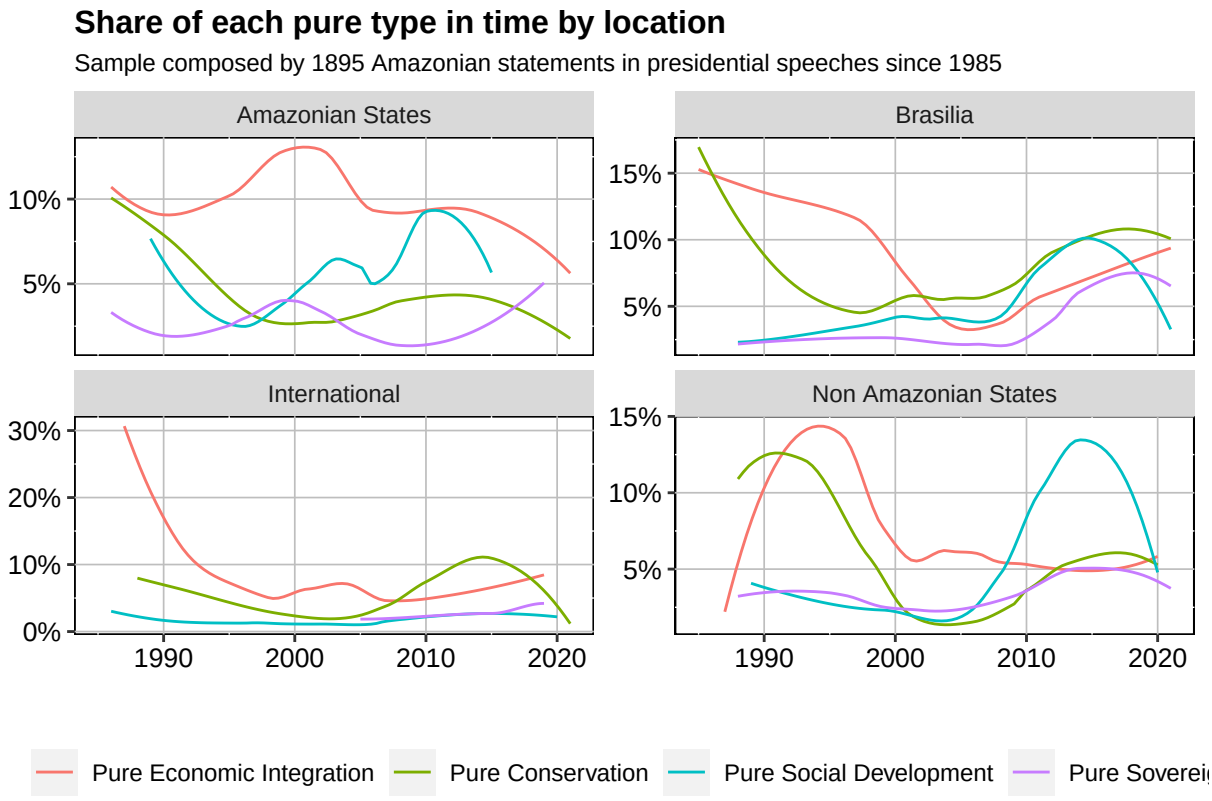


Table 2, below, displays the multinomial regression coefficients for the correlation between diverse problem constructions and locations. The regression coefficients express the log odds, that is, the logarithm odds to the reference categories. The reference categories are Amazonian states for location and environmental conservation for problem construction. To facilitate visualization, since the model has many more columns (i.e. types of problem construction), we only display the model results for the pure-type constructions, however, the model does account for both pure and mixed-type constructions. We keep the results for the control variables for election year, annual deforestation rates, and average yearly inflation in the table.

Table 2: Table 2 - Amazon Problem-Construction by Loc

Dependent.Variables	Economic Integration vs. Environmental Conservation	Social Development vs. En
Brasilia.vs..Amazonian.States	-1.024***	-1.002***
International.vs..Amazonian.States	-0.612***	-1.583***
Non.AM.States.vs..Amazonian.States	0.023	-0.041
Election.Year	-0.241	0.028
Annual.Deforestation	0.063***	-0.031*
Average.Inflation	-0.001***	-0.001***

The results indicate that the presidents are more likely to construct it as an environmental conservation problem far away from the Amazon. The negative statistically significant coefficients of problem constructions such as pure economic integration and pure social development in both international settings and Brasilia, in relation to environmental conservation problem constructions in Amazonian states, indicate that presidents are less likely to construct the Amazon as an issue of economic integration and social development in those locations. That is, presidents are more likely to construct the Amazon as an issue of environmental conservation in international settings and in Brasilia than in Amazonian states.

Sovereignty in the Amazon is an issue within Brazil. The negative statistically significant coefficient for constructing the Amazon as a problem of pure sovereignty in international settings, in relation to conservation problem constructions in Amazonian states, indicate that presidents are less likely to construct the Amazon as an issue of economic integration and social development in those locations. The lack of statistically significant correlations between pure sovereignty constructions and Brasilia or other non-Amazonian states, corroborates that the Amazon as an issue of sovereignty is an internally performed issue.

Constructing the Amazon as an issue of economic integration correlates with increases in deforestation rates. Some of the control variables correlate with some Amazonian problem constructions in interesting ways. For example, pure sovereignty constructions correlate negatively with election years in relation to conservation. That is, in election years conservation constructions are more likely to take place in comparison to sovereignty. As well, annual deforestation rates correlate positively with economic integration constructions in relation to conservation. This indicates that as deforestation increases, presidents are also more likely to construct the Amazon as an issue of economic integration, or vice-versa.

Putnam (1988) seminal article on the two level game between domestic and international politics analyzes how negotiations at both levels make policies possible. The author argues that both domestic and international levels need to be taken into consideration when analyzing how, often, domestic politics became entangled in international negotiations. The Amazon, as a region and a forest, has been the topic of international negotiations, national debates, and local policy implementation; though how the Amazon has been constructed as an issue differs on each of these three levels. While in Brasilia or internationally different presidents might construct the Amazon as an issue of conservation, the same presidents might construct the Amazon as an issue of economic integration or social development at the local level. This implies not only that audiences' priorities in each setting change, but that which policies are appropriate to solve the "Amazon issue" differ. The three level game entails that conservation might be a desirable construction when speaking internationally about the Amazon, but not for local electorates. Such might help explain diverse local implementation gaps between public policy negotiated outside and implemented within the Amazon as perceptions and expectations about the issues the same policy addresses might differ (Alesina and Giuliano 2009; López et al. 2020).

Whereas presidential discourses at the top matter to define and justify public policy (Zarefsky 2004), presidents shape their discourses according to who their audience might be and what "they want to hear". This democratic game contributes to the advancement of ambiguous public policies thought from the outside to the Amazon or contradictory policies from Amazon to the outside. Take, for example, the rural credit offered to local agricultural producers in Amazonian states went from 500 million reais in 1999 to over 4 billion by 2012 (Capobianco 2021). During the same period, the money spent in fighting deforestation in the Amazonian states also increased from ... in ... to ... in ... These policies match diverse local, national,

and international expectations and match solutions to different problem constructions presented at each of these levels.

5 Discussion

6 Conclusion

References

Appendix

Extended Methodology

This appendix details the methodology employed by the authors in the article.

The Dataset

We update a dataset provided by Cezar (2020), which builds upon the archives of the Brazilian Presidential Library. The dataset contains all official remarks by Brazilian Presidents from 1985 to 2019. We update the dataset by scraping and adding all official speeches from 2020 and 2021. The final dataset encompasses 6130 speeches. Overall, it covers a total of 8 presidents (Sarney, Collor, Franco, Cardoso, Silva, Rousseff, Temer, and Bolsonaro) across 8 mandates (Collor and Dilma were impeached and vice presidents Franco and Temer took over).

We start by cleaning the dataset by removing all accents, non-standard Latin characters, and extra spaces. We then identify all speeches about the Amazon as a region, peoples, or forest out of the 6130 speeches. Our dictionary is composed of a single lexicon stem: "amazon". In Portuguese, it captures terms such as "Amazonia", "Amazonica", "Amazonidas", "Amazonense(s)", "Amazonas", among others. 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 uses a pronoun, he or she could be referring to the Amazon. Also, it is likely that whenever a president mentions "deforestation" or derived vocabulary, he or she is speaking about the Amazon. However, as we cannot be sure all the time in those instances (i.e. mentions of "the forest" or "deforestation" could be referring to the Atlantic Forest or the Cerrado). We opt for the safer side and make sure speeches we gather are indeed about the Amazon as a region, forest, or people by only capturing "amazon" related lexicon. We find that 946 speeches are, at least partially, about the Amazon from the 6130.

Using the poldis R package, we extract two sentences before and two sentences after the sentence in which the stem "amazon" appears. By doing so we create our unit of analysis: an Amazonian statement. We use Amazon statements as our unit of analysis for three main reasons. First, presidential speeches can be long and cover a wide variety of topics. For example, the average word count for speeches that mention the stem "amazon" are 2355 words. Working at the level of statements allows us to identify only passages that are meaningful for our specific purpose. A single speech can have more than one Amazonian statement and this statement might be embedded within a different part of the speech. Second, it increases the number of our observations and its variety meaningfully, allowing for more specificity in our analysis. Finally, other authors adopting similar strategies, opt for picking an arbitrary number of words before and after the mention (Kentikellenis and Voeten, 2021). We opt for picking two sentences before and two sentences after, rather than words because a sentence, because sentences usually contain a cohesive idea. Opting for a word threshold, might cut a sentence in the middle and yield an incomplete idea. Nevertheless, this process yields 2014 unique Amazonian statements across the 946 speeches about the Amazon identified previously. Notice

that an Amazonian statement can contain two or more matches of the stem "amazon" (i.e. two consecutive sentences in which one of the words covered by the stem appears). In this case, we get two sentences before the first match and two sentences after the last match. On average, an Amazonian statement contains 123 words.

Operationalization

We proceed to operationalize how the Amazon is constructed as a problem. To do so, we develop and apply a qualitative codebook to Amazonian statements. We do so for two reasons. First, and foremost, we believe that a dictionary and other "bag of words" methods might not capture nuances in the texts. These nuances include Amazonian statements that negate certain aspects about the Amazon or statements in which the matched words might not be not directed at the Amazonian region, peoples, or forest. Second, we chose to look at the statements and inductively develop a codebook to verify if the insights from the literature hold within presidential speeches and, if not, add or remove codes, as well as discuss which statements should, and not, be included in each code and why.

After revising the literature (section 2), we went through a random sample of the speeches to develop the codebook. The three policy-cycles (sovereignty, economic integration, and conservation) were clearly identifiable in the speeches. However, once the coding began to take place, however, we noticed two things. One, that some of the Amazon statements were not about Amazon per se. That is, our strategy to identify Amazonian statements yielded a few false positives. These are statements that mention the stem "amazon", but are not about the Brazilian Amazon region, people, or forest. For example, the president might greet the Governor of the Amazonas in a speech or make a reference to the Venezuelan Amazon. We coded these statements as false positives. Two, we noticed speeches often refer to social development using a different vocabulary of policies and objectives. Those references often differ from references to conservation or economic integration. Hence, we created the code category 'social development' as explained below. We consider this to be a finding, but rather than emerging from our analysis, it emerged from codebook development. contain a full description of each code category and the coding practices that inform our procedure.

Table 1 – Qualitative Codebook

Sovereignty Description: This code constructs the Amazon region and/or forest as an issue of national sovereignty. We understand claims of sovereignty as a particular narrative that touches on imaginaries of external threats to territory. Relatedly, we also understand sovereignty as a particular narrative that raises concerns about wrong perspectives and criticism from foreign and non-state actors about governments' actions related to the Brazilian Amazon. In all, it advances the view that the Amazon is Brazilian and foreign presence in the region needs to be monitored closely.

Coding practice: we apply this code to references to sovereignty that meaningfully reflect the description above. Simple mentions to the Brazilian Armed Forces, frontiers, or military technology (e.g. SIPAM-SIVAM), are not automatically, by themselves, understood as constructing the Amazon as a problem of sovereignty. When presidents question the authority or interests of someone's arguments about Amazon, for example, we apply this code as it raises concerns about wrong perspective and criticism. When presidents claim external actors want to internationalize the Amazon territory, we apply this code as it touches upon external threats to territory.

Example: "Senhores deputados. Elo fundamental para que o Brasil realmente rume em direção à prosperidade. Queria primeiro dizer, senhor Hu Chunhua, eu quero agradecer as palavras do seu embaixador no Brasil reconhecendo a nossa soberania sobre a região Amazônica, no episódio ocorrido há pouco, por ocasião do encontro do G7. Muito obrigado ao governo chinês. Para nós, não têm preço esse reconhecimento público e suas palavras sobre essa região tão importante para o mundo e para o Brasil." (Bolsonaro 25/10/2019) Economic Integration Description: 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.

Coding practice: We apply this code to references to economic integration that meaningfully reflect the description above. Simple mentions of development, integration, investment, and technology are not automatically coded as economic integration. However, direct mentions of the words "economic development" are coded here. We avoid overlap between this code and social development by considering integration references as targeting infrastructure rather than peoples' rights. For example, developing infrastructure for internet, radio, and energy are coded as economic integration. However, if the presidents speak about people's access and rights to information (internet and radio) and electricity, we code as social development. Relatedly, improving macro-structural conditions of the job market is coded as economic integration„ while people's right to a dignified job is coded as social development. Importantly, we make the analytical choice to include micro-finance instruments as credits and loans in economic development, while grants or donations fall within social development.

Example: "Se me permitem, na Amazônia -que durante tanto tempo ficou adormecida, por falta de uma ação integrada- nós temos já algumas ações muito estruturadoras. Nós, na Amazônia, estamos fazendo uma ligação que passa por Manaus, passa por Boa Vista, Caracaraí, até chegar lá em cima, que é aquela lista vermelha, que vai lá para cima, na direção da Venezuela,é a estrada 174. Essa estrada dará possibilidade da produção da Zona Franca de Manaus ser competitiva, não aqui dentro, mas lá fora mesmo, como é a vocação natural da Zona Franca, exporte, e poderá exportar pelo Caribe." (FHC 2/7/1997) Social Development Description: 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.

Coding practice: We apply this code to references to social development that meaningfully capture the description above. Simple mentions to development are not automatically coded as social development. However, direct mentions supporting "social development" are coded here. An illustrative example relates to speeches outlining the role of the armed forces in providing health services for faraway populations, which we code as social development but not sovereignty.

Example: "Mas como o Estado não tem que ter lucro, o Estado precisa garantir a cidadania, nós achamos que o cidadão que mora às margens do rio Amazonas, a 600 Km de Manaus, ele tem que ter direito a ter luz na sua casa, a ter geladeira, a ter televisão e a ver sua novela. Já investimos 14 bilhões de reais nesse programa, em três anos e meio. Sabe quantos postes nós já colocamos? Um milhão de quilômetros de fio." (Lula 20/11/2009) Conservation Description: This code constructs the Amazon region and/or forest as an issue of conservation. This narrative 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 peoples 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.

Coding practice: We apply this code to references to conservation that meaningfully capture the description above. Simple mentions of biodiesel, renewable energies, climate change, or sustainable development are not automatically coded as constructing the Amazon as a conservation problem. However, calls for more demarcation of territory are coded as constructing the Amazon as a conservation problem. While general references to tourism are coded as economic integration, references to eco-tourism are coded here.

Example: "Adotei medidas de caráter emergencial, suspendi a exportação de madeiras em toras, suspendi incentivos fiscais e creditícios na Amazônia a projetos que podiam causar danos ambientais e instituí a obrigatoriedade do licenciamento para a atividade de extração de ouro com a proibição da utilização do mercúrio. Dando início à reestruturação do sistema governamental de controle e preservação do meio ambiente, criei o Instituto Brasileiro do Meio Ambiente e Recursos Naturais, IBAMA, que está entregue à capacidade do Dr. Fernando César Mesquita." (Sarney, 20/7/1989) False positive Description: statements that were

assigned as Amazonian but are about the Amazon.

Example: "cumprimentar os presidentes de bancos publicos do banco do brasil alexandre abreu do bndes luciano coutinho da caixa miriam belchior do banco do nordeste marcos costa holanda do banco da amazonia valmir pedro rossi o vicepresidente do banco do brasil cesar borges da diretoria de infraestrutura queria cumprimentar as senhoras e os senhores dirigentes de agencias reguladoras dirigir um cumprimento especial ao senhor robson andrade presidente da confederacao nacional da industria por intermedio de quem cumprimento todos os empresarios das federacoes aqui presentes" (Rousseff, 9/7/2015)

Each code is mutually exclusive in its conceptualization, meaning that they cover different forms of constructing the Amazon as a problem. Each Amazonian statement, though, might be assigned to one or more codes. 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, and so on. Amazonian statements, thus, can be either coded as a single code (ideal types) or one or more codes (mixed types).

With this codebook in hands, then, each one of us manually coded the same set of 1007 randomly selected Amazonian statements. This amount refers to 50% of all the Amazon Statements identified. We coded all statements separately from each other, following inter-coder reliability procedures. After reading a statement, we assigned the value of one or zero to each one of the four code categories in table 1. Inter-coder agreement for each of the four main categories was 85%, on average. Most of the disagreements were on economic integration versus social development and related to the difference in emphasizing infrastructure versus emphasizing peoples' rights. For each non-matching code, the co-authors discussed and sorted their disagreements to finalize the putting together a training set so that a supervised machine-learning model classifies the rest.

Supervised Machine-Learning

We use this hand-coded set to train a model that codes the remaining Amazonian statements in our text corpus using R. To select the best approach, we use the hand-coded data to compare how several supervised-machine learning methods perform in identifying false positive observations from the training set. To do so, we do some simple text pre-processing in R such as removing stopwords, punctuations, signs, and empty spaces using the TM package. Then, we split the hand coded sample into a randomly selected training set and a validation set. The training set contains 80% of the observations in the hand-coded sample (806 observations) while the validation set contains the other 20% of the observations (201 observations).

We use this training set to train models support-vector machine(SVM) models to label text data on the validation set. Table 2, below, describes how the model performs in labeling observations in the validation set in regard to accuracy and AUC scores (Area Under the Curve).. The SVM training algorithm is a non-probabilistic binary linear classifier that classifies documents by assigning points in mapped space to maximize the width of the gap between categories (Meyer et al. 2021). SVM is a particularly appropriate machine-learning algorithm for binary text labeling since it relies on maximizing distances between two categories (see also Noble 2006). We rely on the e1071 package to run the SVM model due to its flexibility in regard to parameter choices and because it helps users tune parameters to better fit the label patterns in the text data. Once the model parameters are tuned to better fit the patterns for each code, we expect the model to perform considerably better in labeling the remaining 1007 statements automatically.

Table 2 - SVM Model Performance

Accuracy AUC False Positives 0.946 0.69 Sovereignty 0.866 0.59 Economic Integration 0.678 0.68 Social Development 0.792 0.66 Conservation 0.802 0.78

After the SVM models are tuned, the probability that a certain Amazonian statement belongs to a code category is returned. Statements that have a probability of 0.45 or more of belonging to a code category are labeled 1 (i.e. belonging to a category) and statements that have a probability of 0.45 or less of belonging to a code category are labeled 0 (i.e. not belonging to a category). We find that a 0.5 threshold can be too strict while a 0.4 may generate a few false positives and, for this reason, we set the threshold at 0.45. The final trained models excel to label observations in some categories in comparison to others. We also take

a random sample of 101 (10% of the automatically labeled Amazonian statements to check how the model performed. We find that the model performs much better than the metrics above appear to indicate in comparison to how the authors would hand code these observations. The final models automatically label, out of the remaining 1007 statements, 84 statements as sovereignty, 437 as economic integration, 186 as social development, and 300 as conservation. The model also identified 41 false positive Amazon statements out of the 1007 labeled. Moreover, the proportions of the automatically labeled Amazonian statements for all categories in regard to the number of observations in the set, including observations that were not labeled but were not false positives (i.e. others), are similar to the proportions of the coded statements for the hand coded training set.

After merging the data altogether for analysis, we chose to delete the false positive Amazonian statements for analysis since these are not meaningful statements about the Amazon as a forest, peoples, or region. In total there were 119 false positives out of the 2014 Amazonian statements. The final dataset for analysis contains 1895 Amazonian statements. Out of these, 237 statements are labeled as national sovereignty, 810 as economic integration, 418 as social development, and 567 as environmental conservation. We then added metadata about each of the speeches from which these Amazonian statements were taken from. The metadata includes variables such as the president (speaker), the year, the speech title, and the full text for the broader speech. Lastly, we use poldis once again to extract locations from texts. These locations can represent the Brazilian state in which certain speech was given, or international country or forum (e.g. United Nations).

Multinomial Modeling

To analyze our data, we first present a series of different plots on proportions of Amazonian statements and problem-constructions over time and by presidents. We control proportions for factors that might affect the incidence of the Amazon in speeches and portray both real and controlled curves. To test whether different problem constructions change according to location, we run a multinomial regression model in which different problem constructions (as categories) are the dependent variable and location is the independent variable. We code 4 different location categories for where speeches take place, they are: Amazonian states, non-Amazonian states, Brasilia, and International. In the model, we also control for annual deforestation rates, annual inflation rates, and election years in the model as these are variables which could mitigate the correlations between problem construction and location. Annual deforestation rates data were taken from the Satellite Monitoring of Deforestation Program (PRODES). However, since annual deforestation rates are calculated from 1988, we input the rates of 1988 to 1985, 1986, and 1987 because these rates are consistent with most estimates (see Prates and Bracha 2010). The average annual inflation data is taken from the Worldwide Inflation Data. Election years are input as a dummy variable in which election years are marked 1 and non-election years are marked 0. After the model is run, post estimation tests such as the Chi-square test shows us that the model selected is highly statistically significant in explaining variance in data in comparison to a null model (i.e. our model explains a considerable amount of the variance). The likelihood ratio test also shows that the model does not suffer with issues of multicollinearity.

```
##
## ================================================================================================
##                                                  Dependent variable:
##                     ---------------------------------------------------------------------------
##                        EI          SD          Sov       EI-Con      EI-SD     Sov-Con  SD-EI-Con  Sov-EI     S
##                        (1)         (2)         (3)         (4)        (5)        (6)        (7)        (8)
## ------------------------------------------------------------------------------------------------------------
## Brasilia            -1.024***   -1.002***    -0.206     -0.341    -1.019***    0.420    -1.197*** -1.212*** -(
##                      (0.169)     (0.205)     (0.260)    (0.248)    (0.273)    (0.257)    (0.330)    (0.342)
##
## International       -0.612***   -1.583***   -1.427***   -0.265    -0.980***   -0.451    -1.110*** -1.105***  -
##                      (0.192)     (0.303)     (0.431)    (0.292)    (0.336)    (0.367)    (0.407)    (0.395)
##
```

```
## Non-AM state        0.023     -0.041     0.324     0.149     0.071   0.823***   -0.466    -0.136    -
##                    (0.197)   (0.230)    (0.302)   (0.296)   (0.292)   (0.306)   (0.373)   (0.366)
##
## Election           -0.241     0.028    -0.684**   -0.059    -0.254    -0.573     0.064   -1.243**   -
##                    (0.186)   (0.215)    (0.298)   (0.253)   (0.281)   (0.406)   (0.367)   (0.547)
##
## Deforestation     0.063***   -0.031*     0.004     0.023    0.047**    0.005    -0.013    -0.001
##                    (0.013)   (0.016)    (0.019)   (0.017)   (0.019)   (0.027)   (0.026)   (0.028)
##
## Inflation         -0.001*** -0.0005***  -0.0001  -0.001*** -0.0005**  0.0002   -0.001**   -0.0004   -
##                   (0.0001)   (0.0002)  (0.0002)  (0.0002)  (0.0002)  (0.0002)  (0.0004)  (0.0004)  (0
##
## Constant            0.228    0.852***   -0.599*  -0.762**  -0.981*** -2.041*** -0.794**  -1.049*** -1
##                    (0.210)   (0.252)    (0.333)   (0.312)   (0.335)   (0.332)   (0.371)   (0.347)
##
## ---------------------------------------------------------------------------------------------------
## Akaike Inf. Crit. 7,488.783 7,488.783  7,488.783 7,488.783 7,488.783 7,488.783 7,488.783 7,488.783 7
## ===================================================================================================
## Note:                                                                                 *p<0.1; **
```

Limitations

These procedures come with its limitations. Our codebook is developed using specific Amazon related vocabulary. For example, a statement will be coded as economic integration if it is a meaningful support to the Zona Franca of Manaus or a Dam in the Amazon. However, the economy is generally a topic that presidents speak about. Hence, high incidence of economic integration in Amazonian statements can also be related to the higher importance of this problem-construction in Brazil in time. Moreover, 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 Mata Atlantica. Nevertheless, our dataset covers only what is considered an official remark. Presidents, though, give interviews, appear in debates, talk at campaign rallies, and more recently start to appear in social media. Problem-construction within presidential discourse, thus, also happens in different sites for which we do not account for in this paper.

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