Blaze of Distrust: The Impact of Wildfires on Social Capital and Governance in Brazilian Amazonia

Feishi Gong

Professor Michelle Connolly, Faculty Advisor

Acknowledgement

First and foremost, I'd like to thank Professor Michelle Connolly. This thesis would not be in shape without her patient guidance, invaluable suggestions, and continuous support. I'd also like to thank all my peers from the Honors Thesis seminar. Their suggestions have always been a source of inspiration during the research process.

I am also grateful to all the professors who have taught and mentored me during my years at Duke. I'd like to thank Professor Bocar Ba, Professor Christopher Timmins, and Professor Shelly Liu who generously hired me as their research assistant and showed me the exciting world of academic research.

Last but not least, I'm beyond grateful to my family and friends. I'd like to thank Yangfan Wang for his unwavering support. I would not be here without the unconditional love from my parents Pan Huang and Ping Gong, and my grandparents Lihua Huang and Jianqiu Zhong.

All errors are my own.

Abstract

The 2019 wildfire crisis in Brazilian Amazonia not only captured global headlines but also deeply influenced public sentiment towards environmental and political challenges within the country. Trust, a pivotal element of social capital, plays a vital role in shaping a nation's progress and the well-being of its citizens. This study employs detailed satellite data on wildfire occurrences and survey data reflecting Brazilian public opinion to investigate the nature of fire activity in Brazilian Amazonia, treating it as indicative of organized criminal behavior. Further, it delves into the ramifications of wildfires on the institutional and interpersonal trust of Brazilians. Our findings reveal that wildfires exert a considerable detrimental impact on the trust that local residents place in institutions and each other. These insights underscore the urgency of enhancing environmental protection measures and wildfire management strategies. By doing so, Brazil can bolster its social capital and empower local governments to rebuild and maintain public trust effectively.

1 Introduction

The Amazon rainforest, located in South America, is a repository for nearly one-third of the world's tropical forests, serving as a critical carbon sink by storing an estimated 76 billion tons of carbon (WWF, 2023). The global population depends on the Amazon not only for essential resources such as food, water, timber, and medicine but also for its pivotal role in maintaining climate stability. However, in recent years, the Amazon has witnessed a disconcerting surge in deforestation, and there are no signs of this trend abating. Brazil, which encompasses approximately 60% of the Amazon Basin, has seen over 18% of its rainforest vanish over the past four decades (WWF, 2023). This rampant deforestation exacerbates climate change, and poses a substantial threat to global biodiversity and the long-term economic stability and legal frameworks of the region.

Figure 1: Deforestation in Brazilian Amazonia, 2012-2021
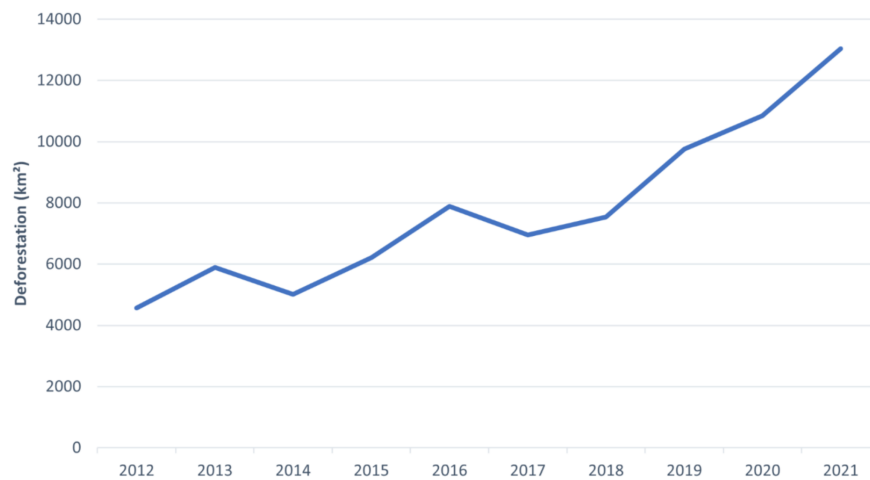
Sources: PRODES, INPE

3

While the concept of the tragedy of the commons has long been a fundamental tenet in economics, limited research has been undertaken to understand the impact of this issue on the community level social capital. This paper aims to investigate how illegal fire activities in the Amazon rainforest impact interpersonal trust and institutional trust among Brazilians.

To begin, it is important to note that the overwhelming majority of wildfires in the Amazon are human-initiated (van der Werf et al., 2017). The primary driver of deforestation in the Brazilian Amazon is industrial agriculture, with the country establishing itself as a major supplier of beef and soybeans (WWF, 2018).

Figure 2: Drivers of forest loss in the Brazilian Amazonia, 2001-2013
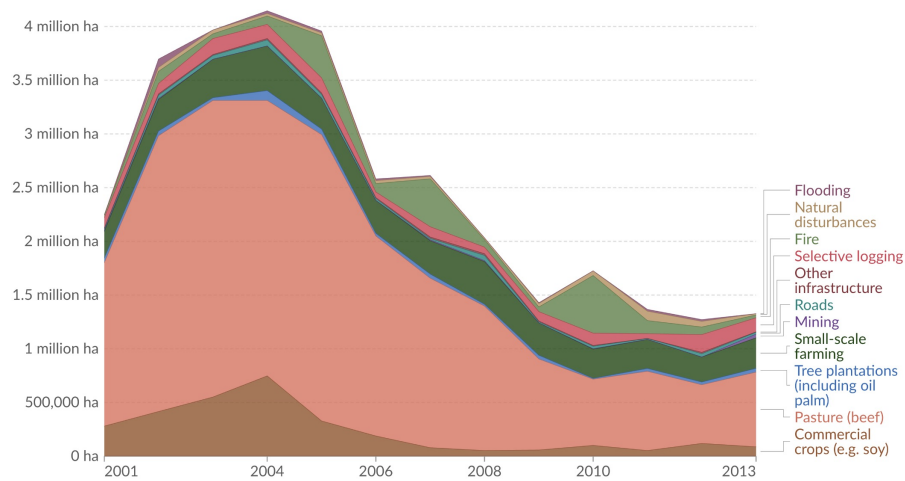
Data source: Tyukavina et al. (2017). Types and rates of forest disturbance in Brazilian Legal Amazon, 2000–2013. Science.
OurWorldInData.org/forests-and-deforestation | CC BY

In Brazil, the intentional use of fire is a common practice for land clearance to make way for agricultural activities, effectively transforming thriving forests into ashes (van der Werf et al., 2017). While fire may be legally

4

used for agricultural purposes (requiring authorization), approximately 94% of the current fires are illegal, particularly when linked to deforestation and the removal of native vegetation (Pivello et al., 2021; Coelho-Junior et al., 2022). These illegal, unregulated deforestation fires have significantly contributed to large-scale wildfires throughout Brazil, leading to disastrous consequences. For instance, Silveira et al. (2022) observed that one-third of the fires occurring between 2003 and 2019 in the Amazon resulted in deforestation within the same year, clearly demonstrating the correlation between fire and deforestation. Human-initiated wildfires constitute a severe offense against nature, yet the existing literature on crimes within the Brazilian Amazon predominantly focuses on illegal logging and land-related disputes, with few examining the impact of human-initiated wildfires on social order. News and interviews indicate that some wildfires in Amazon were organized by farmers in the same communities (Klein and Medaglia, 2020; Lopes, 2019). International attention to the situation peaked in 2019 when thousands of square miles of Amazon forest were destroyed by unprecedented massive wildfires, and over 70 farmers came together to organize burning forest on the "Day of Fire" (Matias, 2022). In other words, the human-initiated fire in Amazon could be viewed as an organized illegal activity.

This paper delves into an examination of the impact of coordinated and predominantly illegal fire activities in the Amazon Biome of Brazil, encompassing the Amazon forest and a significant portion of the Amazon basin, on people's levels of interpersonal trust and institutional trust, both within the

Amazon Biome and across the entire nation.

I seek to provide causal evidence regarding the potential influence of fire activity on interpersonal trust and institutional trust and thereby implicitly address whether policies on limiting fire activities in Amazon are viable strategies for building trust.

Section 2 of this paper reviews the previous studies of the relationship between countries' economic growth and trust as social capital, and the important role of environmental issues in influencing Brazilians' public opinions. Section 3 explains my data sources, and presents summary statistics. Section 4 presents my empirical models and theoretical framework behind my empirical models construction. Section 5 presents and discusses my findings. Section 6 concludes.

2 Literature Review

Social capital, broadly understood as the set of shared norms and values that contribute to well-being (Algan, 2018), has received a huge amount of academic and policy interest as a key driver of social progress and well-being. As defined by Paldam and Svendsen (2000), social capital is "the density of trust existing within a group" and "it determines how easily people work together." Therefore, as a core component of social capital, trust between individuals (interpersonal trust) and trust in institutions (institutional trust) have been associated with well-being (Helliwell et al., 2016; Piosang and

Grimes, 2022), stronger economic growth (Knack and Keefer, 1997; Dearmon and Grier, 2009; Dincer and Uslaner, 2010) and greater capital accumulation (Dearmon and Grier, 2009). Higher trust in institutions can also cause better governance and institutional quality, which are associated with greater economic growth (Bjørnskov, 2012; Efendic et al., 2011). What's more, it is a widely shared view among economists that trust is essential in ensuring cooperation, especially in organizations (La Porta et al., 1997).

Understanding the level of trust the public holds is crucial for policymaking. In democratic nations, the legitimacy of political decisions is closely tied to their alignment with public sentiment. Many studies in public policy and environmental policy have found a positive relationship between political trust and government's action in environmental protection (Kentmen Cin, 2013; Konisky et al., 2008; Flatø, 2022). Especially in Brazil, concern over environment is a particularly strong indicator of public opinions (Hodges and Sotero, 2010; Funk et al., 2020). A 2022 nationally representative survey conducted by researchers from Yale University and Institute for Technology & Society of Rio (ITS) shows that over 96% of Brazilians said climate change is happening and 77% identified human activity as its primary cause.[1] Large-scale natural disasters always cause complicated and far-reaching social and political consequences (Drury and Olson, 1998; Pelling and Dill, 2010). Thus, it is evident that the government's ability in addressing environmental issues

---

[1]Yale Program on Climate Change Communication: `https://climatecommunication.yale.edu/publications/climate-change-in-the-brazilian-mind/`

plays a significant role in shaping public trust. In cases where the government prioritizes economic growth over environmental concerns to an extent that erodes public trust, the legitimacy of its actions can be called into question.

Therefore, from the viewpoint of policymakers, an important question that arises naturally is how social trust and trust in institutions can be built up. This paper will contribute to the growing literature on the politics of deforestation and provide a new perspective in a criminology sense by analyzing human-initiated forest burning as an organized crime. It also builds on the literature on elements that affect trust in institutions at the local level.

3 Data Description

The first main dataset I use is the AmericasBarometer dataset by the LAPOP Lab of the Vanderbilt University, which measures people's interpersonal trust and trust in institutions.[2] These surveys commenced in 2004 and have been conducted biennially ever since. The primary sampling units are the municipalities. The secondary sampling units are the households. The ultimate sampling unit is the dwelling (pre-2020 and 2023) and the cellphone number (2023). The unit of observation is the individual respondent. Each year, the survey chooses respondents randomly, so the dataset consists multiple cross-sectional datasets pooled over time. In 2021, due to the impact of COVID-19, the questionnaire was conducted over phone interview and was a split-sample

---

[2]The AmericasBarometer by the LAPOP Lab: `www.vanderbilt.edu/lapop`

design: approximately half the respondents were randomly assigned to part A of the questions, and about half randomly assigned to part B, and some questions are common across two groups.

The main variables that I use are:

- interpersonal trust: a categorical variable ranging from 1 (not trustworthy at all) to 4 (very trustworthy)

- institutional trust, specifically respect for the municipal/local government: a categorical variable ranging from 1 (no respect) to 7 (a lot of respect)

Table 2 in Appendix presents the summary statistics of respondents institutional and interpersonal trust both nationwide and in Amazon. The trends in average institutional and interpersonal trust on province level are shown in Figure 3 and 4 in Appendix.

I also use many demographic data in the survey as control variables, including the respondent's age, education level, race, income level, attention to news, and whether has the respondent been a victim of crime in the past 12 months.

In our analysis, we focus on data from respondents located within the Brazilian Amazon from 2012 to 2023, as 2012 is the earliest year in which the dataset encompasses observations from all provinces. Our final dataset has 2,581 observations. The details and summary statistics of demographic characteristics can be found at Table 1 in Appendix. The respondents dis-

tribute evenly in different age groups. About 15% have received higher education, 15% have been a victim of violent crime in the past 12 months, and over 70% watch news everyday. Over half of the respondents self-identify as Pardos (mixed-race Brazilians) and half of them come from households with monthly income less than 1,800 Brazilian Real, which is roughly equal to 350 USD in 2024.

The second main dataset I use comes from Brazil National Institute for Space Research (INPE)'s Programa Queimadas.[3] The data has been collected by INPE's satellites on a daily basis since 2000. Each observation is a detected vegetation-burning hotspot. Each observation represents an active fire detection, pinpointing the center of a 1 km pixel identified as containing one or more fires or other thermal anomalies. It's essential to note that the "location" specified in the dataset corresponds to the center point of the pixel and may not necessarily reflect the precise coordinates of the actual fire. A fire of a few tens of m^2 will be identified as having at least 1 km^2. Therefore, In other words, the INPE system detects the existence of vegetation fire without being able to assess the proportion of the area that is burning, or the type of vegetation affected. In cases with many burning pixels together, it can be inferred that the burning will have the size of the burning pixels detected. The dataset contains variables including latitude, longitude, time of detection, state, and municipality. Figure 5 presents the number of fire

---

[3]Programa Queimadas do INPE: `http://terrabrasilis.dpi.inpe.br/queimadas/portal/`

incidents and Figure 6 presents the percentage of land burned, both at the province level. Para, the biggest province in Brazilian Amazon, has the most number of fire incidents, but Acre and Rondonia have higher proportion of land being burned.

4   Empirical Specification

A large and growing body of psychological research shed light on the enduring nature of people's resistance to change their beliefs or perceptions on social issues (Lord et al., 1979; Kunda, 1990; Tversky and Kahneman, 1974). This suggests that changes in people's trust may exhibit a lag relative to the real-time rate of fire activity. In other words, an individual's trust level in the current period is often constructed upon the foundation of their trust level from the previous year. Moreover, an individual's perspectives are often strongly shaped by the environment in which they live. Thus, it is natural to hypothesize that nearby municipalities may play roles in affecting each others' trust level. As a result, we take into account the temporal dynamics in trust level changes, a facet effectively captured by an auto-regressive model with geographical fixed effects on different levels.

Given that we are working with separate cross-sectional datasets pooled over time, it is essential to recognize that individuals surveyed differ across time periods. Therefore, our dataset does not allow us to track the individual's trust level over year. The best alternative we can use is the average

trust on municipality level in the past year. We also include year fixed effects to capture any annual macro level changes.

Furthermore, a multitude of studies, such as Kim and Kim (2011) on interpersonal trust and Schwartz (2007) on institutional trust, have demonstrated that trust levels are significantly influenced by a range of individual demographic factors, including age, gender, socioeconomic status, education, and social engagement. In particular, Schwartz (2007) identifies education, employment, and income as the most robust predictors of institutional trust. Similarly, crime might reduce civilians' institutional trust level. For example, existing economics literature focusing on Latin American countries such as Colombia and Mexico finds that perceptions of insecurity and crime victimization have negative effect on people's institutional trust levels (Blanco, 2013; Blanco and Ruiz, 2013). Lastly, we consider that individual's attention to news likely impacts their opinions. Therefore, we include these variables as control factors in our analysis. Although individual's political interest would very likely be an important factor, our data shows that respondents are generally unwilling to reveal their political parties when being asked. Hence, we are unable to include political ideology in our model.

Many respondents live in urban municipalities, where no wildfire happens. Therefore, our main independent variable is the proportion of land burned in the province that the respondents live in. Studying the proportion of land burned helps us to better understand the 'severity' of fire relative to the absolute numbers of fire incidents.

4.1 Main Models

We consider the following models:

$$
\begin{aligned}
TrustGov_{ijkt} = \beta_0 + \beta_1 AvgGovTrust_{jk,t-2} \\
+ \beta_2 PctLandBurned_{k,t+t-1} + \theta_1 X_{ijkt} + \gamma_j + \alpha_t + \epsilon_{ijt}
\end{aligned}
\tag{1}
$$

$$
\begin{aligned}
TrustGov_{ijkt} = \beta_0 + \beta_1 AvgGovTrust_{k,t-2} + \beta_2 PctLandBurned_{k,t+t-1} \\
+ \beta_3 PopulationDensity_j + \theta_1 X_{ijkt} + \gamma_k + \alpha_t + \epsilon_{ijt}
\end{aligned}
\tag{2}
$$

$$
\begin{aligned}
TrustPpl_{ijkt} = \beta_0 + \beta_1 AvgPplTrust_{jk,t-2} \\
+ \beta_2 PctLandBurned_{k,t+t-1} + \theta_1 X_{ijkt} + \gamma_k + \alpha_t + \epsilon_{ijt}
\end{aligned}
\tag{3}
$$

$$
\begin{aligned}
TrustPpl_{ijkt} = \beta_0 + \beta_1 AvgPplTrust_{k,t-2} + \beta_2 PctLandBurned_{k,t+t-1} \\
+ \beta_3 PopulationDensity_j + \theta_1 X_{ijkt} + \gamma_j + \alpha_t + \epsilon_{ijt}
\end{aligned}
\tag{4}
$$

where the dependent variable $TrustGov_{ijkt}$ and $TrustPpl_{ijkt}$ measure the institutional and interpersonal trust of respondent i who lives in municipality j, province k in year t, $AvgGovTrust_{jk,t-2}$ and $AvgPplTrust_{jk,t-2}$ is the average institutional and interpersonal trust of the municipality j in province k two years ago. Since the surveys were conducted in different months over the years, the respondents were not affected by fires in year t that occurred after the survey month. $PctLandBurned_{k,t+t-1}$ is the proportion of total land burned in province k in year $t-1$ and t (before the month that the survey was done). The term X_{ijkt} is a vector of control variables, including age, race, education, attention to news, income, and whether has the respondent been a victim of violent crime in the past 12 months. α_t represents

13

the year fixed effects, respectively. ϵ_{ijt} is the error term. In Model (1) and (3), we include an municipality fixed effect γ_j. In Model (2) and (4), we replace the municipality fixed effect with an province fixed effect γ_k, and add $PopulationDensity_j$ to measure the effect of population density on municipality level. $PopulationDensity_j$ can reflect the socioeconomic development of a municipality to some extent. It would be ideal to include more comprehensive municipality level demographic and socioeconomic control variables, but unfortunately, these kinds of data were not available to the best of our knowledge.

5 Finding

The results are presented in Table 3 in Appendix. The main findings are as follows: We find a negative relationship between wildfire and individuals' institutional and interpersonal trust. When controlling for municipality fixed effects, individuals' institutional trust decreases by over 0.16 points as 1% of the province burned by wildfire, and individuals interpersonal trust decreases by over 0.09 points as 1% of the province burned by wildfire. Given that the scale of institutional trust is 1-7 and the scale of interpersonal trust is 1-4, as 1% of the province burned by wildfire, we estimate that both individuals' institutional trust and interpersonal trust dropped by 2.3% of their maximum score, respectively.[4] When controlling for province fixed

---

[4]2.3% is calculated by dividing 0.16 by 7 and dividing 0.09 by 4.

effects and municipality population density, the model finds that individuals'
institutional trust decreases by over 0.39 points as 1% of the province burned
by wildfire, and individuals interpersonal trust decreases by over 0.12 points
as 1% of the province burned by wildfire. That is, individuals' institutional
trust drops by 5.6% of its maximum score, and interpersonal trust drops by
3.1% of its maximum score. [5]

The result is consistent with our hypothesis that wildfires decrease peo-
ple's interpersonal and institutional trust. At the same time, our results also
show that whether the respondents has been a victim of violent crime in
the past 12 months is a significant factor in affecting both types of trust.
Both types of trust tend to increase as individuals grow older, and decrease
as their income increases. People's interpersonal trust also increases as their
education degree gets higher. Asians' trust to government is significant lower
than average Pardos (mixed-race Brazilians), and White and Black people's
interpersonal trust is significantly higher than average Pardos.

It is noteworthy that upon controlling for province fixed effects and mu-
nicipality population density, our model finds a significantly larger estimated
impact on trust changes compared to controlling for only municipality fixed
effects, accompanied by smaller standard errors. This discrepancy likely
stems from the data collection methodology employed by the LAPOP sur-
vey. The survey's approach to data gathering was not uniform across all
municipalities, as it particularly varied in frequency and scale. In smaller

---

[5]5.6% is calculated by dividing 0.39 by 7, and 3.1% is calculated by dividing 0.12 by 4.

municipalities, the number of respondents was limited, resulting in some municipalities having minimal to no data points in certain years. This uneven distribution of observations may account for the observed variations in the estimated effects on trust. Also, the municipality population density may not capture all heterogeneity across municipalities within a province.

It is surprising that Model (2), (3), (4) all find a negative relationship between individual's trust and the lagged average municipality/province trust. This may be caused by the same problem in data collection method mentioned above. Since some municipalities have too few observations, and individual's trust in local government and people around can be affected by many unobservable factors that are highly personal, the results can be unstable over years.

There seems to be no difference in interpersonal trust between people who never pay attention to news and people who watches news everyday, which is not surprising because individuals' trust to people around are more likely affected by real life interaction instead of news. When controlling for province fixed effect, people who watch news everyday have significantly lower institutional trust than people who never watch news. This is also not surprising since people who watch news everyday are more likely to be exposed to information about government's misconducts or scandals. When controlling for municipality fixed effects, the difference becomes insignificant. The inconsistency in the results may be again caused by the issue in data collection method discussed above, as some municipalities have too few observations to

deliver precise estimation.

Lastly, Model (2) and (4) finds that municipalities with the most population density per km^2 have the lowest level of both institutional and interpersonal trust. Individuals who live in urban areas may have more complex views on local government and people around relative to individuals who live in rural areas. Individuals who live in municipalities with low population density may be familiar with their local community and thus tend to have higher trust.

6 Conclusion

Based on the comprehensive analysis of wildfire activity in Brazilian Amazon and its impact on institutional and interpersonal trust among residents, our study provides insights into the negative relations between environmental crises and social capital.

Our findings underscore the significant negative effects of wildfires on both institutional and interpersonal trust among Brazilian Amazon residents. The severity of the wildfire, as indicated by the percentage of land burned in the province, correlates with a substantial decrease in trust levels. We present two models, one with municipality fixed effects and one with province fixed effects and municipality population density. Specifically, individuals exhibit a notable decline in institutional trust. The model municipality fixed effects shows that as 1% of the province burned by wildfire, both individuals' institu-

17

tional and interpersonal trust declined by 2.3% of their respective maximum scale. The model with the province fixed effects and municipality population density shows that individuals' institutional trust declines by 5.6%, and interpersonal trust declined by 3.1% of its maximum scale, respectively. These results emphasize the detrimental impact of environmental disasters on the foundation of social capital within communities. Our results suggest that human initiated wildfire is an important factor in influencing social trust in Brazilian Amazon. This also reflects Brazilian Amazon residents' concerns for environment. The significant decrease in trust levels, quantified through this research, underscores the critical importance of environmental protection and wildfire control in safeguarding and enhancing Brazil's social capital. The erosion of trust, both in institutions and between individuals, poses a considerable challenge to the country's development and the well-being of its citizens. It highlights the urgency for Brazilian local governments to strengthen their capacities in environmental management and to rebuild public trust through effective and transparent policies.

Furthermore, our study highlights the interplay between wildfire severity and individual demographic factors in shaping trust levels. Factors such as age, income, education, and ethnicity significantly influence individuals' trust perceptions. Older individuals tend to exhibit higher levels of trust, while income negatively correlates with trust levels. Additionally, disparities in trust are observed across ethnic groups, with Asians exhibiting lower trust in government compared to average Pardos, while White and Black individuals

display higher interpersonal trust.

While our study offers valuable insights, it is essential to acknowledge the limitations inherent in our methodology. Due to the cross-sectional nature of our data, we are unable to track individual-level trust changes over time. For smaller municipalities, the survey only interview few people every year, which could lead to unstable results across years. Instead, we rely on municipality-level and province-level averages and employ fixed effects to capture temporal dynamics and mitigate potential biases. Additionally, although we control for various demographic and contextual factors, the complexity of trust dynamics necessitates further exploration, including the role of political ideology, which was not feasible due to data constraints. The public opinion dataset that we use also has limitations, since the survey does not cover the same municipality every time, we are not able to calculate the municipality-level lagged average trust for all municipalities every year. We also need to note that our measurement of the fire incident is not very accurate. In the satellite data we used, a fire of a few tens of m^2 will be identified as having at least 1 km^2. In other words, we might overestimate the scale of the fire, and we are not able to detect the intensity of the fire.

In conclusion, our findings underscore the critical importance of environmental protection and wildfire control in safeguarding social capital and fostering trust within communities. By addressing environmental challenges effectively, policymakers can enhance governance legitimacy and bolster public trust, ultimately contributing to the resilience and well-being of Brazilian

society. Continued research in this area is vital for informing evidence-based policies aimed at mitigating the adverse impacts of environmental crises on social cohesion and trust dynamics.

References

Algan, Y. (2018). *Trust and social capital*, pages 283–320. OECD.

Bjørnskov, C. (2012). How does social trust affect economic growth? *Southern Economic Journal*, 78(4):1346–1368. Publisher: Southern Economic Association.

Blanco, L. and Ruiz, I. (2013). The impact of crime and insecurity on trust in democracy and institutions. *American Economic Review*, 103(3):284–288.

Blanco, L. R. (2013). The impact of crime on trust in institutions in mexico. *European Journal of Political Economy*, 32:38–55.

Coelho-Junior, M. G., Valdiones, A. P., Shimbo, J. Z., Silgueiro, V., Rosa, M., Marques, C. D. L., Oliveira, M., Araújo, S., and Azevedo, T. (2022). Unmasking the impunity of illegal deforestation in the brazilian amazon: a call for enforcement and accountability. *Environmental Research Letters*, 17(4):041001. Publisher: IOP Publishing.

Dearmon, J. and Grier, K. (2009). Trust and development. *Journal of Economic Behavior & Organization*, 71(2):210–220. Publisher: Elsevier.

Dincer, O. and Uslaner, E. (2010). Trust and growth. *Public Choice*, 142(1):59–67. Publisher: Springer.

Drury, A. C. and Olson, R. S. (1998). Disasters and political unrest: An

empirical investigation. *Journal of Contingencies and Crisis Management*, 6(3):153–161.

Efendic, A., Pugh, G., and Adnett, N. (2011). Confidence in formal institutions and reliance on informal institutions in bosnia and herzegovina. *Economics of Transition*, 19(3):521–540.

Flatø, H. (2022). Trust is in the air: pollution and chinese citizens' attitudes towards local, regional and central levels of government. *Journal of Chinese Governance*, 7(2):180–211.

Funk, C., Tyson, A., Kennedy, B., and Johnson, C. (2020). Concern over climate and the environment predominates among these publics.

Helliwell, J. F., Huang, H., and Wang, S. (2016). New evidence on trust and well-being.

Hodges, J. and Sotero, P. (2010). Public opinion in brazil: Findings from the pew research center's global attitudes project. `https://www.wilsoncenter.org/event/public-opinion-brazil-findings-the-pew-research-centers-global-attitudes-project`.

Kentmen Cin, C. (2013). Blaming the government for environmental problems: a multilevel and cross-national analysis of the relationship between trust in government and local and global environmental concerns. *Environment and Behavior*, 45(8):971–992.

Kim, D. Y. and Kim, H.-Y. (2011). Trust me, trust me not: A nuanced view of influencer marketing on social media. *Journal of Business Research*, 134:223–232. Publisher: Elsevier.

Klein, L. and Medaglia, T. (2020). In a drier amazon, small farmers and researchers work together to reduce fire damage. `https://rainforestjournalismfund.org/stories/drier-amazon-small-farmers-and-researchers-work-together-reduce-fire-damage`.

Knack, S. and Keefer, P. (1997). Does social capital have an economic payoff? a cross-country investigation. *The Quarterly Journal of Economics*, 112(4):1251–1288. Publisher: Oxford University Press.

Konisky, D. M., Milyo, J., and Richardson, L. E. (2008). Environmental policy attitudes: Issues, geographical scale, and political trust. *Social science quarterly*, 89(5):1066–1085.

Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin*, 108(3):480–498. Publisher: American Psychological Association.

La Porta, R., Lopez-de Silanes, F., Shleifer, A., and Vishny, R. W. (1997). Trust in large organizations. *The American Economic Review*, 87(2):333–338. Publisher: American Economic Association.

Lopes, M. (2019). Why brazilian farmers are burning the rainforest — and why it's so hard for bolsonaro to stop them. *Washington Post*.

Lord, C. G., Ross, L., and Lepper, M. R. (1979). Biased assimilation and attitude polarization: The effects of prior theories on subsequently considered evidence. *Journal of Personality and Social Psychology*, 37(11):2098–2109. Publisher: American Psychological Association.

Matias, I. (2022). Grupo usou whatsapp para convocar "dia do fogo" no pará. `https://globorural.globo.com/Noticias/noticia/2019/08/grupo-usou-whatsapp-para-convocar-dia-do-fogo-no-para.html`.

Paldam, M. and Svendsen, G. T. (2000). An essay on social capital: looking for the fire behind the smoke. *European Journal of Political Economy*, 16(2):339–366.

Pelling, M. and Dill, K. (2010). Disaster politics: tipping points for change in the adaptation of sociopolitical regimes. *Progress in Human Geography*, 34(1):21–37. Publisher: SAGE Publications Ltd.

Piosang, T. and Grimes, A. (2022). Trust in institutions and subjective well-being: Evidence from the philippines. *Asian Politics & Policy*, 14(4):490–517.

Pivello, V. R., Vieira, I., Christianini, A. V., Ribeiro, D. B., da Silva Menezes, L., Berlinck, C. N., Melo, F. P. L., Marengo, J. A., Tornquist, C. G., Tomas, W. M., and Overbeck, G. E. (2021). Understanding brazil's catastrophic fires: Causes, consequences and policy needed to prevent future tragedies. *Perspectives in Ecology and Conservation*, 19(3):233–255.

Schwartz, S. H. (2007). Value orientations: Measurement, antecedents and consequences across nations. In *Measuring attitudes cross-nationally: Lessons from the European Social Survey*, pages 169–203. Sage Publications, Inc.

Silveira, M. V. F., Silva-Junior, C. H. L., Anderson, L. O., and Aragão, L. E. O. C. (2022). Amazon fires in the 21st century: The year of 2020 in evidence. *Global Ecology and Biogeography*, 31(10):2026–2040.

Tversky, A. and Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185(4157):1124–1131. Publisher: American Association for the Advancement of Science.

van der Werf, G. R., Randerson, J. T., Giglio, L., van Leeuwen, T. T., Chen, Y., Rogers, B. M., Mu, M., van Marle, M. J. E., Morton, D. C., Collatz, G. J., Yokelson, R. J., and Kasibhatla, P. S. (2017). Global fire emissions estimates during 1997–2016. *Earth System Science Data*, 9(2):697–720. Publisher: Copernicus GmbH.

WWF (2018). What are the biggest drivers of tropical deforestation? https://www.worldwildlife.org/magazine/issues/summer-2018/articles/what-are-the-biggest-drivers-of-tropical-deforestation.

WWF (2023). The amazon rainforest. https://www.wwf.org.uk/where-we-work/amazon.

7 Appendix

Table 1: Summary Statistics for Demographic Characteristics 2012-2023

Variables	Levels	Frequency	Percent
Age	16-25	666	25.80
	26-35	422	16.35
	36-45	755	29.25
	46-65	571	22.12
	66+	167	6.47
Education[1]	Primary	1,051	40.72
	Secondary	1,123	43.51
	Higher Education	407	15.77
Race	Asian	365	14.14
	Black	316	12.24
	Indigenous	38	1.47
	Pardo	1,467	56.84
	White	386	14.96
	Other	9	0.35
Real Income[2]	0-1800	1,306	50.94
	1801-2500	434	16.93
	2501-3700	369	14.39
	3701+	455	17.75
Attention to News	Never	51	1.98
	A few times a year	62	2.40
	A few times a month	37	1.43
	A few times a week	618	23.94
	Daily	1,813	70.24
Victim of Crime	No	2,189	84.81
	Yes	392	15.19

1. Primary indicates education level of Primary/Elementary School (complete or incomplete). Secondary indicates education level of Secondary/High School/Collegiate (complete or incomplete). Higher Education indicates education level of Higher Education/Bachelor/College (complete or incomplete).
2. The income levels are adjusted using Brazil's CPI inflation index.

Table 2: Summary Statistics for Institutional and Interpersonal Trust
2012-2023

	2012-2023	2012	2014	2016	2018	2021	2023
Institutional Trust Nationwide	3.531	3.557	3.229	3.257	3.530	3.670	3.935
	(1.977)	(1.822)	(1.896)	(1.941)	(1.994)	(2.041)	(2.067)
Interpersonal Trust Nationwide	2.645	2.750	2.594	2.400	2.475	2.747	2.807
	(0.919)	(0.847)	(0.890)	(0.939)	(0.959)	(0.894)	(0.928)
Number of Obs.	10,224	1,459	1,467	1,493	1,456	3,016	1,526
Institutional Trust in Amazon	3.364	3.667	3.125	3.387	3.101	3.274	3.724
	(1.837)	(1.857)	(1.598)	(1.920)	(1.738)	(2.131)	(2.107)
Interpersonal Trust in Amazon	2.639	2.780	2.495	2.690	2.591	2.606	2.690
	(1.015)	(0.894)	(0.776)	(1.133)	(1.183)	(1.047)	(0.961)
Number of Obs.	2,581	495	511	506	504	307	258

1. Institutional Trust is a categorical value ranging from 1-7. Interpersonal Trust is a categorical value ranging from 1-4.
2. In 2021 questionnaire, half of the respondents were not assigned to the question about institutional trust, but all respondents were assigned to the question about interpersonal trust.

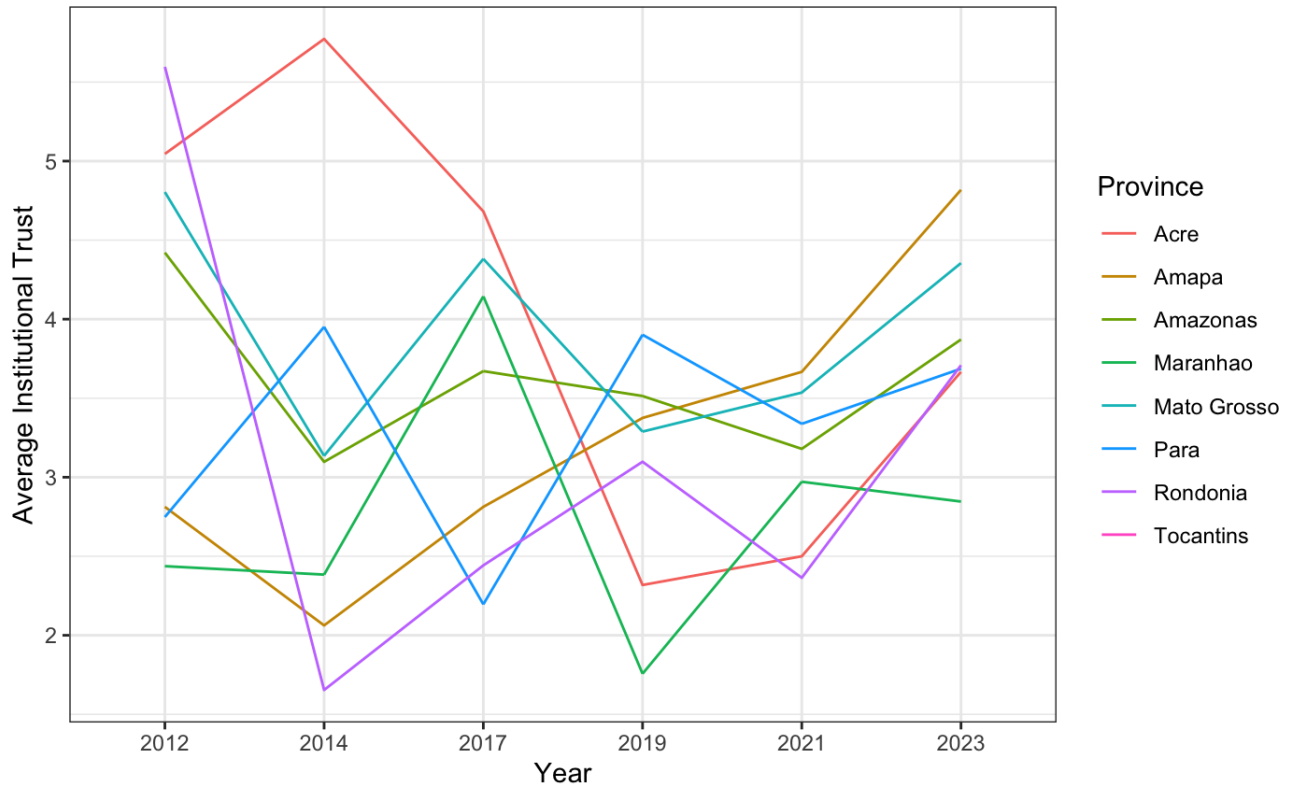Figure 3: Average Institutional Trust by Province 2012-2023

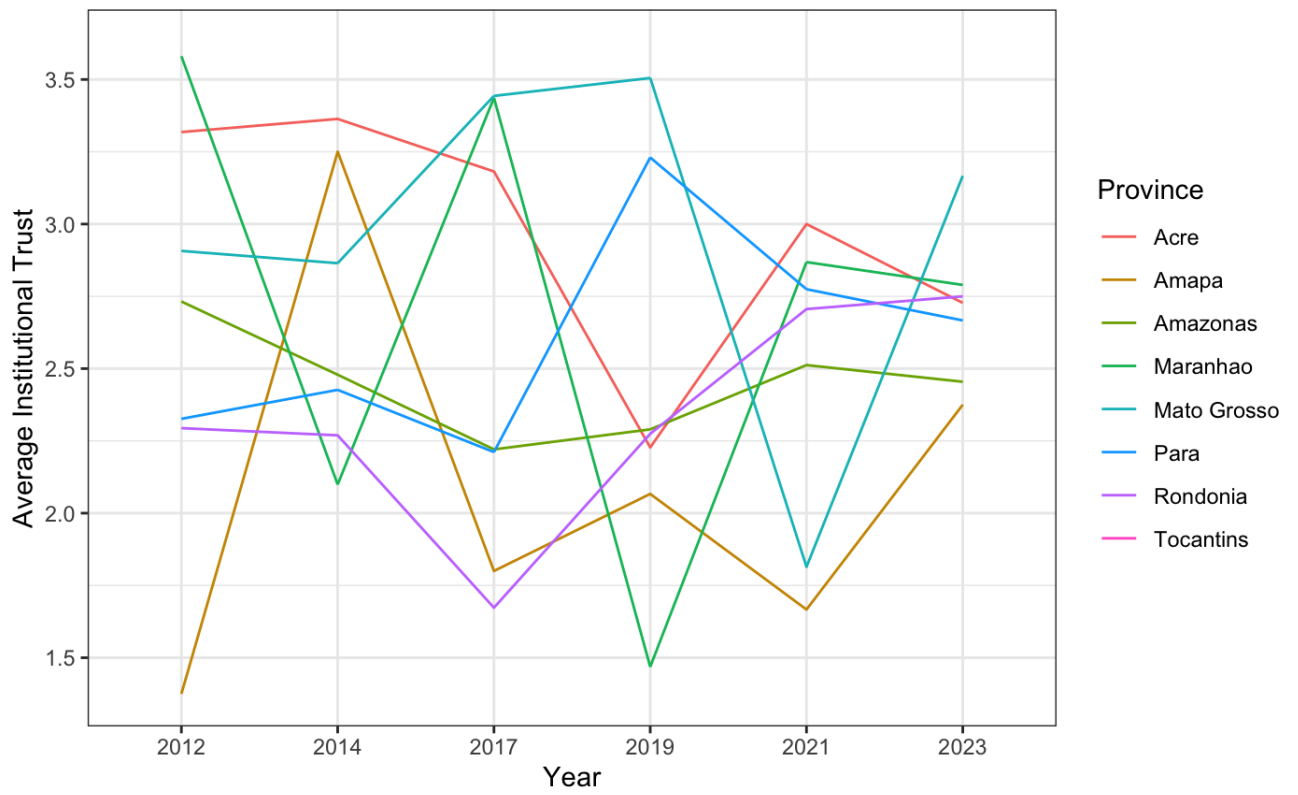Figure 4: Average Interpersonal Trust by Province 2012-2023

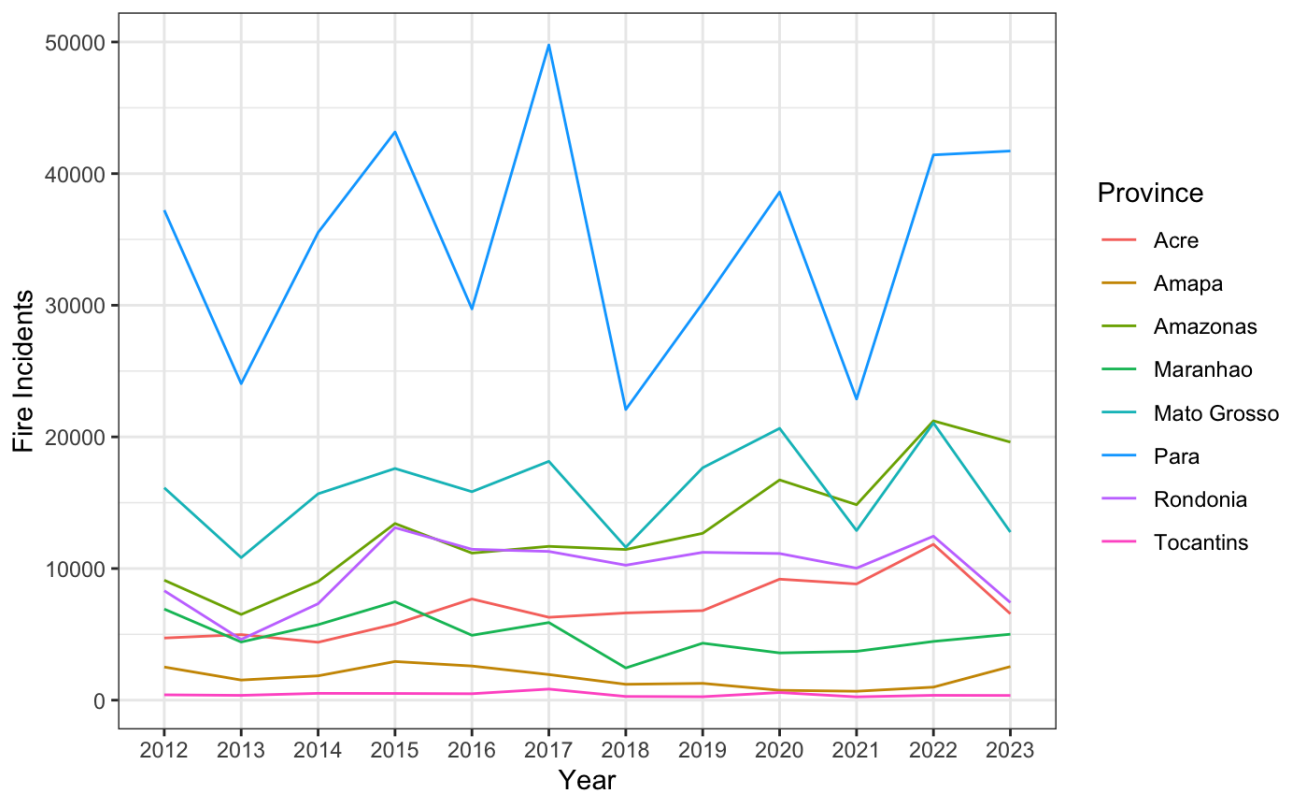Figure 5: Number of Fire Incidents by Province 2012-2023

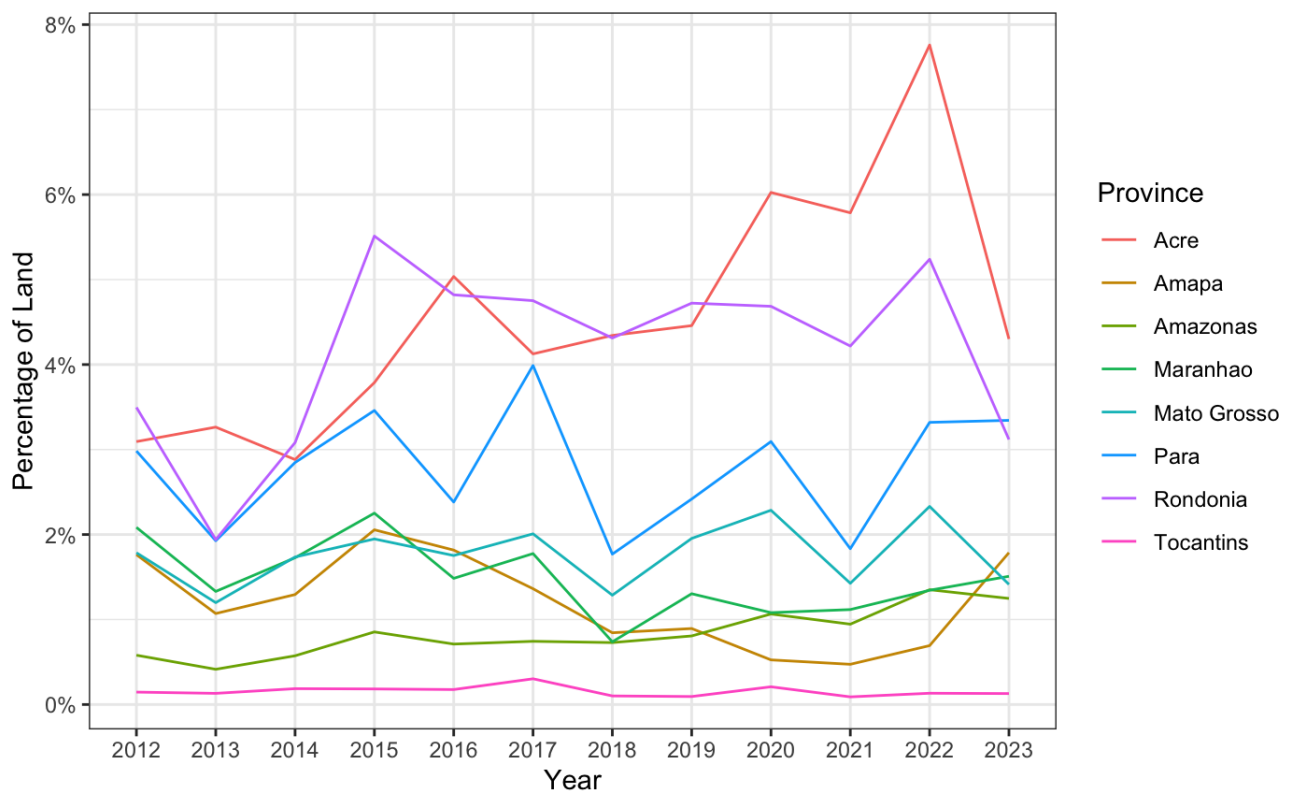Figure 6: Percentage of Land Burned by Province 2012-2023

Table 3: Regression Results

	Institutional Trust		Interpersonal Trust	
	(1)	(2)	(3)	(4)
Proportion of Province Land Burned$_{t+(t-1)}$	-16.573***	-39.092***	-9.126***	-12.594**
	(5.947)	(5.904)	(2.948)	(2.940)
Average Municipality Institutional Trust$_{t-1}$	0.078			
	(0.063)			
Average Province Institutional Trust$_{t-1}$		-0.537***		
		(0.053)		
Average Municipality Interpersonal Trust$_{t-1}$			-0.373***	
			(0.055)	
Average Province Interpersonal Trust$_{t-1}$				-0.253***
				(0.045)
Victim[1]				
Yes	-0.332***	-0.311***	-0.160***	-0.133**
	(0.117)	(0.114)	(0.058)	(0.059)
Race				
Asian	-0.715***	-0.425***	-0.259***	-0.111
	(0.153)	(0.144)	(0.078)	(0.079)
White	0.016	0.168	0.205***	0.304***
	(0.130)	(0.124)	(0.063)	(0.062)
Black	0.031	0.004	0.254***	0.439***
	(0.143)	(0.133)	(0.072)	(0.071)
Indigenous	0.178	0.442	-0.170	-0.095
	(0.330)	(0.310)	(0.155)	(0.156)
Other	-1.016	-0.494	-0.833**	-0.184
	(0.796)	(0.797)	(0.374)	(0.342)
Age				
26-35	0.277**	0.074	0.264***	0.168**
	(0.136)	(0.133)	(0.067)	(0.069)
36-45	0.021	0.153	0.353***	0.356***
	(0.131)	(0.122)	(0.066)	(0.064)
				Continued on next page

Table 3 – continued from previous page

	Institutional Trust		Interpersonal Trust	
	(1)	(2)	(3)	(4)
46-65	0.615***	0.486***	0.419***	0.317***
	(0.134)	(0.127)	(0.067)	(0.067)
66+	2.141***	2.025***	1.334***	1.114***
	(0.197)	(0.188)	(0.100)	(0.102)
Real Income[2]				
1801-2500	-0.023	0.251**	-0.115*	0.010
	(0.127)	(0.127)	(0.061)	(0.063)
2501-3500	-0.097	0.064	0.058	0.095
	(0.140)	(0.132)	(0.069)	(0.068)
3501+	-0.458***	-0.428***	-0.258***	-0.330***
	(0.125)	(0.125)	(0.062)	(0.064)
Education[3]				
Secondary	0.268**	0.364***	0.107*	0.116**
	(0.109)	(0.101)	(0.055)	(0.053)
Higher Education	-0.055	0.045	0.353***	0.558***
	(0.161)	(0.155)	(0.078)	(0.075)
Attention to News				
Rarely	0.291	-0.254	0.452**	0.236
	(0.410)	(0.393)	(0.214)	(0.216)
Few Times Every Month	1.013**	0.571	0.502**	0.384
	(0.449)	(0.434)	(0.234)	(0.239)
Few Times Every Week	-0.242	-0.519*	0.392**	0.089
	(0.331)	(0.311)	(0.173)	(0.169)
Daily	-0.218	-0.776**	0.276	0.255
	(0.326)	(0.307)	(0.171)	(0.167)
Municipality Population Density				
100−1000 per square km		-0.479***		-0.297**
		(0.125)		(0.062)
>1000 per square km		-0.482***		-0.123*
		(0.142)		(0.072)

Table 3 – continued from previous page

	Institutional Trust		Interpersonal Trust	
	(1)	(2)	(3)	(4)
Constant	2.717^{***}	4.035^{***}	3.745^{***}	4.521^{***}
	(0.524)	(0.389)	(0.295)	(0.341)
Observations	1643	1762	1792	2042
R Squared	0.290	0.272	0.393	0.278
Year FE	Yes	Yes	Yes	Yes
Municipality FE	Yes	No	Yes	No
Province FE	No	Yes	No	Yes

Standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

1. The 'Victim' dummy variable represents respondents' answer to the question 'Have you been a victim of any type of crime in the past 12 months?'

2. The income levels are adjusted using Brazil's CPI inflation index.

3. Primary indicates education level of Primary/Elementary School (complete or incomplete). Secondary indicates education level of Secondary/High School/Collegiate (complete or incomplete). Higher Education indicates education level of Higher Education/Bachelor/College (complete or incomplete).