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CURRENT POSITION:

Senior Analyst on Sustainable Infrastructure at Climate Policy Initiative **2021 – present**

EDUCATION:

FGV EPGE Rio de Janeiro, PhD. candidate **2018 – present**
Committee: Francisco Costa (advisor), Marcelo Sant'Anna (co-advisor), Teevrat Garg, Robert Heilmayr, José Scheinkman, Juliano Assunção

FGV EPGE Rio de Janeiro, MSc. Economics **2016 – 2018**

University of São Paulo, BSc. Economics **2011 – 2015**

RESEARCH INTEREST: Environmental economics and industrial organization.

My work focuses on topics related to deforestation, climate, ecosystem services, agricultural productivity, and infrastructure.

WORKING PAPERS: (abstracts below)

"When clouds go dry: an integrated model of deforestation, rainfall, and agriculture"

"Valuing tropical forests: deforestation, rainfall, and hydropower"

"Efficient forestation in the Brazilian Amazon: evidence from a dynamic model"

with Francisco Costa (U. of Delaware) and Marcelo Sant'Anna (EPGE FGV). Submitted

"Public attention reduced forest fires in Brazil"

with Francisco Costa (U. of Delaware) and Teevrat Garg (UCSD). Submitted

"Environmental impacts of transportation infrastructure in the Brazilian Amazon"

with Juliano Assunção (PUC RIO – CPI) and Arthur Bragança (CPI – PUC RIO).

INVITED SEMINARS AND CONFERENCES:

2023: AERA-ASSA*

2022: Ridge, Applied Young Economists, Occasional Workshop UCSB*, TSE Conference on Energy and Climate Economics*, Cowles Conference on Models and Measurement*, LSE Environment Week*, AERE-SEA*.

2021: NBER EEE Spring Meeting, ASSA Meeting*, LACEA/LAMES*, KDI Frontiers in Development Policy*, Barcelona GSE Summer Forum AIO*, BNDES

2020: RIDGE Forum Environmental Economics, AERE, AEA*

2019: RIDGE Forum Environmental Economics, Low Carbon Markets Workshop

*presented by co-author

OUTREACH:

VOXDEV [1], Valor Econômico [1,2], Nexo [1], Folha de São Paulo [1].

SELECTED POLICY REPORTS:

Mining Royalties and Socioeconomic Development in Pará, CPI 2022
Roadmap for Sustainable Infrastructure in the Amazon, CPI 2022
Accessibility in the Legal Amazon: Measuring Market Access, CPI 2022
Accessibility in the Legal Amazon: Delimiting the Area of Influence, CPI 2022
Mapping the Effect of Deforestation on Rainfall, CPI 2021
Governance, Area of Influence, and Environmental Risks of Transp. Infra., CPI 2021
Weaknesses and Lessons Learned in Implementing Sustainable Infrastructure, CPI 2020
The Environmental Impacts of the Ferrogrão Railroad, CPI 2020

ADDITIONAL EXPERIENCE:

As a senior analyst in CPI, I lead a new agenda of valuing the ecosystem services of tropical forests by connecting climate and economic models.

Research Assistant at Climate Policy Initiative, Brazil. 2018

Teaching assistant: Econometrics (for Prof. João Issler, graduate and undergraduate courses) and Macroeconomics I and II (for Prof. Rubens Cysne and Prof. Cézar Santos, graduate courses); Game Theory (for Prof. Rafael Santos, professional master's course).

TECHNICAL SKILLS:

Coding: Python (preferred), Google Earth Engine, Stata
Language: Portuguese (Native) and English (Fluent)

REFERENCES:

Francisco Costa
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University of Delaware
20 Orchard Rd, Newark, United States
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Marcelo Sant'Anna
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190 Praia de Botafogo, RJ, Brazil
E-mail: marcelo.santanna@fgv.br

ABSTRACTS:

"When clouds go dry: an integrated model of deforestation, rainfall, and agriculture"

Deforestation of tropical forests affects rainfall, changing the productivity of the agricultural sector, the main driver of deforestation. This deforestation-rainfall mechanism is in effect even in regions that are thousands of kilometers away from the forest, but does it result in a sizable externality? I develop an integrated climate and land-use model to measure the externality impact that land use decisions have on agricultural productivity through changes in rainfall. As an application, I use pixel level climate data for the entire Amazon Rainforest and pixel level land use data for the Brazilian state of Mato Grosso, one of the most important agricultural hubs in the world. I then consider a counterfactual where farmers are allowed to deforest protected areas. I find that, due to the precipitation decrease resulting from deforestation, the returns of crop production by 2% with some regions losing up to 8%.

"Valuing tropical forests: deforestation, rainfall, and hydropower"

Tropical forests affect rainfall on a continental scale. I develop an approach to value this ecosystem service provided by tropical forests to the energy sector using an econometric climate model that connects tropical deforestation with rainfall, hundreds or even thousands of kilometers away from the forest. As an application, I estimate the impact that Amazon deforestation has on the power generation capacity of the Teles Pires hydropower plant in Brazil, one of the ten largest plants in a country that has hydropower as its main source of energy. The decrease in energy generation is higher in the wet season, with an average decrease of 10% and 17% in extreme scenarios, amounting to a potential loss for the hydroelectric operator of USD 21 million per year. I then map the regions of the Amazon that would have the highest conservation values for the hydroelectric. The results provide evidence of the economic importance of ecosystem services of tropical forests to economic activities.

"Efficient forestation in the Brazilian Amazon: evidence from a dynamic model"

with Francisco Costa (U. of Delaware) and Marcelo Sant'Anna (EPGE FGV). Submitted

This paper estimates the Brazilian Amazon's carbon-efficient forestation -- i.e. when farmers internalize the social cost of carbon. We propose a dynamic discrete choice model of land use and estimate it using a panel of land use and carbon stock of 5.7 billion pixels between 2008 and 2017. Business-as-usual implies an inefficient release of 44 Gt CO_2 in the long run resulting from deforestation of an area twice the size of France. We find that relatively small carbon taxes can mitigate a substantial part of inefficient deforestation. We show that targeted mitigation efforts on areas with the largest potential for emission reductions can be very effective. We also find that while taxing cattle production can abate emissions, taxing crops is virtually innocuous.

"Public attention reduced forest fires in Brazil"

with Francisco Costa (U. of Delaware) and Teevrat Garg (UCSD). Submitted

International agreements to reduce anthropogenic environmental disasters rely on public pressure driving local action. We study whether focused media and increased public outcry can drive local environmental action, reducing environmental damage.

Although an annual affair, forest fires in the Brazilian Amazon received unprecedented public scrutiny in August 2019. Comparing active fires in Brazil versus those in Peru and Bolivia in a difference-in-differences design, we find that increased public attention reduced fires by 22% avoiding 24.8 $MtCO_2$ in emissions.

"Environmental impacts of transportation infrastructure in the Brazilian Amazon"

with Juliano Assunção (PUC RIO – CPI) and Arthur Bragança (CPI – PUC RIO).

This paper estimates the effects of investments in transportation infrastructure on deforestation and agricultural production in the Brazilian Amazon. Using novel data on the evolution of the transportation network in Brazil, we construct a measure of market access that captures the aggregate effects of changes in infrastructure through changes in trade costs. This model can be applied to measure the impact of the construction or improvement of individual infrastructure projects, such as roads, ports, and railroads. As an application, we study the impacts of the highly debated project of the *Ferrogrão* railroad. Our model suggests a large area of influence of the project, with a relevant deforestation footprint that is unevenly distributed along the project's outline.