

Research Statement

Neha Deopa

✉ neha.deopa@univ-amu.fr

My philosophy as an economist is that empirical research should be guided by rigorous economic theory and theoretical research should be inspired by and help explain empirical observations. I believe the constant interplay between theory, data, and revision of the theory are core features of the discipline. I consider myself an applied theorist with a focus on environmental economics and political economy. The first section of this research statement elaborates on my work which lies at the intersection of these two fields, specifically my job market paper. The second section discusses my work on political economy, in particular culture and religion. Finally, the last section discusses my work on environmental and resource economics. All sections include my plans for future research in these areas.

1 Nexus of Environment & Political Economy

The management and extraction of natural resources have been influenced both historically and in modern times by states and formal institutions (Deacon et al. [4]; Collier [3]) as well as by individuals, groups and classes via cultural and political factors (Alesina et al. [1]; Barba and Jaimovich [2]). My job market paper, titled “**Sacred Ecology: The Environmental Impact of African Traditional Religions**”, provides insights into the cultural dimension of resource use. I investigate how religion can codify ecological principles, therefore shaping human interactions with the environment. Inspired by Mbiti [11]’s seminal work on African Traditional Religions (ATR), I examine the underlying rituals and beliefs related to land and nature which sacralize forests. Utilizing this, I build a novel continuous time non-market interaction model of a continuum of agents with heterogeneous religious adherence and study its effect on the spatial density of forest cover. The mean field equilibrium consumption policy highlights the full coupling of the joint dynamics of both individual beliefs and their distribution in the population, which is central to explaining the impact ATR adherence has on forest use. The main prediction of the model is that for any given belief distribution in the population, a higher individual ATR adherence implies a decline in the consumption of forest resources. Conversely, the model shows how the distribution of ATR beliefs can independently affect both individual and population extraction decisions via scarcity. Finally, the model also characterizes the impact of peer effects and risk aversion vis-à-vis religious adherence on forest consumption policies.

I test empirically the main model prediction using micro data from Benin, a country that has experienced a renaissance in ATR and where its adherence is freely reported. Using an instrumental variable strategy that exploits the variation in proximity to the Benin-Nigeria border, I provide evidence that the ATR-forest link is indeed positive, causal and robust. I find that a 1 standard deviation increase in ATR adherence has a 0.43 standard deviation positive impact on the five years average annual change in forest cover. As an alternate strategy, I utilize the historical boundaries of the ancient Kingdom of Dahomey, the birthplace of Vodun religion, within a spatial regression discontinuity design. I find that long term annual changes in forest cover averaged over 10 and 15 years were pos-

itive within Dahomey. Finally, recovering the ATR beliefs distribution within the Benin population I structurally estimate the equilibrium transition density for forest cover as predicted by the model and conduct relevant counterfactual analysis.

The theoretical results derived in my job market paper can be applied to a variety of settings, as its framework is very general. It allows me to highlight how the micro behaviour is dependent on the information about the overall community, as well as to couple belief distributions (which can be political, cultural or environmental) together with the density of natural resources. Currently, I am working on utilizing this framework to explore the role of transhumant pastoralism - a livelihood in which populations seasonally migrate and herd livestock - on forest and land degradation. Individuals within this group are highly interdependent and cohesive but hostile to out-group individuals (Le Rossignol and Lowes [10]). Such conflicts arising between transhumant herders and agricultural farmers are known to be a key phenomenon of deforestation in Benin. Characterizing the conflict over land and forest resources as a continuous time Cournot competition between pastoralists and farmers, it can be analyzed as a dynamic continuum in a mean field game.

2 Culture & Religion

Guiso et al. [7] define culture as a set of “customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation”. In this strand of research, I build on the literature that shows culture as a possible determinant of economic phenomena. In two co-authored papers, titled “**Coronagraben in Switzerland: culture and social distancing in times of COVID-19**” [5] and “**Language and the cultural markers of COVID-19**” [6] we examined cultural traits that characterize different societies and find that it played a significant role in explaining heterogeneity in exposure to COVID-19 both across and within countries. Taking the unique case of Switzerland, which has distinct linguistic geographical areas associated with specific cultural traits, we find the results to hold even when comparing individuals living in the same communities, with access to the same health infrastructure and subject to identical administrative restrictions, but with a different inherited cultural background. Our findings suggest that cultural origins can go a long way in explaining why compliance to social distancing measures and stay-at-home campaigns varied widely with the local context. In the absence of perfect enforcement capacity by public authorities, cultural attitudes and behavioural norms can make an important difference and justify deviations in voluntary compliance.

In another co-authored work in progress, titled “**Religiously-Inspired Baby Boom. A Case Study of Georgia**” we study the persuasive impacts of religious authority figures on fertility decisions by using the distinctive experience of Georgia where in December 2007, in a move to boost the declining fertility rates, the Georgian Orthodox Church’s Patriarch began to personally baptise third or higher parity child. Using detailed household and individual data we exploit the exogenous variation in birth timing and the religion and ethnicity of the mother to measure the short and long-run causal impact of religious persuasion. We find that the announcement significantly increased the probability of giving birth by 2 percentage points. Using quantile and counterfactual density

estimation we find that this increase was not driven by higher parity fertility but by first and second births. We are currently working on investigating the impact on the drivers of fertility: marriage and abortion rates.

3 Environment, Resources & Uncertainty

As environmental crises and the urgency to create ecological sustainability escalate, so does the importance of environmental economics. My third strand of research is concerned with sustainability, resource use and the relation between biodiversity loss and health. In a co-authored paper, titled “ **Scenes from a Monopoly: Quickest Detection of Ecological Regimes**” we study the stochastic dynamics of a renewable resource extracted by a monopolist whose actions affect the resource’s ability to regenerate, resulting in sequential regime shifts. The firm faces further uncertainty in the timing of these shifts. We encapsulate in our model environmental surveillance of ecological dynamics where the firm searches for the profit-maximizing extraction policy while simultaneously detecting in the quickest time possible the change in regime. We provide the conditions that determine whether an adverse regime shift can lead to either an aggressive or a precautionary extraction policy, depending on the interaction between market demand, resource scarcity and time horizon. We show how implementing the detection procedure is Pareto optimal. We apply our framework to the case of the Cantareira water reservoir in São Paulo, Brazil, and study the events that led to its depletion and the consequent water supply crisis.

Currently, we are exploring an extension of the quickest detection framework within an oligopolistic market structure. More specifically, we are focusing on the “Lithium Gold Rush”, an essential ingredient in electric car batteries and renewable energy and which has experienced an unprecedented rise in demand. The increase in competition for lithium extraction and mining has continued at the cost of ignoring the ecological impacts on land, water, wildlife (Penn et al. [12]). We characterize both profit-maximizing and sustainable extraction strategies under joint environmental surveillance and strategic competition, and determine the incentives required for the two strategies to overlap.

An additional line of research that I am pursuing within the sphere of biodiversity and health is related to the grant I was awarded from *The Swiss National Science Foundation*. I study the role of tropical forests in the global ecosystem services. In particular, my aim is to investigate the impact of anthropogenic forest loss and fragmentation on the emergence of infectious and zoonotic diseases. Utilizing spatially explicit data on expansion of logging roads in the Congo Basin, I am investigating the cascading ecological effects with respect to increasing probability of pathogen spillover and their disproportionate welfare effects (Kleinschroth et al. [9]).

A common unifying tool in the majority of my research is the use of stochastic analysis. Inspired by the notes of Karatzas [8], I have striven to find creative applications of stochastic processes in different economic phenomena. One of the areas it naturally lends itself to is the study of uncertainty. In a co-authored paper, titled “ **Firm Decisions under Jump-Diffusive Dynamics**” we present a model of firm investment under uncertainty and partial irreversibility in which uncertainty is represented by a jump-diffusion. This allows to represent both the continuous Gaussian volatility and the discontinuous

uncertainty related to information arrival, sudden changes and large shocks. The model shows how both sources of uncertainty negatively impact the optimal investment and disinvestment policies, and how the presence of large negative jumps can drastically affect the firm's ability to recover. Our results show that the standard Gaussian framework consistently underestimates the negative effect of uncertainty on firm investment decisions. We test these predictions on a panel of UK firms: we first structurally estimate the uncertainty parameters using multinomial maximum likelihood and differential evolution techniques and subsequently study their impact on firm investment rates, validating our model predictions. We are currently expanding the empirical application of our theoretical framework to study the impact of COVID-19 and the 2022 Russian invasion of Ukraine on the electricity and natural gas prices in Europe.

References

- [1] Alesina, A., C. Gennaioli, and S. Lovo (2019). Public goods and ethnic diversity: Evidence from deforestation in indonesia. *Economica* 86(341), 32–66.
- [2] Barba, F. M. and D. Jaimovich (2022). Ethnic diversity and forest commons. *World Development* 158, 105986.
- [3] Collier, P. (2010). The political economy of natural resources. *Social research* 77(4), 1105–1132.
- [4] Deacon, R. T., B. Mueller, et al. (2006). Political economy and natural resource use. *Economic development and environmental sustainability: new policy options* 122.
- [5] Deopa, N. and P. Fortunato (2021). Coronagraben in switzerland: culture and social distancing in times of covid-19. *Journal of Population Economics* 34(4), 1355–1383.
- [6] Deopa, N. and P. Fortunato (2022). Language and the cultural markers of covid-19. *Social Science & Medicine* 301, 114886.
- [7] Guiso, L., P. Sapienza, and L. Zingales (2006). Does culture affect economic outcomes? *Journal of Economic perspectives* 20(2), 23–48.
- [8] Karatzas, I. (1988). A tutorial introduction to stochastic analysis and its applications. *Lecture notes*.
- [9] Kleinschroth, F., N. Laporte, W. F. Laurance, S. J. Goetz, and J. Ghazoul (2019). Road expansion and persistence in forests of the congo basin. *Nature Sustainability* 2(7), 628–634.
- [10] Le Rossignol, E. and S. Lowes (2022). Ancestral livelihoods and moral universalism: Evidence from transhumant pastoralist societies. Technical report, National Bureau of Economic Research.
- [11] Mbiti, J. S. (1990). *African religions & philosophy*. Heinemann.
- [12] Penn, I., E. Lipton, and G. Angotti-Jones (2021). The lithium gold rush: Inside the race to power electric vehicles. *The New York Times* 6.