Who is Carlos and Why is He in the Econometrics Group?

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Outline

Who am I?

My Work

Fun Facts

Bibliography

- Born and raised in Valladolid, Spain
- Growing up I was very interested in Physics but then... GFC hit us hard
- I adopted some “saviour syndrome” and decided to become a politician!?
- Every politician should know Law and Economics. But I was too lazy to study Law so...

- I enrolled in a Double Bachelor in Economics and International Studies at UC3M
- I still don't know what International Studies was about, but I am a good asset in pub quizzes ig
- I visited UC Berkeley and Bocconi
- Finally, I worked full-time as a Consultant while completing my degree in the weekends (1/10 would not recommend)

- I was lucky to be part of the first **MPhil + DPhil** cohort
- Although I came here as a super applied person (remember politician vibes), I was early seduced by theory thanks to Anders, Martin, Max and many others
- My paper at the intersection of Micro Theory, ML and Policy Design was awarded the runner-up **prize for best thesis**

- So... what do I do?
- I have a wide range of interests: **Machine Learning Theory** (Online Learning), **Micro Theory** (Information Theory and Mechanism Design), and **Applied Micro** (Policy, Labor and Education)
- Anything but Macro (*aka* Macron't or $\overline{\text{Macro}}$)
- I am most interested in understanding **how agents learn**, and how we can import notions of learning from ML to design efficient **adaptive policies**
- Let me give you some examples

- **Problem:** A profit-maximizing wage-setting firm is presented with a line of workers, who are characterized by a pair (productivity p, reservation wage r)
- The firm has no access to (p_i, r_i) AND holds **no informative prior** on the joint distribution $F_{P,R}$
- The firm offers wage w to agent i and conditional on $w > r_i$, it observes p_i

- Define the optimal policy as the best wage you could offer if you knew $F_{P,R}$
- **Question:** Can any **simple learning strategy** be asymptotically **no worse than the optimal policy**?

- Building on Max's work [Cesa-Bianchi et al., 2022], I designed an **algorithm which converges to optimal**
- This is a big deal, as it extends the notions of **equilibrium under adverse selection** of Akerlof & Co. without priors! (subject to game repetition)
- I show that such algorithm is **unimprovable**

- I also look at the impact of **structural policies** in the firm's learning process, like Minimum Wage, LIPC or Productivity Shocks
- To make my life harder, I prove these results in **adversarial settings with limited feedback**
- I do a few other things, so go check it out!

- My thesis contains a **positive theory**, which characterizes equilibrium under adverse selection in repeated games, and a **normative theory**, which provides a simple strategy to the monopsony firm
- However, **this is not really how firms set wages**
- To make my work more empirically relevant, in subsequent work I embedded a theory of **Concave Bandits with Convex Knapsacks**

- The idea is that we can now budget constrain the firm
- This allow us to: (i) generalize to any concave function (like DRS) and (ii) impose high-dimensional budget constraints (number of workers, salary budget, etc.)
- Math becomes more difficult but intuition is simple: The firm must now learn the most **cost effective arm**

- What I enjoyed the most from my MPhil Thesis was the analysis of the **interaction between policies and learning**
- Prominent literature in CS and Computational Econ [Frazier et al., 2014], [Adusumilli, 2021], [Papanastasiou et al., 2018], [Mansour et al., 2015], [Adjaho and Christensen, 2022] which looks into the design of **incentives** to curve the behaviour of myopic agents so they explore optimally on behalf of the Principal
- This brings together the areas of Persuasion, Mechanism Design, Bandits and more

- **VERY preliminary** idea is to look at more refined learners which interact repeatedly with the environment
- Probably related to **labor markets** like search-matching functions or hiring decisions
- Focus on the role of **incentives timing**
- One example: **How does the policy-maker incentivize optimal exploration, when it holds loose priors on the matching efficiency of a firm-worker pair?**

- **Mechanism Design** toolkit (Real Analysis and Measure Theory)
- **Bandit Theory** toolkit (Measure Theory, Probability Theory, Large Deviation Theory, Martingales, some Calculus and lots of bounding tricks)
- **Connecting** fields (Convergence Results)

Some Additional Fun (?) Facts about Me

- I run a lot. Like a lot. Like 9 times a week. I talk a lot about how much I run and how much I hate running
- I am the President of the Spanish Society here in Oxford, so I am in charge of organizing the best Reggaeton Parties in town
- Love sports, chess, nature, languages and stupid geographic facts


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Thank you!

- I think I did not manage to explain why I am in the Econometrics group, but...
- At least I hope that you got to **know me better**
- If you ever **wanna chat**, please just drop me an email carlos.gonzalezperez@economics.ox.ac.uk
- If wanna know more about my work you can visit my website presidente-carlos.github.io

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