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**DOCTORAL
STUDIES**

Massachusetts Institute of Technology (MIT)
PhD, Economics and Statistics, Expected Completion June 2025
DISSERTATION: “Essays on Econometrics and Digital Economics”

DISSERTATION COMMITTEE AND REFERENCES

Professor Alberto Abadie
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Professor Tobias Salz
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**PRIOR
EDUCATION**

London School of Economics, London, United Kingdom 2018
BSc. in Econometrics and Mathematical Economics
(First Class Honours)

LANGUAGES

Catalan (Native), Spanish (Native), English (Fluent), French (C1)

FIELDS

Primary Field: Econometrics
Secondary Fields: Industrial Organization, Statistics, Applied Econometrics

**RELEVANT
POSITIONS**

RA to Prof. Alberto Abadie, MIT 2020-24
TA to Prof. Roberto Rigobon and Prof. Joseph Doyle for
Econometrics for Managers, MIT Sloan 2023
TA to Prof. Whitney Newey and Prof. Max Kasy for Non-linear
Econometrics, MIT 2022
Statistics Consultant for the Catalan Government and Ivàlua, Spain 2022-23
Data Science Intern, Chief Economist Team, Google, US 2021
Research Professional for Prof. Eric Budish, U. of Chicago Booth 2018-19
Data Science Intern, Quantco, Germany 2018

FELLOWSHIPS,	Best Job Market Paper Award – Special Mention, EEA/UniCredit	2024
HONORS, AND	Best Student Paper Award, IAAE	2022-24
AWARDS	Meta Research PhD Fellowship, Meta	2023
	ACIC Travel Scholarship, Society for Causal Inference	2022
	GSC Conference Grant, MIT	2020-22
	La Caixa PhD Fellowship, La Caixa Foundation	2020
	George and Obie Shultz Fund grant, MIT	2019
	Economics Department Fellowship, MIT	2017
	Departmental Principles of Econometrics Prize, LSE	2014
	Extraordinary Baccalaureate Award, Catalan Government	2014
	Ernest Lluch Award, Universitat Pompeu Fabra	

PROFESSIONAL ACTIVITIES **Referee:** *Journal of Applied Econometrics, ICML, NeurIPS, ICLR, AAAI, Plos One, SERIEs, Economica*, NSF grants.

Service: Econometrics Lunch Organizer (Spring 2022), MIT Graduate Economics Association Co-president (2020-2021), MIT Graduate Student Council Economics Department Representative (2020-2021).

Presentations:

2025: ASSA.

2024: Notre Dame Junior Econometric Conference, BSE Summer Forum, North American Summer Meeting of the Econometric Society, European Summer Meeting of the Econometric Society, IAAE (co-author), Google.

2023: BSE ML and Energy Workshop, European Economic Association Summer Meeting, European Winter Meeting of the Econometric Society, American Causal Inference Conference (oral), Universitat Pompeu Fabra (public lecture).

2022: Rand Causal Inference Symposium, American Causal Inference Conference (poster), DataX Workshop on Synthetic Control Methods (Princeton, poster), Google, Facebook, Two Sigma PhD Symposium.

PUBLICATIONS **“Stretching the Net: Multidimensional Regularization”** *Econometric Theory*, 2023

“Synthetic Controls in Action” (with Alberto Abadie) *Econometric Society Monographs*, forthcoming

In this article we propose a set of simple principles to guide empirical practice in synthetic control studies. The proposed principles follow from formal properties of synthetic control estimators, and pertain to the nature, implications, and prevention of over-fitting biases within a synthetic control framework, to the interpretability of the results, and to the availability of validation exercises. We discuss and visually demonstrate the relevance of the proposed principles under a variety of data configurations.

RESEARCH PAPERS

“Synthetic IV Estimation in Panels” (Job Market Paper) (with Ahmet Gulek)
Co-winner of the Best Student Paper Award of the IAAE (Thessaloniki, 2024)
Special Mention (runner-up) Best JM Paper Award (EEA and UniCredit)

We propose a Synthetic Instrumental Variables (SIV) estimator for panel data that combines the strengths of instrumental variables and synthetic controls to address unmeasured confounding. We derive conditions under which SIV is consistent and asymptotically normal, even when the standard IV estimator is not. Motivated by the finite sample properties of our estimator, we introduce an ensemble estimator that simultaneously addresses multiple sources of bias and provide a permutation-based inference procedure. We demonstrate the effectiveness of our methods through a calibrated simulation exercise, two shift-share empirical applications, and an application in digital economics that includes both observational data and data from a randomized control trial. In our primary empirical application, we examine the impact of the Syrian refugee crisis on Turkish labor markets. Here, the SIV estimator reveals significant effects that the standard IV does not capture. Similarly, in our digital economics application, the SIV estimator successfully recovers the experimental estimates, whereas the standard IV does not.

“Predictor Selection for Synthetic Controls” *revise and resubmit at Journal of Econometrics*

Synthetic control methods often rely on matching pre-treatment characteristics (called predictors) of the treated unit. The choice of predictors and how they are weighted plays a key role in the performance and interpretability of synthetic control estimators. This paper proposes the use of a sparse synthetic control procedure that penalizes the number of predictors used in generating the counterfactual to select the most important predictors. We derive, in a linear factor model framework, a new model selection consistency result and show that the penalized procedure has a faster mean squared error convergence rate. Through a simulation study, we then show that the sparse synthetic control achieves lower bias and has better post-treatment performance than the un-penalized synthetic control. Finally, we apply the method to revisit the study of the passage of Proposition 99 in California in an augmented setting with a large number of predictors available.

“Bayesian and Frequentist Inference for Synthetic Controls” (with Ignacio Martinez)

The synthetic control method has become a widely popular tool to estimate causal effects with observational data. Despite this, inference for synthetic control methods remains challenging. Often, inferential results rely on linear factor model data generating processes. In this paper, we characterize the conditions on the factor model primitives (the factor loadings) for which the statistical risk minimizers are synthetic controls (in the simplex). Then, we propose a Bayesian alternative to the synthetic control method that preserves the main features of the standard method and provides a new way of doing valid inference. We explore a

Bernstein-von Mises style result to link our Bayesian inference to the frequentist inference. For linear factor model frameworks we show that a maximum likelihood estimator (MLE) of the synthetic control weights can consistently estimate the predictive function of the potential outcomes for the treated unit and that our Bayes estimator is asymptotically close to the MLE in the total variation sense. Through simulations, we show that there is convergence between the Bayes and frequentist approach even in sparse settings. Finally, we apply the method to re-visit the study of the economic costs of the German re-unification and the Catalan secession movement. The Bayesian synthetic control method is available in the `bsynth` R-package.

“Bagged Polynomial Regression and Neural Networks” (with Sylvia Klosin)

Series and polynomial regression are able to approximate the same function classes as neural networks. However, these methods are rarely used in practice, although they offer more interpretability than neural networks. In this paper, we show that a potential reason for this is the slow convergence rate of polynomial regression estimators and propose the use of bagged polynomial regression (BPR) as an attractive alternative to neural networks. Theoretically, we derive new finite sample and asymptotic L2 convergence rates for series estimators. We show that the rates can be improved in smooth settings by splitting the feature space and generating polynomial features separately for each partition. Empirically, we show that our proposed estimator, the BPR, can perform as well as more complex models with more parameters. Our estimator also performs close to state-of-the-art prediction methods in the benchmark MNIST handwritten digit dataset.

RESEARCH IN PROGRESS

“The Effects of Regulating Food Delivery Platform Design” (with Alejandro Sabal)

There is rising interest amongst regulators in understanding how different platform design choices affect welfare. In this project we focus on two important mechanisms platforms have at their disposal: (1) offering preferential treatment to producers in consumer search and (2) determining producer payments (commission fees). We study the welfare implications of different platform choices in the empirical setting of a food delivery platform that bargains with producers to set commission fees and to adjudicate fixed ranking slots in the consumer search wall. Using transaction level data and click stream search data from a large food delivery platform in Europe, we show that both mechanisms are important in practice. Producers with low commission fees are preferred by consumers, and low commission fees are used to attract valuable “anchor” producers that drive consumers into the platform. Search preferencing is also important. Using an A/B test in which rank was randomized we show that search rank is a driver of consumption. To evaluate the impact of different platform designs on consumer and restaurant welfare, we develop a structural model featuring a consumer demand with search frictions, bargaining between restaurants and the platform over ranks and commission fees, and restaurant and consumer entry into the platform. Using the model, we compute counterfactual experiments to assess the impact of regulations forbidding platforms from

providing preferential rank to larger restaurants and from setting differential commission fees across restaurants.

“Pushing Back Against Private Practice: the Spanish Physician Public Exclusivity Bonus” (with Jon Gruber, Núria Mas and Judit Vall)

Most nations in the world have side-by-side private and public health care systems. Policymakers worry that “dual practice” across these sectors might reduce either the quantity or quality of care to the public sector. This concern led regions in Spain to offer “exclusivity bonuses” to physicians who practice exclusively in the public sector. We show theoretically that the impact of these bonuses on the public sector is ambiguous and empirically demonstrate that the bonuses had the opposite of their intended effect. The least skilled workers moved to the public sector and total hours of public sector physician labor supply fell.

**POLICY
REPORTS**

“Synthetic Experimental Design for a UBI Pilot Study”

This paper provides a guide for practitioners wanting to use synthetic experimental designs to evaluate policy interventions. It focuses on the Catalan universal basic income pilot study that aims to treat two towns in 2023 with a substantial universal basic income for a period of two years. The main goal of the paper is to show how inference on various outcomes of interest can be achieved by choosing the towns to treat using the synthetic experimental design framework of Abadie and Zhao (2021). We show that approximate inference can be achieved despite the small number of treated units. This paper expands beyond the standard synthetic experimental design framework by considering inference on multiple outcomes and by providing a point-by-point rubric to dealing with practical concerns such as choosing exclusion constraints or thinking about allocation fairness.

“Assessment: Universal Basic Income Pilot Project, Recommendations for an Evaluable Design” (with Mireia Borrell-Porta, Júlia de Quintana, Gianmarco León-Ciliotta and Xavier Ramos)