January 20, 2022

Dear Brett Maranjian,

I am writing to apply to the NBER Innovation Research Boot Camp 2022.

After completing my PhD coursework in economics at SciencesPo Paris, I opted for working in a policy organization. For the past seven years I have been a researcher at the Innovation Growth Lab at Nesta, where I focus on supporting innovation policymakers in designing and testing new programs through randomized controlled trials (RCTs).

In 2020, I started a PhD in economics at the Humboldt-University in Berlin, alongside my Nesta role. This has allowed me to focus on a specific area of work – experimenting with improvements to the way innovation is assessed and selected for funding. Attending the boot camp would be an invaluable opportunity for me to develop my research.

My letter of recommendation was sent by Albert Bravo-Biosca, Director of the Innovation Growth Lab at Nesta (where I work), and Guest Professor at the Barcelona School of Economics (BSE).

My contact information is as follows:

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I look forward to hearing from you.

Kind regards,

Teo Firpo

Research statement

The primary focus of my research is to study how innovation projects are assessed by funding organizations. Grant funding is a key policy lever used by governments to promote innovation – from basic science to applied R&D (Bloom et al., 2019). And yet there are many open questions on how different evaluation mechanisms affect the type and quality of funded projects and their outcomes (Jones, 2011; Azoulay and Li, 2020). I focus on two related topics. First, I study how well expert assessors perform in evaluating innovation projects. This includes examining their ability to predict (successful) project outcomes; the amount of 'noise' in panel evaluations; and the presence of bias against certain types of applications (e.g., novel proposals) and applicants (e.g., from diverse backgrounds). Second, I aim to test interventions that may improve the assessment of innovation projects through RCTs.

Assessing the assessors

I tackle the first question through observational studies. I am currently working with Innovate UK – the UK's innovation agency – to match data on their funding programs to firm and project outcomes. The agency funds applied R&D in firms and has a budget of around $750 million.[1] I have access to detailed assessment data (including scores and comments at the assessor level, and information on applicants) which I am matching with firm and project outcome data (including firm productivity and profits, patenting, and VC funding).[2]

I will use this novel dataset to study the effectiveness of Innovate UK's assessment process. First, I will examine how well assessors' score predict project outcomes, following a similar approach to that of Li and Agha (2015) in the context of NIH funding, controlling for important applicant and project characteristics.[3]

The granularity of the dataset will allow me to test a wider series of questions. Borrowing from the more developed literature on science funding (Boudreau et al., 2016; Li, 2017; Banal-Estañol et al., 2019; Franzoni et al., 2021), I will test whether:

a) Certain types of assessors are better at predicting outcomes (e.g., more experienced assessors or those with more industry experience);
b) Certain types of applications – e.g., those indicating more novelty – or applicants are less likely to be funded, or even biased against;
c) Scores for specific criteria are better predictors of success than others (e.g., marks on 'commercialization potential' predict VC funding).

Moreover, I am working with two Innovate UK analysts to identify cases of exogenous variation in assessment mechanisms (e.g., changes in rules on the number of assessors), to estimate more robustly their impact on the performance of the assessment process (and potentially also on the ultimate impact of funding on selected firms).

This research will contribute to our understanding of the evaluation of innovation. To my knowledge, only one paper examines the performance of the assessment process in predicting outcomes in the context of firm R&D grants (Hünermund and Czarnitzki, 2019).[4] My research will add to this literature and provide further insights on key questions such as the role of novelty, expertise and evaluation criteria.

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[1] For more information, see UKRI's 2021/22 budget: https://www.ukri.org/wp-content/uploads/2021/05/UKRI-270521-UKRI-Allocation-Explainer-2021-22-FINAL-PDF.pdf

[2] The matching process is currently ongoing through UK Office for National Statistics (ONS), and their Secure Research Service.

[3] Unlike Li and Agha (2015), I will also focus (separately) on *unfunded* projects, to find out whether the agency's selection excluded firms that went on to have successful outcomes.

[4] Other papers, such as Howell (2017) and Santoleri et al. (2020), provide general evidence on the correlation between ranks and outcomes, but do not directly study the question or analyze the relationship through additional controls or exogenous variation. A separate literature touches on the predictive ability of assessors with respect to early-stage ventures or businesses, e.g., McKenzie and Sansone (2019) and González-Uribe and Reyes (2021).

Testing improvements to the evaluation process

Beyond observational studies, I hope to conduct RCTs to test changes to current evaluation mechanisms. Currently I am working on two such research projects with policy partners of my employer.

In a first project, I am collaborating with a large public funder of innovative SMEs to test how they could improve the diversity of (successful) applicants.[5] The agency funds R&D projects by small firms with grants in the hundreds of thousands of USD. Over the next funding period, we plan to test the impact of blinding reviewers to the applicant's characteristics, tracking how this changes funding decisions. The effect of blinding has been studied in the context of science funding (Forscher et al., 2019; Kolev et al., 2019) and academic conferences (Tomkins et al., 2017), but there is less evidence on its impact for the assessment of firm R&D grants. Blinding could address concerns that such programs disproportionately fund incumbent firms (as has been documented in similar public schemes, such as the US Air Force SBIR – see Howell et al. (2021)). The experiment is still in the design phase, but we have senior buy-in for a basic design where, by randomizing reviewers, each incoming proposal is read an equal number of times blinded and unblinded.

In a second experiment I aim to test the use of Machine Learning (ML) to improve the precision of assessment processes. The project is in partnership with Innovation Norway (the country's innovation funder), focusing on a program that provides seed funding to new ventures. There is significant concern about the 'noise' in scores across evaluators. In a lab-in-the-field experiment, we will test the effect of providing assessors with the information generated by a ML algorithm that connects new applications to past applications, providing a similarity score. Evaluators – drawn from the same pool used for real assessments – will be randomly allocated in pairs to either receive this information, or not, such that each proposal will be read by a treatment pair and a control group pair. We will then track whether the algorithm reduces score variance within pairs. Moreover, we plan to investigate whether evaluators choose to alter their scores if, after submitting their assessment, they are shown a 'ML prediction' that contradicts their funding recommendation, following a similar design as Lane et al. (2020).

Naturally, these projects are somewhat opportunity driven. I plan to complement them, where suitable, with lab or lab-in-the-field experiments. Other areas that I am actively exploring include: testing the effect of alternative aggregation rules, such as quadratic voting (as suggested in Azoulay and Li, 2020); asking reviewers to quantify their uncertainty; and randomizing the order in which criteria appear.

Motivation for attending the NBER Summer Boot Camp

Attending the boot camp would help me strengthen the theoretical framework behind my research projects. My background is policy focused, having spent much of the last seven years interacting with innovation policymakers from around the world to design and test new programs with RCTs. This gives me a valuable perspective for research, but also means I do not usually approach problems from a theoretical angle first. The boot camp would help me gain this complementary perspective and equip me with the necessary knowledge to generate more useful research, learning from the top scholars in the field. I am also keen to find out more about how to make the most of observational data, as for the past years I have primarily focused on experimental research.

Moreover, the boot camp would allow to expand my network of innovation PhD students. As stated in the call for applications, this is not a field that is often taught separately. Coupled with the pandemic, this has reduced PhD students' chances to find co-authors. As most high-quality research I look up to was produced by teams, building connections with future collaborators would be invaluable at this stage in my research career.

[5] This project is co-authored with Albert Bravo-Biosca, Director of IGL at Nesta (my employer), and Guest Professor at the Barcelona School of Economics (BSE).

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COURSE DESCRIPTION

Preface: I completed all PhD coursework at the Economics Department at SciencesPo Paris in 2013-2015 before taking a job at Nesta. I then continued taking graduate-level courses in econometrics at Birkbeck, University of London. As a result, upon my acceptance as a PhD candidate in Economics at Humboldt-University in Berlin, I obtained a full course waiver.

Courses at Birkbeck, University of London – Course handbook available here.

Econometrics (Prof. Ron Smith)
MSc-level, two semester long course worth 30 UK credits (15 ECTS). Covered all basic graduate theoretical and applied econometrics, focusing on time-series methods first and then cross-section and panel data methods. Passed with 'Distinction' (highest grade level).

Advanced Econometrics (Prof. Walter Beckert)
Advanced, optional MSc-level courses worth 15 UK credits (7.5 ECTS). Covered advanced topics, including linear and nonlinear techniques for cross-section and cross-section panel data, with applications in demand analysis and empirical IO, e.g. deriving properties of ML and GMM estimators based on asymptotic as well as bootstrap arguments, applying non-parametric estimation models, quantile regression, etc. Passed with 'Distinction'.

Courses at SciencesPo Paris Economics Department

All the following courses included 24 hours of lectures covering theory and 24 hours of seminars where we covered problem sets.

Graduate econometrics 1: Statistics & probabilities (Prof. Koen Jochmans)
First of two-first year PhD metrics courses for 8 ECTS. Covered GLM, OLS, GLS, asymptotic theory, maximum likelihood, etc.

Intermediate econometrics (Prof. Jean-Marc Robin)
Second first-year PhD metrics course for 8 ECTS. Covered simple and multiple regression, small sample properties of OLS for the linear model, asymptotic theory and applications to OLS, heteroscedasticity and Generalised Least Squares, endogenous regressors and IVs, the IV estimator in detail, qualitative dependent variables, limited dependent variables (Tobit, semi-parametric regression, etc.), applications to labour supply.

Game Theory (Prof. Emeric Henry)
Second first-year PhD micro course for 8 ECTS. Covered simultaneous move games, Nash equilibria, sequential games and applications, finite and infinite games, repeated games and applications, incomplete information games, etc.

Microeconomics 1: Consumers & Markets (Prof. Sidharta Gordon)
First of two first-year PhD micro courses for 8 ECTS. Covered topics from the Mas-Colell book, including Welfare Theorems, household and firm, etc.

Microeconomics for public policy - public economics (Prof. Joan Monras)
Third course on micro for 8 ECTS. Focused mainly on empirical methods in micro (Natural experiments, RDD, DiD, IV) as well as applications to public policy at national, regional and urban/local level.

Macroeconomics 1 Growth (Prof. Philippe Weil)
First of two first-year PhD macro courses for 8 ECTS. Covered infinite horizons, life-cycle models, growth, RBC, money, money and output, etc.

Macro 2 Business Cycles (Prof. Zsofia Barany)
Second first-year PhD macro course for 8 ECTS. Covered DSGE, New Keynesian DSGE models and their calibration in Matlab, introducing money (CIA and MIA models), Calvo pricing, labour market search and matching models, modelling labour market policies, consumption (PIH, heterogeneous consumer models), idiosyncratic risk and incomplete markets equilibrium, etc.

Macroeconomics for public policy – Monetary and fiscal policy (Prof. Jean Barthélémy)
Third course on macro for 8 ECTS. Covered fiscal policy theory (non-neutrality, taxation, time inconsistency and reputation, multiplier) and monetary policy theory (including estimation techniques), as well as interactions (Fiscal Theory of Price Level, limits to central bank intervention, ZLB).

International Trade (Prof. Thierry Mayer)
Core course part of the PhD track on trade theory for 8 ECTS (24h theory and 24h seminars). Covered 'New New Trade', Melitz model and empirical applications, the gravity equation, economic geography models, plus special topics (trade and growth, environment, culture, wars, etc.).

Experimental Economics (Prof. Quoc-Ahn Do)
Elective course part of the PhD track on experimental methodology and empirics for 4 ECTS.

Economics of Education (Profs. Yann Algan and Denis Fougère)
Elective course part of the PhD track on the economics of education for 4 ECTS.

Urban and Regional Economics (Prof. Pierre-Philippe Combes)
Elective course part of the PhD track on economic geography for 4 ECTS.

Macro development: Growth (Profs. Sergei Guriev and Quoc-Anh Do)
Elective course part of the PhD track on macro theories of development for 4 ECTS.

Time series & forecasting methods (Prof. Magali Marx)
Elective course on time series and forecasting methods in economics for 4 ECTS.

Political Economy of Development (Prof. Sergei Guriev)
Elective course covering normative and positive political economy theories of government intervention in development and topics in economic development (institutions, human capital, governance and corruption, etc.) for 6 ECTS.

Economics of sustainable development (Prof. Jean-Marc Bourgeon)
Elective course on the economics of sustainability, resource economics, biodiversity, etc. for 4 ECTS.

Research Design for Policy Reports (Profs. Francesca Borgonovi and Monica Brezzi)
Elective course on developing policy-related research and reports, for 4 ECTS.

Migration demographics (Prof. Mirna Safi)
Elective course on the sociology of migration for 4 ECTS.

Political Philosophy of Nature (Prof. Bruno Latour)
Elective course on the political philosophy of nature from an anthropological and sociological perspective, for6 ECTS.

Barcelona, January 20th 2022

Dear Heidi, Ben and Kevin,

I've known and worked with Teo Firpo since 2015, when he joined the IGL team as a researcher, and I would strongly recommend him for participation in the NBER Innovation Research Boot Camp 2022.

At IGL Teo has worked with countless innovation policy makers across the OECD, supporting them to adopt experimental approaches in their own programmes. Specifically, his work has involved a range of different activities, such as developing "Ideas Banks" to help policymakers identify interesting experiments that they could undertake, running ideation and capacity building workshops, advising on the design of RCTs or setting them up, and creating methodological resources on how to conduct RCTs in this policy field.

More recently, Teo's work has focused on the development of a research programme on science and innovation funding experiments, including co-authoring a new handbook on experimental funders (in which he wrote most the chapters focused on the potential use of experimental methods in the design of funding calls).

While at IGL Teo has learnt new skills and obtained valuable experience, he recognised that in order to pursue a successful research career, he needed to develop a more formal grounding on both methods and subjects, so in 2020 started a PhD.

I'm convinced that the NBER bootcamp will help him progress in his research career by giving him both a firm foundation in the field of the economics of innovation and a good understanding of the academic frontier across it. This is not something that he has been able to get elsewhere, as his past work has been focused on a small subset of policy questions.

While Teo's background and experience may be quite different from some of the other participants in the course, I believe this diversity can enrich everyone's experience at the bootcamp, as Teo will be able to contribute some policy perspectives from his regular engagement with policy makers in this area. He is definitely a team player that enjoys

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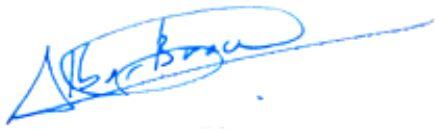
engaging in conversations with others on research ideas and methods, and always makes thoughtful contributions.

Last but not least, Teo is passionate about the economics of innovation, intellectually curious and creative, and has a strong background in research methods. I have no doubt about his ability to thrive in a research environment and I'm confident that he will go on to produce high impact research in this field in the future.

Because of all of these, I strongly recommend him for the NBER Innovation Research Boot Camp 2022.

If you have any questions please do not hesitate to contact me.

Best regards,



Albert Bravo-Biosca

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