Eric Donald
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Reference:
Pascual Restrepo
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To the selection panel of the NBER Innovation Research Boot Camp,

As a fourth-year economics PhD student at Boston University with research interests closely related to the economics of innovation, I believe I would be an excellent candidate for the inaugural NBER Innovation Research Boot Camp. Both of my primary subfields, economic growth and public economics, have innovation as a central topic in their biggest open questions, and as discussed later in my application, many of my research projects are related to innovation.

I have successfully completed coursework and am in the process of writing my PhD dissertation but continuing to invest time in learning is part of being a good scientist. There was not a field course at Boston University dedicated exclusively to innovation, but I have gravitated towards the subject in my own research questions. For instance, my second year paper, which won the best second year paper prize in my cohort, describes how policy should respond to technological change, such as automation, that creates winners and losers.

I view myself as an applied theorist with an interest in understanding the mechanisms behind long-run changes in welfare. The generation and spread of novel ideas are what has allowed humanity to break from Malthusian constraints that were previously ubiquitous, so I am deeply curious about the workings of a process that has fundamentally shifted humanity's ability to turn what it has into what it wants. This desire to learn would make me an active and engaged participant throughout the program.

I believe I have the creativity and skills needed to make valuable contributions to our understanding of innovation during my research career, and I would welcome the opportunity to learn about the frontier questions of innovation from top scholars in the field. Thank you for your consideration. Please do not hesitate to reach out if you have any questions.

Best regards,
Eric Donald

Eric Donald

PERSONAL INFORMATION

Doctoral Candidate
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Main Advisor: Pascual Restrepo
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EDUCATION

Boston University
Ph.D. in Economics, Fourth-Year
Boston University, 2018
M.A. in Economics
Texas Christian University, 2017
B.S. in Economics, *Summa Cum Laude*

FIELDS OF INTEREST

Economic Growth, Public Economics, Institutions & Culture

WORKING PAPERS

Optimal Taxation with Automation: Navigating Capital and Labor's Complicated Relationship

WORK IN PROGRESS

Technology Traps in Schumpeterian Growth Theory

Pareto Inequality, with Pascual Restrepo

The Social Cost of Carbon with Extinction Risk Discounting

A Model of Honor Culture

CONFERENCES & SEMINARS

2021: Green Line Macro Meeting (Boston)

2020: Boston University Macro Dissertation Workshop

FELLOWSHIPS & AWARDS

Best Second Year Paper Prize, Boston University, 2020/2021
Graduate Student Fellowship, Boston University, 2018-
Special Summer Stipend for MA Graduates in the PhD Program, Boston University, 2018
Alumni Excellence in Economics Scholarship, Texas Christian University, 2016 (Best Econ Undergrad)

OTHER PROFESSIONAL ACTIVITIES

Referee Services: *Review of Economic Dynamics*

WORK EXPERIENCE

Research Assistant for Pascual Restrepo, Boston University, Summer 2020 - Spring 2021
Research Assistant for W. Charles Sawyer, Texas Christian University, Summer 2016

TEACHING EXPERIENCE

Teaching Fellow, Introductory Macroeconomics, Boston University, Spring 2020
Teaching Fellow, MA Topics in Economic History, Boston University, Fall 2019
Teaching Fellow, Topics in Economic History, Boston University, Fall 2019

PROGRAMMING LANGUAGES

Primary: Python, Stata, LaTeX
Secondary: MATLAB, R

List of PhD Courses

Eric Donald

1 Completed

1.1 For Credit:

- EC701 Advanced Microeconomics I
- EC702 Advanced Macroeconomics I
- EC707 Advanced Statistics for Economists
- EC705 Mathematical Economics
- EC703 Advanced Microeconomics II
- EC704 Advanced Macroeconomics II
- EC708 Advanced Econometrics I
- EC709 Advanced Econometrics II
- EC741 Topics in Macroeconomics
- EC761 Topics in Public Finance
- EC764 Topics in Economic History I
- EC742 Applied Macroeconomics
- EC762 Public Finance Theory
- EC765 Topics in Economic History II
- EC721 Topics in Development Economics I
- EC722 Topics in Development Economics II

1.2 Audits:

- EC2450B Public Economics and Fiscal Policy II (Harvard)
- 14.471 Public Economics I (MIT)

Research Profile

Eric Donald

Both my current and future research topics have innovation as a central theme. My overarching research interest lies in understanding the process of long-run improvement. Human welfare has seen major advances over the last few centuries through a process of slow and steady improvement, and the scope for future improvement is one the great open questions for our discipline. Innovation has been central to this historical change, so understanding, and wisely directing, the process of further improvement requires an understanding of innovation.

My second year paper considered the optimal policy response to disruptive technologies that generate losers in the labor market. This was primarily a theoretical paper that considered a Planner problem in a heterogeneous agents task model. The disruptive technology I considered was automation, but the logic of the results extends to creative destruction more generally.

In the absence of perfect tools for redistribution (e.g. idiosyncratic lump-sum transfers), a Planner may be willing to distort the production process to change the pre-tax distribution of income. I argued that the tradeoff one needs to consider when attempting to help workers facing automation is that the relationship between capital and labor is only adversarial at the extensive margin of automation. Once a task has been automated, standard q-complementarity implies that it is in the best interest of workers for the automating capital to be used as intensively as possible.

This insight implies that popular calls for higher taxation of capital in response to automation are somewhat misguided. A general capital tax cannot discriminate between cases where capital is the friend or foe of labor; such a tax reduces the use of capital everywhere. Instead, automation policy should attempt to be as targeted towards the extensive margin of automation as possible. To quantifying the optimal magnitude of various policy instruments, the paper had a simulation of the US economy with empirically calibrated, occupation-level exposure to automation.

This research dealt with the policy response to an exogenous innovation process, rather than an explanation of innovation itself. In other research projects, I intend to examine the mechanisms that underpin the innovation process.

My current project considers the effect of competing technologies on economic growth. A technology here denotes different modes of production that use different factors and have their own process of productivity growth. Examples could include automated production versus that which uses labor, clean energy versus dirty energy, etc. An endogenous growth model with competing

technologies would allow us to explore path dependence in technology driven by market failures in the innovation sector.

In particular, I consider a Schumpeterian model of technology competition akin to that of Acemoglu et al. (2016). To speak to the concept of skill biased technological change, I consider technologies that exclusively use either skilled or unskilled labor. I conjecture that such a model admits of multiple steady states: two where each of the two technologies dominates as well as one mixed case. The basic intuition for this conjecture lies in the incremental nature of technological advance. If one technology far surpasses the other, the next incremental improvement for the laggard technology is likely to still be uncompetitive, so the researcher will make no profit. This can lead to positive feedback as the incentive to invest in a technology is lost as it gets farther behind.

A number of questions stem from this multiplicity of steady states. First, there is the question of normative ordering over the various steady states. Second, there is the question of transitions. One can ask what sort of perturbations would push us into the basin of attraction of a new steady state.

Finally, I am working with my advisor, Pascual Restrepo, on a paper which considers how innovation can lead to a Pareto distribution of income that shifts rapidly in response to structural changes. The random growth, random death model is a common explanation for the observed power-law distribution of income, but Gabaix et al. (2016) have found that, without substantial change to the typical model, the transition from one steady state distribution to another is counterfactually slow.

I would like to attend the NBER Innovation Research Boot Camp to learn about the frontier of innovation research so that I might make my own contributions to the literature. In addition, it would be of great value to meet a talented cohort of young researchers with similar interests who could someday act as colleagues and co-authors. It is naturally difficult to absorb the key lessons of a literature without some guidance, so my own understanding of innovation economics would be enhanced by learning from some of the experts in the field. Among the presenters, I admire the research style of Chad Jones: gaining insight on big questions, such as the importance of demographics for the long term future of economic growth, using elegant models. I attended the lectures he gave as a visitor to Boston University in the first year of my PhD, and I would value the opportunity to learn from him again.

Pascual Restrepo
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January 18th, 2022

Dear colleague,

This letter is to enthusiastically recommend **Eric Donald** for the NBER Innovation Research Boot Camp 2022. Two students from Boston University are applying to the camp: Eric and Nils Lehr. They are the two best students that I have encountered during my career at Boston University. This is not only my view but a common view among all the faculty in the area of macroeconomics. We all see Eric and Nils as our most promising students in years.

Eric is a fourth-year student who is planning to go on the academic job market on 2024. Eric's performance in our Ph.D. program has been outstanding. He was the top student of his cohort (one cohort below Nils) in all of the core classes and had an exceptional performance in our Ph.D. qualifying exams. Since then, Eric has been focused on macroeconomics as his primary field. He has worked with me on several projects since I arrived at BU.

Eric has a clearly defined portfolio that fits perfectly with the Innovation Boot Camp. His work investigates the distributional implications of technical change and the optimal societal response to the inequalities generated by technology. He completed a fascinating second-year paper, has made great progress on another solo-author paper that could become his job market paper, and is working with me on a coauthored paper.

In his second year paper, "The Optimal Policy Response to Automation: Regulation or Taxation?" Eric is motivated by a big and important question: how should policy respond to technological change that creates winners and losers? In particular, how should policy respond to automation technologies, which have the potential to substitute for some workers and bring adverse distributional consequences? Some people like Bill Gates have argued for a robot tax, while politicians like Andrew Yang have argued for a universal basic income (UBI) to insure people. Eric rigorously studies these proposals and uses economic theory to ask whether the optimal response to automation should involve higher capital taxes coupled with UBI or if there are better policy tools to be used.

Eric provides a clear, surprising, and very sophisticated answer to this question. His main result and the paper's main point is that capital taxation and UBI are very blunt tools. Instead, regulating the use of automation technologies at marginal tasks would be a more efficient way to reduce this technology's distributional harm. Moreover, once the optimal automation regulation is in place, capital taxation and optimal UBI should not respond to automation. The reason is that a uniform tax on capital reduces the use of robots and equipment at all tasks, including those where robots have a strong comparative advantage, and where firms will respond by cutting production rather than re-instating workers. Think for example of robots used to handle dangerous chemicals. The tax will reduce these robots' use for these tasks but won't get firms to hire workers in their place. Likewise, UBI is a blunt tool because it is not directed towards the workers at risk of displacement by automation.

Eric argues that a better idea is to regulate the use of automation. He models regulation as a rule requiring firms that automate to do so only if the cost-saving gains from automation are above some regulatory threshold. With no regulation, a firm will automate a task so long as capital is more cost-effective than labor—even if only by a small amount. Instead, with a regulatory threshold of 20%, firms can automate if capital is 20% more cost-effective than labor at the tasks to be automated. One can also think of regulation as task-specific taxes on

capital, with higher taxes on capital used to produce tasks where capital is only marginally more cost-effective than labor. Regulating the use of automation overcomes the targeting issues discussed above. In particular, regulating automation discourages the use of capital at marginal tasks—those in which it displaces workers and reduces their relative wages. But crucially, regulating automation does not distort the use of capital at tasks where it has a strong comparative advantage. In fact, the regulation reallocates capital from marginal tasks where it competes with labor to infra-marginal tasks where it complements workers.

One aspect that I find remarkable in the paper is that Eric takes the model seriously and uses it to evaluate its quantitative implications. Eric shows how one can use empirical estimates of the exposure to automation for workers with different wage levels (for example, those provided in Michael Webb's work) to calibrate his model and compute the optimal regulatory threshold for automation via software and robots. His quantitative exercise shows that a regulatory threshold of close to 10% would be optimal. Eric also finds that the substitution patterns associated with AI do not call for more aggressive automation regulation, reflecting the fact that the empirical estimates he uses show that AI is not as skill-biased as automation via software or robots.

Eric is also working on a very ambitious job market paper exploring the competition and development of technological paradigms. The key idea is that innovation often involves improving technologies within a existing paradigm. When there are competing paradigms (for example, automation vs. labor-augmentation, or clean vs dirty energies), one of them might pull ahead of the other and attract all innovation. Eric builds a tractable model to illustrate this insight and shows that this could lead to path dependence and technological traps. He also shows that a set of temporary policies can re-direct innovation towards the paradigms with the greatest social value. While this is still work in progress, I believe it has great potential. It is also at a stage where Eric would benefit tremendously from feedback by other students and young scholars.

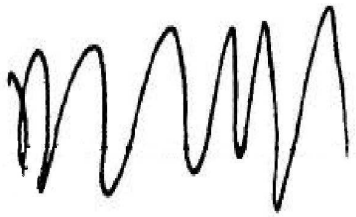
Eric work shows that he has a taste for big and important normative questions on the economics of innovation. His papers exhibit remarkable technical sophistication and are very well executed. He would benefit tremendously from participating at the NBER Innovation Boot Camp at this early stage in his career, since he has a very clear interest in the economics of innovation and has already started to develop a clear portfolio in this area.

Besides his solo work, Eric is also working with me on two papers. Our work is still preliminary but I believe showcases perfectly Eric's interests and abilities. In one project we are exploring the political consequences arising from the adverse distributional effects of technology. The key insight is that technological change might also affect the political power of different groups in society. When this happens, re-distributive polices become politically infeasible and it might be impossible to tax winners to compensate losers. In another project we are exploring the link between the diffusion of ideas over time and inequality. The key insight is that new tasks and products require knowledge that is not widely available and it takes time for people and entrepreneurs to master new tasks. We show that these dynamics generate a Pareto tail for income, where the top is populated by the firsts to master new tasks. As new tasks become more complex and it takes more time to master them, the economy moves rapidly to a new steady state with higher inequality and slower growth.

Beyond his academic potential, Eric will also provide several benefits to the participants of the boot camp. Eric is a thoughtful and active member of the academic community at BU, always asking insightful questions in seminars and lunches, and providing valuable feedback to classmates. He loves to talk about economics and we can stay full afternoons discussing

issues related to innovation, inequality, and politics. I am always eager to meet him, work with him, and pick on his brain. Eric has my strongest recommendation for this program.

Please let me know if there is anything else I can do to make a case for Eric.



Pascual Restrepo