September 2023

Bernardo Ribeiro

Address: Department of Economics
Yale University
New Haven, CT 06520-8268

Telephone: +1 (203) 8096350

E-mail: bernardo.ribeiro@yale.edu

Web page: www.bernardoribeiro.com

Citizenship: Brazilian, F1 visa

Fields of Concentration:

Primary fields: Macroeconomics, Economic Growth, and Innovation

Secondary fields: Spatial Economics, International Trade

Desired Teaching:

Macroeconomics

Comprehensive Examinations Completed:

2020 (Oral): Macroeconomics (*with distinction*), International Trade

2019 (Written): Microeconomics and Macroeconomics

Dissertation Title: *Essays on Economic Growth*

Committee:

Professor Fabrizio Zilibotti (Co-Chair)

Professor Michael Peters (Co-Chair)

Professor Samuel Kortum

Degrees:

Ph.D., Economics, Yale University, 2024 (expected)

M.Phil., Economics, Yale University, 2021

M.A., Economics, Yale University, 2020

M.A., Economics, PUC-Rio, 2018

B.A., Economics, Federal University of Minas Gerais (UFMG), 2015

Fellowships, Honors, and Awards:

University Dissertation Fellowship, 2023

Cowles Foundation & Economic Growth Center Fellowship, 2018 – 2023

Doctoral Fellowship, Yale University, 2018–2022

CNPq full scholarship for master's degree program, 2016-2018

Summer Research paper award, PUC-Rio, 2017

Undergraduate Independent Research Program scholarship, from CAPES, 2012-2015

Teaching Experience:

Spring 2022, Teaching Assistant to Prof. Aleh Tsyvinski and Dr. William Hawkins, Introductory Macroeconomics (Undergraduate), Yale University

Fall 2021, Teaching Assistant to Prof. Willian Nordhaus, Intermediate Macroeconomics (Undergraduate), Yale University

Spring 2021, Teaching Assistant to Prof. Fabrizio Zilibotti, Intermediate Macroeconomics (Undergraduate), Yale University

Fall 2020, Teaching Assistant to Prof. Ilse Lindenlaub and Dr. Marnix Amand, Intermediate Macroeconomics (Undergraduate), Yale University

Fall 2017, Teaching Assistant to Prof. Tiago Berriel, Macroeconomics II (Graduate), PUC-Rio

Spring 2017, Teaching Assistant to Prof. Diogo Guillén, Empirical Macroeconomics (Graduate), PUC-Rio

Research Experience:

NBER, Innovation Research Boot Camp (2023)

Working Papers:

"Embracing the Future or Building on the Past? Growth with New and Old Technologies" (2023), *Job Market Paper*

Work In Progress:

"Directed Technical Change and Technology Diffusion" (2023), *Preliminary draft available under request*

"Spatial Consequences of Corruption: Entry and Location Decisions of Firms" with Alvaro Cox, (2023)

Under Revision:

"International Macroeconomic Vulnerability" with D. Guillen, M. Garcia, and J. Velloso,
Journal of International Money and Finance, Revise & Resubmit, (2023)
Insper Working Paper (2022), *PUC-Rio Working Paper* n. 691 (2022)

Seminar and Conference Presentations:

Brazilian Econometric Society, 2017 meeting

Languages:

Portuguese (native), English (fluent), Spanish (beginner)

References:

Prof. Fabrizio Zilibotti
Yale University
Department of Economics
New Haven, CT 06520
PO Box 21345
Phone: (203) 432-9561
fabrizio.zilibotti@yale.edu

Prof. Michael Peters
Yale University
Department of Economics
New Haven, CT 06520
PO Box 21345
Phone: (203) 436-8475
m.peters@yale.edu

Prof. Samuel Kortum
Yale University
Department of Economics
New Haven, CT 06520
PO Box 21345
Phone: (203) 432-6217
samuel.kortum@yale.edu

Dissertation Abstract

Embracing the future or building on the past? Growth with new and old technologies
[Job Market Paper]

Emerging technologies draw significant attention from policymakers and society. For instance, the National Science Foundation (NSF) often supports research in new areas, as in the 'NSF 10 Big Ideas' project, which channels millions of dollars into quantum computing. This raises important questions: Should governments and public agencies provide selective support to the development of new technologies instead of older and mature ones? Are market incentives alone not sufficient to optimally allocate our innovative resources across these different technologies?

To address such questions, I start by documenting how society has balanced innovation between new and old technologies over time. Using two centuries of patent data and the technological classification of the US Patent Office, I present two new facts. First, the cross-sectional distribution

of innovation efforts (measured by the flow of new patents) across technologies of different ages has a pronounced hump shape. Most of the patents at a point in time build on technologies whose emergence dates from 70-100 years before – such as 'Wave transmission lines and networks' in 2000, and 'Electrical generator or motor structure' in 1900. Second, this hump-shaped distribution is stationary, remaining remarkably stable throughout the entire 20th century in the US.

Next, I construct a novel innovation-led growth model with vintage technologies in the spirit of Arrow (1962) and the theories of General Purpose Technology (Helpman and Trajtenberg, 1994). Technologies with increasing productivity potential emerge over time in the frontier – but must compete with older ones already perfected and streamlined. Firms face a trade-off between directing innovation towards new technologies (embracing the future), whose intrinsic potential is higher, or further pushing the development of older technologies that are already very productive and for which the standing on shoulders of giants' effect is stronger (building on the past). Despite the large state space, the model is tractable: I analytically characterize the stationary distribution of R&D across technologies and show that it can match the empirically observed hump shape.

Crucially, my theory highlights that the allocation of research is inefficient under a laissez-faire policy. Profit-maximizing firms overinvest in mature technologies and spend too little on improving nascent technologies close to the frontier. Although the social value of innovation is higher than the private value for all technologies due to knowledge spillovers, this gap is more pronounced for nascent technologies, whose potential improvements are largely yet undisclosed. Contrary to the hump-shaped distribution observed in laissez-faire conditions, the socially optimal number of discoveries (patents) monotonically declines as technologies age.

The theory predicts quantitatively significant productivity (and welfare) losses from underinvestment in new technologies. To assess these effects, I calibrate the model to the above-mentioned data on patent flows, as well as to information on the age profile of patent valuations. Implementing the socially optimal allocation of research initially leads to a growth slowdown, as it channels more resources into nascent, albeit initially less productive, technologies. However, this decline is temporary. After 15 years, growth in the optimal plan exceeds the growth under Laissez-faire. The gains are sizeable. Over the course of a century, the average annual growth rate is 2.18%, which compares to 2% in the Laissez-faire scenario.

In conclusion, innovation policies that selectively support nascent technologies at the expense of well-established paradigms can yield large productivity and welfare gains.

Directed Technical Change and Technology Diffusion [Preliminary draft available under request]

This paper extends existing models of Directed Technological Change (DTC) by integrating insights from the technology diffusion literature to investigate the dynamics of technology replacement and coexistence. Unlike conventional DTC models rooted in the works of Acemoglu and Zilibotti (2001) and Acemoglu (1998, 2002), the proposed framework accounts for scenarios

where emerging technologies progressively supplant their predecessors following an S-shaped adoption curve. I show that if ideas get harder to find within a technology, the model may not exhibit path dependence, as predicted by standard DTC models. Leveraging the text from patents spanning nearly two centuries, I build a novel dataset that tracks innovation flows for a set of critical technologies related to sectors such as communication, transportation, and energy. I calibrate the model to the steelmaking industry in 1890-1935. I find that the declining technology during the time, the Bessemer process, was responsible for 15% of the total productivity growth.

Spatial Consequences of Corruption: Entry and Location Decisions of Firms, with Alvaro Cox

In many developing countries, corruption is a pervasive phenomenon, widespread across districts and local officials. In this paper, we ask: does corruption affect the spatial allocation of economic activity? Does it have dynamic implications on local and aggregate growth? To study these questions, we first use a natural experiment in Brazil, marked by an exogenous reduction in corruption at the municipality level. In line with Colonnelli and Prem (2021), we found positive effects of corruption reduction on local economic activity using a diff-in-diff analysis. This can either represent a reallocation of resources away from other municipalities towards the treated one or represent a faster increase in entry and production. Similarly, when locations have production/demand connections, the aggregate effects of the policy are bigger than the observed diff-in-diff estimate. We then build a general equilibrium spatial model of firms to evaluate the overall and aggregate effects of the policy on welfare and growth.