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Permanent Address
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4858 Battery Lane, Apt. 216
Bethesda, M.D., 20814

Personal Information:
Birthdate: July 26, 1997
Pronouns: He/Him/His
U.S. citizen

Undergraduate Studies:
Majors: Chemical and Biomolecular Engineering and Economics
Minor: Mathematics
Johns Hopkins University
General and Departmental Honors; Tau Beta Pi
2019

Professional Activities:
Board of Governors of the Federal Reserve System
Senior Research Assistant Macro-financial Analysis Section, Monetary Affairs Division
Washington, D.C.
June 2019-present

Unilever
R&D Intern
Englewood Cliffs, N.J.
June 2017-August 2018

Johns Hopkins University
Undergraduate TA/Student-athlete tutor/PILOT Leader (rough equivalence: Undergraduate TA)
Baltimore, M.D.
September 2016-May 2019

Professor Laurence Ball
Research Assistant
Baltimore, M.D.
November 2017-May 2019

Research Interests:
Primary field: Macroeconomics

Secondary fields: International, Macro-labor, Monetary, Growth, Innovation, and IO

Teaching Experience:
Fall 2016 Elements of Macroeconomics, Johns Hopkins University, student-athlete tutor and PILOT leader

Fall 2017	Monetary Analysis, Johns Hopkins University, student-athlete tutor and PILOT leader
	Elements of Macroeconomics, Johns Hopkins University, PILOT leader
	General Physics for Physical Sciences Majors I, Johns Hopkins University, undergraduate TA
	Introductory Chemistry I, Johns Hopkins University, PILOT leader
Spring 2018	Macroeconomic Theory, Johns Hopkins University, student-athlete tutor
	International Monetary Economics, Johns Hopkins University, student-athlete tutor and PILOT leader
	General Physics for Physical Sciences Majors II, Johns Hopkins University, undergraduate TA
	Introductory Chemistry II, Johns Hopkins University, PILOT leader
Fall 2018	Elements of Macroeconomics, Johns Hopkins University, PILOT leader
	International Trade, Johns Hopkins University, student-athlete tutor
	Macroeconomic Theory, Johns Hopkins University, Student-athlete tutor
	General Physics for Physical Sciences Majors I, Johns Hopkins University, undergraduate TA
Spring 2019	Macroeconomic Theory, Johns Hopkins University, Student-athlete tutor and PILOT leader

Honors:

September 2015-May 2019	Dean's List
Spring 2018	Tau Beta Pi
Spring 2019	Graduated with General and Departmental Honors
Spring 2020	Division Director's Award for Excellence

Research Papers:

"*Interest Rates, Innovation, and Creative Destruction*" (with Jonathan Goldberg and David López-Salido)

- Invited to be presented at the macro seminars of the Federal Reserve banks of NY, Chicago and San Francisco and Einaudi
- Accepted for the FR System Macro Conference (Discussant: Martí Mestieri)

Do very low interest rates harm innovation, long-run growth, and competition? Using a quantitative endogenous growth model, we find that a lower interest rate boosts growth with the markup distribution little changed. Our framework nests canonical assumptions about creative destruction and the technology of R&D. To match the cross section of markups, profit volatility, R&D, and innovation output, as well as entrants' employment share and contribution to aggregate innovation, the model requires some "advantage of backwardness," with market laggards or entrants always having at least some chance of more-than-incremental innovation. A lower interest rate spurs innovation by raising the value of the profits from innovation; in general equilibrium, strategic interactions among firms and a rise in the wage dampen, but do not overturn, the valuation-driven increase in R&D and growth. To be sure, imposing severe (and counterfactual) restrictions on creative destruction leads to a growth "speed limit" at low interest rates, with growth declining as the interest rate falls. However, this decline in growth reverses under modest departures from these severe restrictions, if labor supply is elastic, if patent policy is adjusted optimally, or if credit access is restricted. The growth speed-limit economy offers policymakers a free lunch: weakening patent protection boosts growth and reduces markup-related production distortions. Our results suggest that very low interest rates do not harm growth and competition unless the forces of creative destruction are unrealistically shackled.

"*Optimal Schumpeterian R&D Subsidies with Declining Real Rates*"

What is the optimal level of research and development (R&D) subsidies for innovative firms? What types of firms should be subsidized and how should a social planner attempt to target these firms? How do optimal subsidies vary with key features of the economic environment? Finally, what is the interaction between R&D subsidies and other policies (such as patent policies and, more broadly, intellectual property rights (IPR))? In this paper, I leverage a

realistically calibrated and flexibly parameterized Schumpeterian endogenous growth model to answer these questions. Crucially, I find that the optimal R&D subsidy policy diverges from optimal IPR policy. I use the methods developed by Goldberg, López-Salido, and Chikis (2020) to unpack this and other results. The optimal R&D policy is to positively subsidize innovation by laggards and negatively subsidize (or tax) innovation by entrants. Subsidies that encourage innovation by entrants harm welfare because the endogenous increase in creative destruction reduces the incentive to become a market leader via a "trickle down" effect (Acemoglu and Akcigit (2012)). In contrast, a useful cross-section of innovative laggards "opt-in" to subsidies; industries with high levels of competition see increased innovation, causing an increase in welfare via a "composition" effect. Subsidies provided to technological laggards resemble state-dependent IPR – firms in industries with differing levels of competition access subsidies in a state-dependent manner, inducing a bi-modality in the economy's equilibrium of technology gaps and leading to more very competitive industries and more very uncompetitive industries, with a hollowing out of the middle. Finally, I explore the implications of allowing the social planner to set subsidy and IPR policy jointly and find these policies act cooperatively, though via different mechanisms.