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Education

Stanford University

Ph.D. in Economics, 2020-2026 (expected)

American University of Beirut

B.A. in Economics & B.S. in Mathematics, High Distinction, 2016-2020

Field

Macroeconomics

References

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Job Market Paper

Quantifying Knowledge Spillovers Using Firm and Product Dynamics

Knowledge spillovers are a common rationale for government support of innovation, yet evidence on their magnitude remains limited. In this paper, I quantify the wedge that spillovers create between social and private rates of return to innovation. To do so, I build a novel semi-endogenous growth model featuring multiproduct firms and endogenous exit of products. In equilibrium, product exit exhibits negative selection and is preceded by a gradual decline in market share, consistent with facts I document using barcode-level data. Through the lens of the model, these dynamics of product exit are informative about spillovers: by accelerating growth in the quality of new products, stronger spillovers increase the rate at which incumbent products lose market share and exit. Since comprehensive datasets track firms rather than products, I leverage the model to infer the wedge created by spillovers from data on firm exit by age. Across U.S. private nonfarm businesses, I infer spillovers that drive a 16 percentage point wedge between the social and private rates of return to innovation.

Working Papers

Variable Markups, Incomplete Pass-Throughs, and R&D Misallocation (with Jean Félix Brouillette and Emma Rockall)

Motivated by growing evidence on variable markups and positive yet incomplete cost pass-through, we develop a growth model featuring monopolistically competitive firms facing non-isoelastic demand and making forward looking investments in R&D to improve their process efficiency. By featuring a lower elasticity of demand at lower prices, the model endogenously generates higher markups for more productive firms and incomplete pass-through of cost savings. A novel implication is that such variable markups lead to R&D misallocation: by acting as a size-dependent wedge, higher markups disproportionately shrink the scale and depress the private R&D returns of the most productive firms. We quantify the model using French firm-level data and find this R&D misallocation slows aggregate growth by 0.9 percentage points. This effect is driven entirely by markup dispersion, not the average level of markups.

Population and Welfare: Measuring Growth when Life is Worth Living (with Mark Bils, Chad Jones, and Pete Klenow) *Conditionally Accepted, AEJ: Macroeconomics*

Economic growth is typically measured in per capita terms. A long tradition in philosophy, however, suggests that social welfare may depend on the number of people as well. To illustrate how much this matters quantitatively, we decompose welfare growth—measured in consumption-equivalent (CE) units — into contributions from rising population and rising per capita consumption. Because of diminishing marginal utility from consumption, population growth is scaled up by a value-of-life factor that empirically averages nearly 3 across countries since 1960. Population increases are therefore a major contributor to growth if one takes a total utilitarian perspective.

Work in Progress	<p>Carbon Neutral Growth: Evidence from French Manufacturing (with Thibault Ingrand)</p> <p>This paper studies decarbonization in the French manufacturing sector, where energy-related emissions have fallen sharply despite continued output growth. Using establishment-level data on energy consumption, we decompose this trend. We find declining carbon intensity of energy (emissions/energy) and falling energy intensity (energy/output) account for 40% and 60% of the trend, respectively. The reduction in carbon intensity is primarily due to electrification. We find this electrification is driven almost entirely by within-establishment changes, with little role for reallocation across producers. In contrast, for the decline in energy intensity, both reallocation and within-firm improvements are important: reallocation of activity across industries accounts for 20% of the gains; within industries, the vast majority of the decline (85% of the within-industry effect) stems from incumbent firms improving their own efficiency.</p>
Teaching	<p>Econ 211 (first year PhD Macro core), Stanford University, TA for Prof Pete Klenow, 2023-2025</p> <p>Outstanding Teaching Assistant Award, Stanford Economics Department, 2025</p>
Fellowships & Awards	<p>Econ JM Best Paper Award, European Economic Association and Unicredit Foundation, 2025</p> <p>Leonard W. Ely and Shirley R. Ely Graduate Student Fellowship, SIEPR, 2025-2026</p> <p>Patricia Liu McKenna and Kenneth McKenna Graduate Fellowship, SIEPR, 2023-2024</p> <p>Muhanna Foundation in Mathematics Award of Excellence, American University of Beirut, 2020</p> <p>Mona Chemali Khalaf Award, American University of Beirut, 2020</p> <p>Philip K. Hitti Prize, American University of Beirut, 2019</p> <p>Dr. Basil Fuleihan Excellence Award in Economics, American University of Beirut, 2019</p> <p>Fund Challenge for MCD countries, International Monetary Fund, 2019</p> <p>Remy Rubeiz Award Economics, American University of Beirut, 2018</p> <p>Full-ride scholarship, American University of Beirut, 2016</p> <p>Bourse Excellence Major, Agence pour l'enseignement français à l'étranger, 2016</p>
Research Positions	<p>Research Assistant for Profs Pete Klenow and Chad Jones, Stanford University, 2022-2025</p> <p>Research Assistant for Prof Luigi Bocola, Stanford University, 2023</p>
Referee Service	<p>American Economic Journal: Macroeconomics, American Economic Review, American Economic Review: Insights, Econometrica, Journal of Political Economy: Macroeconomics, Quarterly Journal of Economics, Review of Economic Dynamics</p>
Conference Presentations	<p>Minneapolis Federal Reserve Junior Scholar Conference</p> <p>Chicago Federal Reserve Rookie Conference</p>
Data Clearances	<p>U.S. Census Bureau Special Sworn Status</p> <p>CASD (French Administrative datasets)</p>
Other Professional Activities	<p>Mentor, Spelman-Sloan-Stanford Mentorship Program, 2023-2025</p> <p>NBER Innovation Research Bootcamp, 2023</p> <p>Member of Graduate Student Council, Stanford Economics Department, 2022-2024</p> <p>Stanford Growth Reading Group, 2021-2026</p>
Research Grants	<p>Graduate Research Opportunity (\$6,000), School of Humanities and Sciences, 2023-2024</p>
Languages	<p>Arabic (native); French (fluent); English (fluent)</p>
Software skills	<p>Python, Matlab, Stata</p>
Personal Information	<p>Citizenship: Lebanese; Born June 30, 1998</p>