

OFFICE CONTACT INFORMATION

MIT Department of Economics
 77 Massachusetts Avenue, E52-301
 Cambridge, MA 02139

moscona@mit.edu

<https://economics.mit.edu/people/phd-students/jacob-moscona>

HOME CONTACT INFORMATION

888 Massachusetts Avenue
 Cambridge, MA 02139
 Mobile: 917-547-2362

MIT PLACEMENT OFFICER

Professor Rob Townsend

rtownsen@mit.edu

617-452-3722

MIT PLACEMENT ADMINISTRATOR

Ms. Shannon May

shmay@mit.edu

617-324-5857

CURRENT POSITION Prize Fellow in Economics, History, and Politics, Harvard University 2021-
 Postdoctoral Fellow at J-PAL, MIT

DOCTORAL STUDIES Massachusetts Institute of Technology (MIT)
 PhD, Economics, September 2021
 DISSERTATION: “Technological Change and Agricultural Development”

DISSERTATION COMMITTEE AND REFERENCES

Professor Daron Acemoglu
 MIT Department of Economics
 77 Massachusetts Avenue, E52-446
 Cambridge, MA 02139
 617-253-1927
daron@mit.edu

Professor Benjamin Olken
 MIT Department of Economics
 77 Massachusetts Avenue, E52-542
 Cambridge, MA 02139
 617-253-6833
bolken@mit.edu

Professor Abhijit Banerjee
 MIT Department of Economics
 77 Massachusetts Avenue, E52-540
 617-253-8855
banerjee@mit.edu

Professor Nathan Nunn
 UBC Vancouver School of Economics
 6000 Iona Drive, Iona Building 172
 604-822-2876
nathan.nunn@ubc.ca

PRIOR EDUCATION Harvard College 2016
 A.B. in Economics with a Secondary Field in Mathematics

CITIZENSHIP: USA **GENDER:** Male

LANGUAGES English, Spanish, Portuguese (intermediate)

FIELDS Primary Fields: Development, Environmental, Political Economy
 Secondary Fields: Innovation, Economic Growth

TEACHING EXPERIENCE Development Economics: Macro (graduate, MIT course 14.772) 2020
 Teaching Assistant to R. Townsend, B. Olken, and A. Banerjee

MIT Economics

JACOB MOSCONA

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RELEVANT POSITIONS Research Assistant to Daron Acemoglu 2018-2019

FELLOWSHIPS, HONORS, AND AWARDS

Hausman Dissertation Fellowship, MIT	2020
George and Obie Shultz Fund Grant (x4), MIT	2018-2019
Kenneth & Doreen Wang (1971) Fellowship, MIT	2017
John Krob Castle Fellowship, MIT	2016
Thomas T. Hoopes Prize, Harvard	2016
Phi Beta Kappa, Harvard	2016
Lawrence Lader Prize in Writing, Harvard	2013

PROFESSIONAL ACTIVITIES **Referee:** *American Economic Journal: Applied Economics, American Economic Review, American Economic Review: Insights, American Journal of Political Science, Climate Policy, Econometrica, Economic Journal, Journal of the Association of Environmental and Resource Economists, Journal of Development Economics, Journal of Economic Growth, Journal of Political Economy, PNAS, Review of Economics and Statistics, Review of Economic Studies, Quarterly Journal of Economics*

Conference Presentations: ASSA Annual Meeting (2023 scheduled); Twelfth Annual Conference of the Julis-Rabinowitz Center for Public Finance at Princeton (2023 scheduled), Columbia-NYU Trade Day (2022 scheduled); WIDER Development Conference in Bogota (2022); European Meeting of the Econometric Society (2022); NBER Summer Institute, Environmental and Energy Economics (2022); NBER Summer Institute, Macroeconomics and Productivity (2022); NBER Summer Institute, Development of the American Economy (2022); Brown Conference on the Roots of Comparative Development (2022); BREAD Development Conference at Northwestern (2022); RIDGE Forum, Towards Sustainable Growth (2021); NEUDC (2021); CEPR/LEAP Workshop in Development Economics (2021); NBER Development Economics/BREAD Fall Program Meeting (2021); European Economics Association/Econometric Society Congress (2021); NBER Summer Institute, Environmental and Energy Economics (2021); NBER Summer Institute, Innovation (2021); UC Berkeley Advanced Climate Economics Workshop (2020); Association for Psychological Science Annual Convention (2019); NEUDC (2017)

Invited Seminar Presentations: Cornell (2023 scheduled); Stanford (2022 scheduled); NYU (2022); Harvard (2022); University of Southern California (2022); UC Berkeley Economics (2022 x2); UC Berkeley Haas School of Business (2022); UC San Diego (2022); Penn State University (2022); IIES Stockholm (2022); Stockholm School of Economics (2022); University of British Columbia (2021); University of Hawaii (2021)

PUBLICATIONS **“Does Directed Innovation Mitigate Climate Damage? Evidence from US Agriculture”** (with Karthik Sastry), Forthcoming, *Quarterly Journal of Economics*

This paper studies how innovation reacts to climate change and shapes its economic impacts, focusing on US agriculture. We show in a model that directed innovation can either mitigate or exacerbate climate change's potential economic damage depending

on the substitutability between new technology and favorable climatic conditions. To empirically investigate the technological response to climate change, we measure crop-specific exposure to damaging extreme temperatures and crop-specific innovation embodied in new variety releases and patents. We find that innovation has re-directed since the mid 20th century toward crops with increasing exposure to extreme temperatures. Moreover, this effect is driven by types of agricultural technology most related to environmental adaptation. We next show that US counties' exposure to induced innovation significantly dampens the local economic damage from extreme temperatures. Combining these estimates with the model, we find that directed innovation has offset 20% of potential losses in US agricultural land value due to damaging climate trends since 1960, and that innovation could offset 13% of projected damage by 2100. These findings highlight the vital importance, but incomplete effectiveness, of endogenous technological change as a source of adaptation to climate change.

“Segmentary Lineage Organization and Conflict in Sub-Saharan Africa” (with Nathan Nunn and James A. Robinson), *Econometrica*, 88(5): 1999-2036.

We test the longstanding hypothesis that ethnic groups organized around “segmentary lineages” are more prone to conflict. Ethnographic accounts suggest that in such societies, which are characterized by strong allegiances to distant relatives, individuals are obligated to come to the aid of fellow lineage members when they become involved in conflicts. As a consequence, small disagreements often escalate into larger-scale conflicts involving many individuals. We test for a link between segmentary lineage organization and conflict across ethnic groups in sub-Saharan Africa. Using a number of estimation strategies, including a regression discontinuity design at ethnic boundaries, we find that segmentary lineage societies experience more conflicts, and particularly ones that are retaliatory, long in duration, and large in scale.

“Keeping it in the Family: Lineage Organization and the Scope of Trust in Sub-Saharan Africa.” (with Nathan Nunn and James A. Robinson), *American Economic Review: Papers and Proceedings* 107(5): 565-571.

We present evidence that the traditional structure of society is an important determinant of the scope of trust today. Within Africa, individuals belonging to ethnic groups that organized society using segmentary lineages exhibit a more limited scope of trust, measured by the gap between trust in relatives and trust in non-relatives. This trust gap arises because of lower levels of trust in non-relatives and not higher levels of trust in relatives. A causal interpretation of these correlations is supported by the fact that the effects are primarily found in rural areas where these forms of organization are still prevalent.

“State Capacity and American Technology: Evidence from the 19th Century” (with Daron Acemoglu and James A. Robinson), *American Economic Review: Papers and Proceedings* 106(5): 61-67.

Robert Gordon's *The Rise and Fall of American Economic Growth* provides a compelling interpretation of how technical change and innovation has radically

changed the living standards of the citizens of the US in the past 150 years. Lying behind these changes are the institutions which have allowed the country to harness its human potential. In this paper we conduct an empirical investigation of the impact of one key set of institutions, the capacity of the US state as proxied by the presence of post offices in a county, on innovation. We show that between 1804 and 1899, the time when the US became the world technological leader, there is a strong association between the presence and number of post offices in a county and patenting activity, and it appears that it is the opening of postal offices that leads to surges in patenting activity, not the other way around. Our evidence suggests that part of the yet untold story of US technological exceptionalism is the way in which the US created an immensely capable and effective state.

RESEARCH PAPERS

“Inappropriate Technology: Evidence from Global Agriculture” (Job Market Paper) (with Karthik Sastry)

An influential explanation for global productivity differences is that frontier technologies are adapted to the high-income, research-intensive countries that develop them and “inappropriate” elsewhere. We study this hypothesis in the context of global agriculture by using mismatch in the presence of crop-specific pests and pathogens (CPPs) as a shifter of technology's inappropriateness and investigating its effect on global innovation, technology diffusion and productivity. We find that (i) technology development is biased toward CPP threats in high-income countries; (ii) CPP mismatch reduces plant-variety transfer at the crop-by-country-pair level, particularly from innovation-intensive origins; and (iii) CPP mismatch with innovation-intensive countries reduces crop production, both statically in the modern cross-section and dynamically in response to historical events that have altered the geography of agricultural innovation. Our estimates, combined with a model, imply that the inappropriateness of technology reduces global productivity by 58% and increases cross-country disparities by 15%. We use our framework to explore how global productivity gaps would be affected by counterfactual changes to both the geography of innovation, for example from the rise of R&D in emerging markets, and environmental differences across countries, for example due to climate change. Together, these findings provide support for each pillar of the inappropriate technology hypothesis and demonstrate how the direction of innovation underlies disparities in global agricultural productivity.

“Age Set vs. Kin: Culture and Financial Ties in East Africa” (with Awa Ambra Seck), Revise and Resubmit, *American Economic Review*

We study how social organization shapes patterns of economic interaction and the effects of national policy, focusing on the distinction between age-based and kin-based groups in sub-Saharan Africa. Motivated by ethnographic accounts suggesting that this distinction affects redistribution, we analyze a cash transfer program in Kenya and find that in age-based societies there are consumption spillovers within the age cohort, but not the extended family, while in kin-based societies we find the opposite. Next, we document that social structure shapes the impact of policy by showing that Uganda's pension program had positive effects on child nutrition only in kin-based societies.

“The Management of Aid and Conflict in Africa,” Revise and Resubmit,
American Economic Journal: Economic Policy

This study investigates the relationship between the management of development aid and violent conflict in Africa. I exploit variation in World Bank project management quality driven by the assignment of project leaders of varying capacity, combined with geo-coded data on lending and project performance scores. I find that better project management reduces violent conflict across sub-national aid receiving regions. Poorly-managed projects increase conflict while well-managed projects do the opposite. Project monitoring is particularly important and management matters most in regions with a recent history of warfare. The results suggest that the quality of aid implementation affects patterns of conflict.

“Environmental Catastrophe and the Direction of Invention: Evidence from the American Dust Bowl”

This paper investigates how innovation responded to and shaped the economic impact of the American Dust Bowl, an environmental catastrophe that led to widespread soil erosion on the US Plains during the 1930s. Combining data on county-level erosion, the historical geography of crop production, and crop-specific innovation, I document that in the wake of the environmental crisis, agricultural technology development was strongly re-directed toward more Dust Bowl-exposed crops and, within crops, toward bio-chemical and planting technologies that could directly mitigate economic losses from environmental distress. County-level exposure to Dust Bowl-induced innovation significantly dampened the effect of land erosion on agricultural land values and revenue. These results highlight the role of crises in shaping the direction of innovation and the importance of endogenous technological progress as an adaptive force in the face of disasters.

“Flowers of Invention: Patent Protection and Productivity Growth in US Agriculture”

Patent protection was introduced for plant biotechnology in the United States in 1985, and it affected crops differentially depending on their reproductive structures. Exploiting this unique feature of plant physiology and a new dataset of crop-specific technology development, I find that the introduction of patent rights increased the development of novel plant varieties in affected crops. Technology development was driven by a rapid increase in private sector investment, was accompanied by positive spillover effects on innovation in certain non-biological agricultural technologies and led to an increase in crop yields. Patent rights, however, could come with potentially significant costs to the consumers of technology and distortions to downstream production. Nevertheless, I document that in US counties that were more exposed to the change in patent law because of their crop composition, land values and profits increased. Taken together, the results suggest that the prospect of patent protection spurred technological progress and increased downstream productivity and profits.

“Agricultural Development and Structural Change, Within and Across Countries”

This study exploits rapid technological development during the Green Revolution (1960-1990) to estimate the causal effect of agricultural productivity growth on structural change both within and across countries. I use variation in ecological characteristics that determined the maximum potential impact of new crop-specific technologies on agricultural productivity to construct an instrument for agricultural productivity growth. Across districts in India, agricultural productivity growth spurred income growth, employment, and land use in the agricultural sector; it also reduced urban development and manufacturing employment. Across countries, agricultural productivity increased specialization in agricultural production and reduced urbanization. I find no evidence that agricultural productivity growth increased national income on average. Estimated effects are most pronounced for districts and countries that were more open to trade in 1960 and had a negative impact on income in countries that were most open.

“Specializing in Cities: Density and the Pattern of Trade” (with Antoine Levy)

Variation in urban density is a core determinant of patterns of productivity within countries, but does it also shape patterns of trade across countries? We develop a strategy to estimate the extent to which local population density boosts productivity in each industry. Combining these industry-level estimates with fine-grained global population data, we show that both US states and countries with more spatially concentrated (“denser”) populations disproportionately export in density-loving sectors. The estimates are similar using an instrumental variables strategy that exploits countries' historical population distributions, and they are driven by variation across sectors in the importance of R&D and collaborative/interactive tasks in production. We rationalize these findings with a model in which national export specialization emerges endogenously from the distribution of factors within countries and show how location-level data can be aggregated to measure country-level specialization and derive our empirical regression equations.

RESEARCH IN PROGRESS

“Rich-World Bias in Global Biomedical Innovation” (with Daron Acemoglu, Karthik Sastry, and Heidi Williams)

“The Direction of Biomedical Research, in Principle and in Practice” (with Daron Acemoglu, Karthik Sastry, and Heidi Williams)

“Import Risk and Directed Innovation” (with Joel Flynn and Antoine Levy)

“The Globalization of Silicon Valley: The Dynamics of Start-Up Diffusion” (with Josh Lerner and David Yang)

“Temperature Shocks and Innovation” (with Ben Jones and Ben Olken)

“Global Warming and the Siesta Effect: Temperature Shocks and the Shifting Time of Work” (with Ben Olken)

“Markets, Morals, and Mores: Constructing a New Ethnographic Database for Africa” (with Awa Ambra Seck, Sara Lowes, and Nathan Nunn)

“Labor Coercion, Wages, and Technology” (with Daron Acemoglu)