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Program Report: Children and Families

Janet Currie and Anna Aizer

On July 1, the Program on Children was renamed the Program on Children and Families. This change, which better captures the range of research carried out by its 171 affiliates, in part marks a return to the program's roots. In 1993, the late Alan Krueger launched an NBER project on the Economics of Families and Children. It subsequently became a program and has been known as the Program on Children since 1997.[1] Broadening the program name recognizes the complex web of interactions, economic and otherwise, that involve children. Economic and other forces that affect families can have important effects on children, and developments involving children in turn have significant influence on the wellbeing of adult family members.

In the eight years since our last program report, scholars affiliated with the program have authored 919 working papers on a wide array of topics. We begin this report with a sampling of their continuing research in core areas, such as the long-term consequences of early-life conditions and the effects of public programs affecting children. We then summarize studies on a number of issues that are attracting growing attention, including gun violence, mental health, access to abortion services, and the long-lived effects of the COVID-19 pandemic.
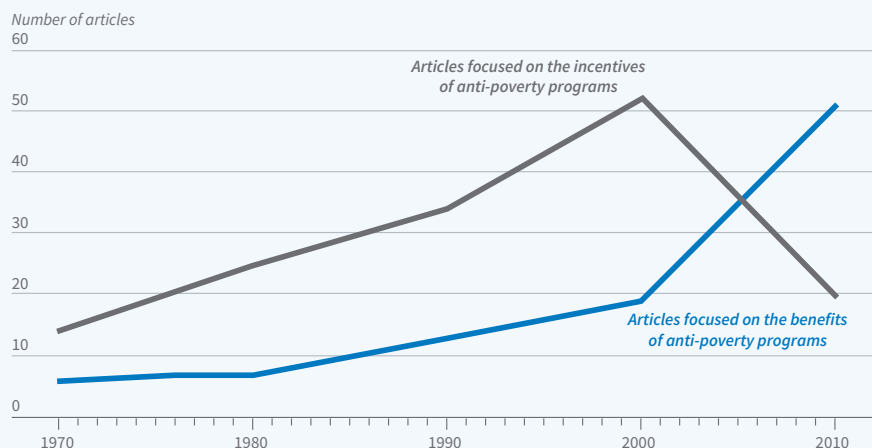
Consequences of Early-Life Conditions and Policies

It is now well established that events in early life, including in utero, can have both immediate and lasting impacts on children and, therefore, on families. Douglas Almond, Janet Currie, and Valentina Duque review some of the literature and conclude that even relatively mild adverse shocks in early life can have substantial negative impacts. These effects are heterogeneous, reflecting differences in children's endowments, family budget constraints, and the technologies of production.[2] This observation has in-

Figure 1

Focus of Research Articles on Anti-Poverty Programs

Number of articles

Articles focused on the incentives of anti-poverty programs

Articles focused on the benefits of anti-poverty programs

Source: "Children and the US Social Safety Net: Balancing Disincentives for Adults and Benefits for Children," Aizer A, Hoynes HW, Lleras-Muney A. NBER Working Paper 29754, February 2022, and Journal of Economic Perspectives 36(2), Spring 2022, pp. 149–174. Copyright American Economic Association; reproduced with permission of the Journal of Economic Perspectives.

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spired work investigating how the social safety net influences child health and wellbeing.

Historically, much of the economic research on the safety net focused on how unconditional assistance to low-income families might affect parental behavior. It was thought that by reducing labor supply and marriage, safety net programs might sustain poverty rather than alleviate it. However, as Anna Aizer, Hilary Hoynes, and Adriana Lleras-Muney show, recent research on the impact of the safety net for children and families has focused more on its impact on child outcomes, as shown in Figure 1.[3] This shift in research emphasis roughly coincides with the launch of the NBER research program.

The newer work has shown significant positive effects of safety net programs on short-run child outcomes, as well as on longer-term measures. For example, the Supplemental Security Income (SSI) program is an important safety net program that began to serve larger numbers of children after 1990. Manasi Deshpande and Michael Mueller-Smith find that removing children from the SSI program at age 18 increased the likelihood of criminal charges and incarceration for crimes associated with income generation by 60 percent.[4]

Research on the social safety net has increasingly focused on the long-term impact of initiatives such as the Food Stamp Program rolled out in the US in the 1960s. Martha Bailey, Maya Rossin-Slater, Reed Walker, and Hoynes document significant increases in adult human capital, economic self-sufficiency, and longevity among children exposed to the program early in life, as shown in Figure 2.[5]

Researchers continue to explore the impact of the safety net on parental behavior. Many papers find little effect of safety net programs on labor supply and marriage rates. These include work by Elizabeth Ananat, Benjamin Glasner, Christal Hamilton, and Zachary Parolin;[6] Shari Eli, Aizer, and Lleras-Muney;[7] and Jason Cook and Chloe East.[8] However, Kevin Corinth, Bruce Meyer, Matthew Stadnicki, and

Derek Wu conduct simulations and find that an unconditional child allowance could reduce employment, thus offsetting some of the effects of the allowance in alleviating child poverty.[9] Concerns about these effects have contributed to a change in the structure of the US safety net after 1990 so that spending goes increasingly to families with earners who are more likely to have incomes above the poverty line, as documented by Diane Whitmore Schanzenbach and Hoynes.[10]

Researchers continue to find large positive effects of cash transfers on children, in part through effects on parental behavior. For example, Lindsey Bullinger, Analisa Packham, and Kerri Raissian show that unconditional cash payments from the Alaska Permanent Fund reduced child maltreatment in that state, as seen in Figure 3.[11] The effects of cash transfers on family functioning could potentially be more important than any documented effects on labor supply.

The social safety net can potentially improve parents' mental health, which may be a pathway for improvements in child outcomes. Lucie Schmidt, Lara Shore-Sheppard, and Tara Watson show in a simulation that a $1,000 increase in cash and food benefits reduced severe psychological distress by 8.4 percent.[12] These effects were most pronounced for single mothers with low levels of education. Manudeep Bhuller, Gordon Dahl, Katrine Loken, and Magne Mogstad link parental distress with child wellbeing: A domestic violence incident leads to a 30 percent increase in mental health visits among adult victims and a 19 percent increase in such visits among victims' children.[13]
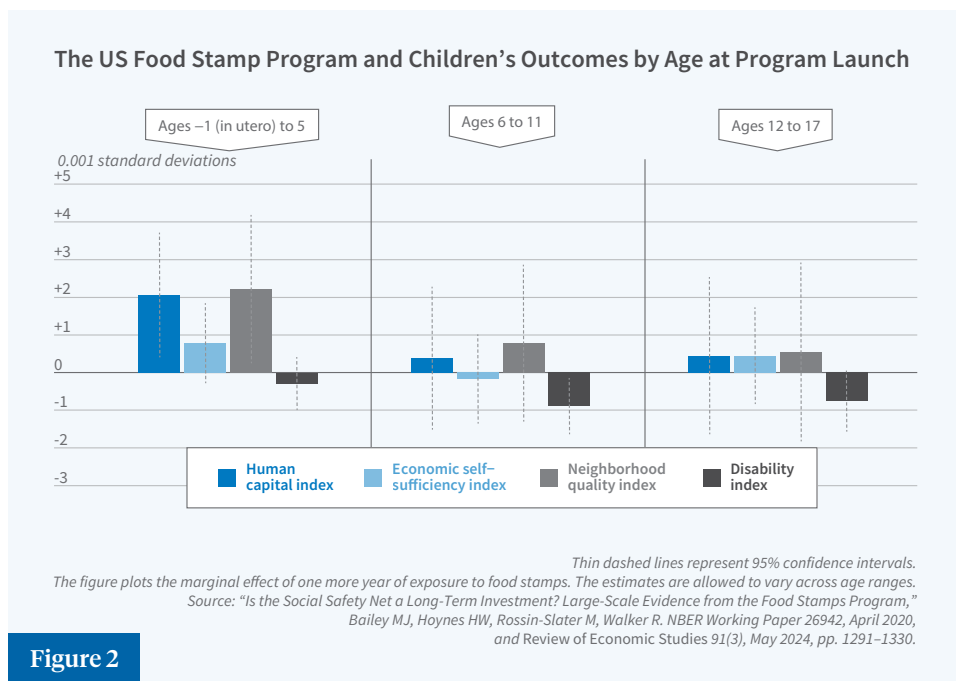
Early Childhood Education

Promising results from two model programs implemented in the US in the 1960s helped to generate significant interest in early childhood education.

Work by Jorge Luis García, James Heckman, and Victor Ronda documents the lasting effects of one such program for African American participants and their children. They find that both parents and children completed more schooling and were more likely to be employed later in life.[14]

Since the first evaluations of these small model programs, other work examining the impact of the Head Start program, which now serves nearly 800,000 children, has also documented significant long-term benefits. Shuqiao Sun, Breden Timpe, and Bailey use restricted linked census data and the roll-out of Head Start across counties to estimate that access to Head Start led to a half-year increase in schooling and a 40 percent increase in college completion.[15]

While evaluations of small model programs and Head Start suggest positive and long-lasting gains, some other early childhood programs have smaller benefits. Elizabeth Cascio reviews the research and concludes that the effectiveness of early childhood education depends on the quality of the program and the environment that children would have spent time in absent the program.[16] Greg Duncan, Ariel Kalil, Mari Rege, and Mogstad explore the heterogeneity in estimated impacts and conclude that investments in skill-specific curricula may be espe-

The US Food Stamp Program and Children's Outcomes by Age at Program Launch

Figure 2

Alaska Permanent Fund Payments and Child Maltreatment

Figure 3

Bars show effect of households receiving an additional $1000 annual payment.

cially important.[17]

Variation in the quality of early childcare environments can have implications for inequality and social mobility. Sarah Flood, Joel McMurry, Aaron Sojourner, and Matthew Wiswall find that children from families with higher socioeconomic status (SES) are more likely to receive high-quality care which may exacerbate inequalities.[18] Jonathan Borowsky, Jessica Brown, Elizabeth David, Chloe Gibbes, Chris Herbst, Sojourner, Erdal Tekin, and Wiswall model the implications of expanding childcare subsidies for low-income families and conclude that it would increase maternal employment and shift more low-income children into high-quality care.[19]

Health Insurance and Healthcare

Several recent studies find positive impacts of access to medical care, especially for historically marginalized Black children. Esra Kose, Siobhan O'Keefe, and Maria Rosales-Rueda demonstrate that increasing access to medical care via the rollout of community health centers improved birth outcomes.[20] Despite the demonstrated benefits of public health insurance coverage during pregnancy, undocumented 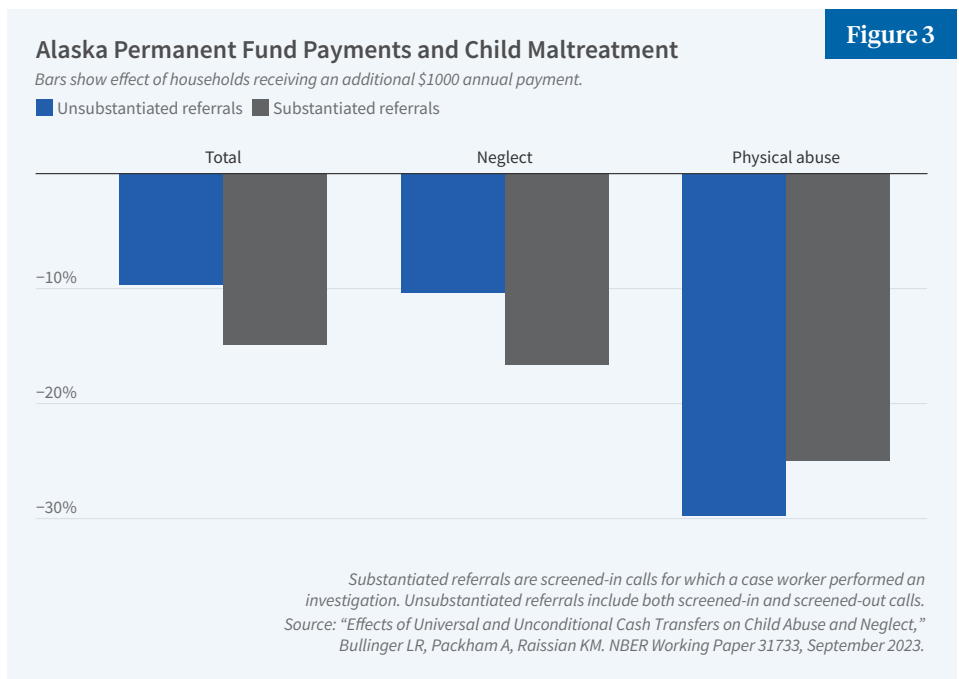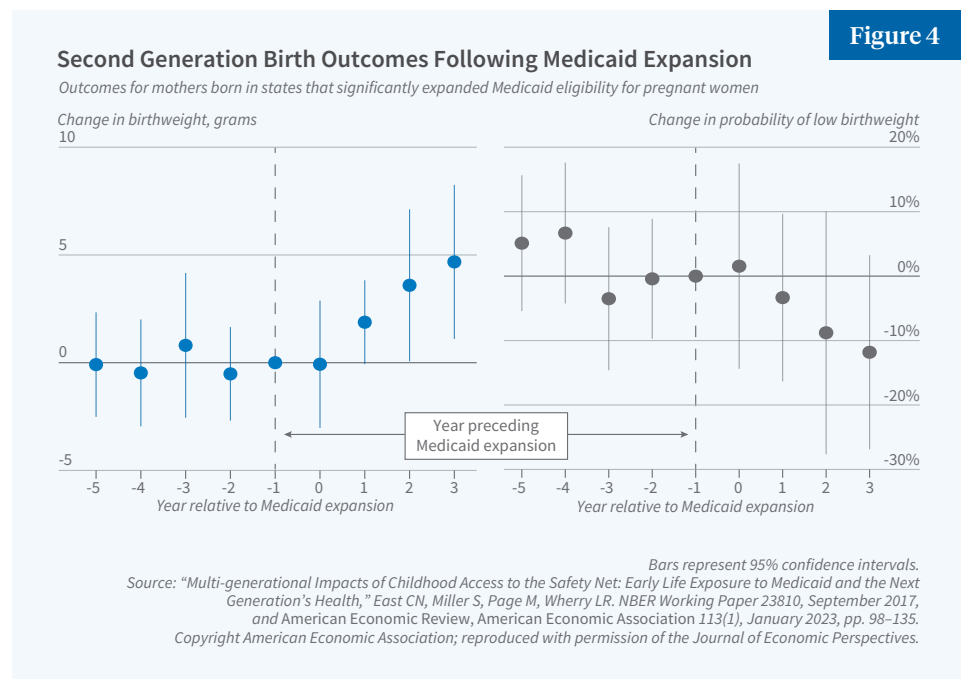women remain largely ineligible in the United States. Work by Sarah Miller, Laura Wherry, and Gloria Aldano shows that Medicaid coverage of undocumented women increases prenatal care, with positive impacts on birth weight.[21]

Expansions in Medicaid access can even have intergenerational impacts. East, Marianne Page, Wherry, and Miller estimate the intergenerational impact of Medicaid expansions in utero and in early life. They document that the offspring of children exposed to Medicaid expansions early in life are themselves born healthier, as shown in Figure 4.[22]

Despite Medicaid's benefits, many eligible children are not enrolled. Iris Arbogast, Anna Chorniy, and Currie show that regulations increasing the administrative burden of enrollment reduce health insurance coverage

Second Generation Birth Outcomes Following Medicaid Expansion
Outcomes for mothers born in states that significantly expanded Medicaid eligibility for pregnant women

among children by six percent in the six months following a new regulation. These effects were especially pronounced among Hispanic children.[23]

Intergenerational Effects

The growing availability of large datasets that allow linkages across generations has enabled researchers to explore the intergenerational effects of childhood events. Krzysztof Karbownik and Anthony Wray link childhood hospitalizations in 1870–1902 London with later outcomes.[24] Boys admitted to the hospital before the age of 12 were three percentage points more likely to experience downward occupational mobility than their brothers, explaining 11 percent of the downward occupational mobility in England at this time. Using historical data on US Civil War veterans linked with that of their children and grandchildren, Dora Costa documents that the grandchildren of men who experienced severe conditions including nutritional deprivation as prisoners of war (POWs)— lost roughly a year of life at age 45 compared to grandsons of veterans who were not POWs.[25]

Finally, Gordon Dahl and Anne Gielen study a Dutch reform of disability insurance that resulted in an increase in employment and earnings. They find that children of affected adults had

increased schooling attainment and better health and labor market outcomes.[26]

Parental Investments

What explains the intergenerational persistence of shocks to health and wellbeing? One potential mediator is parental investment behavior. García, Frederik Bennhoff, and Duncan Leaf document that a child's participation in a model early childhood program has spillover benefits to siblings.[27] They show that the program affects parental decision-making and likely increases parental investments in all children in the household. Susan Mayer, William Delgado, Lisa Gennetian, and Kalil focus on differences in time investments in children by maternal education. They find that college-educated mothers spend more time, even though they do not appear to place a high value on the time spent.[28]

There are often important differences in parental investment decisions within families. Rebecca Dizon-Ross and Seema Jayachandran ask how mothers and fathers differ in their propensity to invest in their sons and daughters in Uganda.[29] They find that differences in spending across siblings are driven by fathers spending less on daughters.

The opioid epidemic severely dis-

rupted many parents' capacity to invest in their children. Building on research showing that the epidemic was initially caused by lax prescribing, Kasey Buckles, William Evans, and Ethan Lieber ask how variation across states in the ease with which doctors could prescribe opioids relates to overdose death rates. They conclude that the epidemic led to an additional 1.5 million children living apart from a parent and in a household headed by a grandparent.[30]

Parents with more resources invest more in their children, but how do parents respond to reductions in household resources? Marianne Bitler, Krista Ruffini, Lisa Schulkind, Barton Willage, Currie, and Hoynes find that when household benefits fall as a result of children aging out of the Special Supplemental Nutrition Program for Women, Infants, and Children at age 5, the caloric intake of adult women in the household falls but that of children does not, suggesting that mothers protect their children.[31]

Adolescence

Adolescence is increasingly understood to be a crucial period of growth and development. A number of studies highlight the impact of interventions during this period. Sara Heller evaluates two experiments that provided summer jobs to youth and finds large declines in criminal violence. There was little heterogeneity across implementations of the programs but significant heterogeneity across individual youths: those with the highest probability of negative outcomes benefitted the most.[32] Keyoung Lee, Aizer, Eli, and Lleras-Muney study the Great Depression-era Civilian Conservation Corps and find it had significant positive effects on longevity, lifetime earnings, and disability, even though there was little short-term effect on employment or wages.[33] Jonathan Guryan et al. find that high-impact tutoring during adolescence can increase test scores by 15–37 percent of a standard deviation, which is comparable to successful early childhood interventions.[34] Some recent studies have focused on adolescent girls in developing countries. Eric

Edmonds, Benjamin Feigenberg, and Jessica Leight show that teaching life skills to girls in Indian schools reduced drop out.[35] Manisha Shah, Jennifer Seager, Joao Montalvao, and Markus Goldstein find that an intervention focused on goal setting reduced intimate partner violence among adolescent girls in sub-Saharan Africa.[36]

Emerging Areas

Emerging areas of research among program affiliates include child mental health, abortion access, gun violence, and the impact of COVID-19 on families and children.

Mental Health

The mental health of children is critical to their wellbeing. Rossin-Slater, Molly Schnell, Hannes Schwandt, Sam Trejo, and Lindsey Uniat find that exposure to school shootings led to an increase in youth antidepressant prescriptions, as shown in Figure 5.[37] In follow-up work, Marika Cabral, Bokyoung Kim, Rossin-Slater, Schnell, and Schwandt link exposure to school shootings in Texas to lower educational attainment and worse economic outcomes at age 25.[38] This work underscores an important link between violence, mental health, and future economic outcomes.

Monica Deza, Thanh Lu, and Johanna Catherine Maclean use a county-level, two-way fixed effects analysis to show that higher availability of office-based mental healthcare is associated with fewer juvenile arrests.[39] But even conditional on access, there are significant SES differences in the types of mental healthcare that children receive. Paul Kurdyak, Jonathan Zhang, and Currie find that among Canadian children with the same health insurance coverage and the same mental health diagnoses, low SES children are more likely to be prescribed drugs with dangerous side effects.[40] One way to improve mental health treatment is to encourage adherence to treatment guidelines. Emily Cuddy and Currie show that treating adolescents with mental health conditions in a way that is consistent with treatment guidelines improves health outcomes.[41]

Perhaps unsurprisingly, there are strong intergenerational correlations in mental health. Aline Bütikofer, Rita Ginja, Karbownik, and Fanny Landaud find that in Norway, a parental mental health diagnosis is associated with a 40 percent higher probability that a child has a mental health diagnosis.[42] They also find that early childhood intervention for children whose parents have been diagnosed with a mental health condition can reduce the association between parental and child mental health diagnoses by al-

most half.
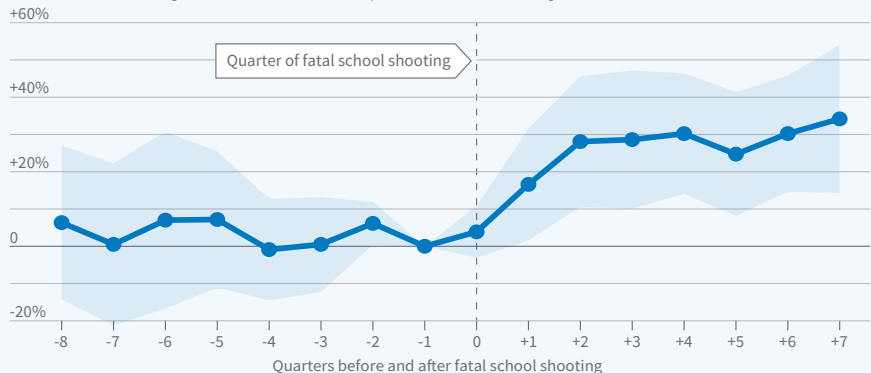
Abortion Access

A growing body of work has explored the ramifications of reduced access to abortion on families and children. Joanna Lahey and Marianne Wanamaker find that abortion restrictions in the late nineteenth century led to increased child mortality.[43] Jason Lindo, Caitlin Myers, Andrew Schlosser, and Scott Cunningham show that recent abortion clinic closures in Texas have reduced geographic access and increased births.[44] Stephanie Fischer, Heather Royer, and Corey White find that these clinic closures also have reduced take-up of family planning.[45] Diana Green Foster, Miller, and Wherry study women who were denied an abortion because they just missed the maximum gestational age cutoff and find that these women experience a large increase in financial distress over the next several years.[46]

Gun Violence and Its Impacts

In 2023, deaths from firearms became the leading cause of child death in the US. Previously mentioned work documents the impact of school shootings on adolescent mental health and future economic outcomes. Bahadir Dursun, Michael Hatch, Tekin, and Currie demonstrate that exposure to the Beltway sniper attacks in utero negatively affected newborn health, as shown in Figure 6.[47]

What explains gun violence, and what can be done to reduce it? Evans, Craig Garthwaite, and Timothy Moore link gun violence today to the crack cocaine epidemic of the 1980s and 1990s, which especially ravaged Black communities. They show that murder rates for young Black males doubled in a city when the crack epidemic started and that it remained 70 percent higher 17 years later largely due to increased gun ownership. They show that today, gun violence explains 10 pe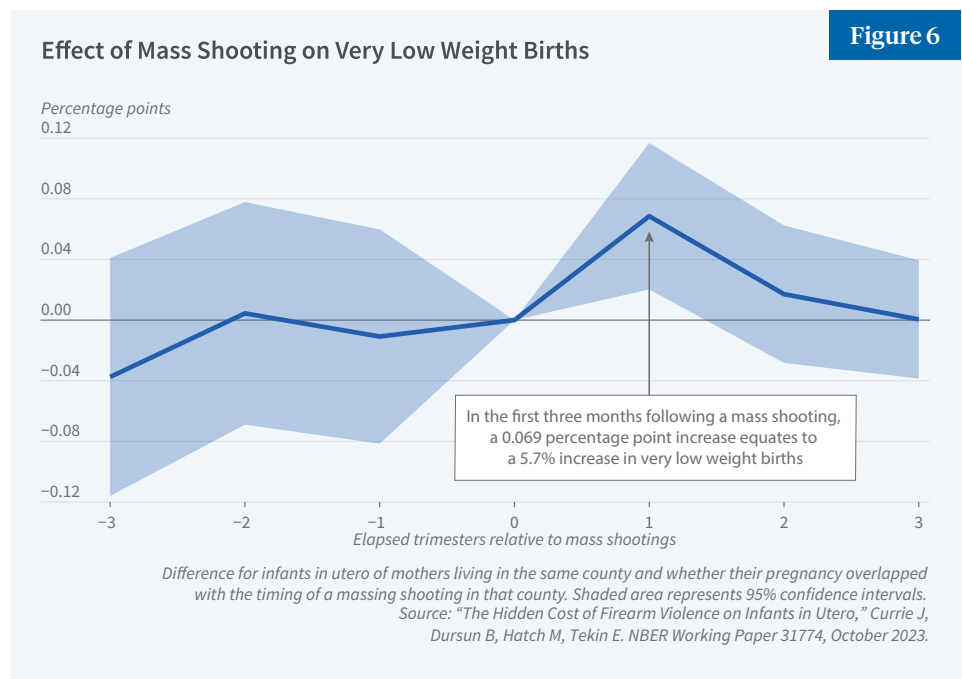rcent of the racial gap in male life expectancy.[48] Monica Bhatt, Max Kapustin, Marianne Bertrand, Christopher Blattman, and Heller evaluate a program that provides paid employment combined with therapy and other social supports

Effect of Mass Shooting on Very Low Weight Births

Figure 6

Percentage points

In the first three months following a mass shooting, a 0.069 percentage point increase equates to a 5.7% increase in very low weight births

Elapsed trimesters relative to mass shootings

Difference for infants in utero of mothers living in the same county and whether their pregnancy overlapped with the timing of a massing shooting in that county. Shaded area represents 95% confidence intervals. Source: "The Hidden Cost of Firearm Violence on Infants in Utero," Currie J, Dursun B, Hatch M, Tekin E. NBER Working Paper 31774, October 2023.

to at-risk, young, primarily Black men and find that it reduced shooting and homicide arrests by 65 percent.[49]

COVID-19

The COVID-19 pandemic significantly disrupted schooling, causing alarming declines in test scores as well as concerns about behavior and mental health. Clare Halloran, Claire Hug, Rebecca Jack, and Emily Oster find that during the 2021–22 school year, 20 percent of English test score losses and 37 percent of math losses were recovered.[50] Anna Gassman-Pines, Ananat, John Fitz-Henley II, and Jane Leer use parent survey data to document that remotely schooled children experienced more disruption and displayed worse behavior.[51] Benjamin Hansen, Joseph Sabia, and Jessamyn Schaller find that teen suicide rates plummeted in March 2020, when the pandemic closed schools, and rose when schools reopened.[52]

Multiple studies have measured the pandemic's impact on fertility. Melissa Schettini Kearney and Phillip Levine document a drop of nearly 100,000 births between August 2020 and February 2021, followed by a rebound of about 30,000 births between March and September 2021.[53] Bailey, Currie, and Schwandt show that 60 percent of the decline was driven by births to

foreign-born mothers. Moreover, an initial decline of 30,000 in births to native-born mothers was more than offset by an increase of 71,000 births by 2021.[54]

Concluding Comments

Economists have long been interested in children and families, but research was scattered across subdisciplines. Development economists thought about stunting and malnutrition, labor economists researched education and discrimination, health economists focused on medical care, demographers studied fertility, and public economists emphasized transfer programs. The Program on Children and Families unites these perspectives and promotes cross-fertilization. The result can be seen in the increasing number of studies that examine multiple outcomes and in the growing internationalization of the field. This richness of perspectives has been complemented by remarkable new data combining information from multiple sources in order to enable research spanning decades, generations, and multiple outcomes. In the coming decade, these sources may facilitate research into vulnerable groups that have seldom been studied, including Native American children, children suffering homelessness, foster children, and the forcibly displaced.

1 In October 1993, Krueger convened an NBER meeting on "Economics of Families and Children" (https://www.nber.org/sites/default/files/2019-09/Winter%201993%284%29.pdf, page 20). Krueger was tapped for service at the US Department of Labor the next year, and in December 1994, Lawrence Katz organized a conference that gathered the researchers associated with an NBER grant-supported project on "The Well-Being of Children" (https://www.nber.org/sites/default/files/2019-09/reporter1995-01.pdf, page 43). Katz convened another such meeting in May 1995 (https://www.econstor.eu/bitstream/10419/62108/2/1995_summer.pdf, page 39). By November 1996, when the group met again, the project had become the "Program on the Well-Being of Children," and Jonathan Gruber had been named program director (https://www.nber.org/sites/default/files/2019-09/reporter1997-01.pdf, page 39). Gruber was tapped for a role at the US Treasury shortly thereafter, and Janet Currie became the program director. She organized a November 1997 meeting of the "Program on Children" (https://www.nber.org/sites/default/files/2019-09/reporter1998-01.pdf, page 34). Gruber returned to academia, and to his role as program director, in 1998 and organized a November 1998 meeting of the "Program on Children" (https://www.nber.org/sites/default/files/2019-08/winter1998-1999_1.pdf, page 42).
Return to Text

2 "Childhood Circumstances and Adult Outcomes: Act II," Almond D, Currie J, Duque V. NBER Working Paper 23017, January 2017, and *Journal of Economic Literature* 56(4), December 2018, pp. 1360–1446.
Return to Text

3 "Children and the US Social Safety Net: Balancing Disincentives for Adults and Benefits for Children" Aizer A, Hoynes HW, Lleras-Muney A. NBER Working Paper 29754, February 2022, and *Journal of Economic Perspectives* 36(2), Spring 2022, pp. 149–174.
Return to Text

4 "Does Welfare Prevent Crime? The Criminal Justice Outcomes of Youth Removed from SSI," Deshpande M, Muller-Smith MG. NBER Working Paper 29800, February 2022, and *The Quarterly Journal of Economics* 137(4), November 2022, pp. 2263–2307.
Return to Text

5 "Is the Social Safety Net a Long-Term Investment? Large-Scale Evidence from the Food Stamps Program," Bailey MJ, Hoynes HW, Rossin-Slater M, Walker R. NBER Working Paper 26942, April 2020, and *The Review of Economic Studies* 91(3), May 2024, pp. 1291–1330.
Return to Text

6 "Effects of the Expanded Child Tax Credit on Employment Outcomes: Evidence from Real-World Data from April to December 2021," Ananat E, Glasner B, Hamilton C, Parolin Z. NBER Working Paper 29823, March 2022.
Return to Text

7 "The Incentive Effects of Cash Transfers to the Poor," Aizer A, Eli S, Lleras-Muney A. NBER Working Paper 27523, July 2020.
Return to Text

8 "The Effect of Means-Tested Transfers on Work: Evidence from Quasi-Randomly Assigned SNAP Caseworkers," Cook JB, East CN. NBER Working Paper 31307, May 2024.
Return to Text

9 "The Anti-Poverty, Targeting, and Labor Supply Effects of Replacing a Child Tax Credit with a Child Allowance," Corinth K, Meyer BD, Stadnicki M, Wu D. NBER Working Paper 29366, March 2022.
Return to Text

10 "Safety Net Investments in Children," Hoynes HW, Schanzenbach DW. NBER Working Paper 24594, May 2018.
Return to Text

11 "Effects of Universal and Unconditional Cash Transfers on Child Abuse and Neglect," Bullinger LR, Packham A, Raissian KM. NBER Working Paper 31733, September 2023.
Return to Text

12 "The Effect of Safety Net Generosity on Maternal Mental Health and Risky Health Behaviors," Schmidt L, Shore-Sheppard L, Watson T. NBER Working Paper 29258, January 2023, and *Journal of Policy Analysis and Management* 42(3), Summer 2023, pp. 706–736.
Return to Text

13 "Domestic Violence and the Mental Health and Well-being of Victims and Their Children," Bhuller M, Dahl GB, Loken KV, Mogstad M. NBER Working Paper 30792, December 2022, and *The Journal of Human Resources* 59(S), April 2024, pp. S152–S186.
Return to Text

14 "The Lasting Effects of Early Childhood Education on Promoting the Skills and Social Mobility of Disadvantaged African Americans," García JL, Heckman JJ, Ronda V. NBER Working Paper 29057, July 2021, and *Journal of Political Economy* 131(6), June 2023, pp. 1477–1506.
Return to Text

15 "Prep School for Poor Kids: The Long-Run Impacts of Head Start on Human Capital and Economic Self-Sufficiency," Bailey MJ, Sun S, Timpe BD. NBER Working Paper 28268, December 2020, and *American Economic Review* 111(12), December 2021, pp. 3963–4001.
Return to Text

16 "Early Childhood Education in the United States: What, When, Where, Who, How, and Why," Cascio E. NBER Working Paper 28722, April 2021.
Return to Text

17 "Investing in Early Childhood Development in Preschool and at Home," Duncan G, Kalil A, Mogstad M, Rege M. NBER Working Paper 29985, May 2022.
Return to Text

18 "Inequality in Early Care Experienced by US Children," Flood S, McMurry JFS, Sojourner A, Wiswall MJ. NBER Working Paper 29249, September 2021, and *Journal of Economic Perspectives* 36(2), Spring 2022, pp. 199–222.
Return to Text

19 "An Equilibrium Model of the Impact of Increased Public Investment in Early Childhood Education," Borows-

ky J, Brown JH, Davis EE, Gibbs C, Herbst CM, Sojourner A, Tekin E, Wisall MJ. NBER Working Paper 30140, June 2022.
Return to Text

20 "Does the Delivery of Primary Health Care Improve Birth Outcomes? Evidence from the Rollout of Community Health Centers," Kose E, O'Keefe SM, Rosales-Rueda M. NBER Working Paper 30047, May 2022.
Return to Text

21 "Covering Undocumented Immigrants: The Effects of a Large-Scale Prenatal Care Intervention," Miller S, Wherry L, Aldana G. NBER Working Paper 30299, July 2022.
Return to Text

22 "Multi-generational Impacts of Childhood Access to the Safety Net: Early Life Exposure to Medicaid and the Next Generation's Health," East CN, Miller S, Page M, Wherry LR. NBER Working Paper 23810, September 2017, and *American Economic Review* 113(1), January 2023, pp. 98–135.
Return to Text

23 "Administrative Burdens and Child Medicaid and CHIP Enrollments," Arbogast I, Chorniy A, Currie J. NBER Working Paper 30580, April 2024, and *American Journal of Health Economics* 10(2), Spring 2024, pp. 237–271.
Return to Text

24 "Educational, Labor-market and Intergenerational Consequences of Poor Childhood Health," Karbownik K, Wray A. NBER Working Paper 26368, February 2021.
Return to Text

25 "Health Shocks of the Father and Longevity of the Children's Children," Costa D. NBER Working Paper 29553, January 2024.
Return to Text

26 "Persistent Effects of Social Program Participation on the Third Generation," Dahl GB, Gielen A. NBER Working Paper 32212, March 2024.
Return to Text

27 "The Dynastic Benefits of Early Childhood Education: Participant Benefits and Family Spillovers," García JL, Bennhoff FH, Leaf DE. NBER Working Paper 31555, August 2023.

28 "Education Gradients in Parental Time Investment and Subjective Well-being," Kalil A, Mayer S, Delgado W, Gennetian LA. NBER Working Paper 31712, September 2023.
Return to Text

29 "Dads and Daughters: Disentangling Altruism and Investment Motives for Spending on Children," Dizon-Ross R, Jayachandran S. NBER Working Paper 29912, April 2022.
Return to Text

30 "The Drug Crisis and the Living Arrangements of Children," Buckles K, Evans WN, Lieber EMJ. NBER Working Paper 27633, August 2020, and *Journal of Health Economics* 87, January 2023, Article 102723.
Return to Text

31 "Mothers as Insurance: Family Spillovers in WIC," Bitler M, Currie J, Hoynes HW, Ruffini KJ, Schulkind L, Willage B. NBER Working Paper 30112, June 2022, and *Journal of Health Economics* 91, September 2023, Article 102784.
Return to Text

32 "When Scale and Replication Work: Learning from Summer Youth Employment Experiments," Heller S. NBER Working Paper 28705, April 2021, and *Journal of Public Economics* 209, May 2022, Article 104617.
Return to Text

33 "Do Youth Employment Programs Work? Evidence from the New Deal," Aizer A, Eli S, Lleras-Muney A, Lee K. NBER Working Paper 27103, July 2020.
Return to Text

34 "Not Too Late: Improving Academic Outcomes Among Adolescents," Guryan J, Ludwig J, Bhatt MP, Cook PJ, Davis JMV, Dodge K, Farkas G, Fryer Jr RG, Mayer S, Pollack H, Steinberg L. NBER Working Paper 28531, March 2021, and *American Economic Review* 113(3), March 2023, pp. 738–765.
Return to Text

35 "Advancing the Agency of Adolescent Girls," Edmonds EV, Feigenberg B, Leight J. NBER Working Paper 27513, July 2020, and *The Review of Economics and Statistics* 105(4), July

2023, pp. 852–866.
Return to Text

36 "Sex, Power, and Adolescence: Intimate Partner Violence and Sexual Behaviors," Shah M, Seager J, Montalvao J, Goldstein M. NBER Working Paper 31624, November 2023.
Return to Text

37 "Local Exposure to School Shootings and Youth Antidepressant Use," Rossin-Slater M, Schnell M, Schwandt H, Trejo S, Uniat LM. NBER Working Paper 26563, December 2019, and *PNAS* 117(38), September 2020, pp. 23484–23489.
Return to Text

38 "Trauma at School: The Impacts of Shootings on Students' Human Capital and Economic Outcomes," Cabral M, Kim B, Rossin-Slater M, Schnell M, Schwandt H. NBER Working Paper 28311, January 2021.
Return to Text

39 "Office-Based Mental Healthcare and Juvenile Arrests," Deza M, Lu T, Maclean JC. NBER Working Paper 29465, November 2021, and *Health Economics* 31(S2), August 2022, pp. 69–91.
Return to Text

40 "Socioeconomic Status and Access to Mental Health Care: The Case of Psychiatric Medications for Children in Ontario Canada," Currie J, Kurdyak P, Zhang J. NBER Working Paper 30595, October 2022, and *Journal of Health Economics* 93, January 2024, Article 102841.
Return to Text

41 "Rules vs. Discretion: Treatment of Mental Illness in US Adolescents," Cuddy E, Currie J. NBER Working Paper 27890, October 2020.
Return to Text

42 "(Breaking) Intergenerational Transmission of Mental Health," Bütikofer A, Ginja R, Karbownik K, Landaud F. NBER Working Paper 31446, July 2023, and *The Journal of Human Resources* 59(S), April 2024, pp. S108–S151.
Return to Text

43 "Effects of Restrictive Abortion Legislation on Cohort Mortality Evidence from 19th Century Law Variation," Lahey JN, Wanamaker MH.

NBER Working Paper 30201, July 2022.
Return to Text

44 "How Far Is Too Far? New Evidence on Abortion Clinic Closures, Access, and Abortions," Lindo JM, Myers C, Schlosser A, Cunningham S. NBER Working Paper 23366, May 2017, and *The Journal of Human Resources* 55(4), October 2020, pp. 1137–1160.
Return to Text

45 "The Impacts of Reduced Access to Abortion and Family Planning Services on Abortion, Births, and Contraceptive Purchases," Fischer S, Royer H, White C. NBER Working Paper 23634, July 2017, and *Journal of Public Economics* 167, November 2018, pp. 43–68.
Return to Text

46 "The Economic Consequences of Being Denied an Abortion," Miller S, Wherry LR, Foster DG. NBER Working Paper 26662, January 2020, and *American Economic Journal: Economic Policy* 15(1), February 2023, pp. 394–437.
Return to Text

47 "The Hidden Cost of Firearm Violence on Infants In Utero," Currie J, Dursun B, Hatch M, Tekin E. NBER Working 31774, March 2024.
Return to Text

48 "Guns and Violence: The Enduring Impact of Crack Cocaine Markets on Young Black Males," Evans WN, Garthwaite C, Moore TJ. NBER Working Paper 24819, July 2018, and *Journal of Public Economics* 206, February 2022, Article 104581.
Return to Text

49 "Predicting and Preventing Gun Violence: An Experimental Evaluation of READI Chicago," Bhatt MP, Heller SB, Kapustin M, Bertrand M, Blattman C. NBER Working Paper 30852, January 2023, and *The Quarterly Journal of Economics* 139(1), February 2024, pp. 1–56.
Return to Text

50 "Post COVID-19 Test Score Recovery: Initial Evidence from State Testing Data," Halloran C, Hug CE, Jack R, Oster E. NBER Working Paper 31113, April 2023
Return to Text

51 "Effects of Daily School and Care Disruptions During the COVID-19 Pandemic on Child Mental Health," Gassman-Pines A, Ananat E, Fitz-Henley II J, Leer J. NBER Working Paper 29659, January 2022.
Return to Text

52 "In-Person Schooling and Youth Suicide: Evidence from School Calendars and Pandemic School Closures," Hansen B, Sabia JJ, Schaller J. NBER Working Paper 30795, December 2022, and *The Journal of Human Resources* 59(S), April 2024, pp. S227–S255.
Return to Text

53 "The US COVID-19 Baby Bust and Rebound," Kearney MS, Levine PB. NBER Working Paper 30000, July 2023, and *Journal of Population Economics* 36, July 2023, pp. 2145–2168.
Return to Text

54 "The COVID-19 Baby Bump: The Unexpected Increase in US Fertility Rates in Response to the Pandemic," Bailey MJ, Curie J, Schwandt H. NBER Working Paper 30569, August 2023.
Return to Text

Clearing the Air: Historical Air Pollution and Health

Karen Clay and Edson Severnini

Air pollution has serious and long-standing negative effects on human health. The primary focus of research on air pollution in the United States since the enactment of the Clean Air Act Amendments of 1990 has been the health implications of particulate matter. In comparison, there has been relatively little work on air pollution and health in historical periods, even though air pollution was much higher in earlier times than it is today. Research on historical air pollution can provide new evidence on the health consequences of air pollution in the United States and offer insights that may be relevant for policymaking in settings with high levels of air pollution, such as developing countries.

Our research focuses on four topics related to historical air pollution and health: the costs and benefits of expansion of coal-fired power generation as measured by infant mortality from 1938 to 1962; the interaction between historical air pollution and influenza pandemics in 1918, 1957–58, and 1968–69; the costs of the Clean Air Act for the electricity sector; and the benefits to fertility from the declines in airborne lead pollution starting in 1978, when lead was added as a criteria pollutant under the Clean Air Act.

Karen Clay

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His research interests lie at the intersection of energy and environmental economics, economic history, and labor economics. He focuses on examining the impacts of the expansion of energy access, pollution, and environmental regulation on local development, health outcomes, and firm behavior since the age of electrification. He is also interested in the impacts of climate change on air pollution, electricity generation, and infectious disease; the effects of economic activity on environmental outcomes; and racial issues in local labor markets and in higher education.

Severnini's research has been supported by the National Science Foundation, and his work has been published in the *American Economic Review*, *The Review of Economics and Statistics*, *AEA Papers and Proceedings*, and other journals. He received his PhD in economics from the University of California, Berkeley, his master's in economics from the Pontifical Catholic University of Rio de Janeiro, and his bachelor's in economics from the University of São Paulo.
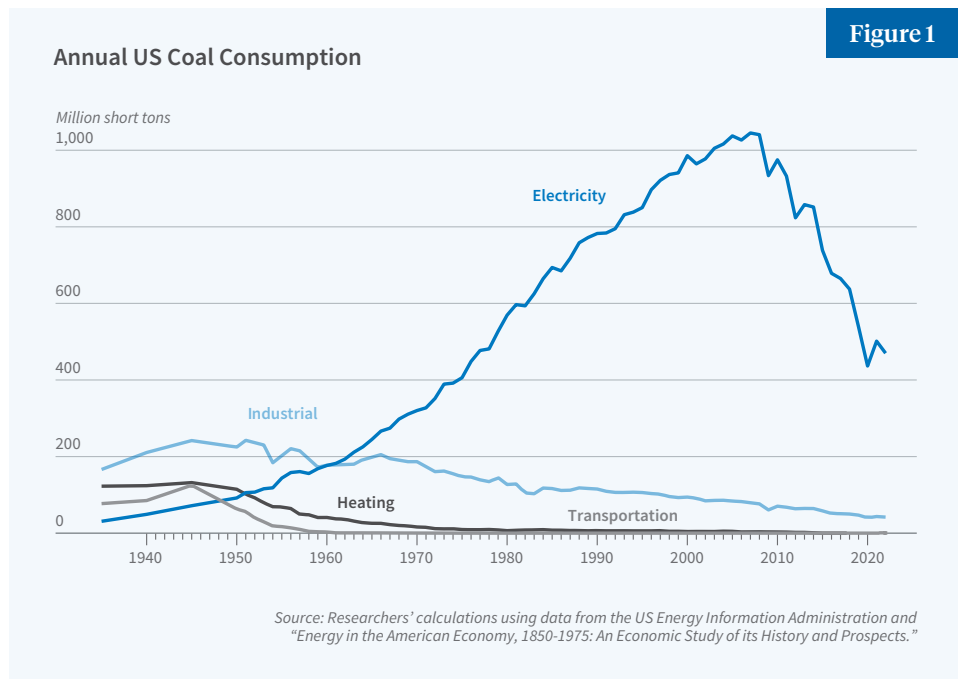
Coal-Fired Electricity and Infant Health

In the early twentieth century, coal was used across a range of sectors and was a major source of air pollution. Evidence summarized in a paper with Joshua Lewis shows that air pollution in cities was high.[1] Newspaper articles decried those high levels, and cities passed local legislation aimed at addressing the pollution problem. Local legislation was, by all accounts, ineffective.

Figure 1 shows the increase in coal consumption by the electricity sector over time and high levels of consumption by the industrial sector before 1970. Nearly all the coal was being burned without emissions controls, so more coal consumption translated into more air pollution. Air pollution in some areas became increasingly severe. This eventually led to the passage of federal legislation in 1955 and 1963 and to the Clean Air Act of 1970.

In other work, we investigate the trade-offs involved in the historical expansion of coal-fired electricity generation in the United States, particularly focusing on its health implications.[2] During the mid-twentieth century, the surge in coal-fired power generation played a pivotal role in local industrial growth and household electrification. However, this expansion also resulted in significant air pollution, raising concerns about its adverse health effects. By analyzing newly digitized data on coal-fired power plants alongside county-level infant mortality rates from 1938 to 1962, we shed light on the relationship between coal-fired generation, electricity access, and infant health.

Our study identifies a striking reversal in the relationship between coal-fired generation and infant mortality around 1950. Initially, coal-fired generation was associated with decreased infant mortality due to expanded electricity access and economic benefits, as shown in Figure 2. However, as the existing capacity of local generating facilities expanded and air pollution increased, the net health impact of expanding coal-fired generation turned negative. Our research finds that while

Figure 1

Annual US Coal Consumption

Source: Researchers' calculations using data from the US Energy Information Administration and "Energy in the American Economy, 1850-1975: An Economic Study of its History and Prospects."

coal-fired capacity expansions led to improvements in household electrification and modest employment growth, the overall health impacts were influenced by the level of exposure to plant emissions. These findings highlight the importance of policy evaluations of infrastructure investments over a long time horizon.

Our study also uncovers substantial heterogeneity in health outcomes based on baseline electricity access levels and local exposure to plant emissions. Counties with low initial access to electricity experienced no significant increase in infant mortality, suggesting that the benefits of expanded electricity generation might have outweighed the health costs of air pollution. Conversely, in counties with high baseline electricity access, coal capacity expansions were associated with a notable rise in infant mortality, demonstrating pollution-related health risks.

Air Pollution and Influenza Pandemics

One important way pollution can cause death is through its interaction

Figure 2

Coal-Fired Power Plants and Infant Mortality

Net effects on infant mortality

Circa 1950

Electricity benefits > pollution costs

Expanding coal-fired generation associated with decreased infant mortality

Pollution costs > electricity benefits

Expanding coal-fired generation associated with increased infant mortality

Access to coal-fired electricity

Source: "Canary in a Coal Mine: Infant Mortality, Property Values, and Tradeoffs Associated with Mid-20th Century Air Pollution," Clay K, Lewis J, Severnini E. NBER Working Paper 22155, April 2016, and Review of Economics and Statistics, 2024.

with infectious disease. The consequences of pollution are likely to be particularly significant during pandemics, such as those associated with influenza.

In joint work with Lewis, we examine excess mortality during the 1918 influenza pandemic.[3] Using a panel dataset covering infant and all-age mortality rates in 180 US cities from 1915 to 1925, our study links mortality to coal-fired electricity generation, which was a significant source of urban air pollution at the time. Employing a difference-in-differences approach, the analysis reveals that cities with higher coal usage experienced substantial increases in both infant and all-age mortality during the pandemic compared to cities with lower coal usage, resulting in an estimated 30,000 to 42,000 additional deaths attributed to pollution — 19 to 26 percent of total pandemic mortality. These findings underscore air pollution's contribution to the severity of the 1918 influenza pandemic, highlighting the importance of considering environmental factors in pandemic preparedness and response strategies.

In work with Lewis and Xiao Wang, we show that the introduction of Medicaid in 1965 significantly mitigated air pollution impacts on infant mortality during the 1968–69 influenza pandemic.[4] Drawing on the newly digitized data on coal-fired power plants mentioned previously, we use coal-fired electricity generation as a proxy for air pollution. Analyzing county-level infant mortality data from 1950 to 1976, we employ a triple-difference estimation strategy to assess the deviation from trend in infant mortality during the 1968–69 pandemic across counties with varying exposure levels to the Medicaid expansion and differing Medicaid eligibility across states. The effects are quantitatively significant, with the introduction of Medicaid estimated to have averted over 2,500 infant deaths nationwide during the 1968–69 pandemic, suggesting a broader local health externality wherein improved healthcare access reduced disease transmission within the population.

The Clean Air Act of 1970

The environmental and health impacts of polluting activities led to the passage of the Clean Air Act (CAA) in 1970. A long-standing question about the costs of the CAA is its impact on key sectors like electricity. In work with Akshaya Jha and Lewis, we call attention to the importance of accounting for anticipatory behavior by polluting firms when assessing these impacts.[5] By leveraging the new dataset on fossil-fuel power plant use spanning 1938 to 1994, we uncover significant anticipatory responses by electric utilities. Nonattainment designations under the CAA resulted in substantial and enduring decreases in productivity among coal-fired power plants, particularly those built before the 1963 CAA that signaled impending federal regulation but was difficult to enforce. The strategic responses of utilities are evident in the design and siting decisions of plants constructed after 1963. We find that the aggregate productivity losses and the associated costs of the CAA borne by the power sector were substantially mitigated by the reallocation of output away from older, less-productive power plants.

Anticipation has implications for understanding the effects of the CAA on air pollution and in turn on health. Figure 3 shows that the level of total suspended particulates (TSP) was already falling prior to the 1970 CAA. Under the CAA, counties were designated as in or out of attainment with National Ambient Air Quality Standards. It also shows that the reduction in TSP levels in nonattainment counties surpassed that of attainment counties following the 1977 amendments. When Maureen Cropper, Nicholas Muller, Yongjoon Park, and Victoria Perez-Zetune examined whether nonattainment counties experienced larger TSP reductions in the 1970s compared to attainment counties, they found that the parallel trends assumption, crucial for causal inference in difference-in-differences analysis, had been violated.[6] Anticipation might explain these preexisting trends.

Air Lead Pollution

Originally, the US Environmental Protection Agency (EPA) regulated five criteria pollutants under the 1970 CAA — particulate matter, ambient ozone, carbon monoxide, nitrogen dioxide, and sulfur dioxide. Following a lawsuit by the Natural Resources Defense Council, the EPA in 1978 established National Ambient Air Quality Standards for airborne lead. Lead is a highly toxic metal known to cause a range of adverse health outcomes, particularly in children and fetuses. In adults, lead exposure has been linked to hypertension, cardiovascular dis-

Figure 3

Clean Air Act and Total Suspended Particulates, by Attainment Status

μg/m3

Passage of Clean Air Act in 1970

Amendments to Clean Air Act in 1977

Counties not in Attainment with National Ambient Air Quality Standards

Counties in Attainment with National Ambient Air Quality Standards
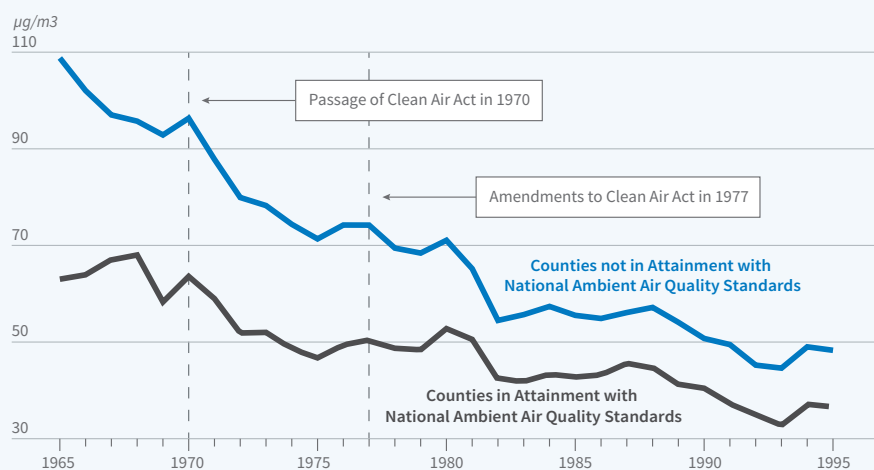
Source: Researchers' calculations using data from the US Environmental Protection Agency, obtained through a Freedom of Information Act (FOIA) request.

ease and mortality, miscarriages, and damage to the reproductive system.

In work with Alex Hollingsworth, we review the surprisingly small quasi-experimental literatures on lead and fertility, lead and infant mortality, and lead and infant birth outcomes.[7] Our research with Margarita Portnykh examines the impact of airborne lead on fertility rates using US county-level data from 1978 to 1988.[8] Over this period, airborne lead exposure decreased due to regulatory efforts to reduce air pollution, particularly lead emissions from gasoline. The study provides the first causal evidence of a relationship between lead exposure and fertility rates in the general population. Instrumental variable estimates indicate that a decrease in airborne lead levels caused an increase in both the general fertility rate and the completed fertility rate, equivalent to about six percent of mean fertility. Additionally, we explore the relevance of these findings more recently by estimating the effect of historically accumulated lead in topsoil on fertility in the 2000s, revealing that counties with higher lead concentrations in their soil had significantly lower general fertility rates. This finding suggests that lead exposure may continue to impact fertility today, not only in the United States but in other countries with significant lead contamination in the air and topsoil.

Conclusion

The research summarized here provides new evidence on historical air pollution and health in the United States. Because the analysis of air pollution and other types of pollution in US history is relatively new, there are many opportunities for additional research. One advantage of working on the US topics is that there are data spanning relatively long periods of time, including periods without and with regulation. Further, historical pollution levels in the US were high and so are more similar to levels in developing countries than they are to contemporary pollution levels. Thus, research on historical pollution can both quantify the costs and benefits of historical policies pertaining to air pollution in the US and offer insights that may be relevant for policymaking in developing countries.

1 "The Historical Impact of Coal on Cities," Clay K, Lewis JA, Severnini ER. NBER Working Paper 31365, June 2023, and *Regional Science and Urban Economics* 107, July 2024, Article 103951.
Return to Text

2 "Canary in a Coal Mine: Infant Mortality, Property Values, and Tradeoffs Associated with Mid-20th Century Air Pollution," Clay K, Lewis J, Severnini ER. NBER Working Paper 22155, April 2016, and *Review of Economics and Statistics* 106(3), May 2024, pp. 698–711.
Return to Text

3 "Pollution, Infectious Disease, and Mortality: Evidence from the 1918 Spanish Influenza Pandemic," Clay K, Lewis J, Severnini ER. NBER Working Paper 21635, May 2018, and *Journal of Economic History* 78(4), October 2018, pp. 1179–1209.
Return to Text

4 "The Value of Health Insurance during a Crisis: Effects of Medicaid Implementation on Pandemic Influenza Mortality," Clay K, Lewis JA, Severnini ER, Wang X. NBER Working Paper 27120, May 2022, and *Review of Economics and Statistics* 1-31, September 2022.
Return to Text

5 "Impacts of the Clean Air Act on the Power Sector from 1938–1994: Anticipation and Adaptation," Clay K, Jha A, Lewis JA, Severnini ER. NBER Working Paper 28962, December 2022.
Return to Text

6 "The Impact of the Clean Air Act on Particulate Matter in the 1970s," Cropper M, Muller N, Park Y, Perez-Zetune V. *Journal of Environmental Economics and Management* 121, September 2023, Article 102867.
Return to Text

7 "The Impact of Lead Exposure on Fertility, Infant Mortality, and Infant Birth Outcomes," Clay K, Hollingsworth A, Severnini ER. NBER Working Paper 31379, June 2023, and forthcoming in the *Review of Environmental Policy and Economics*.
Return to Text

8 "Toxic Truth: Lead and Fertility," Clay K, Portnykh M, Severnini ER. NBER Working Paper 24607, June 2019, and *Journal of the Association of Environmental and Resource Economists* 8(5), September 2021, pp. 975–1012.
Return to Text

Organizational Approaches to Increased Worker Wellbeing and Productivity

Anant Nyshadham and Achyuta Adhvaryu

Negotiations between workers and firm management are a defining feature of labor markets around the world. By many measures, labor relations have deteriorated substantially in recent years, often leading to strikes. In the United States, there were nearly 350 labor actions last year, the most in two decades, followed by 124 in the early months of 2024. Most of these actions are related to differences over worker compensation, benefits, and amenities.

Organizational economics is premised on the notion that firms are not monoliths but rather groups of individuals attempting to coordinate actions towards a set of common goals. Firm performance, then, depends critically on the preferences, incentives, and constraints of individuals, and the nature of their interaction within the organization. Understanding these many factors can help managers and workers create structures and policies that improve collective bargaining outcomes and, more generally, lead to improvements in both worker wellbeing and organizational productivity. Our work takes an organizational approach to understanding the impacts of increased investment in workers and improvements in firm capacity.

In the last decade, a dramatic increase in the availability of data on productivity and on the workplace behaviors of workers and managers has enabled much more granular study of the drivers of worker productivity across varying environments, as well as the rigorous empirical testing of seminal theories of interactions and relationships — both among workers and

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Adhvaryu is a cofounder of Good Business Lab, a global nonprofit fostering rigorous research and action at the intersection of worker wellbeing and business interests. His research focuses on firms' decision-making and productivity in emerging markets, healthcare delivery in low-income contexts, and the long-run economic impacts of early life events. He has worked extensively across East and West Africa, South Asia, Mexico, and the United States.

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Nyshadham received his bachelor's degree from the Wharton School of the University of Pennsylvania and his PhD from Yale University. His recent work focuses on how firm and worker characteristics and decision-making affect individual and organizational performance, particularly in developing countries. His work spans many industries, including auto, electronics, garment manufacturing, food, retail, banking, and hospitality service, and many countries, including Colombia, India, Thailand, Indonesia, Mexico, Kenya, Tanzania, and the US.

across the organizational hierarchy — that determine team performance. Our work over the last few years with various collaborators has leveraged rich administrative data and close partnerships with private sector firms across industries and contexts to contribute to this area of inquiry. We address the importance of the work environment for productivity, the targeting of managerial attention and effort, investments in training, managing worker expectations and potential disappointment, and the value of rapport in organizations.

The Work Environment

The degree to which workers feel comfortable in their work environment can contribute to their productivity. Our work with Namrata Kala combines daily production line-level data from Indian garment factories with weather data to estimate a negative, nonlinear productivity-temperature gradient.[1] The impact on productivity can be seen starkly in the gradient between factory line-level productivity and the ambient temperature, with productivity sharply dropping off at precisely the human body's heat stress threshold.

We establish that these conditions are malleable and can be controlled by the firm to influence worker performance. For example, we find that adopting energy-efficient LED lighting, which dissipates less heat on garment factory floors, raises productivity on hot days by dropping the ambient temperature in the factory below the body's heat stress threshold. Such manipulation of the work environment can be surprisingly valuable to a firm. Using management's cost data, we estimate that the payback period for LED adoption when accounting for productivity co-benefits is only one-third of the payback period that omits them. The average factory in our data gains about $2,880 in power consumption savings and about $7,500 in productivity gains from adopting LED lights.

Air quality in the workplace can also impact productivity. Pairing productivity data from a garment firm with granular measures of air pollution,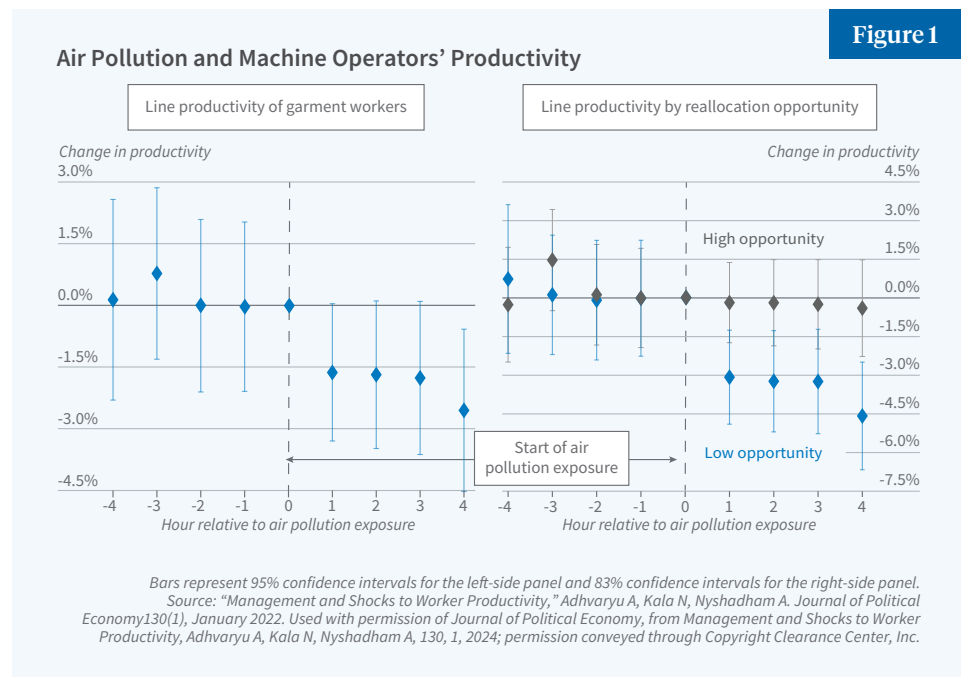 in another paper with Kala, we show that machine operator productivity in garment factories drops acutely when workers are exposed to above-average fine particulate matter concentrations in the air.[2] We also show that if managers have enough workers who can be assigned to multiple operations, they can respond by reallocating particularly sensitive workers to improve worker-to-task matches, mitigating team productivity losses. However, whether and how well the manager can take advantage of these opportunities depends critically on how well the manager understands which workers are more resilient to this type of shock. We find that many managers do not devote the necessary level of attention to enable them to engage in high-impact worker-task reallocations.

Attention and Other Behavioral Determinants of Productivity

The importance of how managers allocate their attention can also be observed in the study of how quickly and effectively teams learn in the course of producing a given order. Combining granular garment production data with survey data on managers across 120 production lines in India, our work with Jorge Tamayo documents substantial productivity dispersion both across teams producing overlapping products and within individual teams over the course of production runs.[3]

We structurally link this variation to a comprehensive assessment of supervisor quality. We find that factors related to managerial attention and control — the latter being managers' beliefs in their ability to affect outcomes rather than conceding outcomes to fate — are most important for enabling line productivity. While both dimensions affect all points along the productivity learning curve of the team, a manager's sense of control is most important for starting orders at a higher initial productivity level, while attention most affects the rate of learning. Both managerial attention and control prove to be more impactful for determining productivity than traditionally emphasized dimensions like cognitive skills and tenure.

We find that technology can be leveraged to direct managerial attention and effort to the most impactful problems to solve. However, managers still must analyze the new information provided by the technology and choose their response strategies. In other work with Tamayo, we study the introduction of a technology that enabled managers to track the progress of drive-through orders in a large quick-service restaurant chain.[4] Sales initially increased by five percent, driven by managerial training inputs, but the impact diminished by half within two months. Some managers invested in refreshing the training of workers at key workstations,

Figure 1

Air Pollution and Machine Operators' Productivity

Line productivity of garment workers

Line productivity by reallocation opportunity

*Bars represent 95% confidence intervals for the left-side panel and 83% confidence intervals for the right-side panel.
Source: "Management and Shocks to Worker Productivity," Adhvaryu A, Kala N, Nyshadham A. Journal of Political Economy 130(1), January 2022. Used with permission of Journal of Political Economy, from Management and Shocks to Worker Productivity, Adhvaryu A, Kala N, Nyshadham A, 130, 1, 2024; permission conveyed through Copyright Clearance Center, Inc.*

while others provided new training for workers elsewhere in the store. The former "quality" strategy proved effective, yielding large and persistent sales improvements. The latter "quantity" strategy yielded modest initial sales gains that diminished over time despite continued investment. Our results highlight that even the gains from technological improvements depend fundamentally on human interaction with the technology.

Expectations and Disappointment

Workers have expectations and experience disappointment as well, and we find that even if employers understand the relationship between human comfort and productivity and decide to invest in improving working conditions, they must take care to set worker expectations appropriately or risk losing the benefits altogether.

Our work with Huayu Xu reports the impacts of a randomized housing quality improvement intervention among Indian migrant workers.[5] Despite modest improvements in conditions, respondents experienced a decline in satisfaction and a large increase in psychological distress as a result of treatment. In contrast, residents who faced the same treatment-induced variation in living conditions as the original sample, but who arrived after treatment had already been initiated, had increased satisfaction. Impacts on turnover echo these patterns. We interpret this as evidence of reference dependence: Residents who were primed to expect larger-than-realized improvements in living conditions suffered utility losses, while exposed but unprimed residents experienced gains.

Similarly, when determining wage increases, employers can observe substantial disappointment depending on workers' expectations ahead of the wage increase, but enabling worker voice in the aftermath can help to mitigate adverse consequences. In work with Teresa Molina, just after what proved to be a disappointing wage hike, we chose workers at random to participate in an anonymous survey in which they were asked for feedback on job conditions, supervisor performance, and overall job satisfaction.[6] Enabling voice in this manner reduced turnover and absenteeism after the hike, particularly for the most disappointed workers. In a follow-up study with Smit Gade and Molina, we find that simply having access to a technology that enables voice can deliver effects of similar magnitudes on worker turnover and absenteeism even when actual utilization is low.[7]

Interactions and Relationships between Workers

In a series of studies, we document how the quality of interactions and relationships between workers can amplify or attenuate the impacts of these human conditions on performance at the team level. In work with Kala, we find that the skills required to effectively collaborate in teams are not uniformly present across workers, but that workers can be trained in these skills.[8] The value of training workers in these types of soft skills can be surprisingly high, even when the tasks workers perform seem inherently independent, such as operating a machine. We estimate productivity gains of 13.5 percent from randomized on-the-job soft skills training among machine operators in Indian garment factories, but these productivity gains are most pronounced when trainees work on joint operations alongside other coworkers, particularly coworkers who also were trained. Furthermore, productivity is mirrored among nontreated coworkers on the production line, consistent with gains being driven by improved teamwork and collaboration. Heterogeneous treatment effects indicate that improvements in the teamwork and collaboration skills of workers substitute for supervisor attention, but that the training is complemented by the degree to which supervisors act autonomously to adjust production processes in response to issues raised by workers.

In work in a similar context with Emir Murathanoglu, we test whether investments in training supervisors in more-autonomous problem-solving and decision-making and more atten-

Figure 2

Productivity Payoffs From Training Supervisors

Change in supervisor productivity

Supervisors with strong recommendations — Supervisors with weak recommendations

Managers were asked to nominate members of their supervisory team for training. Bars represent 95% confidence intervals. Source: "On the Allocation and Impacts of Managerial Training," Adhvaryu A, Murathanoglu E, Nyshadham A. NBER Working Paper 31335, June 2023.

tive monitoring of and communication with workers can have productivity impacts as well.[9] While this training improved both manager knowledge of effective practices and the productivity of the teams they manage, the potential for human intervention — or in this case disruption — once again appears. Consistent with standard practice for training investments within firms, prior to the training assignment we asked middle managers, who sit above production line supervisors in the hierarchy, to nominate members of their supervisory team for training. Program access was randomized within these recommendation rankings. Highly recommended supervisors experienced no productivity gains while less recommended supervisors' productivity increased by 12 percent relative to controls.

This was not due to poor information or favoritism. Instead, consistent with the fact that supervisor turnover comes at a large effort cost to middle managers due to gaps in coverage and onboarding, middle managers prioritized retention over productivity impacts. Indeed, treated supervisors were 15 percent less likely to quit than controls, a gain that was most pronounced for highly recommended supervisors. This scope for misalignment of incentives across the hierarchy in organizations and the misallocation of investments such as supervisor train-

Training and Retention Rate of Supervisors
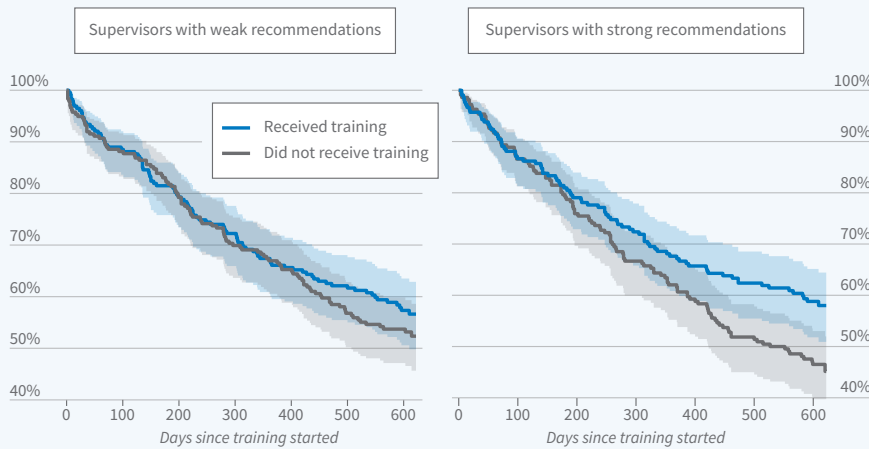
Middle managers, who sit above production line supervisors, were asked to nominate member of their supervisory team for training. Shaded areas represent 95% confidence intervals.
Source: "On the Allocation and Impacts of Mangerial Training," Adhvaryu A, Murathanoglu E, Nyshadham A. NBER Working Paper 31335, June 2023.

ing can help explain the persistence of low managerial quality in firms, particularly in the developing world.

While the aforementioned study documents ways in which the hierarchy can hinder organizations' productivity, there are many ways in which hierarchical structure can help allocate tasks within organizations efficiently. Seminal theories of how knowledge should be distributed across the hierarchy have existed for decades, but empirical evidence of how organizations might endogenously change their shape as objectives change has been hard to come by. In recent work with Vittorio Bassi, Nicolas Torres, and Tamayo, we use daily administrative data from a leading automobile manufacturer to study the organizational impacts of introducing greater task complexity in the form of new models in the auto assembly line.[10] We first show that costly defects per vehicle spike when new models are introduced. As a response, the firm trains lower- and mid-level employees in problem-solving skills and encourages workers at these levels to solve the more complex problems that arise. In this sense, the organization takes on a less pyramidal shape in their knowledge hierarchy with fewer layers and a smaller span of control at each managerial level.

This rigorous empirical evidence, made possible by access to granu-

lar high-frequency personnel data on team structures, highlights the need for an extension to the classic theory of knowledge-based hierarchies. We develop such an extension that reconciles our novel empirical results by allowing the firm to invest in its training resources in a dynamic context in which product models become increasingly more complex at regular intervals, necessitating more knowledgeable, top-heavy teams, and the volume of production expands to take advantage of this greater stock of knowledge in the organization.

In a related study with Jean-François Gauthier and Tamayo, we document that peer managers of different teams in an organization can determine how well production issues can be addressed.[11] For example, managers can borrow and lend resources, including workers, to cope with productivity shocks. One such shock which is ubiquitous is worker absenteeism. In the Indian garment manufacturing context, we document that worker absenteeism shocks are frequent, often large, and weakly correlated across teams, which substantially reduces team productivity. Together these facts imply gains from sharing workers. Accordingly, we study how relational contracts help managers cope with these worker absenteeism shocks.

Using unique data that tracks trans-

fers of workers across teams, we show that managers respond to worker absenteeism shocks by lending and borrowing workers in a manner consistent with relational contracting, but many potentially beneficial transfers are unrealized because managers' primary relationships are with a very small subset of potential partners. In this sense, we once again find that human tendencies determine how well this productive cooperation can be leveraged. Building trusting relationships is critical, as emphasized by seminal models of relational contracting. Physical distance on the factory floor and demographic differences — in age, gender, and education — can increase the costs of building this trust.

Trust is perhaps even more important in the worker-manager relationship. Workers and their managers interact each day and must cooperate in a myriad of ways to ensure smooth and productive operations. The rapport between the manager and worker can be a strong determinant of how well this cooperation can be achieved and team performance enhanced. In a study with Tamayo of the importance of rapport in organizations, we use personnel and productivity data from the universe of a large fast food chain in Colombia to study whether mismatched gender identity between managers and workers affects teams' ability to deal with demand shocks.[12] We leverage the staggered expansion across the country of a leading food delivery platform to study how well managers are able to adjust worker staffing to resulting increases in demand. In this setting, managers spend considerable time and attention on training workers and allocating them to shifts to meet variable demand. Worker cooperation is critical for the manager to successfully accomplish both of these tasks.

We show that stores in which managers and workers share predominantly the same gender have better communication and rapport between their managers and workers and more broadly skilled workers who are more easily reallocated across shifts. These stores exhibit the largest impacts on observed worker reallocation following the delivery platform implementation,

and consequently, realize nearly three times the sales gains of stores in which predominantly male managers supervise predominantly female workers.

The scope for trust to drive productivity is apparent between organizations as well, and organizations may even tax productivity to invest in building and maintaining this trust. For example, in a recent study with Bassi and Tamayo, we leverage the high degree of worker mobility across production lines in a large Indian manufacturer and data on daily worker productivity to document that more-productive workers tend to be matched with less-productive managers.[13] Estimates of the production technology, however, reveal that productivity would increase by up to 4 percent if the opposite pattern of worker-manager matching were implemented. Coupling these findings with a survey of managers and data on orders from multinational brands, we document that this forfeiting of productivity arises, at least in part, because maintaining valuable relationships with buyers provides strong incentives to avoid delays on orders by letting any given production line fall too far behind its targets. These results highlight how supply chain relationships shape production decisions at the firm level by affecting the internal organization of labor.

Low-Income Country Contexts

Much of our work on these topics has focused on firms operating in low-income country contexts. This perhaps reflects the greater potential in these contexts for improvements in physical environments, workers' skills, managerial practices, and workplace relationships to increase productivity. Temperatures are hotter and air quality is poorer in these settings. Schools at all levels are less likely to prioritize professional and soft skills, and opportunities for internships and other experiences to develop these skills are fewer and more competitive. Managerial quality is lower even in the largest firms operating in global supply chains, and contracting is weaker with much more limited enforcement. In this sense, the opportunity to study these phenomena is greatest in low-income country contexts. But perhaps most importantly, the potential for impactful intervention to enhance the productive capacity and earning potential of workers is also greatest in these contexts. The studies highlighted here can hopefully serve as a springboard for future work in this area.

1 "The Light and the Heat: Productivity Co-benefits of Energy-Saving Technology," Adhvaryu A, Kala N, Nyshadham A. NBER Working Paper 24314, February 2018, and *The Review of Economics and Statistics* 102(4), October 2020, pp. 779–792.
Return to Text

2 "Management and Shocks to Worker Productivity," Adhvaryu A, Kala N, Nyshadham A. NBER Working Paper 25865, May 2019, and *Journal of Political Economy* 130(1), January 2022, pp. 1–47.
Return to Text

3 "Managerial Quality and Productivity Dynamics," Adhvaryu A, Nyshadham A, Tamayo J. NBER Working Paper 25852, May 2019, and *The Review of Economic Studies* 90(4), July 2023, pp. 1569–1607.
Return to Text

4 "An Anatomy of Performance Monitoring," Adhvaryu A, Nyshadham A, Tamayo J. Harvard Business School Working Paper No. 22-066, 2022.
Return to Text

5 "Hostel Takeover: Living Conditions, Reference Dependence, and the Well-being of Migrant Workers," Adhvaryu A, Nyshadham A, Xu H. *Journal of Public Economics* 226, October 2023, Article 104949.
Return to Text

6 "Expectations, Wage Hikes, and Worker Voice: Evidence from a Field Experiment," Adhvaryu A, Molina T, Nyshadham A. NBER Working Paper 25866, May 2019. Published as "Expectations, Wage Hikes, and Worker Voice" in *The Economic Journal* 132(645), January 2022, pp. 1978–1993.
Return to Text

7 "Sotto Voce: The Impacts of Technology to Enhance Worker Voice," Adhvaryu A, Molina T, Nyshadham A. *The Economic Journal*, forthcoming
Return to Text

8 "The Skills to Pay the Bills: Returns to On-the-Job Soft Skills Training," Adhvaryu A, Kala N, Nyshadham A. NBER Working Paper 24313, February 2018. Published as "Returns to On-the-Job Soft Skills Training" in *Journal of Political Economy* 131(8), August 2023, pp. 2165–2208.
Return to Text

9 "On the Allocation and Impacts of Managerial Training," Adhvaryu A, Murathanoglu M, Nyshadham A. NBER Working Paper 31335, June 2023.
Return to Text

10 "Organizational Responses to Product Cycles," Adhvaryu A, Bassi V, Nyshadham A, Tamayo J, Torres N. NBER Working Paper 31582, August 2023.
Return to Text

11 "Absenteeism, Productivity, and Relational Contracts Inside the Firm," Adhvaryu A, Gauthier J, Nyshadham A, Tamayo J. NBER Working Paper 29581, December 2021, and forthcoming in the *Journal of the European Economic Association*.
Return to Text

12 "Rapport in Organizations: Evidence from Fast Food," Adhvaryu A, Howell P, Nyshadham A, Tamayo J. Harvard Business School Working Paper No. 24-032, 2023.
Return to Text

13 "No Line Left Behind: Assortative Matching Inside the Firm," Adhvaryu A, Bassi V, Nyshadham A, Tamayo J. NBER Working Paper 27006, April 2020.
Return to Text

The Startup Cartography Project

Jorge Guzman and Scott Stern

Academic researchers and policymakers have long recognized that high-growth startups contribute disproportionately to innovation and economic performance. The outsize success of regions such as Silicon Valley has inspired economists to study the link between entrepreneurship and regional economic performance, and economic developers to promote initiatives that nurture the establishment and expansion of new firms.

But evaluating entrepreneurial "ecosystems" raises an empirical challenge: How can one measure the state of an entrepreneurial ecosystem at a point in time, track changes in that system over time, or make comparisons across or within regions at different levels of geographic granularity? This challenge is particularly salient given that the geographical unit of analysis might vary from a few blocks around a university campus to cities, states, or even countries, and that the outcomes from any given cohort of startups within that region are highly skewed and significantly lagged in time.

By and large, previous assessments of entrepreneurial ecosystems focused on measuring the number of new firms founded at a given point in time within a fixed geographic domain, or conditioned the study on firms that satisfied a set of predetermined performance criteria, such as the receipt of venture funding or achievement of certain employment levels. While these approaches offer valuable insights, they do not fully address the challenges of skewness, lagged performance, and geographic granularity. While a quantity-based approach tends to abstract away differences among firms at the time of founding (which might be related to later differences in performance) conditioning on intermediary outcomes such as the receipt of venture capital conflates the measurement of the rate of entrepreneurship with that cohort's subsequent performance. If the rate of venture financing in a given region is low, does that imply that there is too little venture capital, or are there too few firms with the potential to attract such financing?

A Choice-Based Predictive Analytics Approach

Our work was initially motivated by a debate about both the level of and changes in the rate of entrepreneurship in the United States. On the one hand, data drawn from the US Census Bureau identified that while the bulk of net new job creation resulted from employment growth by young firms, the United States had experienced a long secular decline in the rate of new firm formation.[1] At the same time, the rate of private financing of firms with high growth potential — such as early-stage venture capital — was highly cyclical and had increased significantly over time.[2] This contrast led to seemingly puzzling results: benchmarks of regional entrepreneurial ecosystems would regularly highlight locations with high rates of new firm formation, such as Montana and Miami, that were at

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variance with assessments that focused on active risk capital markets, such as those in Silicon Valley or Boston.

Our research is premised on one foundational insight: the measurement of entrepreneurship benefits from estimating entrepreneurial "quality" as part of any metric. This approach combines three interrelated insights. First, state-level business registration records, which are the legal documents filed by founders to establish a company, provide rich and timely data about new firm formation. Second, business registration records, along with other data linked through location and name matching, provide information about the founders' choices at or near the time of founding. A founder using the term "restaurant" in their firm name presumably intends to run a restaurant — a domain with limited growth potential — while founders who include the term "biotechnology" have ambitions with higher growth potential. Applying for formal intellectual property rights, such as a copyright or patent, and investing in a higher form of corporate governance, for example, by registering the firm as a corporation under Delaware jurisdiction, reflect early choices by a founder that signal that founder's ambitions for the growth potential of their firm. Finally, extreme growth events, such as an initial public offering or large acquisition within a certain time frame, are observable, making it possible to map the likelihood of these growth events against the observed choices of business registrants across the population of business registrants.

We first experimented with this approach in two proof-of-concept studies. In one, we use this methodology to capture the variation in the quantity and quality of entrepreneurship across California, demonstrating that the approach infers both the location of Silicon Valley relative to Southern California as well as variation within that region.[3] In the second, we use data from Massachusetts to illustrate how the approach can illuminate the micro-geography of entrepreneurship and chart the evolution of an entrepreneurial ecosystem over time.[4]
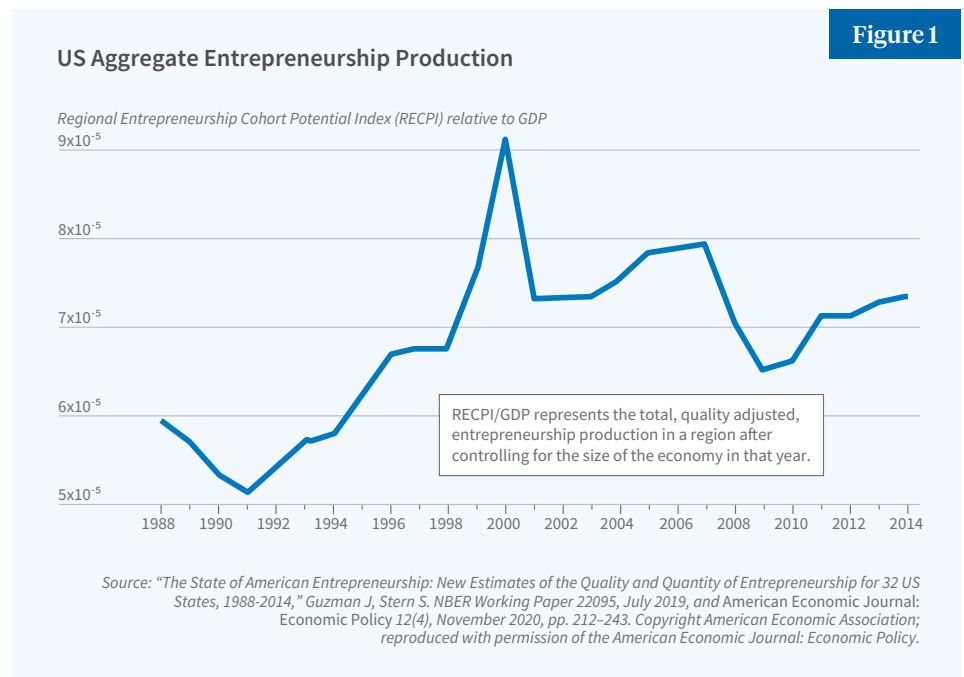
The Startup Cartography Project Database and Key Findings

Following our proofs of concept, we scaled this methodology by examining a dataset from across the US and over an extended period of time.[5,6] Along with our regular collaborator Catherine Fazio as well as other collaborators on particular projects, we have developed the Startup Cartography Project (SCP), which combines state-level business registration records with predictive analytics to advance a set of novel metrics for the United States. With R. J. Andrews, Fazio, and Yupeng Liu, we construct a comprehensive and publicly accessible set of entrepreneurial ecosystem statistics for 49 states over the period 1988–2014 and 46 states through 2016.[7] The SCP is accessible to researchers at multiple levels of aggregation, including state, metropolitan statistical area, county, and zip-code level, and includes a dynamic mapping tool that enables users to visualize both the quality and quality of entrepreneurship by year down to the level of individual street addresses.

We use data from 32 states to first document the correlation between startup characteristics and the probability of growth. For example, a new firm organized as a corporation that registers in Delaware and files for a patent within a year of its launch is 84 times more likely to grow than a startup organized as a partnership or LLC and registered in its home state. These positive associations are relatively stable over time. We then leverage this predictive analytic approach to formulate four economic statistics that reliably predict across years and multiple levels of geographic aggregation: the number of new firms founded within a cohort, the Startup Formation Rate; the average growth potential of a cohort of new firms, the Entrepreneurial Quality Index; the number of growth outcomes expected in a given region, the Regional Entrepreneurship Cohort Potential Index (RECPI); and the ability of a given region to convert entrepreneurial potential into realized growth, the Regional Entrepreneurship Acceleration Index. Our quality-adjusted estimates reveal a nuanced and distinct picture. The rate of high-growth-potential entrepreneurship, captured by RECPI, follows a cyclical pattern sensitive to economic and capital market conditions. This is shown in Figure 1, which highlights the importance of accounting for entrepreneurial potential when assessing the "state" of entrepreneurship across regions or over time.

Our results suggest that a small number of governance and intellectual property characteristics predict firm quality. In an out-of-sample test, 54 percent of realized growth outcomes, and nearly 37 percent in the top 1 per-

Figure 1

US Aggregate Entrepreneurship Production

Regional Entrepreneurship Cohort Potential Index (RECPI) relative to GDP

RECPI/GDP represents the total, quality adjusted, entrepreneurship production in a region after controlling for the size of the economy in that year.

cent of the estimated quality distribution, occur in the top 5 percent of our estimated quality distribution. Given the extremely skewed nature of entrepreneurial quality, nearly 4,000 local limited liability companies — the modal firm in our data — are associated with the same quality potential as a single Delaware corporation with an early patent and trademark.

The SCP can be used to assess the impact of institutions, policies, and the broader economic environment on both the quantity and quality of entrepreneurship. For example, in "The Impact of State-Level R&D Tax Credits on the Quantity and Quality of Entrepreneurship," we examine how the staggered rollout of different state-level tax credits, specifically, the R&D tax credit and the investment tax credit, impacts different types of entrepreneurship.[8] Though the state-level R&D tax credit has largely been structured to enhance innovation expenditures by *established* organizations, which can use the credit to reduce their tax liability, the introduction of these credits increases both the quantity and the quality-adjusted quantity rate of entrepreneurship in equal proportion over time.[9] We find an increase of about 20 percent over 10 years. However, the R&D tax credit does not seem to help startups realize growth outcomes at a higher rate. In contrast, the effect of the investment tax credit, which mostly helps established firms, is negative.

The data created under the SCP have been used to apply a similar approach to assessing a wide range of alternative institutions and policies. For example, Valentina Tartari and Stern leverage significant changes over time in federal government commitments to universities and national labs to document the impact of federal research expenditures at universities on the quality-adjusted quantity of entrepreneurship within that local university ecosystem.[10] Other studies have used SCP data to understand how expanded opportunities for "gig" work affect local startup rates, the impact of angel tax credits on the quantity and quality-adjusted quantity of entrepreneurship, the persistence of entrepreneurial culture, and the im-

Research and Development Incentives and the Quality of Entrepreneurship

Change in the RECPI, relative to year R&D credit introduced

State-level R&D tax credit introduced

Years since R&D credit introduced

Bars represent 95% confidence intervals.
Source: "The Impact of State-Level R&D Tax Credits on the Quantity and Quality of Entrepreneurship," Fazio C, Guzman J, Stern S.
NBER Working Paper 26099, July 2019, and Economic Development Quarterly 34(2), April 2020, pp. 188–208.

Figure 2

Figure 3

Investment Tax Credit and the Quality of Entrepreneurship

Change in the RECPI, relative to year investment tax credit introduced

State-level investment tax credit introduced

Years since investment tax credit introduced

Bars represent 95% confidence intervals.
Source: "The Impact of State-Level R&D Tax Credits on the Quantity and Quality of Entrepreneurship," Fazio C, Guzman J, Stern S.
NBER Working Paper 26099, July 2019, and Economic Development Quarterly 34(2), April 2020, pp. 188–208.

pact of social networks and locations on the rate and composition of startup formation.[11, 12, 13, 14]

Real-Time Assessment

Since state-level business registration records are publicly accessible legal documents, it is possible, subject to cost and technology limitations, to use them to measure changes in entrepreneurial founding rates at a high level of granularity and on an almost real-time basis. For example, in the wake of the COVID-19 pandemic, we constructed

descriptive but granular statistics for eight representative states to gain preliminary insight into how the pandemic and federal relief packages influenced the rate of entrepreneurship.[15] We found that lockdowns led to steep declines in the formation rate of new businesses, followed by a rapid recovery and rise in new business registrations beyond 2019 levels. We also found that the passage and implementation of major federal relief packages, such as the CARES Act, were associated with higher startup formation rates. Strikingly, new local businesses, not

high-growth-potential firms, in higher-income predominantly Black neighborhoods drove this rebound and persistent recovery in startup formation.

Startup formation in 2020 relative to 2019 in New York City is illustrative. The recovery and expansion in startup formation in 2020 was centered in the Bronx and Brooklyn, while startup formation rates in lower Manhattan did not increase. This pattern highlights the potential of minority business enterprise to contribute to the United States' economic recovery.

Entrepreneurship as a Lens on Perceptions of Economic Opportunity

Beyond their utility as a measurement tool, granular and individualized data on startup choices can provide empirical insight into the behavioral drivers of entrepreneurship itself. With a team of collaborators, Guzman has analyzed whether individuals become entrepreneurs based on their own partisan beliefs about the future of the economy.[16] While Republicans start more firms than Democrats in general, this "partisan gap" is time varying. Republicans increase their relative entrepreneurship during Republican administrations and decrease it during Democratic administrations, amounting to a partisan reallocation of 170,000 new firms over our 13-year sample.
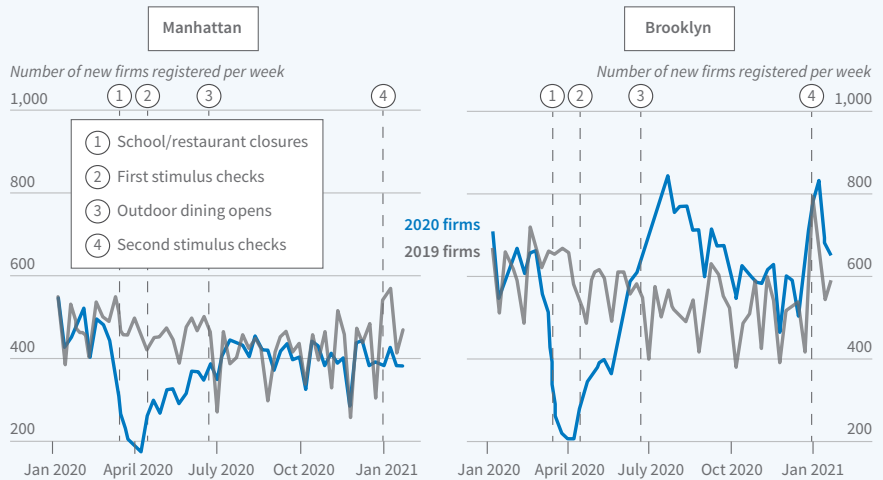
The strongest effects are centered on those who donate to campaigns and vote. These findings are consistent with emerging work emphasizing a "Bayesian" approach to entrepreneurship, in particular with the idea that a "favorable" election outcome induces a more optimistic assessment of opportunity and so results in more selection into entrepreneurship by partisans.

Conclusion and Future Directions

The SCP underscores the importance of accounting for high-growth potential in understanding entrepreneurship and using a more behavioral approach that centers around entrepreneurs' choices. We hope to integrate these insights into a more holistic view of entrepreneurial policy and interventions; this is reflected in our recent work on regional innovation ecosystems and the stakeholder-based approach that leads to them.[17] We also plan to perform a higher level of integration of additional granular and intermediate firm-level data sources, such as ORBIS, and to apply advanced analytical techniques to assess the impact of specific strategic interventions in regional innovation ecosystems as the startups they seek to seed attempt to scale. These advances will allow us and others to continue to explore the intersection of entrepreneurship, policy, and economic development, with a particular focus on the industry clusters that fuel regional innovation, the potential for entrepreneurship to drive inclusive growth, the influence of the social and political environment on shaping the choice to become an entrepreneur, and the impact of entrepreneurship on broader economic and social outcomes.

1 "The Role of Entrepreneurship in US Job Creation and Economic Dynamism," Decker R, Haltiwanger J, Jarmin R, Miranda J. *Journal of Economic Perspectives* 28(3), Summer 2014, pp. 3–24.
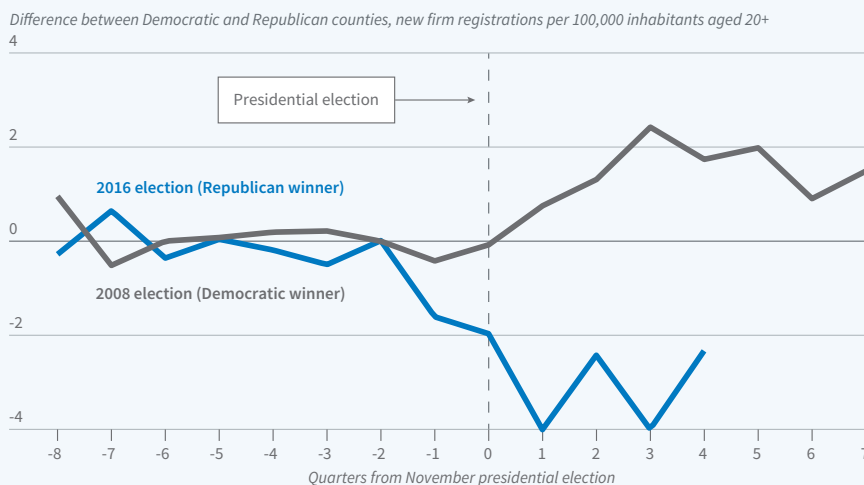
Return to Text

2 "How Resilient Is Venture-Backed Innovation? Evidence from Four Decades of US Patenting," Howell ST, Lerner J, Nanda R, Townsend RR. NBER Working Paper 27150, October 2023.
Return to Text

3 "Innovation Economics. Where Is Silicon Valley?" Guzman J, Stern S. *Science* 347(6222), February 2015, pp. 606–609.
Return to Text

4 "Nowcasting and Placecasting Entrepreneurial Quality and Performance," Guzman J, Stern S. NBER Working Paper 20954, February 2015, and in *Measuring Entrepreneurial Businesses: Current Knowledge and Challenges*, Haltiwanger J, Hurst E, Miranda J, Schoar A, editors, pp. 63–109. Chicago, IL: University of Chicago Press.
Return to Text

5 "A New View of the Skew: Quantitative Assessment of the Quality of American Entrepreneurship," Fazio C, Guzman J, Murray F, MIT Innovation Initiative Laboratory for Innovation Science and Policy, February 2016.
Return to Text

6 "The State of American Entrepreneurship: New Estimates of the Quantity and Quality of Entrepreneurship for 32 US States, 1988–2014," Guzman J, Stern S. *American Economic Journal: Economic Policy* 12(4), November 2020, pp. 212–243.

Return to Text

7 "The Startup Cartography Project: Measuring and Mapping Entrepreneurial Ecosystems," Andrews RJ, Fazio C, Guzman J, Liu Y, Stern S. *Research Policy* 51(9), November 2022, article 104581.
Return to Text

8 "The Impact of State-Level R&D Tax Credits on the Quantity and Quality of Entrepreneurship," Fazio C, Guzman J, Stern S. NBER Working Paper 26099, July 2019, and *Economic Development Quarterly* 34(2), April 2020, pp. 188–208.
Return to Text

9 "The Impact of State-Level R&D Tax Credits on the Quantity and Quality of Entrepreneurship," Fazio C, Guzman J, Stern S. NBER Working Paper 26099, July 2019, and *Economic Development Quarterly* 34(2), April 2020, pp. 188–208.
Return to Text

10 "More Than an Ivory Tower: The Impact of Research Institutions on the Quantity and Quality of Entrepreneurship," Tartari V, Stern S. NBER Working Paper 28846, May 2021.
Return to Text

11 "Launching with a Parachute: The Gig Economy and New Business Formation," Barrios JM, Hochberg YV, Yi H. NBER Working Paper 27183, May 2020, and *Journal of Financial Economics* 144(1), April 2022, pp. 22–43.
Return to Text

12 "Regional Crowdfunding and High

Tech Entrepreneurship," Yu S, Fleming L. *Research Policy* 51(9), November 2022, article 104348.
Return to Text

13 "Rugged Entrepreneurs: The Geographic and Cultural Contours of New Business Formation," Barrios JM, Hochberg Y, Macciocchi D. NBER Working Paper 28606, March 2021.
Return to Text

14 "Go West Young Firm: The Impact of Startup Migration on the Performance of Migrants," Guzman J. *Management Science*, September 2023, https://doi.org/10.1287/mnsc.2023.4924.
Return to Text

15 "How Is COVID Changing the Geography of Entrepreneurship? Evidence from the Startup Cartography Project," Fazio CE, Guzman J, Liu Y, Stern S. NBER Working Paper 28787, May 2021.
Return to Text

16 "Partisan Entrepreneurship," Engelberg J, Guzman J, Lu R, Mullins W. NBER Working Paper 30249, July 2022.
Return to Text

17 "Accelerating Innovation Ecosystems: The Promise and Challenges of Regional Innovation Engines," Guzman J, Murray F, Stern S, Williams HL. NBER Working Paper 31541, August 2023, and *Entrepreneurship and Innovation Policy and the Economy* 3(1), March 2024, pp. 9–75.
Return to Text

The Challenging Transition from Investment- to Consumption-Led Growth in China

Tao Zha

Miraculous growth has been China's hallmark for decades. In recent years, however, China's gross domestic product (GDP) growth rate has slowed down considerably [See Figure 1]. Never has this change been more evident than after the COVID-19 crisis, when the government periodically locked down the entire economy. A series of my recent research papers with Kaiji Chen and other collabora-tors provides a glimpse into how China achieved its miraculous growth, what caused its slowdown, and the headwinds it faces.

Rise of an Investment-Driven Economy

The sources of China's GDP growth have changed over time. Growth of total factor productivity (TFP) was a main driver of growth during 1978–97, contributing to 56.6 percent of GDP growth per worker. In the period 1998–2015, however, investment — capital deepening — played a dominant role, contributing to 68.3 percent of GDP growth.[1] The government provided preferential credit to large, capital-intensive firms, whether state-owned enterprises (SOEs) or privately owned enterprises (POEs), as long as they contributed to GDP growth. During this period, the ratio of real estate investment to GDP steadily increased from 4 percent in 2000 to around 10 percent in 2014, and the contribution of business investment, particularly in service sectors, increased steadily from 26.3 percent in 2000 to 36 percent in 2010.[2] China witnessed a steady increase in the aggregate investment-to-GDP ratio and a decline in both the consumption-to-GDP ratio and the labor income share during the first decade of the 2000s. Private investment in both large and small enterprises was a crucial pillar of the Chinese economy in this period. The share of investment by POEs increased to about 70 percent in 2008, up from 30 percent in 1998, and the investment-to-GDP ratio increased steadily.

Figure 1

China's Annual Real GDP Growth

Beginning of investment-driven economy

Shift towards consumption-focused economy
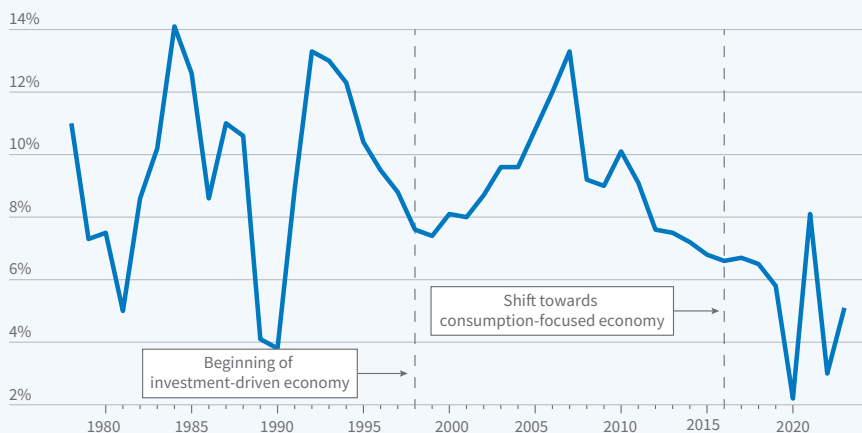
Source: "Constructing Quarterly Chinese Time Series Usable for Macroeconomic Analysis," Chen K, Higgins PC, Zha T. NBER Working Paper 32087, January 2024, and Journal of International Money and Finance 143(103052), May 2024. Reprinted from Journal of International Money and Finance, 143, Chen K, Higgins PC, Zha T, Constructing Quarterly Chinese Time Series Usable for Macroeconomic Analysis, article 103052, 2024, with permission from Elsevier.

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Zha's major fields of study are macroeconomics, financial economics, the Chinese economy, and econometrics. He has been elected a fellow of the Econometric Society and has served on the editorial boards of *Econometrica, Journal of Economic Literature, Quantitative Economics, American Economic Journal: Macroeconomics,* and *Journal of Econometrics*. His work has appeared in *The Review of Economic Studies, Journal of Finance, Brookings Papers on Economics Activity, Econometrica,* and many other publications.

Zha holds a bachelor's degree in mathematics from Chengdu University of Technology in China, a master's in economics from Washington State University, and a PhD in economics from the University of Minnesota.

To explain this phenomenon, we construct a theoretical two-sector model with different capital intensities and asymmetric credit access between firms in labor-intensive and capital-intensive sectors. We explore what happens when the government provides credit support for large, capital-intensive firms, regardless of whether they are SOEs or POEs. Under standard assumptions about production technologies, firms receiving such preferential support have an incentive to expand production along the transition path due to the positive interaction between the credit support they receive and the firms' collateral values. Consequently, capital is reallocated from labor-intensive to capital-intensive sectors, which explains the pattern observed after 1998.

To support this preferential credit policy, the Chinese government pursued quantity-based monetary policy. From 1998 to 2017, under the supervision of the State Council, the People's Bank of China (PBC) used a target of M2 supply growth rates as a primary tool to influence economic activity. This period is characterized by so-called pro-growth monetary policy [See Figure 3].[3] As highlighted by former PBC governor Xiaochuan Zhou, China's monetary policy "is yet to be understood by the outside world." By incorporating key institutional characteristics, my collaborators and I formulate and estimate a quantity-based Taylor rule that accurately captures China's monetary policy practices.

From 2000 to 2016, the PBC primarily used M2 growth to support output growth, manage inflation, and indirectly control aggregate bank loans. Our estimated monetary policy rule displays an asymmetric response to economic conditions. When GDP growth falls short of the government's target, monetary policy becomes more aggressive and contributes twice as much to GDP fluctuations as in normal times. As shown in Figure 1, most M2 growth was driven by the endogenous response of monetary policy to the state of the economy. This pro-growth policy was transmitted to the economy by increased investment in heavy sectors financed by medium- and long-

China's Shift Towards Investment-Driven Economy

Figure 2

Share of GDP

Source: "Trends and Cycles in China's Macroeconomy," Chang C, Chen K, Waggoner DF, Zha T. NBER Working Paper 21244, June 2015, and NBER Macroeconomics Annual 2015 30, University of Chicago Press, June 2016, pp. 1–84.
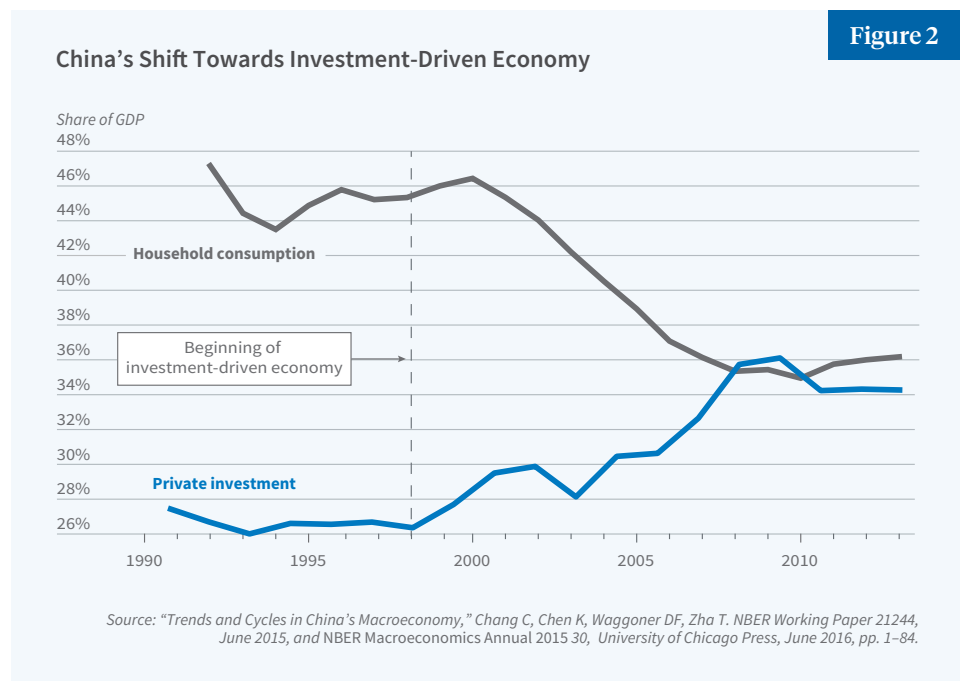
term bank credit preferentially allocated to large and capital-intensive firms.

This investment-driven growth strategy was exemplified by the 2009 economic stimulus, which combined expansionary fiscal and monetary policies. We develop a two-stage empirical model using granular loan-level data and find that this combined approach was particularly effective in stimulating GDP growth by increasing investment in the infrastructure sector in the wake of the 2008 global financial crisis.[4] While the substantial boost in infrastructure spending successful-

ly propelled GDP growth, it came at a cost: a reduction in available funds for private firms outside the infrastructure sector.

The crowding-out effects resulting from the infrastructure investment spree underscore the complex trade-offs associated with expansive fiscal measures that target specific sectors. The unintended consequence of reduced loanable funds for private investment exposed the double-edged sword of investment-driven policies. The post-2008 shift toward prioritizing SOEs, coupled with already elevated

Responses to Pro-Growth Monetary Policy

Figure 3

Realized GDP growth minus target, pp

CPI inflation

Source: "The Nexus of Monetary Policy and Shadow Banking in China," Chen K, Ren J, Zha T. NBER Working Paper 23377, May 2018, and American Economic Review 108(12), December 2018, pp. 3891–3936. Copyright American Economic Association; reproduced with permission of the American Economic Review.

aggregate investment levels relative to GDP, raises questions about the sustainability of this growth model. The increasing dominance of SOEs and the resulting crowding-out of bank loans to and investment in POEs pose challenges to maintaining the previous pace of economic expansion.

Boom and Bust in Real Estate

Understanding the boom and bust of China's real estate sector requires a closer look at China's banking system. Using hand-collected transaction-level data on both shadow banking and balance-sheet activities, Chen, Ren, and I investigate why monetary tightening in China was ineffective in constraining bank credit to the real estate sector.[5]

As inflation in China began to rise after 2009, surging to 6 percent in 2011, the PBC tightened monetary policy. As expected, the traditional bank sector responded by decreasing lending. At the same time, however, this tightening spurred a rapid expansion of shadow banking from 2009 to 2015. The burgeoning activities of shadow banks effectively thwarted the PBC's efforts to control credit growth and thus undermined the intended impact of monetary policy. Nonstate banks, driven by the search for higher yields in a tighter credit environment, actively engaged in shadow banking activities such as loaning funds to risky projects. The boom of shadow banking fueled a surge in loans for real estate investment. But shadow banking products were often moved onto banks' balance sheets, ultimately elevating systemic risks to financial stability. The recent collapse of the China Evergrande Group, the second-largest property developer in China, is related to these lending practices.

The surge of shadow banking activities in China had far-reaching consequences, leading to an overstock in the real estate sector, overcapacity in industries supporting real estate, and overleveraging in both the real and financial sectors. In response to these challenges, in late 2014, China made an unprecedented policy shift by relaxing the loan-to-value (LTV) ratio limit for 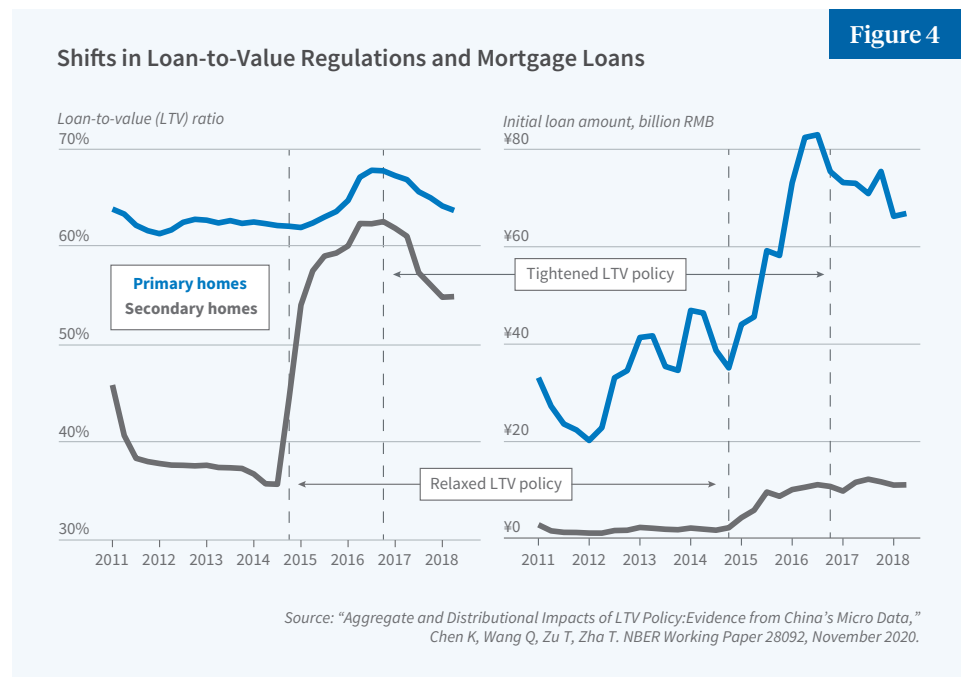secondary houses primarily used as investments. This policy experiment, unparalleled in magnitude both within China and globally, aimed to address the real estate overstock and stimulate housing market activity.

Using a comprehensive dataset of more than 3 million mortgage originations nationwide, we examine the impact of this policy change on the housing market from 2014Q4 to 2016Q3.[6] Our findings highlight the pivotal role of the housing investment channel in magnifying the effects of a mortgage LTV policy change. As house prices surged, homeowners cashed in capital gains to upgrade to larger primary homes, setting off a positive feedback loop between rising house prices and increased mortgage demand. This feedback loop led to substantial increases in both equilibrium house prices and mortgage borrowing, demonstrating that the LTV policy change not only spurred investment in secondary houses but also boosted demand for primary homes.

We built and calibrated a life-cycle model that replicates these empirical findings. The model also reveals the distributional implications of the LTV policy across age-income groups by demonstrating how the policy generates the boom and bust of house prices and mortgage demand. Middle-aged households with high incomes or education benefit the most from capital gains due to rising house prices, and trade up their primary homes for speculative investment purposes. Young households are disadvantaged as they cannot afford to purchase their first homes due to rising prices. These distributional effects highlight the unintended trade-offs generated by housing policy changes.

After 2016, following the peak of the housing boom, China made a strategic decision to reverse the loosening of the LTV policy on secondary houses in an attempt to cool the overheated housing market. As a result, mortgage activity declined and in early 2024 house prices slumped, as did new property sales and property investment. This downturn in the real estate sector, a pillar of China's macroeconomy, marked a significant departure from previous trends and underscored the challenges of managing housing market dynamics in a rapidly evolving macroeconomic environment. Our quantitative model predicts that, despite the temporary relaxation of the LTV policy, it still has a persistent negative effect on household consumption. During a housing boom, households delay consumption and investment in real estate, and then face the burden of mortgage debt long after the boom subsides. This prediction is consistent with the observed sluggishness of household consumption in China in recent years.

Figure 4

Shifts in Loan-to-Value Regulations and Mortgage Loans

Loan-to-value (LTV) ratio

Primary homes
Secondary homes

Tightened LTV policy

Relaxed LTV policy

Initial loan amount, billion RMB

Source: "Aggregate and Distributional Impacts of LTV Policy:Evidence from China's Micro Data,"
Chen K, Wang Q, Zu T, Zha T. NBER Working Paper 28092, November 2020.

Sluggish Household Consumption

With investment growth reaching a plateau and the real estate sector facing a downturn, household consumption has emerged as a potentially critical engine for the Chinese economy. This perspective was explicitly emphasized during the Eighteenth National People's Congress in 2012, which highlighted concerns about sluggish consumption growth and the disproportionately low share of income allocated to labor. My collaborators and I develop a conceptual framework for analyzing the potential for household consumption to spur growth. Our model predicts that China's investment-driven growth model would inherently result in subdued consumption and a decline in labor's share of national income.[7]

Our empirical evidence from the 2011–17 China Household Finance Surveys, as well as our life-cycle model, offers a similar prediction. While the mortgage boom generated wealth for middle-aged, highly educated households through capital gains from rising house prices, it also came at a significant cost. These households often curtailed consumption to finance their real estate investments, and the growing burden of mortgage debt relative to income further suppressed their spending. Consequently, despite creating wealth for a specific segment of the population, the mortgage boom ultimately contributed to a decline in overall household consumption.

Our research also highlights the significant impact of the COVID-19 pandemic on household consumption both during and after the pandemic. We construct China's key macroeconomic variables to examine the macroeconomic fluctuations during the global financial crisis and the pandemic.[8] Our analysis focuses on the differing impacts of these two crises on China's economy, with a particular emphasis on the impacts on household consumption. We identify several distinct regimes in China's economic history: the investment-driven period before 2008, the outbreak of the financial cri-

sis, the post-2008 economic stimulus era, and the COVID period.

We find that the financial crisis affected China's GDP primarily through its negative effects on investment and exports. Household consumption remained relatively stable throughout this period but failed to show strong growth during or after the 2009 economic stimulus. This finding is consistent with the Chinese government's 2012 initiative to bolster household consumption in an effort to sustain economic growth. The pandemic, however, fundamentally altered the nature of economic shocks affecting China. The pandemic period emerged as a pivotal moment, as large shocks resulting from periodic lockdowns, which we term "consumption-constrained shocks," exerted prolonged and significant negative impacts on household consumption expenditure. These shocks had a more pronounced effect on household consumption than previous crises, and they raised concerns about long-term prospects for China's nascent consumption-centered growth strategy.

Challenges to Sustainable Growth

The rapid accumulation of household debt, corporate debt, and government debt was a cause for concern due to potential risks to financial stability even before the pandemic hit. These risks were heightened by pandemic shocks. My collaborators' and my research underscores the significant challenges China faces in transitioning to a more balanced and sustainable growth model in which household consumption plays a central role.

The views expressed herein do not necessarily reflect the views of the Federal Reserve Bank of Atlanta or the Federal Reserve System.

1 "Macroeconomic Effects of China's Financial Policies," Chen K, Zha T. NBER Working Paper 25222, November 2018, and in *The Handbook of China's Financial System*, Marlene Amstrad, Guofeng Sun, and Wei Xiong, editors, pp. 151–182. Princeton, NJ and Woodstock, UK: Princeton University Press, 2020.
Return to Text

2 "Trends and Cycles in China's Macroeconomy," Chang C, Chen K, Waggoner DF, Zha T. NBER Working Paper 21244, June 2015, and *NBER Macroeconomics Annual 2015* 30, June 2016, pp. 1–84.
Return to Text

3 "The Nexus of Monetary Policy and Shadow Banking in China," Chen K, Ren J, and Zha T. NBER Working Paper 23377, May 2018, and *American Economic Review* 108(12), December 2018, pp. 3891–3936.
Return to Text

4 "Monetary Stimulus Amidst the Infrastructure Investment Spree: Evidence from China's Loan-Level Data," Chen K, Gao H, Higgins P, Waggoner D, Zha T. NBER Working Paper 27763, July 2022, and *Journal of Finance* 13(1), April 2023, pp. 1147–1204.
Return to Text

5 "The Nexus of Monetary Policy and Shadow Banking in China," Chen K, Ren J, and Zha T. NBER Working Paper 23377, May 2018, and *American Economic Review* 108(12), December 2018, pp. 3891–3936.
Return to Text

6 "Aggregate and Distributional Impacts of LTV Policy: Evidence from China's Micro Data," Chen K, Wang Q, Xu T, Zha T. NBER Working Paper 28092, November 2020.
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7 "Trends and Cycles in China's Macroeconomy," Chang C, Chen K, Waggoner DF, Zha T. NBER Working Paper 21244, June 2015, and *NBER Macroeconomics Annual* 2015 30, June 2016, pp. 1–84.
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8 "Constructing Quarterly Chinese Time Series Usable for Macroeconomic Analysis," Chen K, Higgins P, Zha T. NBER Working Paper 32087, January 2024, and *Journal of International Money and Finance* 143, May 2024, Article 103052.
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American Economic Association Names New Distinguished Fellows
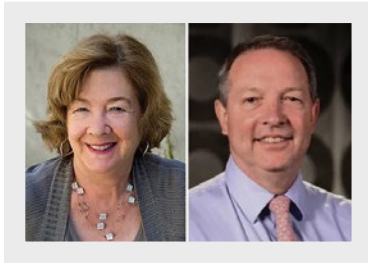
The American Economic Association has **named four new Distinguished Fellows**, two of whom, **Bronwyn Hall** and **John Haltiwanger**, are NBER Research Associates.

Hall, of the University of California, Berkeley, is a leading authority on the determinants of innovation, the measurement of innovation with patent data, and the economic effects of innovation. She is a Research Associate affiliated with the NBER's Industrial Organization and Productivity, Innovation, and Entrepreneurship programs.

Haltiwanger, of the University of Maryland, has made key contributions to the study of the birth and death of firms, to labor market dynamics, and to a range of other questions in economic measurement. He is a Research Associate affiliated with the Economic Fluctuation and Growth and Productivity, Innovation, and Entrepreneurship programs.

The other newly named Distinguished Fellows are William A. Darity Jr. and Margaret Simms.

NBER Appoints 71 New Affiliates

Following a call for nominations in January, the NBER has appointed 71 new affiliates: 17 Research Associates and 54 Faculty Research Fellows. In addition, eight Faculty Research Fellows have been promoted to Research Associates.

The directors of the NBER's 19 research programs recommend appointments after consulting with steering committees made up of leading scholars. Research Associate appointments must be approved by the **NBER Board of Directors**, while Faculty Research Fellows are appointed by the NBER president. All new affiliates must hold primary academic appointments in North America; Research Associates must have tenure.

The newly appointed researchers serve on the faculties of 41 different colleges and universities. They received their graduate training at 28 different institutions. The new appointments bring the total number of Research Associates to 1,475 and the number of Faculty Research Fellows to 338. 24 affiliated researchers are on leave; most are serving in government policy roles.

The names and university affiliations of the newly appointed NBER affiliates are listed below.

Research Associates

*Promotion from Faculty Research Fellow

Name	University Affiliation	Program
Borağan Aruoba	University of Maryland	Monetary Economics
*Anmol Bhandari	University of Minnesota	Economic Fluctuations and Growth
*Aaron Chalfin	University of Pennsylvania	Law and Economics
Benjamin Feigenberg	University of Illinois at Chicago	Law and Economics
Donn. L. Feir	University of Victoria	Development of the American Economy
Maryann Feldman	Arizona State University	Productivity, Innovation, and Entrepreneurship
Vyacheslav Fos	Boston College	Corporate Finance
*Gopi Shah Goda	Stanford University	Economics of Aging
Todd Gormley	Washington University in St. Louis	Corporate Finance
Kyle Greenberg	US Military Academy West Point	Labor Studies
Bård Harstad	Stanford University	Environment and Energy Economics, Political Economy
*Cosmin Ilut	Duke University	Economic Fluctuations and Growth
*Gregor Jarosch	Duke University	Economic Fluctuations and Growth
Timothy McQuade	UC, Berkeley	Public Economics
Nathan Miller	Georgetown University	Industrial Organization

Name	University Affiliation	Program
Charles Murry	Boston College	Industrial Organization
Caitlin Myers	Middlebury College	Children
*Michael Peters	Yale University	Economic Fluctuations and Growth
*Pascual Restrepo	Boston University	Economic Fluctuations and Growth, Labor Studies
Michael Richards	Cornell University	Economics of Health
Ivan Rudik	Cornell University	Environment and Energy Economics
Meghan Skira	University of Georgia	Economics of Aging, Economics of Health
Kjetil Storesletten	University of Minnesota	Economic Fluctuations and Growth
*Laura Wherry	New York University	Economics of Health
Dacheng Xiu	University of Chicago	Asset Pricing

Faculty Research Fellows

Name	University Affiliation	Program
Desmond Ang	Harvard University	Development of the American Economy
Francis Annan	UC, Berkeley	Development Economics
Marion Aouad	UC, Irvine	Economics of Health, Economics of Aging
Juan Pablo Atal	University of Pennsylvania	Economics of Health
Nano Barahona	UC, Berkeley	Industrial Organization
Zachary Bleemer	Princeton University	Economics of Education, Labor Studies, Public Economics
Kirill Borusyak	UC, Berkeley	International Trade and Investment
Laura Boudreau	Columbia University	Development Economics
Jesse Bruhn	Brown University	Economics of Education
Christopher Clayton	Yale University	International Finance and Macroeconomics
Robert Collinson	University of Notre Dame	Public Economics
Lydia Cox	University of Wisconsin-Madison	International Trade and Investment
Kevin Donovan	Yale University	Development Economics
Thomas Drechsel	University of Maryland	Monetary Economics
Andres Drenik	University of Texas at Austin	International Finance and Macroeconomics
Hannah Druckenmiller	California Institute of Technology	Environment and Energy Economics
Mayara Felix	Yale University	International Trade and Investment, Development Economics
Eyal Frank	University of Chicago	Environment and Energy Economics
Daniel Greenwald	New York University	Asset Pricing, Monetary Economics
Leander Heldring	Northwestern University	Political Economy, Development of the American Economy
Danae Hernandez-Cortes	Arizona State University	Environment and Energy Economics
Clemence Idoux	UC, San Diego	Economics of Education
Max Kapustin	Cornell University	Law and Economics
Patrick Kennedy	UC, Los Angeles	Public Economics
Benny Kleinman	Stanford University	International Trade and Investment
Adam Leive	UC, Berkeley	Economics of Aging, Economics of Health
Benjamin Marx	Boston University	Political Economy, Development Economics
Filippo Mezzanotti	Northwestern University	Productivity, Innovation, and Entrepreneurship
Sara Moreira	Northwestern University	Productivity, Innovation, and Entrepreneurship
Jacob Moscona	MIT	Development Economics
Christian Moser	Columbia University	Economic Fluctuations and Growth

Name	University Affiliation	Program
Kyle Myers	Harvard University	Productivity, Innovation, and Entrepreneurship
Peter Nencka	Miami University	Development of the American Economy
Tamar Oostrom	The Ohio State University	Economics of Health
Alberto Ortega	Indiana University	Economics of Health
María Padilla-Romo	University of Tennessee	Children
Markus Pelger	Stanford University	Asset Pricing
Laura Pilossoph	Duke University	Economic Fluctuations and Growth
Nolan Pope	University of Maryland	Economics of Education
Ana Reynoso	University of Michigan	Children
Evan Riehl	Cornell University	Economics of Education
Benjamin Rosa	University of Michigan	Industrial Organization
Nina Roussille	MIT	Labor Studies
Krista Ruffini	Georgetown University	Children, Economics of Health
Adrienne Sabety	Stanford University	Economics of Aging, Economics of Health
Felipe Saffie	University of Virginia	International Finance and Macroeconomics
Karthik Sastry	Princeton University	Economic Fluctuations and Growth
Yotam Shem-Tov	UC, Los Angeles	Labor Studies
Gabriel Tourek	University of Pittsburgh	Public Economics
Clemence Tricaud	UC, Los Angeles	Political Economy
Jacob Wallace	Yale University	Economics of Health
Emily Weisburst	UC, Los Angeles	Law and Economics
Kairong Xiao	Columbia University	Corporate Finance
Jonathan Zhang	McMaster University	Economics of Health

Program on Children and Families

To reflect the importance of research on economic issues confronting families for understanding the well-being of children, as well as the influence of children's circumstances on other family members, economically and in other dimensions, the NBER's Program on Children will henceforth be known as the Program on Children and Families. This change captures the breadth of research that is discussed at most program meetings and is also a return to the program's roots. In October 1993, Alan Krueger of Princeton University organized an NBER meeting on "The Economics of Families and Children." That meeting served as the catalyst for the program launch three years later.

Conferences and Meetings

Detailed programs for NBER conferences are available at nber.org/conferences

Title of Conference/Meeting	Organizers	Dates
Financing Higher Education	John Y. Campbell, Kaye G. Husbands	April 4–5, 2024
The Economic Impacts of World War II	William J. Collins, Andreas Ferrara, Price V. Fishback	April 4–5, 2024
Race and Stratification Working Group	Marcus D. Casey, Ellora Derenoncourt, Bradley Hardy, Trevon D. Logan	April 5, 2024
Development of the American Economy	Leah Platt Boustan, William J. Collins	April 6, 2024
Organizational Economics Working Group	Raffaella Sadun, Andrea Prat	April 11–12, 2024
Corporate Finance Program Meeting	Isil Erel, Adi Sunderam	April 12, 2024
Asset Pricing Program Meeting	Jules H. van Binsbergen, Dimitris Papanikolaou	April 12, 2024
International Trade and Investment Program Meeting	Stephen J. Redding	April 12–13, 2024
New Developments in Long–Term Asset Management	Luis M. Viceira, Annette Vissing–Jorgensen	April 13, 2024
Behavioral Finance Working Group Meeting	Nicholas C. Barberis	April 13, 2024
Corporate Associates Research Symposium	James M. Poterba	April 16, 2024
Diversity, Identity, and Nation Building	Samuel Bazzi	April 18, 2024
Public Economics Program Meeting	Nathaniel Hendren, Eric Zwick	April 18–19, 2024
39th Annual Conference on Macroeconomics	John V. Leahy, Martin S. Eichenbaum, Valerie A. Ramey	April 18–19, 2024
Political Economy Program Meeting	Raquel Fernandez, Nathan Nunn	April 19, 2024
Infrastructure Economics	Edward L. Glaeser	April 19, 2024
Economics of Culture and Institutions	Alberto Bisin, Paola Giuliano	April 20, 2024
Investments in Early Career Scientists	Donna K. Ginther, Kaye G. Husbands, Bruce A. Weinberg, Joshua L. Rosenbloom	April 26, 2024
Productivity, Innovation, and Entrepreneurship Program Meeting	Nicholas Bloom, Serguey Braguinsky, Sabrina T. Howell, Josh Lerner	April 26, 2024
Economic Analysis of Regulation	Steve Cicala, James M. Poterba	April 26, 2024
Entrepreneurship and Innovation Policy and the Economy Conference	Benjamin Jones, Josh Lerner	May 1, 2024
Children Program Meeting	Anna Aizer, Janet Currie	May 2–3, 2024
Economics of Transportation in the 21st Century	Edward L. Glaeser, James M. Poterba, Stephen J. Redding	May 3, 2024
Economics of Education Program Meeting	Caroline M. Hoxby	May 9–10, 2024
Mentoring Program on Aging and Health Economics Research	Jetson Leder–Luis, Sebastian Tello–Trillo	May 16, 2024
Data Privacy Protection and the Conduct of Applied Research: Methods, Approaches and their Consequences	Ruobin Gong, V. Joseph Hotz, Ian M. Schmutte	May 16–17, 2024

Title of Conference/Meeting	Organizers	Dates
Inflation in the COVID Era and Beyond	Laurence M. Ball, Yuriy Gorodnichenko	May 16–17, 2024
Racial and Ethnic Health Disparities	Jevay Grooms, Hannes Schwandt	May 17, 2024
Insurance Working Group Meeting	Benjamin R. Handel, Motohiro Yogo	May 17, 2024
Emerging Markets: Capital Flows, Debt Overhang, Inflation, and Growth	Cristina Arellano, Saki Bigio, Paulina Restrepo–Echavarria	May 20–21, 2024
Behavioral Macroeconomics Research Boot Camp	Yuriy Gorodnichenko	May 21–22, 2024
6th Annual NBER Environmental and Energy Policy and the Economy Conference	Tatyana Deryugina, Matthew Kotchen, Catherine Wolfram	May 23, 2024
International Seminar on Macroeconomics	Jordi Gala, Kenneth D. West	June 4–5, 2024
Fertility and Declining Population Growth in High-Income Countries	Melissa Schettini Kearney, Phillip B. Levine	June 6–7, 2024
East Asian Seminar on Economics	Benjamin Faber, Takeo Hoshi	June 6–7, 2024
Pension Finance: Investment, Regulation, and Risk–Sharing	Svend E. Hougaard Jensen, James M. Poterba, Joshua Rauh	June 11, 2024
Trans-Atlantic Public Economics Seminar: Tax and Transfer Systems	Hilary W. Hoynes, Tuomas Kosonen	June 12–14, 2024
Doctoral Training Workshop on Economics of Executive Compensation	Dirk Jenter, Kelly Shue	June 17–18, 2024
NBER-SAIF Climate Finance and the Sustainable Energy Transition	James M. Poterba, Hong Yan	June 20–21, 2024

NBER Macroeconomics Annual 2023, Volume 38

Martin Eichenbaum, Erik Hurst, and Valerie Ramey, editors.

The **NBER Macroeconomics Annual** features research by leading scholars on important issues in contemporary macroeconomics.

David Berger, **Kyle Herkenhoff**, **Andreas Kostol**, and **Simon Mongey** consider the importance of market power in the labor market and develop a theory of monopsony that incorporates worker-firm-specific preference heterogeneity, search frictions, and firm granularity. They apply this theory to analyze the effects of monopsony on wages, job flows, and welfare.

Mary Amiti, **Sebastian Heise**, **Fatih Karahan**, and **Ayşegül Şahin** examine how supply chain disruptions and labor supply constraints contributed to the recent rise of inflation, recognizing their interactions with the shift of consumption from services to goods and expansionary monetary policy.

Daron Acemoglu, **David Autor**, and **Christina Patterson** explore the hypothesis that slow productivity growth stems from an unbalanced sectoral distribution of innovation — because innovation depends on complementary innovations among input suppliers, there can be rapid technological progress in a subset of inputs but slow productivity growth in the aggregate.

Greg Buchak, **Gregor Matvos**, **Tomasz Piskorski**, and **Amit Seru** investigate two important margins of adjustment in credit markets — banks' ability to sell loans and shadow bank activity — and argue that accounting for them is critical for analyzing how lending responds to economic or policy shocks and the way such shocks are amplified through financial intermediaries.

Finally, **Pedro Bordalo**, **Nicola Gennaioli**, **Rafael La Porta**, **Matthew O'Brien**, and **Andrei Shleifer** demonstrate that that overreaction of long term profit expectations to reported profits could help reconcile Robert Shiller's "excess volatility" puzzle with economic fluctuations more generally.

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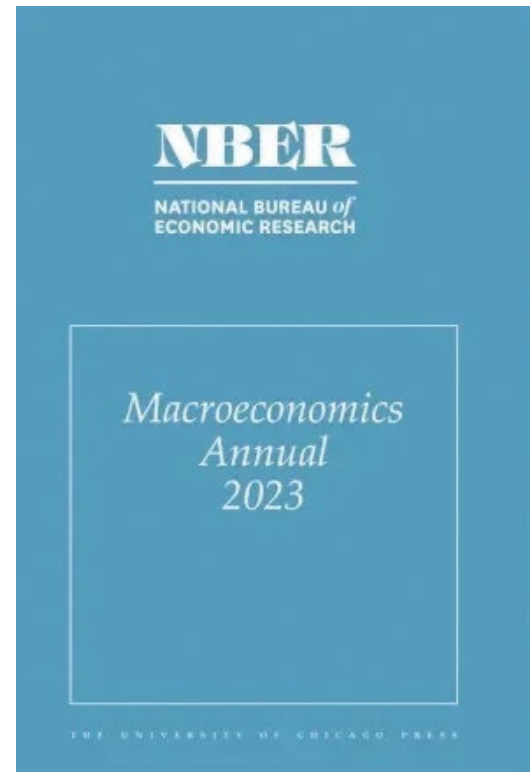
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