Claudia Goldin

The 2020 Martin S. Feldstein Lecture

Journey across a Century of Women

Claudia Goldin

My talk will take us on a Journey across a Century of Women — a 120-year odyssey of generations of college-graduate women from a time when they were only able to have either a family or a career (sometimes a job), to now, when they anticipate having both a family and a career. More women than ever before are within striking distance of these goals.

Fully 45 percent of young American women today will eventually have a BA degree, and more than 20 percent of them will obtain an advanced degree above an MA. More than 80 percent of 45-year-old college-graduate women have children, either biological or adopted. More women than men graduate from college, and there is greater similarity in their ambitions and achievements than ever before. This should all make for a very pleasant ending to the journey. But that happy ending doesn't seem to be happening. A few clarifications: my evidence concerns the United States and the history of its college-graduate men and women. I will focus on college-graduate women because they have the greatest opportunities to achieve "career." Career is achieved over time, as the etymology of the word — meaning to run a race — would imply. A career generally involves advancement and persistence and is a long-lasting, sought-after employment, the type of work — writer, teacher, doctor, accountant, religious leader — which often shapes one's identity. A career needn't begin right after the highest educational degree; it can emerge later in life. A career is different from a job. Jobs generally do not become part of one's identity or life's purpose. They are often solely taken for generating income and generally do not have a clear set of milestones.

I recently finished most of a book on this century-long journey. But my book, like the Old Testament, was written in a BCE world—in this case,

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NBER *Reporter*

Before the Corona Era. Many inequities have been exposed by the COVID-19 economy and society, most notably those concerning social justice and our criminal justice system. The COVID economy has also magnified gender differences at work and in the home. Women are essential workers, but cannot be that at home and at work simultaneously. The burden of school closings on working parents that will continue into the coming year could erase years of career gains by young women in a way we have rarely seen. That is where my talk will take us. But first, we must journey to the beginning. I'll begin the journey 120 years ago, when college-graduate women were faced with the stark choice of family or career (sometimes a job).

Five distinct groups of women can be discerned across the past 120 years, according to their changing aspirations and achievements. Group One graduated from college between 1900 and 1919 and achieved "Career or Family." Group Two was a transition generation between Group One, which had few children, and Group Three, which had many. It achieved "Job then Family." Group Three, the subject of Betty Friedan's *The Feminine Mystique*, graduated from college between 1946 and 1965 and achieved "Family then Job." Group Four, my generation, graduated between 1966 and 1979 and attempted "Career then Family." Group Five continues to today and desires "Career and Family."

College-graduate women in Group One aspired to "Family or Career." Few managed both. In fact, they split into two groups: 50 percent never bore a child, 32 percent never married. In the portion of Group One that had a family, just a small fraction ever worked for pay. More Group Two college women aspired to careers, but the Great Depression intervened, and this transitional generation got a job then family instead. As America was swept away in a tide of early marriages and a subsequent baby boom, Group Three college women shifted to planning for a family then a job. Just 9 percent of the group never married, and 18 percent never bore a child. Even though their labor force participation rates were low when they were young, they rose greatly — to 73 percent — when they and their children were older. But by the time these women entered the workplace, it was too late for them to develop their jobs into full-fledged careers.

"Career then Family" became a goal for many in Group Four. This group, aided by the Pill, delayed marriage and children to obtain more

Group, College Years, (Birth Years) *Achievement/Aspiration*	Never Married, by Age 30	Never Married, by Age 50	No Children (by Age 45)	Labor Force Rate at 25-29, if Ever Married	Labor Force Rate at 45-49, if Ever Married
Group 1: 1900-19 (1878-1897) *Career or Family*	53%	32%	50%	~20%	30%
Group 2: 1920-45 (1898-1923) *Job then Family*	38%	19%	36%	28%	58%
Group 3: 1946-65 (1924-1943) *Family then Job*	16%	9%	18%	35%	73%
Group 4: 1966-79 (1944-1957) *Career then Family*	21%	9%	27%	76%	85%
Group 5: 1980-2000* (1958-1978) *Career and Family*	27%	12%	21%	83%	84%

Group 5 extends to the present but is listed here as having an upper birth year limit of 1978 to track its members to their early forties
Source: Researcher's calculations (from voluminous data sets)

Table 1

education and a promising professional trajectory. Consequently, the group had high employment rates when young. But the delay in having children led 27 percent to never have children. Now, for Group Five the goal is career and family, and although they are delaying marriage and childbirth even more than Group Four, just 21 percent don't have children.

You may be thinking that, because of large increases in college graduation, most of the differences across the groups concern selection into who goes to and graduates from college. The surprising finding is that selection is not that important. I've tracked college entrance classes from the 1890s to the 1990s of women who have similar ability and parental resources. Their marriage ages and birth fractions track those of the total college- graduate group astoundingly well. Treatment, not selection, dominates.

College for Group One had a treatment effect by enabling women to be financially independent—they didn't have to marry. After Group One, as women's potential earnings rose and as substitutes for household goods became cheaper, husbands' preferences, rather than necessarily changing, became more expensive. Though family came first for Group Three, college women planned their home confinement and their eventual escape. They trained to be teachers, nurses, social workers, librar-

ians, and administrators after the kids were sufficiently grown. For Group Four, the Pill and its dissemination to young, single women enabled the delay of marriage and family and helped boost their investment in a career. But the biological clock ran out for many of these women. Group Five has pushed back marriage and family even further, but birth rates have risen, in part due to assisted reproductive technologies that have enabled this group to "beat the clock."

The transition wasn't swift and it wasn't due mainly to dissent. Instead, it was often due to technological advances, increased earnings, and greater education.

Aspirations and achievements of college women greatly changed across the past century, with increased income, the mechanization of the household, and technological improvements in fertility control and assisted reproductive methods. But the structure of work and the persistence of social norms, no matter how much weaker they have become, have limited the success of college-graduate women in achieving career and family.

An important accompaniment to the transition across the Groups concerns changes in customs and norms. For the past 50 years, the General Social Survey has asked respondents whether they agree more or less strongly with the statement:

"Preschool children are likely to suffer if their mother works." The responses are depicted by the respondents' birth years. As can be seen, agreement is always less for women than for men, and decreases for both men and women by birth cohort. It also increases with age, since earlier birth cohorts were generally older when interviewed than more recent birth cohorts. Norms became more expensive to sustain, and they changed. At the same time that the cost of not work-

Evolving Sentiment: Mothers' Employment and Childrens' Wellbeing

Share of males and females who agree with the statement:
"Pre-school children are likely to suffer if their mother works"
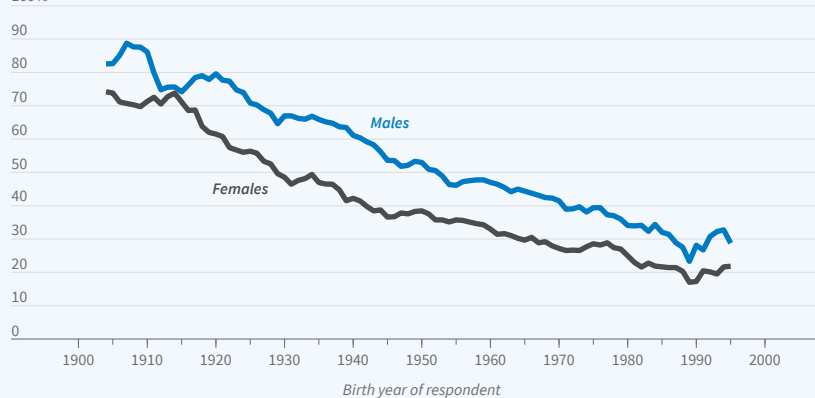
Data represent 5-year moving average
Source: Researcher's calculations using data from the General Social Survey

Figure 1

ing rose, childcare became more available, more commonly used, and generally more acceptable.

To measure the degree of success at achieving both career and family that women in these groups achieved, I created definitions. Family means having a child, biological or adopted, but not necessarily a husband or partner. (Sorry, dogs do not count as surrogate children). Career is achieved by exceeding a level of income for three years in each five-year period where the income level is given by the income of a man of the same age and education at the 25th percentile of the male distribution. Several longitudinal datasets are used, namely the National Longitudinal Survey of Youth (1979) and the Health and Retirement Study (HRS) linked to Social Security and tax data.

Interestingly, success at career and family for women increased both across and within cohorts. The success rate for women in their mid-50s is around 30 percent—half that for men—for the latest group that can be observed until that age. This is the group born between 1958 and 1965. But the success rate for that birth group of women was just 22 percent when they were in their late 30s, or 40 percent of the success rate for comparable men.

Even though a succession of women, group after group, advanced on this journey, women's careers still often take a back seat to those of their husbands. The most recent group has expressed its disappointments and frustrations by focusing on issues such as bias, pay inequity, salary transparency, and sexual harassment.

But as each group progressed and passed the baton to the next, and as actual barriers fell and social norms changed, the real underlying problem that fuels differences in occupations, promotions, and pay has been revealed. Unquestionably, classic discrimination, bad actors, sexual harassment, and biased workers and supervisors exist. But most of the difference is due to something else.

To paraphrase Betty Friedan, the new "problem with no name" is the notion of Greedy Work—that there are large nonlinearities and convexities in pay. To have a family takes the time of at least one parent. There is no way to contract out all childcare, and one wouldn't want to do that, or why have children in the first place? Parents have children to spend time with them. For college graduates, the gender gap in earnings is an indication and a symptom of career blockage.

Women earn less than men, on average. The ratio of women's earnings to men's, often adjusted by hours of work, is referred to as the gender earnings gap, since it is often given as the log of the ratio. The ratio for all workers narrowed considerably from the early 1960s until today, but is still around 0.8. That for college-graduate women to college-graduate men
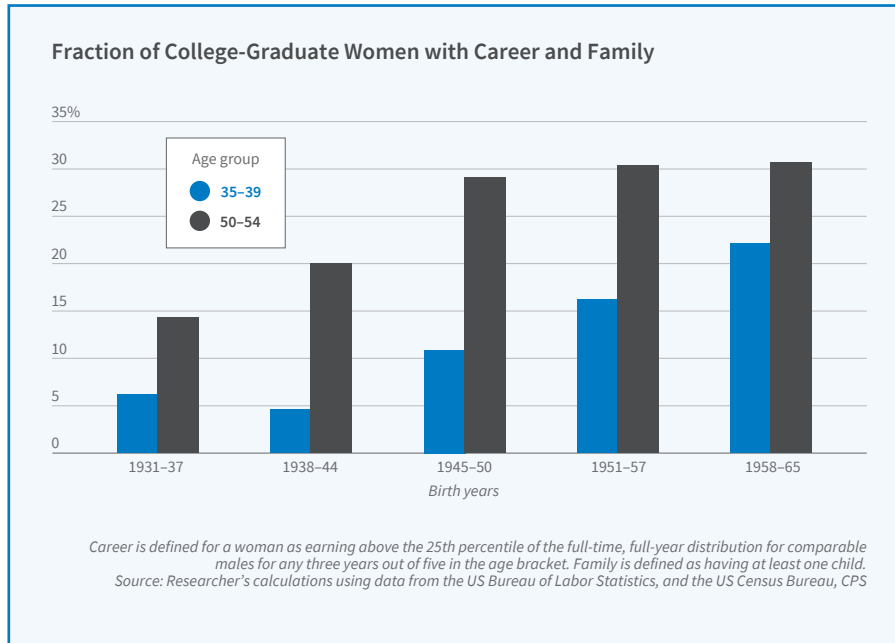
Fraction of College-Graduate Women with Career and Family

Career is defined for a woman as earning above the 25th percentile of the full-time, full-year distribution for comparable males for any three years out of five in the age bracket. Family is defined as having at least one child.
Source: Researcher's calculations using data from the US Bureau of Labor Statistics, and the US Census Bureau, CPS

Figure 2

Ratio of Female to Male Median Annual Earnings, 1960–2017

Data is for full-time, full-year workers. Three-year centered moving averages are used for both series.
Source: Researcher's calculations using data from the US Bureau of Labor Statistics, the Current Population Survey, and the US Census Bureau

Figure 3

followed a similar path until the late 1980s, when it flattened out. Some of the clues as to why the ratio is still substantial and why the ratio for college-graduate women to men became smaller than for the aggregate after the late 1980s are:

- The gender gap in earnings exists for both annual earnings and those on an hourly basis, so it is not just due to the fact that women work fewer hours.

- Women with children earn less than women without children.

- Earnings gaps increase with age up to a point, and they increase with joyous events like births and, often, marriage.

- Gaps are greater at the upper end of male earnings and education levels.

- The more unequal earnings are for an occupation, the lower are women's earnings relative to men's.

- The gender earnings gap is greater in occupations that have more demands on employee time and where face time and client relationships matter most.

The flip side to gender inequality is couple inequality. Working mothers are on-call at home whereas working fathers are on-call at work. The reasons for both gender inequality and couple inequity are the same. The issues are the two sides of the problem mentioned above.

Many jobs, especially the higher-earning ones, pay far more on an hourly basis when the work is long, on-call, rush, evening, weekend, and unpredictable. And these time commitments interfere with family responsibilities. The problem is illustrated here.

One job (the gray line) is flexible and has a constant wage with respect to hours. The other job (blue line) is not so flexible and has a wage rate—the slope of the earnings curve—that rises with hours. A couple with children can't both work at the blue dot. They could both work at the gray dot. But if

Gender Inequality and Couple Inequality

Earnings per week

Less flexible position

Inflexibility premium

More flexible position

Hours per week   *H**

For illustrative purposes only

Figure 4

they did, they would be leaving a lot of money on the table: for each of them it is given by the distance between the two dots. So one works the flexible, less remunerative job and the other works the less flexible, more remunerative job. More often than not, the man takes the less flexible, higher-paying job.

For many highly educated couples with children, she's a professional who is also on-call at home. He's a professional who is also on-call at the office.

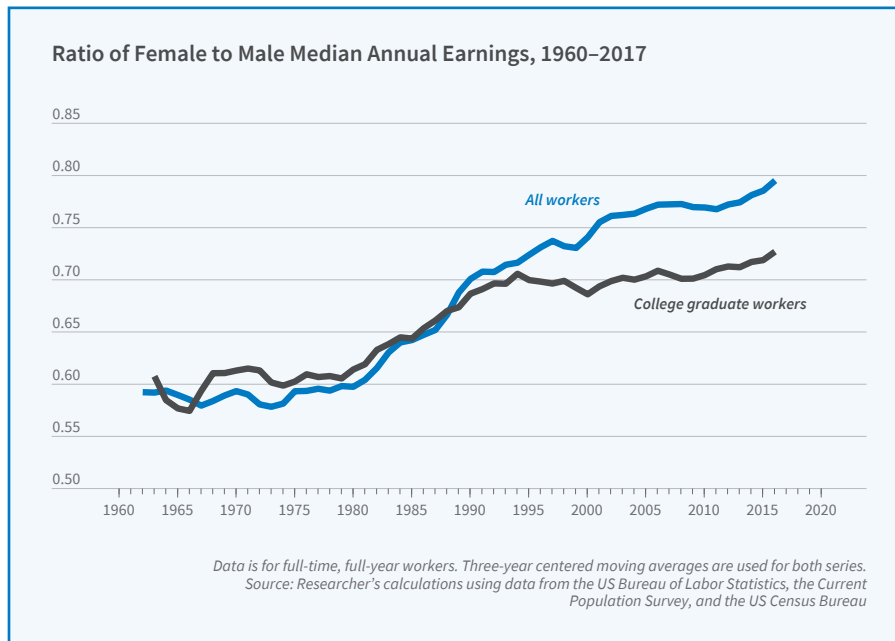In consequence, he earns more than she does. That gives rise to a gender gap in earnings. It also produces couple inequity. If the flexible job were more productive, the difference would be smaller, and family equity would be cheaper to purchase. Couples would acquire it and reduce both the family and the aggregate gender gap. They would also enhance couple equity.

Note that even if these were same-sex couples, there could still be couple inequity without gender inequality. And even if couples wanted a 50-50 relationship, high earnings for the position that had less-controllable hours could entice them to engage in a new version of an old division of household labor.

What are the solutions? First off, any solution must involve lowering the cost of the amenity—temporal flexibility. The simplest is to create good substitutes. Clients could be handed off with no loss of information. Successfully deployed IT could be used to pass information with little loss in fidelity. Teams of substitutes, not teams of complements, could be created, as they have been in pediatrics, anesthesiology, veterinary medicine, personal banking, trust and estate law, software engineering, and primary care. The cheaper the amenity, the more linear total pay becomes by hours worked.

But the tale I have been telling has been set in a BCE world. In mid-March 2020, suddenly and swiftly, we descended into a DC (During Corona) world. Most workers sheltered in place and worked from home. Fortunate children had online schooling and at-home help. Less fortunate workers were deemed essential and often worked in

unhealthful circumstances. Less fortunate children lost valuable schooling.

How does our understanding of the BCE world of career and family help us understand the impact of the new DC era, and what will come after? I will focus on college-graduate, employed adults and their families. These parents and their children are clearly in the more fortunate category. I use the American Time Use Survey (ATUS) from 2010 to 2019 to compute child-care hours of mothers and fathers by the age of their youngest child.

The child-care hours of the mothers in the BCE world are given by the dark gray bars, and the fraction of the total parental child-care hours is given above the bars. In the BCE world, college-graduate employed mothers with college-graduate employed husbands and school-aged children were working around 60 percent of total child-care hours. That fraction was higher for mothers with the youngest children and lowest for those with the oldest children.

The descent into the DC world almost doubled total child-care hours for working couples with children. The dark blue bars denote the hours that mothers contributed to child care and are derived from various surveys done in the United States and elsewhere in April 2020, together with many assumptions. (The ATUS was not administered in March and April 2020, and although it was restarted in May, those numbers won't be available for some time.)

In mid-March 2020, almost 90 percent of school-aged children were not physically in a school, and most child-care facilities for younger children were shuttered. Many families

temporarily furloughed care workers who had worked in their homes. That greatly increased the child-care demands on mothers. But there was also more parental sharing, since many households had both parents at home full time. Consequently, the fraction of child care performed by women fell, even as the absolute number of

Weekly Childcare Provided by Employed, College-Graduate Mothers
For married mothers with employed, college-graduate husbands

● Before Corona Era (BCE)
● During Corona (DC)
● After Corona and During Corona (AC/DC)

Fraction of total childcare hours that are provided by the mother

Daily childcare x7. BCE hours come from a sample of women in the ATUS who were currently employed, college graduates with at least one child younger than 18. DC hours are estimated by increasing BCE hours by 1.51 for mothers and 1.9 for fathers (based on studies from April 2020) and then adding four additional hours per day for school-aged children. AC/DC hours for the couple are the average of BCE and DC hours, but fathers are given only BCE childcare hours (assuming full-time work). Mothers are assumed to be doing the rest of the childcare.
Source: Researcher's calculations using data from the US Bureau of Labor Statistics

Figure 5

hours greatly increased. For those with sick relatives, other care hours also increased, and for single mothers, care hours must have been overwhelming.

We are now moving to an entirely new AC/DC (After Corona/During Corona) world. Draconian pandemic restrictions have been partially lifted in some schools and daycare facilities. Daycare centers opened in most states by the early summer. There will probably be full-time in-place schooling in smaller school districts, part-time schooling together with part-time virtual at-home schooling in most of the larger, urban districts, and entirely virtual at-home schooling in other districts.

But full-time work has returned to many offices, stores, workplaces, construction sites, factories, and elsewhere. What can we expect to happen to the child-care and home-schooling burdens placed on parents? For most mothers,

the AC/DC world will be the BCE world on steroids.

Here, I must go even further out on a data limb since, even though the first day of school is imminent as I am writing this, districts are still debating what they will do. One possible scenario is that in the AC/DC world, total child-care and home-schooling hours will be halfway between what existed in the BCE and DC worlds. That makes sense if schools and child care are available half the week. But because of non-linearities in work, one member of the couple will go back to work full time and the other will work part-time from home and take care of the kids whenever in-person school is out and virtual school is in.

If history is any guide, men will go back to work full time and revert to their BCE childcare levels. Women will take up the slack and do a greater share of the total.

The bottom line may be that there will be no net gains for working women in the AC/DC world. What they gain from minimal school and daycare openings, they lose from less parental help at home. Because of convex hourly pay, couple equity remains expensive for the family unit. That expense persists from the BCE world, and the careers of many young women will take a back seat on this journey.

The corrective in the BCE world was to change the workplace by driving down the price of flexibility. The corrective in the AC/DC world must change the care place by driving down the cost of child care and other family demands. But how can one do that safely and equitably?

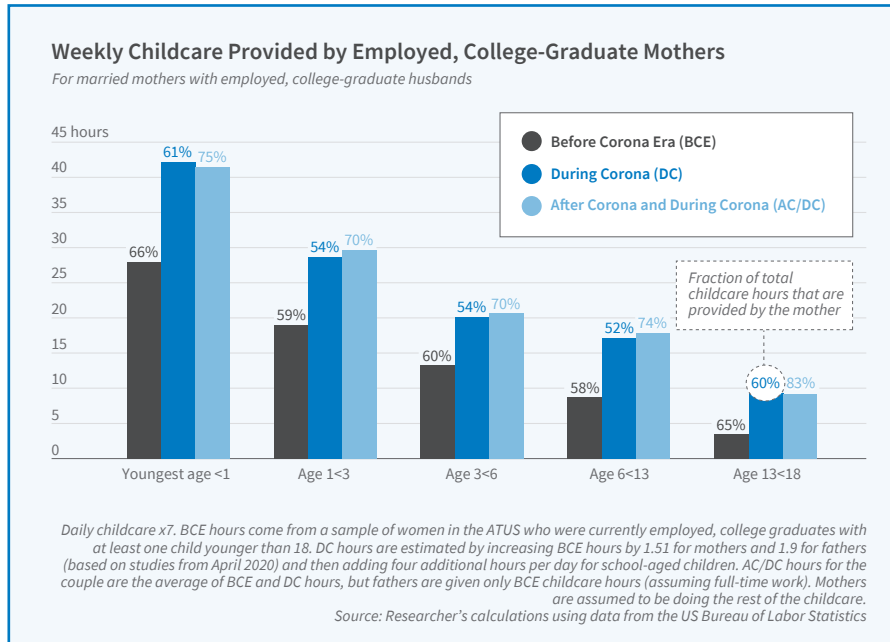When public and free elementary schools spread in the United States in the

19th century, and when they expanded during the high school movement of the early 20th century, a coordinated equilibrium was provided by good governments. Good government today could do the same thing. We need to find safe ways to have classes for children—for their futures and for their parents'.

As in the Great Depression, we have unemployed labor. Today, many of the unemployed are highly educated recent college graduates and gap-year college students with little to do. They could be harnessed in a new Works Progress Administration manner and put to work educating children, espe-cially those from lower-income families. They could free parents, especially women, to return to work. I'll repurpose a name and call them the "Civilian College Corps"—a new CCC.

Some of the Corps' educational work could be done remotely. The Corps could support beleaguered parents too exhausted to correct their children's essays and too confused to help their children with algebra. Other Corps members could be in the classroom, helping districts cope with having fewer teachers because some older teachers don't want to return to a school building. The Corps could employ those without jobs, meaning, and direction and give them something worthy to do: educate the next generation and help women go back to work full time, either in their homes or on-site.

In the BCE world, if the cost of flexibility were much lower, we would solve the problem of Greedy Work and achieve both gender equality and couple equity. In the AC/DC world, we must also reduce the cost to parents of educating and caring for children of all ages. The original journey was from career or family to career and family. The Journey continues.

Research Summaries

Black Officeholders and Spending on Public Goods

Trevon D. Logan

Trevon D. Logan is a research associate in the NBER's Development of the American Economy Program. He is the Hazel C. Youngberg Trustees Distinguished Professor of Economics and interim dean of social and behavioral sciences in the College of Arts and Sciences at The Ohio State University. He is currently director of the American Economic Association's Mentoring Program and member of the editorial boards of the *Journal of Economic Literature* and the *Journal of Economic Perspectives*.

His current research focuses on racial inequality and economic history. Logan received his BS in economics from the University of Wisconsin-Madison in 1999, his MA in demography in 2003 and his PhD in economics in 2004, both from the University of California, Berkeley. His research has received support from the National Science Foundation and the Washington Center for Equitable Growth, among others.

Logan was born and raised in St. Paul, MN and currently lives in Columbus, OH. He enjoys tweeting (@TrevonDLogan), Marvel Comics, Legos, and college football.

The United States has long had racially homogeneous political leadership. For example, 97 percent of all Republican elected officials and 79 percent of all Democratic elected officials are White.[1] Would more Black, Hispanic, and Asian officials advance different policies in office, or would their policies be similar since those officials would represent the same communities?

Theoretically, the race of a politician may or may not matter. Under a classic median voter model, specific candidate demographics have no effect: policymakers reflect the preferences of the electorate.[2] At the same time, a candidate's race may affect the electorate by increasing or depressing turnout, leaving the median voter endogenous to the demographics of the candidates for office.[3] In modern citizen-candidate models, however, politicians differ from the median voter's preferred policy, and there would be a race effect to the degree that politicians of the same race have similar policy preferences.[4]

Racial segregation, the geographic concentration of Blacks in cities in regions outside of the South, endogenous incorporation and municipal boundaries, and political districting and redistricting make it difficult to disentangle contemporary candidate demographics from the communities they represent today. I have therefore turned to history, particularly the history of Reconstruction, to answer questions about the cause and effect of Black political representation.[5] I ask three related questions about the role of race in political representation: Were Black politicians related to policy in a way that was unexplained by the demographics of the voting population? Is there any evidence that their policies were effective? And was that leadership related to the subsequent violence of the Jim Crow era?

Reconstruction offers a unique opportunity to answer these questions because the enfranchisement of Black men was both unexpected and universal. In fact, enfranchisement came to the formerly enslaved before the 15th Amendment of the Constitution in 1870 by way of the first Reconstruction Act in 1867. The Act required new state constitutions in the former Confederacy that allowed for manhood suffrage irrespective of race, color, or religion, and for the establishment of governments under those new constitutions. In many areas of the South, Black turnout for constitutional ratification and subsequent elections exceeded 90 percent.[6] Along with the enfranchisement of one million Black men, the widespread election of Blacks in the South was a striking revolution in both American and global political history.

Building on the narrative work of historians of Reconstruction, I constructed a database that matched every Black official to his county of service during Reconstruction to quantitatively measure the impact of Black officeholding.[7] Going further, I used the narrative approach pioneered in macroeconomic history to qualitatively identify the areas of policy agreement among Black elected officials that were at odds with those of Whites at the time.[8] I found two areas of broad agreement: land policy and pub-

lic schools. Black policymakers sought to use tax policy to induce the sale of unimproved land. The basic idea was not to use taxes on land to seize property for nonpayment of taxes, but rather to alter the opportunity costs of large landholding. Black officials were also strong supporters of public education, which was not widely provided in the South before the Civil War.

Tax Effects of Black Politicians

Since there was little use — or even scope — for municipal taxation at the time, I use county taxes per capita as the measure of the public finance effect of Black political leadership. Ordinary Least Squares (OLS) regression estimates imply that each additional Black politician was correlated with a $0.09 increase in per capita county tax revenue in 1870. Although this correlation is inherently interesting and the first evidence of tax effects of Black politicians at the time, the number of Black officials could be related to electoral preferences for redistribution. Black political leadership could have been more likely in areas which had more progressive attitudes toward racial relations and/or redistribution, which would overstate the relationship. On the other hand, if White resistance and preferences for low levels of redistribution were an increasing function of Black political success, the relationship between politicians and tax revenues could be understated.

To overcome this endogeneity, I use an instrumental variable for Black policymakers during Reconstruction: the number of free Blacks in 1860.

A highly disproportionate number of Black officials were people who gained their freedom before the end of slavery. At the same time, both narrative and quantitative evidence shows that free Blacks in 1860 correlated well with Black officials. This correlation is free from potential errors in the estimating equation, such as preferences for redistribution. As examples, free Blacks were disenfranchised for more than 25 years before the Civil War began, and they are uncorrelated with any Reconstruction political outcomes

Geographic Distribution of Black Politicians During Reconstruction, 1865–1877

- 0 politicians
- 1 politician
- 2-4 politicians
- 5+ politicians

Data represent all major Black officials at the national and state levels and a majority of local officeholders
Source: T. D. Logan, NBER Working Paper 26014

Figure 1

such as party vote shares. The instrumental variable estimates are twice as large as the OLS estimates that do not correct for the endogeneity problem, suggesting that each additional Black politician increased per capita county revenue by more than $0.20 per capita. This is more than a laborer's hourly wage at the time.

Is this a large effect? From the contemporaneous response, yes. For example, in 1874, Whites in South Carolina organized a Taxpayers' Convention to protest high local taxes in Congressional Reconstruction. The commissioned report noted that taxes increased by $0.38 per capita, and were

used to provide a range of public goods, such as schools and improved roads, which were not available in the antebellum era. The results suggest that each additional Black politician could explain roughly half of the increase in per capita taxes from the antebellum era to Reconstruction, an increase that was the focus of intense contemporaneous political protests.

Black Politicians and Policy

Given that Black politicians appear to have had a sizable effect on tax revenue, the open question is whether those revenue effects impacted the two areas of policy agreement among Black politicians. For land policy, I test whether higher taxes in 1870 led to more farms in the same county, which would be suggestive evidence of the breakup of existing farms. The results, however, show that higher taxes in 1870 led to fewer farms in 1880, exactly the opposite effect of the tax policies advocated by Black politicians. Recalling the potential effects of tax policy, higher taxes on property could have spurred landowners to put more land into production, and this could have altered the terms of labor negotiations for Black farmers. I find that taxes had a positive effect on the share of all rental farms that were tenant farms, with each additional dollar of per capita tax revenue increasing the share of tenant farming by 4 percent.

For education, county taxes were positively related to school enrollment for both Blacks and Whites. Estimates from historians suggest that one-fifth of local taxes were used to fund pub-

lic education. Using the relationship between Black politicians and taxes and between taxes and school outcomes, I estimate that a one standard deviation increase in the number of Black politicians resulted in an additional 34 Black students enrolled in school and an additional 125 White students enrolled in school. The results also imply that the same change led to a decline in Black illiteracy: a one standard deviation increase in Black politicians reduced Black illiteracy at age 10 by more than 30 persons and illiteracy at age 15 by 15 persons. Interestingly, there is no similar effect of Black politicians on White illiteracy. As a further check, I use adult literacy after the end of Reconstruction, looking at the literacy of those 21 and above in 1900, who would have been of school age during the time of Black officeholding. The results show that a one standard deviation increase in Black politicians increased adult Black male literacy by 1.6 percent. Given that the baseline literacy rate of Black men above the age of 21 was 50 percent in 1900, this implies a more than 3 percent increase in Black male literacy.[9]

Things Fall Apart

Beginning in the early 1870s, Southern Whites began a violent and widespread campaign to undo the Reconstruction process. After the 1872 election cycle, the relationship between violence and politics was revived and extended. One-third of all of the race riots in 1873 occurred the week before a local election. More than 10 percent of Black officials at the time were victims of vio-

lence. For example, George Barber fled his home in Fairfield County, South Carolina, over Ku Klux Klan death threats in 1871. Theophilus Steward of Georgia received death threats after he asserted that juries should involve both Black and White citizens. Charles Caldwell of Mississippi was murdered in 1875, months after he escaped an armed mob by fleeing to

Black Politicians, County Taxes, and Violence During Reconstruction

Beginning in the early 1870s, Southern Whites began a violent and wide-spread campaign to undo the Reconstruction process

Source: T. D. Logan, NBER Working Paper 26014

Figure 2

Jackson. Simon Coker of South Carolina was killed in 1876 by White Democrats in the Ellenton riot; he was kneeling in prayer after being captured.

While a complete accounting is impossible, congressional testimony and local accounts in newspapers speak to the profound regularity of racial violence in the South during this time, a significant portion of which was politically motivated. Black voter turnout declined more than 20 percent between the late 1860s and the 1880s.[10] Although Blacks sought protection from this political violence and voter intimidation, and prosecution of the perpetrators, they found little will to defend their rights. By the last decade of the 19th century, funding for schools open to Blacks was reduced substantially, taxes were significantly lowered, and the range of public goods offered in the South again stood in stark contrast to the rest of the nation.

Given the extensive violence of the time, I focus on the violence visited upon Black politicians in the Reconstruction era to see if it was related to the public finance policies in their local communities. More specifically, what was the role of taxation in the likelihood of attacks on Black politicians? I use the narrative history of political attacks against Black politicians to test this relationship. Overall, the likelihood of a violent attack increased by more than 25 percent for each additional dollar in per capita tax revenue collected in 1870. Even when restricting the analysis to counties with Black representation, larger tax revenues were strongly correlated with an increased likelihood of a violent attack against Black policymakers. All of this meant an end to the tax policies of Black political leaders. The removal of Black politic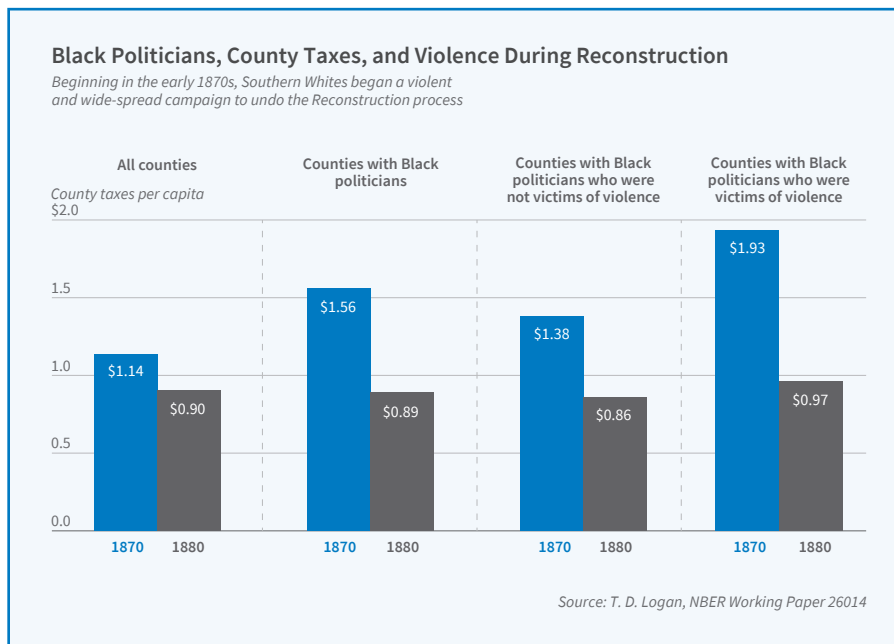ians at the end of Reconstruction more than reversed the differences in taxes levied due to Black politicians in 1870. Tax revenue per capita for counties without a Black politician went from $0.96 in 1870 to $0.98 in 1880, while for counties with Black politicians, revenue went from $1.56 in 1870 to $0.89 in 1880, on average. Further, I find that the violence against Black politicians was precise. These attacks were unrelated to other acts of racial violence, such as lynching, which acted as a means of voter suppression.[11]

Conclusions

Analysis of the beginning and end of Black political leadership in the 19th century provides a cautionary tale about the stability of democracy after expansions of the franchise. While Black politicians were effective in advancing some of their policies, they were undone by violence and legislative maneuvers.[12] Once Blacks

were intimidated from voting, the legislature was captive to White supremacists who promulgated racially hostile policies. Most Southern states moved to block Blacks from voting and subsequently enacted a White supremacist agenda with new state constitutions, poll taxes, grandfather clauses, and other restrictive measures. It would take more than 50 years to begin dismantling these policies, and the violence left a lingering negative effect on Black political participation.[13] The end of those racial voting restrictions also improved outcomes for Black citizens.[14] Overall, these findings suggest there is a measurable effect of Black political leadership on the level and composition of public spending.

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Capital Market Risks in Emerging Markets

Anusha Chari

Anusha Chari is a research associate in the NBER's International Finance and Macroeconomics Program. She is a professor of economics and finance and director of the Modern Indian Studies Initiative at the University of North Carolina at Chapel Hill. Her research interests lie in international finance, with a specific focus on emerging market economies.

Chari received her PhD in economics from the University of California, Los Angeles in 2000, and holds a BA in philosophy, politics, and economics from Balliol College at Oxford, where she was the recipient of a Radhakrishnan Scholarship, and in economics from Delhi University. She has held faculty positions at the University of Chicago's Booth School of Business, the University of Michigan, and the Haas School of Business at the University of California, Berkeley.

Chari has served as a special adviser to the Indian Prime Minister's Economic Advisory Council and as a member of the Indian finance minister's advisory group of eminent persons on G20 issues. She is the incoming associate chair and director of mentoring for the American Economic Association's Committee on the Status of Women in the Economics Profession.

A native of India, she trained in Indian classical dance and is fluent in English, Hindi, and Tamil. She lives in Chapel Hill with her husband, Nathan, and daughter, Dharma.

International financial integration has increasingly exposed capital markets in emerging nations to shocks that originate outside their domestic economies. Theoretical open-economy macro models propose a variety of mechanisms by which global financial conditions are transmitted from developed to emerging markets. Candidate mechanisms include advanced-economy monetary policy spillovers, the risk-bearing capacity of international financial intermediaries, liquidity in international capital markets, and global exchange rate configurations.

Testing the empirical validity of theoretical open-economy macro models using micro datasets is relatively new to international finance. It is a focus of my research. Microeconomic data are important because aggregate data can mask underlying heterogeneity useful in testing theories about a range of international capital market phenomena, such as the effectiveness of international risk-sharing and the welfare gains from international capital movements. In a series of papers, I use microdata to explore the mechanisms by which global financial conditions impact capital markets in emerging economies.

Capital Flows and International Spillovers

The massive surge of foreign capital to emerging markets in the aftermath of the global financial crisis (GFC) of 2008–09 focused attention on the substantial spillover effects of developed-market monetary policy for emerging market economies. Karlye Dilts-Stedman, Christian Lundblad, and I examine the effects of (unconventional) US monetary policy on emerging market capital flows and asset prices using financial derivatives to identify monetary policy shocks.[1] Our high-frequency identification strategy allows us to extract monetary policy shocks and use a dataset on disaggregated global capital flows and posi-

tions from the US Treasury to decompose the quantitative impact of US emerging market portfolio holdings into one component due to flows and another due to valuation changes. The findings shed light on the link between US monetary policy shocks, net capital flows, and emerging market equity and bond market returns. An important feature of our identification strategy is that the monetary shocks originate in the United States and are exogenous to the destination-country fundamentals.

The method allows us to disentangle the channels through which US monetary policy shocks alter yields and risk premia in the term structure of US interest rates. Using traded derivatives contracts on Treasury futures, we decompose the interest rate impacts of monetary policy shocks into the effect of revisions in market participants' expectations about the path of short-term interest rates, and the effect of changes in required risk compensation. Our results confirm that changes in US yields and risk premia significantly impact equity prices and bond yields in emerging markets via the portfolio rebalancing and signaling channels.

In particular, there is a significant correlation between US monetary policy shocks, bond yields, equity prices, and capital flows to emerging markets. The quantitative easing (QE) and tapering phases of unconventional monetary policy in the aftermath of the GFC represent salient examples of the mechanisms at play. During the QE period, falling term premia affected the market for long-duration assets domestically and internationally. This bears out the importance of US term premia for emerging market assets, particularly equities. Conversely, the taper tantrum episode of 2013 led to rising bond yields, falling equity prices, and significant retrenchments out of emerging market assets, increasing the cost of external finance.

In contrast to previous work, extract-

ing the magnitude of the monetary surprises directly from the futures data allows us to quantify the impact of large versus small monetary policy shocks over and above the qualitative statements about the direction of impact that result from the use of event dummies alone. Using monetary surprise magnitudes, we can also directly estimate changes to US investor positions in and flows to emerging markets while controlling for a variety of global-push and destination-specific pull factors.

To illustrate the impact on equity flows, Figure 1 presents the effects of a one standard deviation monetary policy shock in the pre-GFC, QE, and taper tantrum periods, respectively. Using the disaggregated US Treasury International Capital data, the figure decomposes the impact in emerging market positions into changes in flows and valuations. For example, a one standard deviation equity shock in the taper period elicits an equity effect that, on average, represents about 11 percent of monthly market capitalization changes. Given the low average levels of liquidity in these markets, these effects are consequential.

Debt and Distress in Emerging Markets

Periods of expansionary advanced-economy monetary policy can facilitate a rapid buildup of leverage at firms in emerging markets, as witnessed in the aftermath of the GFC. Emerging market corporate leverage and debt levels surged during the period of QE and unconventional monetary policy in the United States, consistent with a fall in the cost of external finance brought about in large part by foreign capital inflows and increased cross-border financial intermediation. In the decade concluding in 2019, credit to nonfinancial corporations in emerging markets more than tripled to $30 trillion, or 98.8 percent relative to GDP. Different from the past, the composition of credit to emerging markets shifted from sovereign to corporate debt. Rising shares of debt held by troubled firms in conjunction with the surge in leverage have led to growing concerns that a wave of corporate defaults in emerging markets could pose a grave risk to financial stability. Tightening external financial conditions on the heels of easy money and a corporate leverage boom

US Monetary Policy Shocks and Flows to Emerging Market Funds

Monthly impact, decomposed as flows and valuation changes, associated with a one standard deviation monetary policy shock, millions of USD

Pre-Great-Financial-Crisis Period | Quantitative Easing Period | Taper Tantrum Period

● Valuation changes
● Flows

Source: A. Chari, K. Dilts Stedman, C. Lundblad, NBER Working Paper 23474

Figure 1

can drive up expected default probabilities.

We know relatively little about the determinants of corporate debt and distress in emerging markets. Research in international finance has primarily focused on the real and financial impacts of sovereign credit risk, and how external shocks that affect sovereign default risk impact the macroeconomy. My research brings new micro evidence to bear on the link between global financial conditions and corporate default risk in emerging markets.

Laura Alfaro, Gonzalo Asis, Ugo Panizza, and I explore the rapid expansion of credit to firms in emerging markets following the GFC.[2] We document a set of stylized facts about leverage and financial fragility for emerging market firms. During the

Asian financial crisis (AFC), corporate debt vulnerability indicators, such as Altman's Z-score, provide a benchmark for comparison. Firm-level data show that post-GFC, more countries are close to or in the "vulnerable" range of this metric, and average leverage for the entire emerging market sample is higher in the post-GFC period than during the AFC. There is a deterioration in many indicators that measure corporate solvency and the ability to service debt.

Moreover, large firms appear to play an outsized role and disproportionately drive risks in emerging capital markets. In a second paper, we examine the links between the surge in corporate leverage in emerging markets, weakened corporate financial fragility indicators, and firm characteristics.[3] We find that firm size plays a critical role in the relationship between leverage, firm fragility, and exchange rate movements. While the relationship between firm-leverage and distress scores varies over time, the relationship between firm size and corporate vulnerability is relatively time-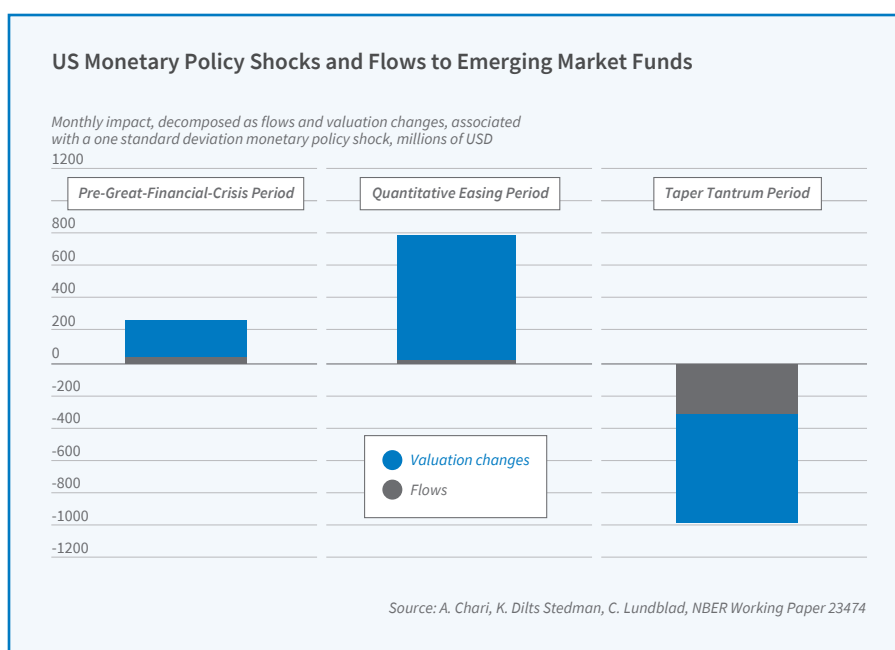invariant. All else equal, large firms in emerging markets are more financially vulnerable and also systemically important. Consistent with the granular origins of aggregate fluctuations, there is a positive and significant correlation between idiosyncratic shocks to large firms' sales growth and GDP growth in our emerging markets sample. Relatedly, the negative impact of exchange rate shocks has a more acute impact on the sales growth of the more highly leveraged large firms.

Forecasting Corporate Default Risk in Emerging Markets

Using a novel multicountry dataset on corporate defaults from the Credit Research Initiative of the Risk

Management Institute at the National University of Singapore, in two papers, Asis, Adam Haas, and I study factors that drive corporate distress in emerging markets. Established bankruptcy models based on developed-market experience do not capture many idiosyncrasies that affect emerging market firm solvency, particularly emerging market vulnerabilities to global financial conditions. We suggest that the extent of global exposure influences whether deteriorating international credit market conditions reduce emerging market firms' ability to repay their debts. Consequently, it is not surprising that models developed in the US context perform poorly when applied to the emerging market firms. They may be missing pertinent factors that drive corporate default risk.

Given the universe of accounting, financial market, domestic, and global macro variables that could potentially influence emerging market firms' solvency, selecting the most relevant variables for gauging corporate resiliency and forecasting distress is a challenging task. In the first paper, Asis, Haas, and I adopt a machine-learning approach to directly confront the issue of variable selection and show how a machine-learning technique, LASSO, can help corporate distress prediction in emerging markets.[4] By limiting the analysis to the most relevant subset from a much broader set of accounting, market, and global variables, machine learning can increase a model's predictive power while maintaining straightforward interpretation.

In terms of forecasting corporate distress, the variable selection exercise using machine learning suggests that models that include global financial conditions perform best in times of crisis. The omission of these variables may provide a clue

for the underperformance of standard bankruptcy models that have not been tailored to the emerging market context. Models that only include accounting and market variables have better predictive power during normal times.

The existing literature uses several measures of a model's predictive power, mostly ranking firms by their estimated probabilities of default. However, studies differ in the number of firms and defaults, the size of the quantiles to group firms, and the allocation of distressed firms across quantiles making cross-model comparisons difficult. We rely on the receiver operating characteristics (ROC) score, also known as the "area under the curve" (AUC), that uses the cumulative fraction of defaults as a function of the ordered population of firms from most to least likely to fail as predicted by the model. The ROC curve plots the true positive rate, based on the number of firms that default, against the false positive rate, based on the number of firms predicted to default that do not, for different threshold settings.

The extant literature on distress risk does not account for the exposure of emerging market firms to global financial shocks. This is the focus of our second paper.[5] The ROC curves in Figure 2 illustrate the importance of global fac-

tors in the identification of distressed firms. They display the curves associated with our main specification that includes global variables, one that only has local macroeconomic variables, and one that includes only accounting variables. The benchmark model that includes global variables performs substantially better in identifying at-risk firms. Over 80 percent of the defaulting firms are included in the top 10 percent of firms when ranked by predicted default probability (blue curve). The specification that includes only accounting variables takes nearly 40 percent of the sample to get to this same rate of identification (light gray curve).

Our findings suggest that increased corporate leverage can make firms more exposed to adverse shocks to their cash flows and asset values, driving up default probabilities. Tightening global financial conditions can exacerbate rollover and currency risks. In the absence of optimal hedging, exchange rate depreciation can impose a significant strain on the ability of emerging-market firms to service foreign currency-denominated debts. Therefore, deteriorating global financial conditions can directly impact credit risk, elevating corporate default probabilities, particularly for firms with weak fundamentals. The data suggest that global financial variables, such as US interest rates, shifts in global liquidity, and foreign investor risk aversion, have significant predictive power for corporate distress risk in emerging markets.

We also explore the asset pricing implications of our measure of distress risk. Do riskier firms command a higher risk premium? Prior literature using US data documents an inverse correlation between distress risk and future stock

In-Sample Predictive Power: Receiver Operating Characteristics Curve

Percentage of failed firms

Models:
- Benchmark
- Only local macroeconomic variables
- Only accounting variables

Percentage of firms (sorted from most to least likely to fail, as predicted by the model)

Source: G. Asis, A. Chari, and A. Haas, NBER Working Paper 27213

Figure 2

returns, referred to as the "distress risk premium puzzle." In contrast, we find strong evidence of a positive distress risk premium in emerging market stocks. Future twelve-month stock returns are monotonically increasing in the probability of corporate default, and the pattern is robust to the inclusion of a variety of standard asset pricing controls. The impact of a global "risk-off" environment on default risk is higher for firms whose returns are more sensitive to a composite global factor that measures external financing conditions.

Risk-on/Risk-off and Tail Events

My research on corporate default risk illustrates how changes in global financing conditions can affect emerging market firms. It is clear that tail events such as sudden stops present pressing challenges. Further, the mapping from global risk-on/risk-off positioning to capital flows and returns is conditional on the measure of risk used and the severity of the episode. Identifying the transmission of global financial conditions to local markets requires different sources of risk and plausible exogeneity with respect to local fundamentals. However, existing research has primarily focused on the first moment of the relevant distributions of aggregated risk measures. In ongoing work, Dilts-Stedman, Lundblad, and I turn our attention to the full distribution of emerging market capital flows and returns. We characterize how extreme capital flow and returns realizations are tied to global risk appetite ("risk-on/risk-off" or RORO).[6]

While imprecisely defined, the RORO terminology has come into

pervasive use in the financial press and among policymakers since the GFC. We view RORO shocks as a reflection of the variation in global investor risk aversion. Since investors rebalance their portfolios towards safe assets in the face of risk aversion shocks, RORO variation has important implications for asset price determination, particularly for so-called "risk assets."

We build a multifaceted RORO index to capture realized variation in global investor risk appetite. Our index, along with constituent subindices, exhibits significant skewness and fat tails. With fat tails, extreme events become both more probable and potentially more destabilizing. As examples, we observe sharp risk-off movements during the GFC, the European debt

Risk-on/Risk-off Index and Emerging Market Bond Flows

Risk-on/risk-off index, normalized to 100 at onset of risk-off event

Cumulative emerging market bond flows, billions US dollars

Days since risk-off event

Weeks since risk-off event

Global Financial Crisis — 2015 Chinese stock market crash

Taper Tantrum — COVID-19 *(Right-hand axis on left panel)*

"Capital Flows in Risky Times: Risk-On/Risk-Off and Emerging Market Tail Risk," A. Chari, K. Dilts Stedman, C. Lundblad, Kansas City Fed RWP 20-08. 2020, and NBER Working Paper 27927

Figure 3

crisis, the 2015 Chinese stock market crash, the taper tantrum, and the COVID-19 crisis.

Figure 3 shows cumulative outflows from emerging market bond funds during these widely recognized, risk-off events along with corresponding cumulative changes in our RORO index. The episodes are associated with severe outflow realizations, highlighting the necessity of modeling tail risk specifically.

Our results show that the distribu-

tional features of global investor risk appetite have important implications for capital flows and return distributions in emerging markets, and lead us to conclude that focusing only on measures of central tendency is incomplete.

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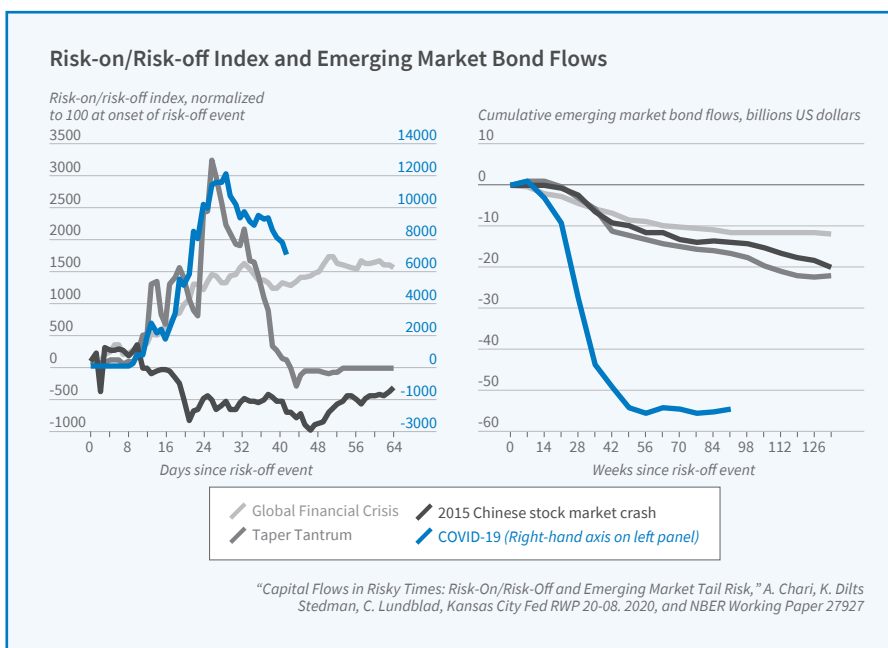
Integrating Renewable Generation into Electricity Markets

Frank A. Wolak

Frank A. Wolak is the Holbrook Working Professor of Commodity Price Studies in the Economics Department and the director of the Program on Energy and Sustainable Development at Stanford University. His recent research and teaching focuses on design, performance, and monitoring of energy and environmental markets in the United States and globally.

From April 1998 to April 2011, he was chair of the Market Surveillance Committee of the California Independent System Operator. In this capacity, he testified numerous times at the Federal Energy Regulatory Commission, and at various committees of the US Senate and House of Representatives on issues relating to market monitoring and market power in electricity markets. Wolak has also worked on design and regulatory oversight of electricity markets in Europe, Australia, Asia, Africa, Latin America, and Africa.

Wolak was a member of the Emissions Market Advisory Committee (EMAC) for California's Market for Greenhouse Gas Emissions allowances from January 2012 to December 2014. This committee advised the California Air Resources Board on the design and monitoring of the state's cap-and-trade market for greenhouse gas emissions allowances. In 2017, Wolak and other EMAC members provided an assessment of the extension of the California's cap and trade market to 2030.

Electricity supply industries in many parts of the world are undergoing disruptive change because of policymakers' desire to reduce energy-sector greenhouse gas (GHG) emissions. Electrifying energy services such as transportation and space heating can significantly reduce these emissions globally. The transportation, electricity, and space-heating sectors currently account for 28, 27, and 9 percent of US GHG emissions, respectively. It follows that reducing GHG emissions from these sectors by significantly increasing wind and solar energy production is likely to be the most economically viable pathway to sizeable reductions in global GHG emissions.

Reliability of Supply with an Increasing Renewable Generation Share

Managing an electricity supply industry with a large share of wind and solar generation capacity involves many new operational challenges, as demonstrated by the rolling blackouts of August 2020 in California. By replacing natural gas-fired and nuclear generation capacity with solar and wind generation capacity, California substituted on-demand generation capacity with generation capacity that only produces when the underlying resource — wind or sunshine — is available. Figure 1 shows the declining shares of natural gas and nuclear generation and increas-
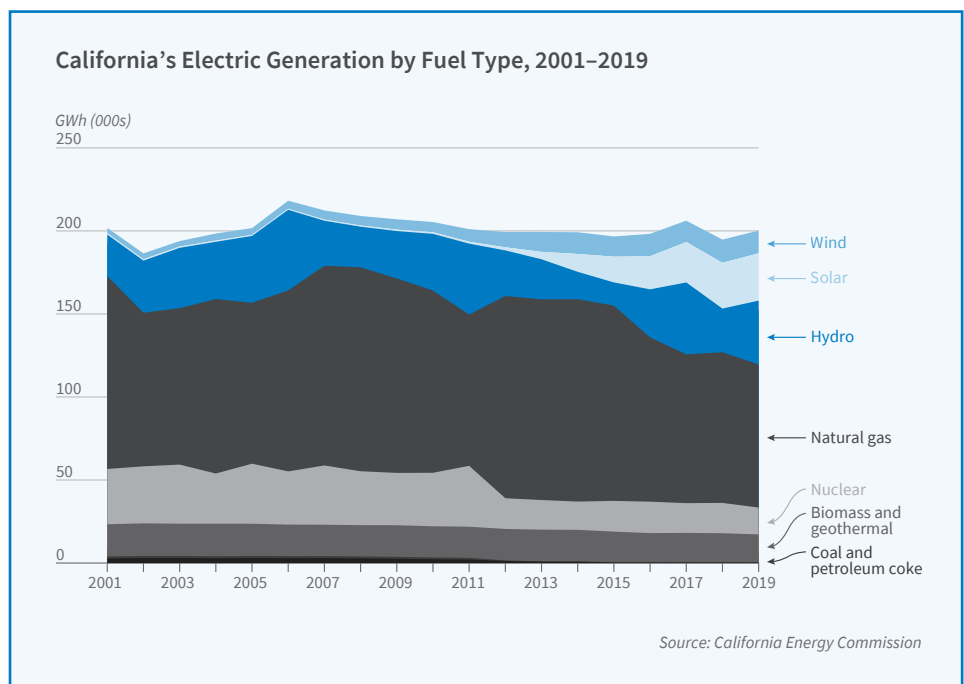

California's Electric Generation by Fuel Type, 2001–2019

Source: California Energy Commission

Figure 1

ing shares of wind and solar generation in California since 2013, the first compliance year of the state's 33 percent by 2020 renewables portfolio standard goal.

In an empirical analysis of the behavior of the hourly output of more than 50 wind and solar generation unit locations in California, I found a high degree of contemporaneous correlation in the hourly output of individual solar and wind facilities.[1] This implies a "feast or famine" distribution of aggregate wind and solar energy production, which can make it extremely challenging for system operators to meet the difference between the hourly system demand and hourly renewables production, typically called the net demand.

Net demand must be met by natural gas, coal, or other generation capacity that has controllable instantaneous output. These kinds of generation units are called "dispatchable," to distinguish them from intermittent renewable units. As the amount of wind and solar generation capacity in a region increases, during the majority of hours of the year many dispatchable units are no longer needed to meet the net demand. However, because of the feast or famine nature of wind and solar energy production, there are still likely to be hours during the year when each of these units is required to meet the net demand. Figure 2 presents a graph of system demand, the hour-ahead forecast of system demand, and net demand for August 15, 2020, when 470 MW of load shedding occurred 6:25 pm to 6:47 pm. The rapid disappearance of solar energy production in the evening implies a rapid increase in net demand.

The intermittency of wind and solar energy production also implies that these dispatchable units will have to be switched on and off more frequently. Turning on a natural gas or coal generation unit incurs a significant up-front cost because fuel is burned without injecting electricity to the grid. These dispatchable generation units also have minimum safe operating levels, maximum safe operating levels, and minimum up-time and minimum down-time constraints. In addition, these units have ramping constraints that restrict how fast they move from one output level to another. Finally, transmission network capacity constraints can restrict the ability of all generation units to supply energy to where it is needed.

California's Electricity Demand on 8/15/2020 and the Effect of a Blackout

MW (000s)

— Hour-ahead forecast demand
— Actual demand
— Net demand

The discrepancy between forecasted demand and actual demand from 6:25pm to 6:47pm is a rough estimate of the demand curtailed by the rolling blackouts

Source: The California ISO

Figure 2

An increasing the amount of intermittent generation in region makes the non-convexities and indivisibilities in production described above increasingly relevant. In addition, the requirement to deliver all electricity through a transmission network with finite transfer capacity between locations in the grid becomes increasingly important because of the substantial increase in volatility in net demand versus system demand. Christoph Graf, Federico Quaglia, and I demonstrate that electricity market designs that employ simplified models of the transmission network operation that ignore many transmission and generation unit operating constraints (such as

the electricity market designs that existed in many regions of the US and currently exist throughout Europe) are increasingly costly to operate, particularly in regions with a growing share of intermittent renewables.[2] A general conclusion from this work is that the market designer must make the market model that is used to set prices and dispatch generation units match as closely as possible the model that system operators use to operate the system in real time.[3]

The increased energy supply risk from a larger share of wind and solar resources also increases the expected benefits from risk-management services. Akshaya Jha and I find that the actions of purely financial participants who do not own generation capacity or serve demand can reduce the cost of serving demand, particularly during high-load conditions when all of these operating constraints are likely to be most relevant. The actions of these purely financial participants make the generation schedules that emerge from the day-ahead market closer to how these generation units actually operate in real time, thereby reducing the need for costly increases or decreases in their output in real time.[4]

Strategies for Active Participation of Final Demand in the Wholesale Market

As the share of energy from wind and solar resources increases, system operators have fewer supply options to deploy to maintain real-time system balance at all locations in the transmission network. Consumers can no longer be passive participants in the wholesale market. By shifting the demand for grid-supplied electricity from hours when
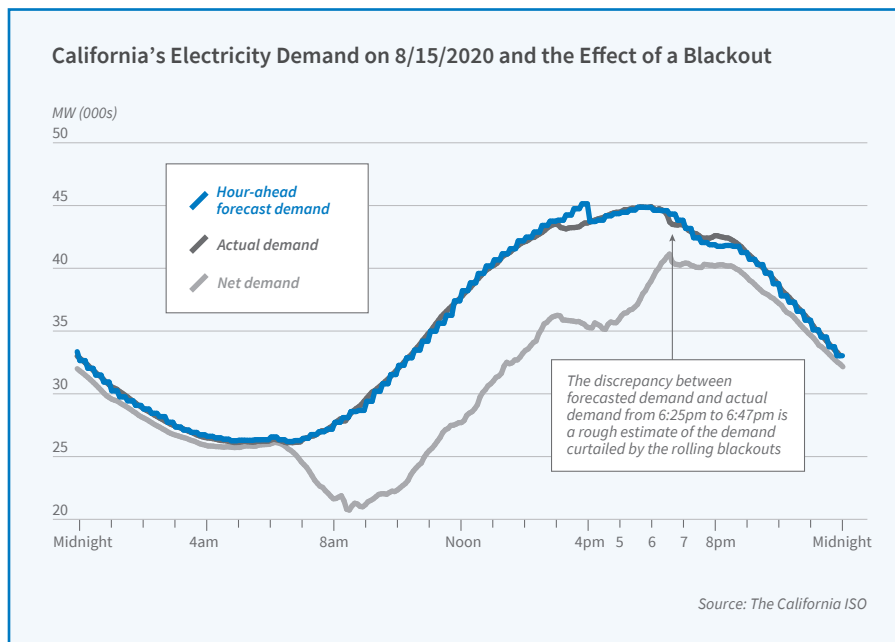
the wind and solar resources are not producing to the hours when they are allows system operators to maintain system balance with fewer dispatchable resources, thereby reducing the cost of serving demand. Laura Andersen, Lars Gårn Hansen, Carsten Jensen, and I performed a field experiment involving residential consumers in Denmark to investigate the willingness of consumers to shift consumption away from or into certain hours of the day if prodded at short notice using cellphone text messages.[5]

This experiment provided Danish residential consumers with dynamic price and environmental signals aimed at causing them to shift their consumption either "into" or "away" from certain time periods. We found that the same marginal price signal caused substantially larger consumption shifts "into" target hours compared to consumption shifts "away" from target hours. We also found that consumption is reduced in the hours before and after the "into" target hours. There is weaker evidence of increased consumption in the hours surrounding the "away" target hours. The same "into" versus "away" results hold for the environmental signals, although the absolute size of the effects is smaller. For both the price and environmental treatments, the same qualitative results are obtained, but with uniformly smaller quantitative magnitudes. We use these estimates to perform counterfactual experiments in which all of an electricity retailer's residential customers are assumed to face these dynamic price signals. We find substantial wholesale energy cost savings for the retailer from declaring "into" events designed to shift consumption from higher to lower demand hours within the day, which suggests that such a pricing strategy could significantly reduce the cost of increasing the share of wind and solar electricity generation.

The declining cost of electronic devices enables automated customer-level demand response actions. A number of companies have designed machine learning-based technologies that use Wi-Fi-enabled plugs to control electricity use on the customer's premises. Understanding

how individual appliances are used throughout the day and which uses are flexible can provide important input into determining the efficient deployment of these technologies. Jiyong Eom and I used a field experiment involving commercial customers in South Korea to measure the typical pattern of appliance-level electricity use and the appliance-level responsiveness of these customers to dynamic prices.[6] We find an important difference between the how commer-

Representative Hourly Load Profile for an Appliance

Full event-day effect
kWh

Campaign effect

Full event-day effect

1h   12h   24h

Hourly treatment relative to control group profile

Figure 3

cial versus residential customers respond to dynamic prices. Rather than reducing their consumption in response to individual dynamic pricing events, commercial customers appear to reconfigure their mode of operation in response to facing dynamic prices. Consistent with our reconfiguration hypothesis, small businesses primarily curtailed their electricity usage during peak periods of the day during all days of the experiment period. Appliances not critical to a positive customer experience were the major sources of the energy savings from these reconfiguration actions. Figure 3 shows a representative difference between the mean daily load profile for an appliance for customers in the treatment group and

customers in the control group during the dynamic pricing experiment, what we call the "Campaign effect." The profile labelled "Full Event-day effect" is the difference in the mean daily load profile between customers in our treatment group and customers in the control group during a dynamic pricing event day. It measures the combined impact on appliance use of participating in the experiment and a dynamic pricing event day.

Rooftop versus Grid-Scale Solar Generation Investment

Rooftop solar systems are an alternative source of renewable energy that many customers find attractive because of how the sunk cost of the transmission and distribution networks have historically been recovered. A per-kilowatt-hour (kWh) charge is typically assessed on all energy withdrawn by the customer to recover these sunk costs. This raises the customer's opportunity cost of consuming grid-supplied electricity, which makes an investment in a rooftop solar system more attractive, despite the fact that utility-scale solar units produce electricity at a significantly lower average cost than a rooftop solar system. Currently in Northern California, the average cost of electricity to residential consumers is close to 20 cents per kWh, despite the fact that the average marginal cost of grid-supplied electricity in 2019 was less than 5 cents per kWh. This creates an incentive for households to install a rooftop solar system that produces electricity at an average lifetime cost of 15 cents per kWh in order to avoid consuming more expensive, grid-supplied electricity. Although this decision is privately profitable for the household, it increases the total cost of supplying electricity to all customers, including those that install rooftop solar systems, because the sunk costs of the transmission and distribution network must now be recovered over a smaller quantity of grid-supplied electricity.

Because installing a rooftop solar system requires substantial up-front costs and a house for the customer to install it on, these systems tend to be
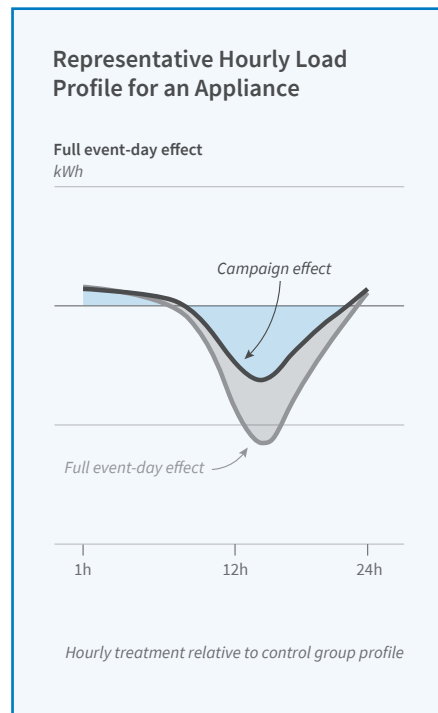
clustered in wealthier neighborhoods. During many hours of the day, rooftop solar systems produce more electricity than the customer consumes. This introduces reverse energy flows, which can require expensive distribution network upgrades to accommodate. Using data from the three major California distribution utilities, I find that distribution network prices for each of these utilities more than doubled between 2003 and 2019.

Using time series data on utility-level quarterly rooftop solar capacity, I find that virtually all of the increase in these distribution network prices can be explained by distribution network upgrades to accommodate the distribution network flows associated with rooftop solar investments. The mechanical effect of fewer withdrawals of grid-supplied electricity to recover the same sunk costs of the distribution network explains only a small fraction of the distribution network price increase.[7] This paper concludes with a description of a distribution network pricing scheme that eliminates the incentive for economically inefficient bypass of grid-supplied electricity.

Carbon Pricing and Electricity Supply

Carbon pricing is an important part of any climate policy for reducing GHG emissions from fossil fuel generation units. Although a carbon tax and a cap-and-trade market can be shown to be equivalent under certainty, they can lead to different outcomes under uncertainty. Over the past 10 years, Trevor Davis, Mark Thurber, and I have developed a web-based Energy Market Game (EMG) in which students own a portfolio of thermal and intermittent renewable generation units and compete to sell electricity in an offer-based wholesale market with uncertain demand with either a cap-and-trade market or a carbon tax. Using the EMG, we compared

the performance of three matched carbon-tax/cap-and-trade pairs with equivalent emissions targets, mean emissions, and mean carbon prices respectively.[8]

Across these matched pairs, the cap-and-trade mechanism produced much higher wholesale electricity prices (38.5 to 52.6 percent higher) and lower total electricity production (2.5 to 4.0 percent lower) than the "equivalent" carbon tax, without any lower carbon emissions. Market participants that forecast a lower price of carbon in the cap-and-trade games ran their generation units more frequently than those that forecast a higher price of carbon, which caused emissions from the dirtiest generating units — coal and natural gas-fired units with high heat rates — to be significantly higher (15.2 to 33.0 percent higher) than in the carbon tax games. This highlights an important advantage of the carbon tax as a policy. With a carbon tax, the carbon is a known input to the supplier's production process and there is no disagreement among market participants about the price of this input. Under a cap-and-trade mechanism, market participants can hold different beliefs about the price of carbon, and these differences will typically result in higher wholesale electricity prices.

Directions for Future Research

There are many difficult remaining economic and engineering challenges associated with reducing GHG emissions from the electricity sector. These increase rapidly as the share of wind and solar generation rises above 50 percent. Addressing them will require more active involvement of consumers in the wholesale market, an increasing range of financial tools to manage supply risk, investments in both short-term and long-term storage technologies, spatial and temporal pricing of access to distribution networks, and new protocols for operating the transmission and distribution network.

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Are US Treasury Bonds Still a Safe Haven?

Zhiguo He and Arvind Krishnamurthy

Safe assets are integral to the functioning of banks, financial markets, and the international financial system. Financial market participants use safe assets to meet liquidity and transaction needs, as high-quality collateral for loans and derivative contracts, and as default-free stores of value. These services imply a nonpecuniary return on safe assets, a convenience yield, that drives up the prices of safe assets and lowers their expected return in equilibrium.

The clearest example of the existence of a safe-asset convenience yield comes from examining US Treasury bonds. US Treasuries have been the premier safe asset around the world for the past several decades, although events in the recent COVID-19 crisis raise the specter that this reign may end, as we review later in this article.

The left panel of Figure 1 plots the spread in yields between long-term AAA corporate bonds and Treasury bonds against the total stock of privately held US Treasury bonds, using annual data from 1919 to 2008. The figure traces out a convenience-demand function for safe assets, akin to a money-demand function. Krishnamurthy and Annette Vissing-Jorgensen infer from this relation that the average convenience yield on Treasury debt over their sample is 75 basis points.[1]

There is ample evidence that some private safe assets carry convenience yields, the most significant example being short-term debt issued by financial institutions, including banks. Gary Gorton argues that this shapes the structure and operation of the banking system.[2] Figure 1's right-side panel plots the quantity of outstanding short-term financial sector debt against the supply of government safe assets, including gold certificates in the early part of the sample, from 1874 to 2014. The figure

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Previously the Dean's Distinguished Visiting Scholar at Stanford University's Graduate School of Business, He is serving as Special-term Alibaba Foundation Professor at Tsinghua University's School of Economics and Management, and as a member of Academic Committee of Luohan Academy.

His research focuses on agency frictions and debt maturities in financial markets and macroeconomics, with a special focus on contract theory and banking. He is also conducting active academic research on Chinese financial markets and on FinTech, especially the potential business applications of blockchain technology.

He holds bachelor's and master's degrees from Tsinghua University in Beijing, and received a PhD degree from the Kellogg School of Management at Northwestern University in 2008. He was named a 2014 Alfred P. Sloan Research Fellow, and has won numerous scholastic awards, including the Lehman Brothers Fellowship for Research Excellence in Finance in 2007, the Swiss Finance Institute Outstanding Paper Award in 2012, the Smith-Breeden First Prize in 2012 and the Brattle Group First Prize in 2014.

Arvind Krishnamurthy is the John S. Osterweis Professor of Finance at the Stanford Graduate School of Business. He is affiliated with the NBER research programs in Asset Pricing, Economic Fluctuations and Growth, International Finance and Macro, and Monetary Economics.

Krishnamurthy formerly taught at the Kellogg School of Management at Northwestern University. He studies finance, macroeconomics, and monetary policy. He has studied the causes and consequences of liquidity crises in emerging markets and developed economies, and the role of government policy in stabilizing crises. Recently he has been examining the importance of US Treasury bonds and the dollar in the international monetary system.

Krishnamurthy received his undergraduate degree from the University of Pennsylvania and his PhD from MIT in 1998.
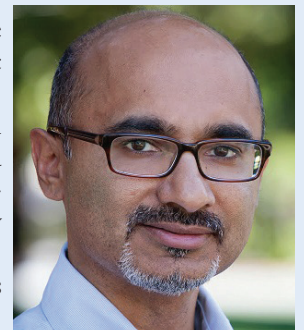
illustrates that bank debt is a substitute for government debt: less government debt increases the convenience yield on safe assets (left panel) and induces the banking sector to take advantage of the higher convenience yield by increasing their issuance of bank debt (right panel).

International Dimensions

Although we have reviewed evidence from the United States, it is likely that government and bank debt in other advanced countries also bear a convenience yield, and that the forces we have described above carry over to these countries. Marco Del Negro, Domenico Giannone, Marc P. Giannoni, and Andrea Tambalotti argue that this factor helps explain the low neutral real rate of interest across advanced economies.[3] Nevertheless, US dollar safe assets are noteworthy relative to those of other countries in carrying a higher convenience yield and shaping the international financial system.

Figure 2 illustrates the premium on dollar bonds compared to the bonds of other countries. It plots in black the Treasury basis, which is defined as the yield on a one-year Treasury bill minus the yield on the average non-US G10 one-year gov-

ernment bond, swapped into dollars via a foreign exchange forward. The black line is negative, indicating the lower yield on US Treasury bonds; hence, the figure is evidence of a higher convenience yield on dollar bonds. Wenxin Du, Joanne Im, and Jesse Schreger are the first to construct and study this basis spread.[4] The blue line is the

LIBOR basis, constructed analogously but for LIBOR (bank deposit) rates.

Because safe dollar debt carries a convenience yield, high-grade firms and banks domiciled both in the US and around the world finance themselves in dollar-denominated debt. That is, the dominance of dollar debt, which is a well-documented feature of the international financial system, is a direct consequence of the dollar safe asset phenomenon. Moreover, high levels of dollar debt explain why US monetary policy has large international spillover effects and why changes in the dollar exchange rate drive a global financial cycle. Finally, as Pierre-Olivier Gourinchas and Hélène Rey observe, the existence of a dollar convenience yield induces the US as a whole to run a carry trade of issuing safe dollar debt and investing in higher-return foreign assets.[5] Jiang, Krishnamurthy, and Hanno Lustig develop a model that connects these observations.[6]

Why Are US Safe Assets Special?

Working with Konstantin Milbradt, we have developed a model that emphasizes financial coordination incentives in the determination of safe asset status.[7] The key idea is that the safety of assets is
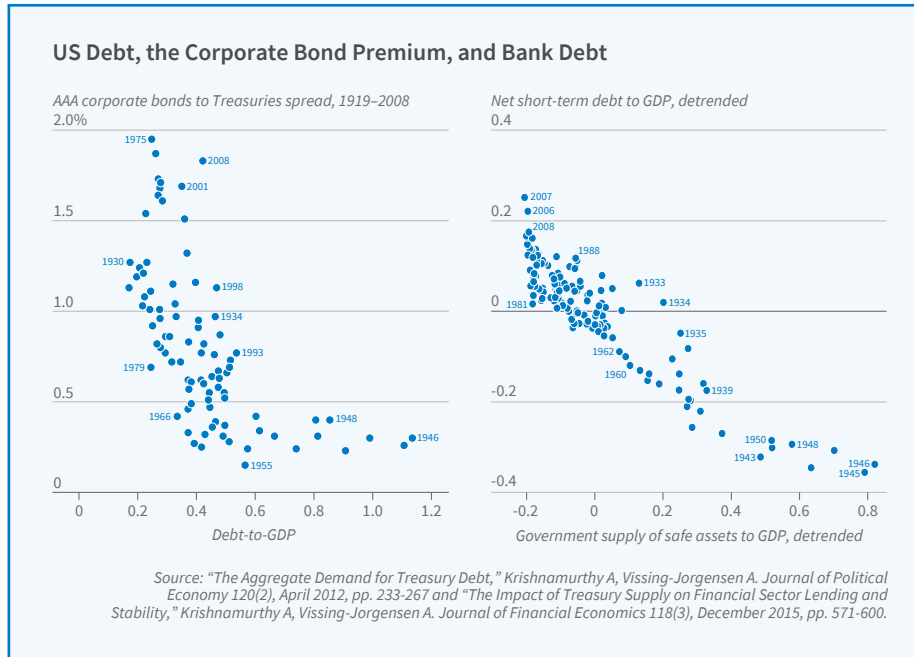

US Debt, the Corporate Bond Premium, and Bank Debt

AAA corporate bonds to Treasuries spread, 1919–2008

Net short-term debt to GDP, detrended

Source: "The Aggregate Demand for Treasury Debt," Krishnamurthy A, Vissing-Jorgensen A. Journal of Political Economy 120(2), April 2012, pp. 233-267 and "The Impact of Treasury Supply on Financial Sector Lending and Stability," Krishnamurthy A, Vissing-Jorgensen A. Journal of Financial Economics 118(3), December 2015, pp. 571-600.

Figure 1

The US Treasury Bond and LIBOR Premium

Basis points

LIBOR basis
Yield on US bank deposit minus average on non-US G10 bank deposits

Treasury basis
Yield on a one-year Treasury bill minus the yield on the average non-US G10 one-year government bond

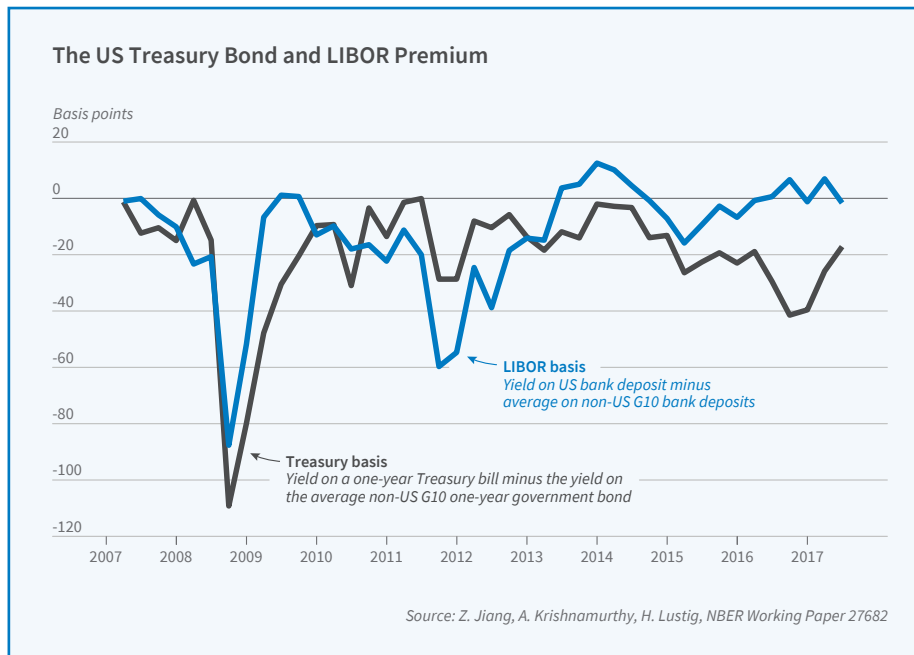Source: Z. Jiang, A. Krishnamurthy, H. Lustig, NBER Working Paper 27682

Figure 2

endogenous to investors' actions: investors act in a manner to make the asset safe. By having a larger Treasury bond market, liquidity and market depth in Treasury bonds are enhanced, drawing in investors across the globe. This in turn reduces rollover risk for the Treasury, which enhances the safety of the bonds, reinforcing investors' desire to purchase them. The model endogenously generates the outcome that the value of the safe asset rises in bad states of the world, when investors endogenously fly to safety.

The model also offers a nuanced perspective on the outstanding amount of government debt. Having too little debt reduces liquidity and investor coordination incentives. Having too much debt relative to fiscal capacity, however, renders debt unsafe and weakens coordination incentives. The size of the US economy enables the country to sustain a large absolute amount of liquid debt, which is why investors coordinate around Treasury debt as the world's safe asset. The model is cast in real terms, and one shortcoming of the analysis is that it does not explain why global investors coordinate on US Treasury debt issued in nominal dollar units.[8]

The US Treasury Market in 2020: Canary in the Coal Mine?

The large and growing size of US deficits has raised concern that US Treasuries and the US dollar may end their reign at the center of the international financial system. We review events in the 2020 COVID-19 crisis in this context.

The β of Long-Term Treasuries

Treasury bonds typically appreciate in times of turmoil — that is, they have a negative β. However, events in March 2020, during the COVID-19

Figure 3

crisis, did not follow this established pattern. As in many previous periods of financial market turmoil, stock prices fell dramatically, implied stock index return volatility spiked, credit spreads widened, and the dollar appreciated. Yet, in contrast to previous episodes, prices of long-term Treasury securities fell sharply. From March 9 to March 18, when the US stock market fell 19.3 percent, the 10-year Treasury yield increased by about 60 basis points (a return of -4.9 percent), resulting in an unusual positive correlation between stock and bond returns (see the left panel of Figure 3). The pattern of rising yields also held for five-year Treasury notes. He, Stefan Nagel, and Zhaogang Song find that this behavior was not due to rising inflation expectations and inflation uncertainty, which fell during this episode.[9]

The positive β of long-term Treasuries during March 2020 is particularly striking when contrasted with what occurred

during the global financial crisis of 2007–09. The right panel of Figure 3 plots the daily market movement of the S&P 500 and yields of Treasury securities in September 2008, covering the Lehman bankruptcy on September 15. Treasury yields fall (prices rise) when the stock market falls.

It is worth highlighting that the contrast in price movements between 2020 and 2008 is only present in long-term Treasury securities. Figure 3 shows that the yield of one-year Treasury bills has remained largely flat in 2020. However, yields at the short end are affected by the Fed's monetary policy easing. We next examine quantities where a clearer contrast between long- and short-term Treasuries emerges.

Sales of Treasuries

We plot the changes in Treasury holdings of a number of the key actors, comparing March 2020 and September 2008. Figure 4 shows the flows for three major institutional players in the Treasury market: foreign investors, mutual funds, and the Fed. We focus on foreign investors and mutual funds because they are liquidity sensitive holders. We separate the long-term treasuries (notes and bonds) and short-term securities (T-bills), and graph the flows for each player as a percentage of the corresponding total outstanding Treasuries in each bucket. In Figure 4, we report the dollar volume (in billions) corresponding to each bar. We only plot the flows in September 2008 for an analogous comparison to March 2020, although the flows were spread out over the second half of 2008 for all entities.
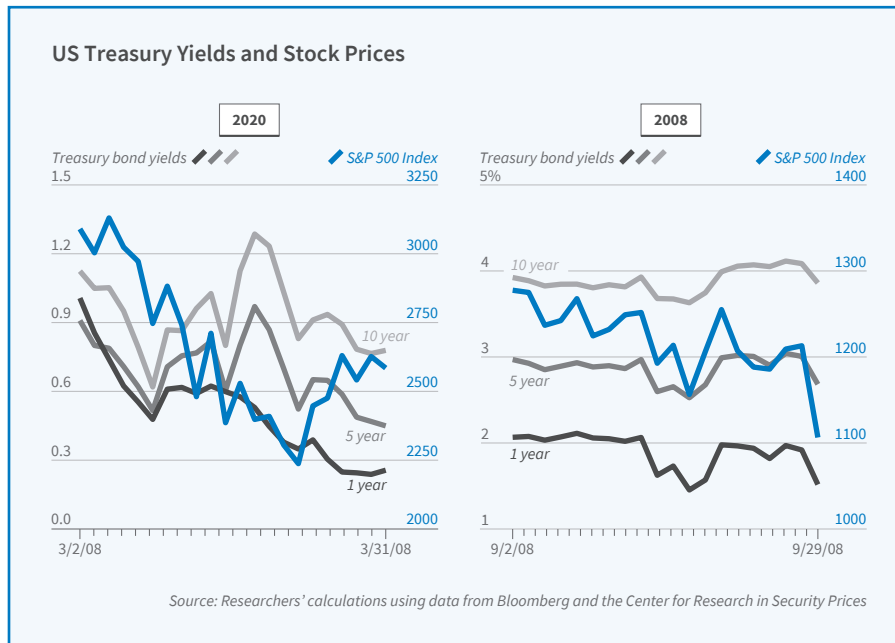
For long-term Treasuries in 2020, we observe that foreign investors, including foreign central banks and investors in tax havens, sold about 2.5 percent, or US $311 billion (the negative blue bar in the top-left of Figure 4). In comparison, they bought about 0.7 percent, or US $20 billion in September 2008. Mutual funds acted similarly, selling in 2020 but buying in 2008. In the COVID-19 crisis, the Fed stepped in to buy 3.4 percent of outstanding long-term Treasuries, or US $419 billion, starting on March 15. In sharp contrast, the Fed supplied about $200 billion worth of long-term Treasuries during the period from March 2008 to June 2009 by allowing dealers to obtain Treasuries against non-Treasury collateral in the Term Securities Lending Facility.[10]

Next, consider the quantity movement of short-term T-bills in March 2020. Mutual funds purchased a massive amount of short-term Treasuries, totaling 10.4 percent of the outstanding stock, or $266 billion. Foreign investors were net sellers, although the amount was negligible. Note that foreign central banks were likely to have acquired dollars via the Fed's swap lines, which were expanded temporarily on March 19 to include some central banks in emerging markets. We conclude that unlike the case of long-term Treasuries where liquidity-sensitive investors sold in 2020, investors sought the safe haven of short-term Treasuries in both 2020 and 2008.

Are Treasuries and the Dollar Losing Safe-Haven Status?

Relative to short-term T-bills, whose values are largely determined by the near-term promise to repay by the US government, the market prices of long-term Treasuries are endogenous. They are subject to coordination incentives of market participants and expectation of future fundamentals.[11] The positive β of long-term Treasuries thus

Change in Treasury Holdings of Foreign Investors, Mutual Funds, and The Fed

Figure 4

Source: Researchers' calculations using data from the Treasury International Capital System, the Federal Reserve Bank of St. Louis, and the Investment Company Institute

raises the prospect that investors questioned the safe-haven status of these bonds.

Furthermore, although the dollar did appreciate in March 2020, which indicates a flight to safety and is consistent with past episodes of market turbulence, the degree of appreciation in the dollar against other currencies is much smaller than that in 2008. From the perspective of safe-haven assets, this observation is at odds with the fact that the 2020 global macroeconomic shock due to the ongoing COVID-19 pandemic appears as severe as the financial crisis shock in 2008. Moreover, the dollar has depreciated since March 2020, alongside weakening US economic fundamentals and a rising fiscal deficit.

There are alternative perspectives on the Treasury market behavior. Darrell Duffie, and in another report Andreas Schrimpf, Hyun Song Shin, and Vladyslav Sushko, argue that the price behavior of long-term Treasury

bonds in March 2020 reflects long-standing flaws in clearing/settlement market design for Treasury bonds, amplified by constraints on dealer balance sheets.[12] Dealers who in previous episodes may have absorbed these flows did not do so because of regulatory balance sheet constraints.[13] As a result, long-term Treasury prices fell in March 2020. The Fed's announcements of the purchase of long-term Treasury bonds and subsequent purchases were critical in restoring market function. Indeed, as of September 2020, the long-term Treasury market has normalized. Yields have fallen and the negative β pattern for long-term Treasury bonds has been restored. Whether the events of March 2020 were a technical aberration or the proverbial canary in the coal mine of international investors shifting toward a nondollar equilibrium remains an open and consequential question.
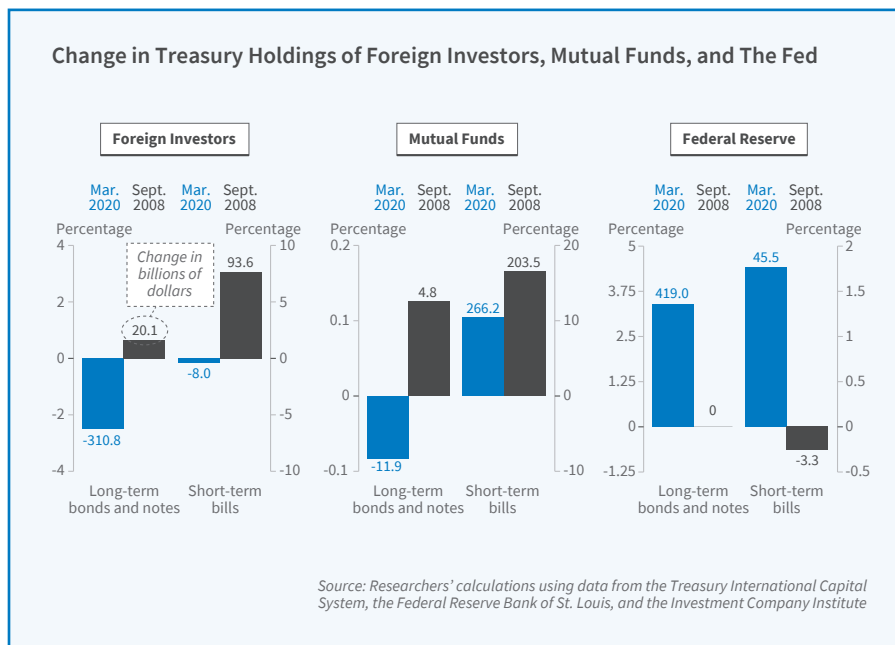
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John Lipsky Elected Chair of NBER Board of Directors; Peter Blair Henry Elected Vice Chair
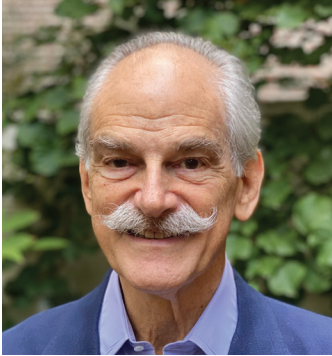
John Lipsky

Peter Blair Henry

John Lipsky was elected chair of the NBER's Board of Directors at the board's September 14 meeting. He succeeds Karen N. Horn, a partner in the Brock Capital Group, former CEO of Bank One, and former president of the Federal Reserve Bank of Cleveland, who had served since 2017. Lipsky, the Peter G. Peterson Distinguished Scholar at Johns Hopkins University's Paul H. Nitze School of Advanced International Studies (SAIS) and a senior fellow of SAIS's Foreign Policy Institute, joined the NBER board in 1998. He served as first deputy managing director of the International Monetary Fund between 2006 and 2011. Prior to his IMF service, he was vice chair of the JPMorgan Investment Bank and served as chief economist and director of research at Chase Manhattan Bank. Lipsky is cochair of The Aspen Institute's Program on the World Economy and vice chair of the Center for Global Development. He is a life member of the Council on Foreign Relations. He received his BA in economics from Wesleyan University and his PhD from Stanford University.

The board elected Peter Blair Henry, the dean emeritus and William R. Berkley Professor of Economics and Finance at New York University's Stern School of Business, as vice chair. Henry's research in international macroeconomics overturned conventional wisdom on debt relief, international capital flows, and the role of institutions in economic growth. He served as head of the external economics advisory group for then-Senator Barack Obama's 2008 presidential campaign, led the presidential transition team's review of lending agencies, and was appointed to the President's Commission on White House Fellowships in May 2009. Henry is a member of the boards of Citigroup and Nike, and is the principal investigator of the PhD Excellence Initiative, a Sloan Foundation-funded fellowship program for minority scholars seeking admission to economics doctoral programs. He received his PhD in economics from MIT, was a Rhodes Scholar at Oxford University, and holds a BA in economics from the University of North Carolina at Chapel Hill, where he was a Morehead Scholar.

Four New Directors Elected to NBER Governing Board

The NBER Board of Directors elected four new members at its September meeting.

Dana M. Peterson is the new representative of The Conference Board, succeeding Bart van Ark. She serves as chief economist at The Conference Board. Prior to joining that organization, she was the North American and global economist at Citigroup, where she analyzed global economic themes with financial market implications. She also was a researcher in the fiscal analysis section of the Federal Reserve Board. Peterson is the rising first vice chair of the New York Association for Business Economics. She received an undergraduate degree in economics with honors from Wesleyan University and a master's in economics from the University of Wisconsin-Madison.

Dana M. Peterson

Lynn Reaser is the new representative of the National Association for Business Economics (NABE), replacing Jack Kleinhenz. She is a faculty member and the chief economist for the Fermanian Business & Economic Institute at Point Loma Nazarene University, and recently completed a four-year term as chief economist of the California Treasurer's Council of Economic Advisors. Reaser was previously the chief economist for the Bank of America Investment Strategies Group and for First Interstate Bank. She is a past president of the NABE and has been honored as an NABE Fellow. She received her BA, MA, and PhD degrees in economics from the University of California, Los Angeles.


Lynn Reaser

Lars Stole is the new representative of the University of Chicago, taking up a position previously held by John Gould. Stole is the David W. Johnson Professor of Economics at the Booth School of Business. His research interests include applied contract theory, industrial economics, and game theory. He is a past editor of the *RAND Journal of Economics*, and the founder of the Applied Theory Initiative at the Booth School, which he codirected from 2009–19. He has been an Alfred P. Sloan Research Fellow, a National Science Foundation Presidential Faculty Fellow, and an Olin Fellow in Law and Economics. Stole received his undergraduate degree from the University of Illinois, an MSc in Economics from the London School of Economics, and a PhD from MIT.

Lars Stole

Hal Varian is a new at-large director. He is the chief economist at Google and an emeritus professor in the School of Information, the Haas School of Business, and the Department of Economics at the University of California, Berkeley. He has made important research contributions in industrial organization, consumer search, the theory of public goods, and demand theory. Varian is the author of two successful microeconomic theory textbooks, one graduate and one undergraduate, as well as an early guide to the information economy, "Information Rules: A Strategic Guide to the Network Economy," with Carl Shapiro. He received his undergraduate degree from MIT and his PhD from the University of California, Berkeley.
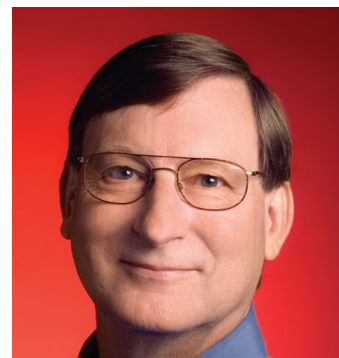
Hal Varian

In addition to these new appointments, the NBER board elected Elizabeth Bailey of the University of Pennsylvania, formerly an at-large board member and board chair from 2005-08, to emeritus status.

A complete listing of members of the NBER Board of Directors

https://www.nber.org/board.html

New Research Associates and Faculty Research Fellows Named, Fall 2020

The NBER Board of Directors appointed 42 research associates at its September 2020 meeting. All but one of these appointees were previously faculty research fellows; most received tenure recently at their home institutions. One appointee is a former research associate who has returned from government service.

Research associates must be tenured faculty members at North American colleges or universities; their appointments are recommended to the board by directors of the NBER's 20 research programs, typically after consultation with a steering committee of leading scholars. The new research associates are affiliated with 31 different colleges and universities; they received graduate training at 22 different institutions.

In addition, the NBER president appointed two new faculty research fellows, also on the advice of program directors and steering committees.

As of October 1, 2020, there were 1,295 research associates and 301 faculty research fellows.

The names and university affiliations of newly promoted and newly appointed NBER affiliates are listed below. Italics indicate the research associate returning from government service.

Research Associates

Rodney Andrews	University of Texas, Dallas	Labor Studies
Anirban Basu	University of Washington	Health Care
Christiane Baumeister	University of Notre Dame	Environment and Energy Economics
Renee Bowen	University of California, San Diego	Political Economy
Marshall Burke	Stanford University	Environment and Energy Economics
Marika Cabral	University of Texas, Austin	Health Care
Katherine Casey	Stanford University	Development Economics
Arun Chandrasekhar	Stanford University	Development Economics
James Cloyne	University of California, Davis	Monetary Economics
Laura Dague	Texas A&M University	Health Economics
Mariacristina De Nardi	University of Minnesota	Public Economics
Tatyana Deryugina	University of Illinois	Environment and Energy Economics
Thomas Fujiwara	Princeton University	Political Economy
Michael Geruso	University of Texas, Austin	Health Care
Jesse Gregory	University of Wisconsin	Labor Studies
Catherine Hausman	University of Michigan	Environment and Energy Economics
Joshua Hausman	University of Michigan	Monetary Economics
Theresa Kuchler	New York University	Corporate Finance
Lee Lockwood	University of Virginia	Economics of Aging
Matteo Maggiori	Stanford University	International Finance and Macroeconomics
Arnaud Maurel	Duke University	Labor Studies
Isaac Mbiti	University of Virginia	Development Economics
Pascal Michaillat	Brown University	Public Economics

Eduardo Morales	Princeton University	International Trade and Investment
Andreas Mueller	University of Texas, Austin	Labor Studies
Aldo Musacchio	Brandeis University	Development of the American Economy
Gregory Niemesh	Miami University	Development of the American Economy
Fernando Parro	Pennsylvania State University	International Trade and Investment
Ricardo Perez-Truglia	University of California, Berkeley	Political Economy
Tomas Philipson	University of Chicago	Health Care
Giorgia Piacentino	Columbia University	Corporate Finance
Laura Salisbury	York University	Development of the American Economy
Yu-Chu Shen	Naval Postgraduate School	Health Care
Adi Sunderam	Harvard University	Corporate Finance
Eric Swanson	University of California, Irvine	Monetary Economics
Lesley Turner	Vanderbilt University	Economics of Education
Arthur van Benthem	University of Pennsylvania	Environment and Energy Economics
Joseph Vavra	University of Chicago	Monetary Economics
Andrea Vedolin	Boston University	Asset Pricing
Danny Yagan	University of California, Berkeley	Public Economics
Wesley Yin	University of California, Los Angeles	Health Care
Gabriel Zucman	University of California, Berkeley	Public Economics

Faculty Research Fellows

Monica Deza	Hunter College, CUNY	Health Economics
Sebastian Tello-Trillo	University of Virginia	Health Economics

Conferences

Gender in the Economy

An NBER conference on Gender in the Economy took place online July 24–25. Research Associates Jessica Goldberg of the University of Maryland, Claudia Goldin of Harvard University, Seema Jayachandran of Northwestern University, Claudia Olivetti of Dartmouth College, and Tom Vogl of the University of California, San Diego organized the meeting, which was sponsored by the Bill & Melinda Gates Foundation. These researchers' papers were presented and discussed:

Papers on Women and Household Finance Issues

- **Francesco D'Acunto**, Boston College; **Ulrike Malmendier**, University of California, Berkeley and NBER; and **Michael Weber**, University of Chicago and NBER, "Gender Roles and the Gender Expectations Gap" (NBER Working Paper 26837)

- **Simone G. Schaner**, University of Southern California and NBER; **Erica M. Field**, Duke University and NBER; **Rohini Pande**, Yale University and NBER; **Natalia Rigol**, Harvard University and NBER; and **Charity M. Troyer Moore**, Yale University, "On Her Own Account: How Strengthening Women's Financial Control Impacts Labor Supply and Gender Norms" (NBER Working Paper 26294)

Papers on Victimization, Vulnerability, and Violence against Women

- **Eleonora Guarnieri**, Ifo Institute Munich, and **Ana Tur-Prats**, University of California, Merced, "Cultural Distance and Conflict-Related Sexual Violence"

- **Girija Borker**, The World Bank, "Safety First: Perceived Risk of Street Harassment and Educational Choices of Women"

- **Roee Levy** and **Martin Mattsson**, Yale University, "The Effects of Social Movements: Evidence from #MeToo"

Papers on Women's Well Being and Children's Health

- **Daniel Halim**, **Hillary C. Johnson**, and **Elizaveta Perova**, The World Bank, "Preschool Availability and Female Labor Force Participation: Evidence from Indonesia"

- **Sarah Miller**, University of Michigan and NBER; **Laura R. Wherry**, University of California, Los Angeles and NBER; and **Diana G. Foster**, University of California, San Francisco, "The Economic Consequences of Being Denied an Abortion" (NBER Working Paper 26662)

- **Wolfgang Keller**, University of Colorado, Boulder and NBER, and **Hâle Utar**, Grinnell College, "Globalization, Gender, and the Family" (NBER Working Paper 25247)

Papers on Women and Education across the World

- **Claudia Senik**, University Paris IV Sorbonne, and **Naomi Friedman-Sokuler**, Bar-Ilan University, "From Pink-Collar to Lab Coat: Cultural Persistence and Diffusion of Socialist Gender Norms"

- **Itzik Fadlon**, University of California, San Diego and NBER, and **Frederik P. Lyngse** and **Torben Heien Nielsen**, University of Copenhagen, "Early Career, Life-Cycle Choices, and Gender"

- **Josefa Aguirre**, Pontifícia Universidad Católica; **Juan Matta**, New York University; and **Ana María Montoya**, Universidad de Chile, "Joining the Men's Club: The Returns to Pursuing High-Earnings Male-Dominated Fields for Women"

Papers on Victimization, Gender, and COVID-19 that received study group support:

- **Heidi Stöckl**, London School of Hygiene and Tropical Medicine, and **Gerry Mshana**, National Institute for Medical Research, Tanzania, "The Effect of COVID-19 on Women, Livelihood, and Violence in Mwanza, Tanzania"

- **Amalia R. Miller**, University of Virginia, and **Carmit Segal**, University of Zurich, "Effects of the COVID-19 Pandemic on Domestic Violence in US Cities"

- **Sonia R. Bhalotra**, University of Essex; **Emilia Brito Rebolledo**, Brown University; **Damian Clarke**, University of Chile; **Pilar Larroulet**, University of Maryland; and **Francisco Pino**, University of Chile, "COVID-19 and Domestic Violence — Evidence from Rolling Quarantines in Chile"

- **Keith Finlay**, US Census Bureau; **Michael G. Mueller-Smith**, University of Michigan; and **Brittany Street**, University of Missouri, "The Determinants and Aftermath of Victimization in US Households and the Implications of COVID-19"

- **Erica M. Field**, Duke University and NBER, and **Ursula T. Aldana**, Institute for Peruvian Studies, "The Impact of COVID-19 on Intimate Partner Violence in Urban Peru"

- **Rebecca Thornton**, University of Illinois at Urbana-Champaign and NBER; **Scott Cunningham**, Baylor University; and **Gregory DeAngelo**, **Anuar Assamidanov**, and **Yunie Le**, Claremont Graduate University, "COVID-19, Shelter-in-Place, and Domestic Violence"

- **Sarah J. Baird**, George Washington University, and **Manisha Shah**, University of California, Los Angeles and NBER, "The Shadow Pandemic: COVID-19 and Violence against Adolescent Girls in LMICs"

- **Bilge Erten** and **Silvia Prina**, Northeastern University, and **Pinar Keskin**, Wellesley College, "COVID-19 Movement Restrictions and Domestic Violence: Evidence from the US"

Summaries of these papers, as well as a several additional papers that the organizers identified as important related studies, may be found at www.nber.org/conferences/2020/SI2020/GE/summary.html

International Trade Policy and Institutions

An NBER conference on International Trade Policy and Institutions took place online September 11–12. Research Associates Stephen J. Redding of Princeton University and Robert W. Staiger of Dartmouth College organized the meeting, which was sponsored by the Smith Richardson Foundation. These researchers' papers were presented and discussed:

- **Samuel S. Kortum**, Yale University and NBER; **David Weisbach**, University of Chicago; and **Michael Wang**, Northwestern Medical School, "Optimal Unilateral Carbon Policy"

- **George A. Alessandria**, University of Rochester and NBER; **Shafaat Y. Khan**, The World Bank; and **Armen Khederlarian**, University of Rochester, "Taking Stock of Trade Policy Uncertainty: Evidence from China's Pre-WTO Accession"

- **Jiwon Choi**, Princeton University; **Ilyana Kuziemko**, Princeton University and NBER; **Ebonya L. Washington**, Yale University and NBER; and **Gavin Wright**, Stanford University, "Local Employment and Political Effects of Trade Deals: Evidence from NAFTA"

- **Beata Javorcik**, **Katherine A. Stapleton**, and **Ben Kett**, University of Oxford; and **Layla O'Kane**, Burning Glass Technologies, "Unravelling Deep Integration: Local Labour Market Effects of the Brexit Vote"

- **Brian McCaig**, Wilfrid Laurier University; **Nina Pavcnik**, Dartmouth College and NBER; and **Woan Foong Wong**, University of Oregon, "Export Markets and Long-Run Industry Adjustment: State, Private, and Foreign Firms in Vietnam"

- **Alberto Cavallo** and **Gita Gopinath**, Harvard University and NBER; **Brent Neiman**, University of Chicago and NBER; and **Jenny Tang**, Federal Reserve Bank of Boston, "Tariff Passthrough at the Border and at the Store: Evidence from US Trade Policy"

- **Pablo Fajgelbaum**, Princeton University and NBER; **Pinelopi K. Goldberg**, Yale University and NBER; **Patrick Kennedy**, University of California, Berkeley; **Amit Khandelwal**, Columbia University and NBER; and **Daria Taglioni**, The World Bank, "Global Reallocations in the 2018–2019 Trade War"

- **Kyle Handley**, University of Michigan and NBER; **Nuno Limão**, University of Maryland and NBER; **Rodney Ludema**, Georgetown University; and **Zhi Yu**, Renmin University of China, "Firm Input Choice underTrade Policy Uncertainty"

- **Ohyun Kwon**, **Constantinos Syropoulos**, and **Yoto V. Yotov**, Drexel University, "Pain and Gain: The Short- and Long-Run Effects of Economic Sanctions on Growth"

- **Ralph Ossa**, University of Zurich; **Robert W. Staiger**, Dartmouth College and NBER; and **Alan O. Sykes**, Stanford University, "Disputes in International Investment and Trade" (NBER Working Paper 27012)

- **Emily J. Blanchard**, Dartmouth College; **Chad P. Bown**, Peterson Institute for International Economics; and **Davin Chor**, Dartmouth College and NBER, "Did Trump's Trade War Impact the 2018 Election?" (NBER Working Paper 26434)

Summaries of these papers are at www.nber.org/conferences/2020/ITPIs20/summary.html

Employer Challenges in Financing and Managing Pension Plans

An NBER conference on Employer Challenges in Financing and Managing Pension Plans took place online September 17–18. Research Associates Robert L. Clark of North Carolina State University and James M. Poterba of MIT organized the meeting, which was sponsored by the Alfred P. Sloan Foundation. These researchers' papers were presented and discussed:

- **Olivia S. Mitchell**, University of Pennsylvania and NBER, "Building Better Retirement Systems in the Wake of the Global Pandemic"

- **Robert L. Clark,** "Recent Developments in Public Sector Pension Plans"

- **Deborah J. Lucas**, MIT and NBER, and **Daniel Smith**, MIT, "How Much Can Collective Defined Contribution Plans Improve Risk-Sharing?"

- **Dhiren Patki**, Federal Reserve Bank of Boston, "Breaking the Implicit Contract: Using Pension Freezes to Study Lifetime Labor Supply"

- **Sean Myers**, Stanford University, "Public Employee Pensions and Municipal Insolvency"

- **Maria D. Fitzpatrick**, Cornell University and NBER, and **Gopi Shah Goda**, Stanford University and NBER, "The Prevalence of COLA Adjustments in Public Sector Retirement Plans"

- **Laura Quinby** and **Gal Wettstein**, Boston College, "Do Deferred Benefit Cuts for Current Employees Increase Separation?"

- **Chuck Boyer**, University of Chicago, "Public Pensions and State Government Borrowing Costs"

Summaries of these papers are at www.nber.org/conferences/2020/PPf20/summary.html

Tax Policy and the Economy

An NBER conference on Tax Policy and the Economy took place online September 24. Research Associate Robert A. Moffitt of Johns Hopkins University organized the meeting, which was sponsored by the Lynde and Harry Bradley Foundation. These researchers' papers were presented and discussed:

- **Jeffrey Clemens**, University of California, San Diego and NBER; **Joshua D. Gottlieb**, University of Chicago and NBER; and **Jeffrey Hicks**, University of British Columbia, "How Would Medicare for All Affect Health System Capacity? Evidence from Medicare for Some"

- **Zhao Chen** and **Zhikuo Liu**, Fudan University; **Yuxuan He**, Duke University; **Juan Carlos Suárez Serrato** and **Daniel Xu**, Duke University and NBER, "The Structure of Business Taxation in China"

- **Youssef Benzarti**, University of California, Santa Barbara and NBER, "Estimating the Costs of Filing Tax Returns and the Potential Savings from Policies Aimed at Reducing These Costs"

- **Mark Duggan** and **Gopi Shah Goda**, Stanford University and NBER, and **Gina Li**, Stanford University, "The Effects of the Affordable Care Act on the Near Elderly: Evidence on Health Insurance Coverage and Labor Market Outcomes"

- **Benjamin Lockwood**, University of Pennsylvania and NBER; **Afras Sial**, University of Pennsylvania; and **Matthew C. Weinzierl**, Harvard University and NBER, "Designing, not Checking, for Policy Robustness: An Example with Optimal Taxation"

- **Diane Whitmore Schanzenbach**, Northwestern University and NBER, and **Michael R. Strain**, American Enterprise Institute, "Employment Effects of the Earned Income Tax Credit: Taking the Long View"

Summaries of these papers are at www.nber.org/conferences/2020/TPE20/summary.html

Economics of Artificial Intelligence

An NBER conference on the Economics of Artificial Intelligence took place online on September 24–25. Research Associates Ajay K. Agrawal, Joshua S. Gans, and Avi Goldfarb of the University of Toronto and Catherine Tucker of MIT organized the meeting, which was sponsored by the Alfred P. Sloan Foundation and the Creative Destruction Lab at the University of Toronto. These researchers' papers were presented and discussed:

- **Martin Beraja**, MIT and NBER; **David Y. Yang**, Harvard University and NBER; and **Noam Yuchtman**, London School of Economics and NBER, "Data-Intensive Innovation and the State: Evidence from AI Firms in China" (NBER Working Paper 27723)

- **Stephanie Assad** and **Robert Clark**, Queen's University; **Daniel Ershov**, Toulouse School of Economics; and **Lei Xu**, Bank of Canada, "Algorithmic Pricing and Competition: Empirical Evidence from the German Retail Gasoline Market"

- **Wei Jiang**, Columbia University and NBER, and **Sean Cao**, **Baozhong Yang**, and **Alan L. Zhang**, Georgia State University, "How to Talk When a Machine Is Listening: Corporate Disclosure in the Age of AI"

- **Kate Bundorf** and **Maria Polyakova**, Stanford University and NBER, and **Ming Tai-Seale**, University of California, San Diego, "How Do Humans Interact with Algorithms? Experimental Evidence from Health Insurance" (NBER Working Paper 25976)

- **Laura Blattner**, Stanford University, and **Scott T. Nelson**, University of Chicago, "How Costly Is Noise? Data and Disparities in the US Mortgage Market"

- **Anton Korinek**, University of Virginia and NBER, and **Joseph E. Stiglitz**, Columbia University and NBER, "Steering Technological Progress"

- **Stephan T. Zheng**, **Alexander Trott**, **Sunil Srinivasa**, **Melvin Gruesbeck**, and **Richard Socher**, Salesforce Research; **Nikhil Naik**, MIT; and **David Parkes**, Harvard University, "The AI Economist: Improving Equality and Productivity with AI-Driven Tax Policies"

- **Simona Abis**, Columbia University, and **Laura Veldkamp**, Columbia University and NBER, "The Changing Economics of Knowledge Production"

- **Emma J. Pierson** and **Jure Leskovec**, Stanford University; **David M. Cutler**, Harvard University and NBER; **Sendhil Mullainathan**, University of Chicago and NBER; and **Ziad Obermeyer**, University of California, Berkeley, "An Algorithmic Approach to Explaining Why the Underserved Feel More Pain"

- **Dirk Bergemann** and **Tan Gan**, Yale University, and **Alessandro Bonatti**, MIT, "The Economics of Social Data"

- **Danielle Li**, MIT and NBER; **Lindsey R. Raymond**, MIT; and **Peter Bergman**, Columbia University and NBER, "Hiring as Exploration" (NBER Working Paper 27736)

- **Debraj Ray**, New York University and NBER, and **Dilip Mookherjee**, Boston University and NBER, "Growth, Automation and the Long-Run Share of Labor"

- **Katherine A. Stapleton**, University of Oxford, and **Michael Webb**, Stanford University, "Automation, Trade and Multinational Activity: Micro Evidence from Spain"

- **Ashesh Rambachan**, Harvard University; **Jon Kleinberg**, Cornell University; **Jens Ludwig**, University of Chicago and NBER; and **Sendhil Mullainathan**, "An Economic Approach to Regulating Algorithms"

- **Daron Acemoglu** and **David Autor**, MIT and NBER; **Pascual Restrepo**, Boston University and NBER; and **Jonathon Hazell**, MIT, "AI and Jobs: Evidence from Online Vacancies"

Summaries of these papers are at www.nber.org/conferences/2020/AIf20/summary.html

Program Meeting

Economic Fluctuations and Growth

Members of the NBER's Economic Fluctuations and Growth Program met July 11 online. Research Associates Benjamin Moll of Princeton University and Valerie A. Ramey of the University of California, San Diego organized the meeting. These researchers' papers were presented and discussed:

- **Antonio Coppola**, Harvard University; **Matteo Maggiori**, Stanford University and NBER; **Brent Neiman**, University of Chicago and NBER; and **Jesse Schreger**, Columbia University and NBER, "Redrawing the Map of Global Capital Flows: The Role of Cross-Border Financing and Tax Havens"

- **Kevin Donovan**, Yale University; **Jianyu Lu**, Central Bank of Chile; and **Todd Schoellman**, Federal Reserve Bank of Minneapolis, "Labor Market Dynamics and Development"

- **Martin S. Eichenbaum** and **Sergio Rebelo**, Northwestern University and NBER, and **Mathias Trabandt**, Freie Universität Berlin, "The Macroeconomics of Epidemics" (NBER Working Paper 26882)

- **Vasco M. Carvalho**, University of Cambridge; **Stephen Hansen**, Imperial College London; **José Rodriguez Mora**, University of Edinburgh; and **Juan R. García**, **Álvaro Ortiz**, **Tomasa Rodrigo**, and **José Ruiz**, BBVA Research, "Tracking the COVID-19 Crisis with High-Resolution Transaction Data"

- **Alisdair McKay**, Federal Reserve Bank of Minneapolis, and **Johannes Wieland**, University of California, San Diego and NBER, "Lumpy Durable Consumption Demand and the Limited Ammunition of Monetary Policy"

Summaries of these papers are at https://www.nber.org/conferences/2020/SI2020/EFGs20/summary.html

NBER Books

NBER Macroeconomics Annual 2019, Volume 34

Edited by Martin Eichenbaum, Erik Hurst, and Jonathan A. Parker

https://www.journals.uchicago.edu/toc/ma/2020/34/+

The thirty-fourth edition of the *NBER Macroeconomics Annual* features theoretical and empirical studies of issues in contemporary macroeconomics and a keynote address by James Stock, a member of President Obama's Council of Economic Advisers from 2013 to 2014. Matias Covarrubias, Germán Gutiérrez, and Thomas Philippon study the evolution of profits, investment and market shares in the US industries over the past 40 years and find evidence of inefficient concentration and barriers to entry since 2000. Margherita Borella, Mariacristina De Nardi, and Fang Yang examine the effects of shorter life expectancies, higher medical expenses, and lower wages for white, non-college-educated Americans born in the 1960s on labor supply and retirement savings. Davide Debortoli, Jordi Galí, and Luca Gambetti assess whether recent eco-nomic performance was affected by a binding zero lower bound constraint on the interest rate. Michael McLeay and Silvana Tenreyro explain why it is difficult to identify empirically the Phillips curve — a key element of the policy framework used by central banks — using aggregate data. The authors suggest using regional variation in unemployment and inflation to estimate the relationship between these variables. Nir Jaimovich, Sergio Rebelo, Arlene Wong, and Miao Ben Zhang investigate the role that increases in the quality of the goods consumed ("trading up") played in the rise of the skill premium that occurred over the last four decades. Chong-en Bai, Chang-Tai Hsieh, and Zheng Song examine the "special deals" provided by Chinese local governments to favored private firms and their effects on economic growth.
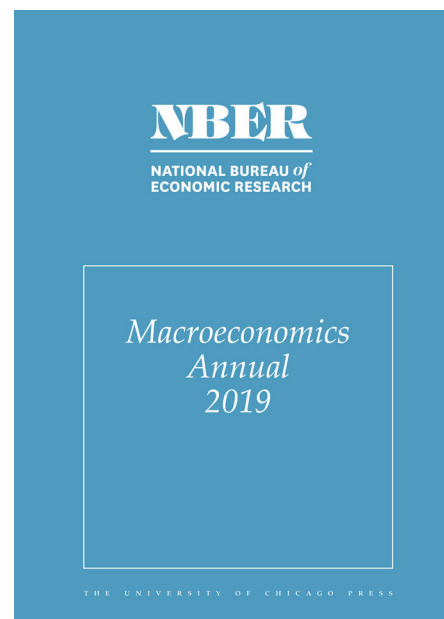
## Social Security Programs and Retirement around the World: Reforms and Retirement Incentives

Edited by Axel Börsch-Supan and Courtney C. Coile

https://press.uchicago.edu/ucp/books/book/chicago/S/bo45618333.html

This ninth phase of the International Social Security project, which studies the experiences of 12 developed countries, examines the effects of public pension reform on employment at older ages. In the last two decades, men's labor force participation at older ages has increased, reversing a long-term pattern of decline; participation rates for older women have increased dramatically as well. While better health, more education, and changes in labor-supply behavior of married couples may have affected this trend, these factors alone cannot explain the magni-tude of the employment increase and its large variation across countries.

The studies in this volume explore how financial incentives to work at older ages have evolved as a result of public pension reforms since 1980 and how these changes have affected retirement behavior. Utilizing a common template to analyze the developments across countries, the findings suggest that social security reforms have strengthened the financial returns to working at older ages, and that these enhanced financial incentives have contributed to the rise in later-life employment.
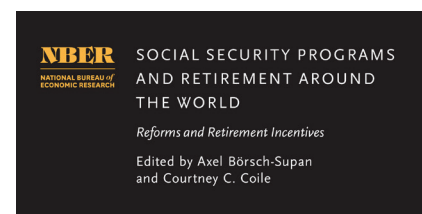
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