

The Digest

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Intertemporal Tradeoffs of Remote Work

The COVID-19 pandemic sharply increased the number of people working remotely, thereby reducing the frequency of in-person interactions between coworkers. Firms are divided about the effects of remote work, with some top firms recalling workers to the office and others embracing remote work.

In *The Power of Proximity to Coworkers: Training for Tomorrow or Productivity Today?* (NBER Working Paper 31880), [Natalia Emanuel](#), [Emma Harrington](#), and [Amanda Pallais](#) find that sitting near coworkers increases knowledge sharing at the expense of short-term productivity. The researchers focus on the main campus of a Fortune 500 firm where software engineers work in two buildings located several blocks apart. Before the pandemic, some engineers were on teams where all members sat in the same building, while other teams were split across buildings. Multibuilding teams held their meetings online, operating more like remote teams even before the pandemic. Once the pandemic hit, the offices closed and all teams worked remotely.

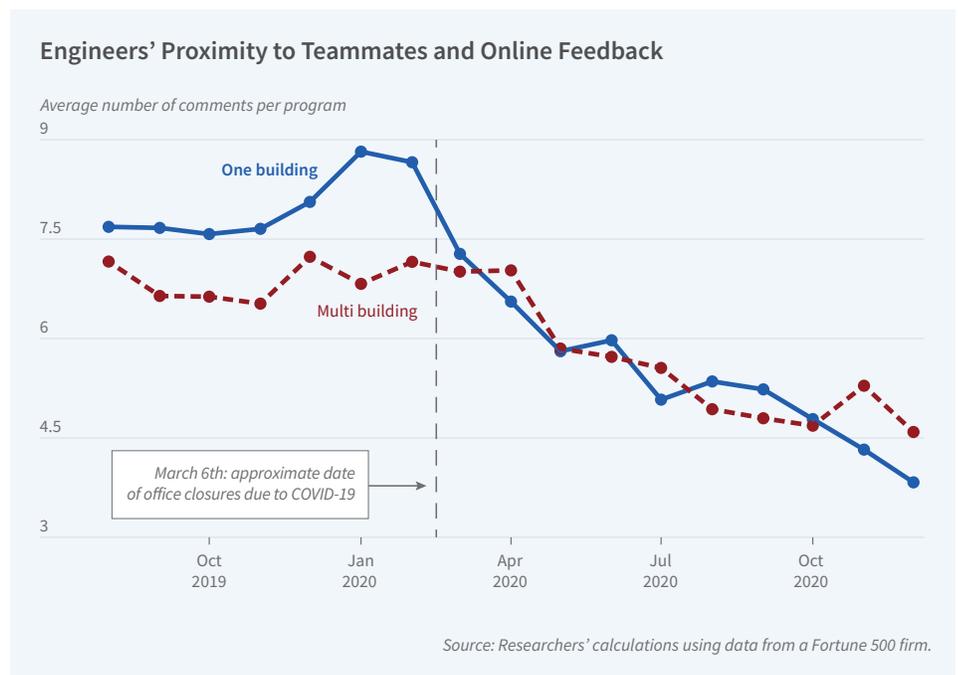
Sitting together increased online feedback. Pre-pandemic, engineers on the one-building teams received 22 percent more comments on their code than those on the multibuilding teams — a gap that largely vanished after COVID-19 struck and everyone began working from home. Junior engineers were the main beneficiaries of these

comments. However, increased mentorship came at a cost, particularly for the senior engineers who did more mentoring. Sitting near colleagues reduced monthly program production by 23 percent, with an even greater reduction for senior engineers.

Suggestively, proximity had divergent impacts on workers’ careers in the short and long run. In the short run, junior engineers on co-located teams were less likely to receive pay

raises, as they spent more time soliciting and responding to feedback at the expense of writing programs. However, after the pandemic closed offices, these engineers were more likely to receive pay raises, consistent with them having accumulated more human capital. Workers who had been trained on one-building teams were also about twice as likely to move to higher-paying firms as were engineers on multibuilding teams (an absolute

Working alongside coworkers increases feedback and knowledge sharing but reduces short-term productivity, leading to tradeoffs over the short and long run.



difference of 1.2 percentage points).

Women, who were underrepresented among software engineers, faced bigger tradeoffs from remote work. Pre-pandemic, women on one-building teams received 40 percent more feedback than their multibuilding counterparts, twice the gap among men. The gender difference was largely driven by follow-up questions,

which suggests that women are more willing to ask for additional feedback when seated near their mentors. On the other hand, senior women do much more mentoring in person, leading to a larger decline in their own output when working near colleagues.

Remote workers have externalities on interactions between in-person workers. Pre-pandemic, hiring just

one team member in another building, instead of in the same building, depressed online feedback between co-located teammates. This suggests that it may be more efficient to sort teams into fully remote or fully in-person groups rather than having teams with both remote and in-person workers.

—Steve Maas

Estimating Mortality Rates for the US Homeless Population

While low socioeconomic status is well known to be associated with heightened mortality risk, little is known about the mortality rate of the most disadvantaged segment of the US population, people experiencing homelessness. In [Life and Death at the Margins of Society: The Mortality of the US Homeless Population](#) (NBER Working Paper 31843), [Bruce D. Meyer, Angela Wyse, and Ilina Logani](#) illustrate the stark health disparities associated with homelessness.

The researchers follow 140,000 people recorded as sheltered and unsheltered homeless during the 2010 Census through 2022, tracking all-cause mortality using administrative data from the Social Security

Homeless individuals face 3.5 times the mortality rate of those who are housed, after accounting for differences in demographic characteristics and geography.

Administration (SSA). They compare homeless individuals' mortality risk to that of a representative sample of the housed US population and examine heterogeneity by income, demographic characteristics, disability status, and the extent of observed family connections to identify especially vulnerable subsets of this already very deprived population.

These estimates suggest that nonelderly homeless individuals face about 3.5 times the mortality risk of people who are housed, account-

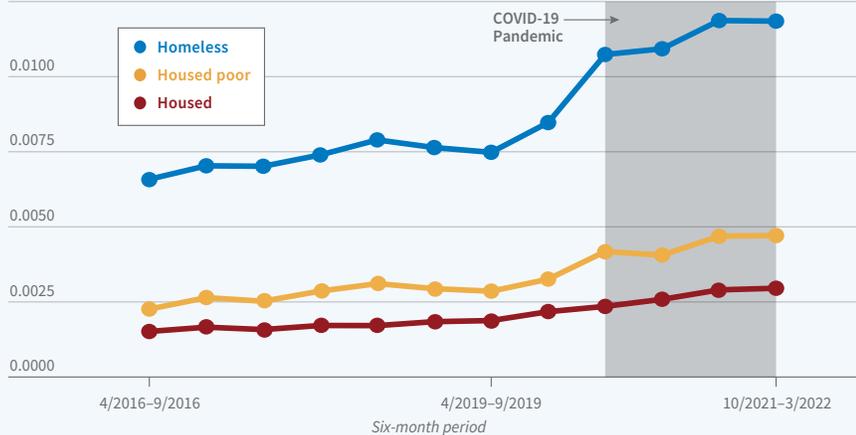
ing for differences in demographic characteristics and geography. This disparity far exceeds the mortality gap between Black and White housed individuals (1.4) and between poor housed and all housed individuals (2.2). Mortality risk relative to the housed population differs over the lifecycle and is highest when these individuals are in their 40s and 50s, with a 40-year-old homeless facing a similar mortality risk as a housed person nearly 20 years older.

Within the homeless population, employment, higher incomes, and more extensive observed family connections are associated with lower mortality. In contrast to the housed population, where White individuals have a lower mortality risk than those who are Black, homeless White individuals face about a 40 percent higher mortality rate than homeless Black individuals, a finding that may be related to the lower prevalence of substance abuse and behavioral health conditions in the latter group. These analyses also reveal the substantial health risks faced by people experiencing homelessness even when they are not sleeping on the streets, with those recorded in shelters in the census facing a similar mortality risk as those counted at unsheltered locations.

The researchers estimate that

Probability of Death among US Homeless, Housed, and Housed Poor Population in a Six-Month Period

Mortality hazard rate of those ages 18-54 in 2010
0.0125



Source: Researchers' calculations using data from the US Census Bureau.

mortality in the homeless population rose by about one-third during the COVID-19 pandemic over the expected increase in mortality due to aging.

While the proportional rise in mortality risk was similar for people who were housed, the pandemic appears to have affected a much larger share of

the homeless population because of their substantially elevated baseline mortality risk.

—Leonardo Vasquez

The Jones Act and Energy Prices

The Jones Act of 1920 mandates that goods transported by water between US ports must travel on ships constructed, owned, and operated by US entities and must display the US flag. It is frequently blamed for the higher costs of domestic shipping and of the products that are transported. In *Impacts of the Jones Act on US Petroleum Markets* (NBER Working Paper 31938), [Ryan Kellogg](#) and [Richard L. Sweeney](#) estimate that if the act had not been in force in 2018–19, fuel prices on the East Coast of the United States would have been lower.

Urban areas on the US East and West Coasts consume large amounts of petroleum fuels. Some of the fuel demand in these regions is met by shipments from Texas and the Gulf Coast, the major domestic oil and gas production centers, but a significant share of the fuel used on the East Coast is imported, and a substantial amount of Gulf Coast production is exported.

The researchers examine shipments of light crude oil and three refined products: gasoline, jet fuel, and ultra-low-sulfur diesel fuel. They use data from Argus Media on the costs of internationally exporting these fuels to estimate what the costs of domestic transport would be, absent the Jones Act's restrictions, as a function of the distance traveled and the date of the shipment. These calculations allow the researchers to estimate the non-Jones Act costs of transporting fuel from the Gulf Coast to different points on the East Coast, separately for crude oil and refined products.

Data from Bloomberg track oil and refined product prices. For the three refined products, on average, the price difference between the Gulf Coast and the East Coast is around \$2 a barrel; the difference between the price differential and the predicted shipping cost

Repeal of the Jones Act would nearly eliminate East Coast imports of jet fuel and ultra-low-sulfur diesel fuel, lowering East Coast prices but raising gasoline prices on the Gulf Coast.

is between \$0.35 and \$1.00 a barrel. For these products, since the price difference is greater than the transport cost, it is more efficient to transport refined products from the Gulf to the East Coast than to trade internationally. In contrast, the average difference between the light crude prices on the Gulf and East Coasts is \$0.34 a barrel lower than the predicted shipping cost on average, so coastwise trade would be inefficient in most months.

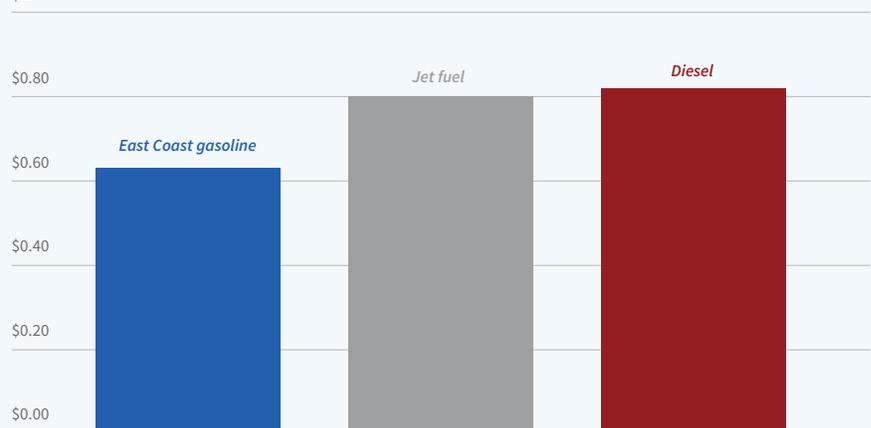
The US Energy Information Administration provides data on volumes of fuel movement and consumption at the Petroleum Administration for Defense Districts (PADDs) level; each PADD is a group of states. PADD 3 is the Gulf Coast. PADD 1a is New England, PADD 1b is the Central Atlantic, and PADD 1c is the Lower Atlantic area. The researchers estimate the impact of hypothetically eliminating the Jones

Act by assuming that if the observed price differential exceeds their estimate of the transport cost, then observed PADD 3 exports would instead be transported first to PADD 1c, the closest domestic market, then (if some products remain) to PADD 1b, and then, if any products are left, to PADD 1a. Shipments from the Gulf Coast to New England (PADD 1a) incur higher costs than to either of the other markets.

Based on this simulation exercise, if the Jones Act had not been in effect, Gulf Coast exports would have nearly completely replaced East Coast imports of jet fuel and ultra-low-sulfur diesel fuel. Gulf Coast exports would have replaced 36 percent of both the East Coast's conventional gasoline and light crude oil imports. Averaging across East Coast PADDs, prices for conventional gasoline, jet fuel, and

Impact of the Jones Act on US East Coast Petroleum Product Prices, 2018-19

Change in price, \$/bbl, of fuel on the US East Coast



Source: Researchers' calculations using data from Argus Media, Bloomberg, and the US Energy Information Administration.

ultra-low-sulfur diesel fuel would have dropped by \$0.63, \$0.80, and \$0.82 per barrel, respectively, with the largest decreases occurring in the Lower Atlantic.

The price of gasoline on the Gulf Coast would have risen by \$0.30 a barrel. In aggregate, the researchers find that eliminating the Jones Act would have

benefited US consumers by \$769 million per year and reduced US fuel suppliers' profits by \$367 million per year.

—Whitney Zhang

Labor Market Implications of “Late Blooming” College Graduates

In *Late Bloomers: The Aggregate Implications of Getting Education Later in Life* (NBER Working Paper 31874), Zsófia L. Bárány, Moshe Buchinsky, and Pauline Corblet analyze individuals who obtain their college degrees after age 30. About 20 percent of the college graduates from the 1930 birth cohort onwards are in this category, which they label “late bloomers.”

Using decadal data from the US Census covering cohorts from 1926 through 1986, the researchers document rising college attainment within each cohort. At age 24, about 10 percent of the 1936 cohort had a college education — at least 16 years of completed schooling — while by age 64 their share rose to almost 20 percent. At age 24 a little more than 25 percent of the 1986 cohort had a college education, and by age 34 this share was almost 40 percent.

The census data also show that late bloomers contribute to a narrowing

Later-in-life college graduation is a more prevalent phenomenon than is generally believed and has important implications for several labor market outcomes.

racial gap in the college share, even as it widens across cohorts at early ages. For the 1930 cohort, the White-Black racial gap in college education at age 30 widens by 6 percentage points, whereas at age 50 the widening is only 3 percentage points. Similarly, the late bloomers contribute to the narrowing of the gender gap. The narrowing of the gender gap from the 1930 to the 1970 cohort is more pronounced at age 50 than at age 30 — a 12.4 versus a 10.4 percentage point reduction.

The authors quantify the contribution of late bloomers to the aggregate increase in educational attainment over time using a shift-share decomposition. The results show that around half of the increase between 1960 and 1990 and more than 70 percent of the

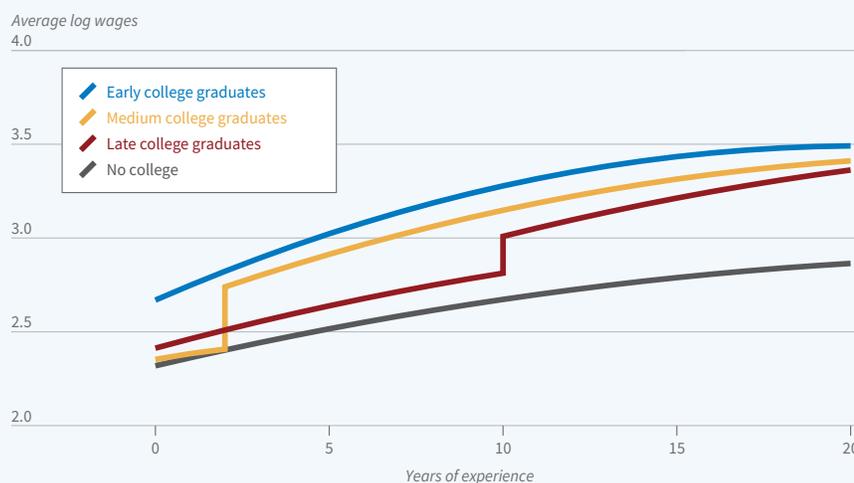
increase between 1990 and 2019 is driven by within-cohort increases in college education, namely due to the late bloomers.

Using data from the National Longitudinal Survey of Youth, the researchers also study the returns to college education by age at graduation. They categorize individuals into four groups: “early college” — individuals graduating at or before age 24, “medium college” — those graduating between ages 25 and 29, “late bloomers,” those graduating from college at or after 30, and “never college,” who never obtain a college degree. The early college group has the highest earnings, while the never college group has the lowest. Before graduation, the medium college group’s earnings are similar to those of the never college group. After graduation, their earnings increase but do not quite reach the early college group’s level of earnings. The late bloomers earn more than the medium and never college groups before graduating and benefit from a college premium upon graduation, as well as the steepest return to experience among college graduates.

The researchers conclude that analyses that do not account for age at graduation underestimate the value of college education for early-college graduates by an average of about 27 percent. The degree of underestimation varies from about 30 percent for men and 23 percent for women to 35 percent for Black individuals and 40 percent for Hispanics.

—Leonardo Vasquez

Wage Trajectories by Timing of College Completion



Source: Researchers' calculations using data from the National Longitudinal Survey of Youth.

Network Relationships and Corporate Bond Trading

In contrast to stocks that are traded on established exchanges such as the New York Stock Exchange, corporate bonds are traded in over-the-counter (OTC) markets. Since a buyer or seller needs to find a specific counterparty to trade with in an OTC market, trade requests can take time and sometimes even fail. In a study of bond trading, [Sequential Search for Corporate Bonds](#) (NBER Working Paper 31904), [Mahyar Kargar](#), [Benjamin Lester](#), [Sébastien Plante](#), and [Pierre-Olivier Weill](#) find that the characteristics of both bond traders and bond trade requests are important in determining the time to consummating a trade, and the failure rate, in OTC markets.

The researchers find that OTC trade inquiries fail approximately 30 percent of the time. However, many OTC investors make repeated inquiries and eventually complete a trade. The researchers find that following a failed initial inquiry, it takes two to three days to make a successful trade. Sales inquiries take about half as long as purchase inquiries to complete. Micro-size trades — valued at less than \$100,000 — move quickest, taking as much as one day less to complete than block trades, which are valued at more than \$5 million.

The “connectedness” of an inquiring customer, measured as the number of existing relationships that the customer has with dealers, is an important determinant of the number and quality of replies a customer receives. On average, customers in the top 10 percent of the connectedness measure complete orders in half the time that customers in the bottom 70 percent do. Connectedness also affects the overall likelihood of trade failure. Customers in the top 10 percent of connectedness fail just 14 percent of the time, compared to 50 percent of the time among those in the bottom 70 percent.

The researchers use a variety of proprietary data sources in their analysis. They include data on customer inquiries and dealer responses

Buyers and sellers with connections to a higher number of traders consummate trades faster than their less-connected peers.

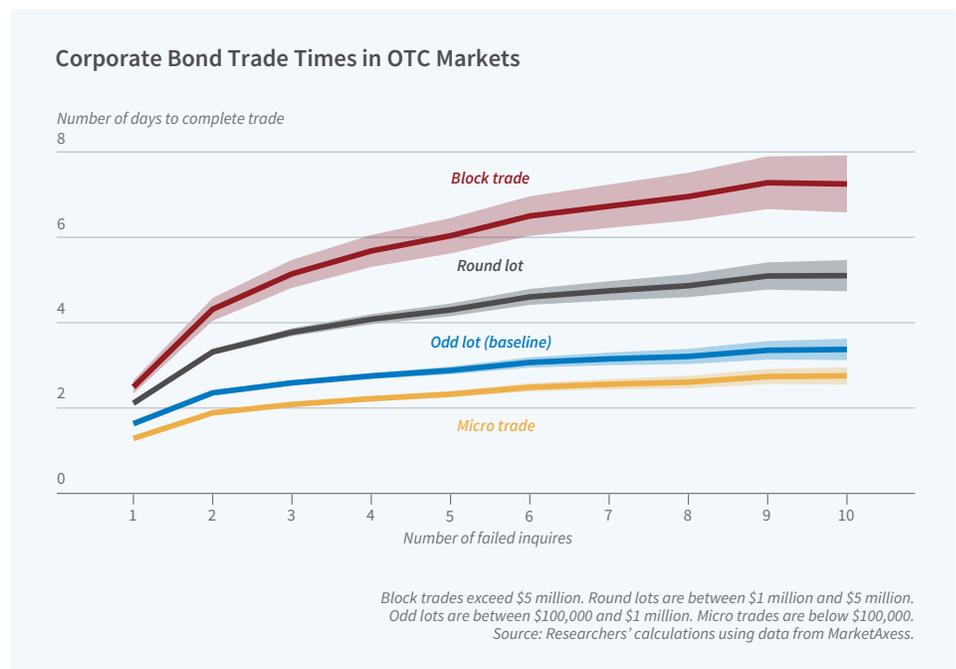
between January 2017 and March 2021 from the MarketAxess (MKTX) electronic trading platform. This platform accounts for about 21 percent of total trade volume in the corporate bond market as of the third quarter of 2022. This dataset includes information on both successful and unsuccessful trade inquiries. To capture some of the trades made outside the MKTX platform, the researchers also use data on all transactions recorded by the Trade Reporting and Compliance Engine, operated by the US Financial Industry Regulatory Authority. This dataset includes only successful trades, but it contains information on all completed trades, regardless of the platform used.

The researchers limit their analysis to what are referred to as “child orders,” which can arise when an OTC customer divides inquiries over a period of several days. For example, a customer hoping to sell 1,500 bonds might inquire about 300, then 500, then 700 bonds, rather than inquiring about 1,500 bonds at once. This customer might therefore accept

or reject several offers on comparable trade units in a short period of time. Focusing on these small and repetitive orders provides insights into dealer and customer decision-making while controlling for the size and other specific characteristics of a given inquiry.

The researchers suggest that repeated failed inquiries and significant variation in time-to-trade could be the result of customers inquiring repeatedly in order to get the best price for their trade. Looking at trades in which a customer made two identical inquiries within several days, they find that 61 percent of the time, the customer received a better offer at the second inquiry than they did at the initial inquiry. This suggests that there can be some return to customers rejecting initial offers if they do not achieve a target response.

—Emma Salomon



Long-Term Mortality Effects of US Air Pollution

Exposure to air pollution is an established cause of increased human morbidity and mortality but quantifying these effects is difficult. Observational studies that examine the correlation between life expectancy and air pollution across space and over time may not account fully for many factors other than pollution levels that contribute to mortality. Quasi-experimental studies can address these challenges, but they usually measure pollution exposure and health outcomes over relatively short time periods and do not shed light on the long-term effects associated with pollution exposure over years or decades.

In [The Long-Run Effect of Air Pollution on Survival](#) (NBER Working Paper 31858), [Tatyana Deryugina](#) and [Julian Reif](#) measure the health effects of exposure to sulfur dioxide (SO₂), a byproduct of the combustion of coal and oil that is a major source of fine particulates. They combine data on death records with measures of air pollution from the Environmental Protection Agency's Air Quality System database over the period 1972–1988. They exploit changes in wind direction, measured on a grid with a resolution of about 86 miles, along with data on SO₂ levels to calculate the variation in county-level SO₂ levels that results from wind-blown regional, but not local, pollution.

The researchers uncover two distinct mortality effects of acute exposure to SO₂: a mortality displacement effect that manifests as an immediate increase in the mortality rate among frail individuals who had a short life expectancy, and an accelerated aging effect among healthier individuals that also

speeds up mortality but does not result in immediate death. Following a 1 part-per-billion (ppb) rise in SO₂ levels, the research finds a statistically significant increase in same-day mortality rates for all age groups older than 20. The effects range from 0.017 deaths per million individuals for 20-to-44-year-olds to 2.3 additional deaths per million for those over age 85. On the day of the SO₂ spike, death records show increased mortality from many causes, including cardiovascular disease, cancer, and other diseases. This suggests that frail individuals with many health conditions are affected by the higher pollution level. Over time, however, only the mortality rate from cardiovascular and other diseases remains elevated: it rises by a factor of four at a horizon of one month. Over the same horizon, the rise in pollution has no effect on cancer mortality, a finding consistent with the increase in short-run cancer mortality

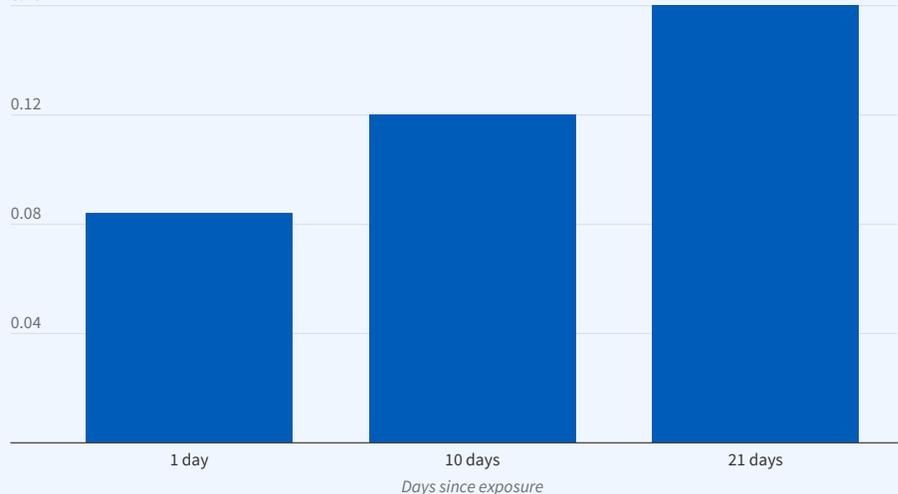
being driven by individuals who were very likely to die in the next month.

The researchers use their estimates to assess the lifetime effect of a permanent decline of 1 ppb in SO₂ levels, roughly a 10 percent drop in average pollution levels during their sample period. They estimate that this would increase life expectancy by about 1.2 years. This effect is more than 7 times larger than the change in life expectancy that would be implied by the study's short-run estimates alone, suggesting that accounting for the long-run health effects of pollution exposure is essential. Three-quarters of the improvements in life expectancy occur after age 65, which implies that cohorts born after the passage of the 1970 Clean Air Act have yet to experience the survival benefits of the drastic reductions in US air pollution over the past 50 years.

—Abigail Hiller

Effect of Acute Sulfur Dioxide Exposure on Cumulative Mortality

Deaths per million associated with exposure to 1 part per billion on day 1



Source: Researchers' calculations using data from the EPA.

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