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Wage Effects of R&D Grants to Small Private High-Tech Firms

When small, private high-tech companies land a government research and development grant, they share the benefits of this windfall with their senior employees.

Workers who were with the company prior to its application for the grant received an average 16 percent raise in pay, according to **Do Cash Windfalls Affect Wages? Evidence from R&D Grants to Small Firms** (NBER Working Paper 26717). While this pay increase could reflect many factors, the explanation that best fits the data, according to researchers [Sabrina T. Howell](#) and [J. David Brown](#), is that employees at small startups work for less than they might earn elsewhere in return for the implicit promise that if the startup succeeds and has more cash available at a later time, their wages will rise.

Such an effect is hard to discern in most settings because it is difficult to disentangle increases in workers' pay that reflect rent-sharing from increases that are due to productivity

improvements. To get around these measurement problems, the study focuses on small high-

After a firm wins a grant, workers' wages rise substantially, which is consistent with their having accepted lower wages in the startup phase in the hope of higher pay later.

tech firms that applied for US Department of Energy Small Business Innovation Research (SBIR) grants between 1995 and 2013. The \$150,000 awards can be considered a cash flow "shock" because the recipient firms face

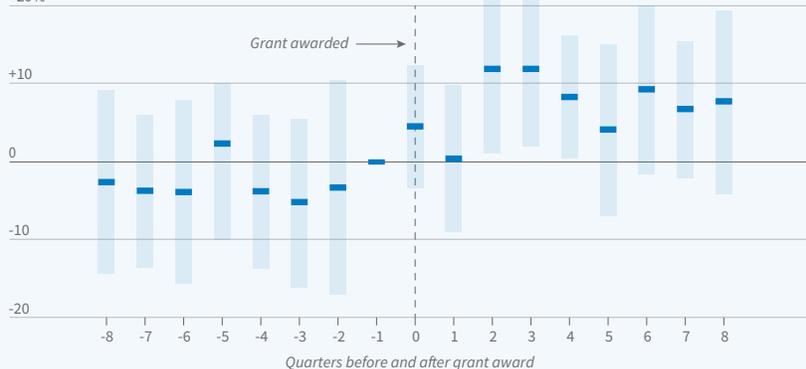
no restrictions on how they spend the money. To establish a causal effect of these cash flow

shocks, the researchers employ a regression discontinuity design, comparing firms around the cutoff for winning an award.

In the quarter following an SBIR award, they found that the average firm raised employee pay by about 9 percent. The effect was more muted at firms with more employees; averaged across all workers at the firms studied, the increase was a bit less than 4 percent. Importantly, the beneficiaries of the wage increases were workers who were at recipient firms before the grants were awarded, and the effect increased with worker tenure. Employees who joined a firm after the award did not receive result-

Effect of Winning a Government R&D Grant on Wages Paid by Small Firms

Change in firm-level wages associated with grant award, relative to the quarter before the award



Shaded-blue bands represent 95% confidence intervals

Source: Researchers' calculations using data from the Department of Energy

ing higher wages. The estimates of how long it took the typical firm to spend the entire grant on higher wages range between four and nine years.

The researchers consider a number of possible explanations for the pay raise for long-tenured workers, such as productivity growth, increased bargaining power among employees, incentive contracting, or backloaded wage contracts. This last one—long-term contract frameworks in which employees agree to work for less initially so they can reap big gains later—is most consistent with the data. Evidence for this explanation comes from a survey that the researchers sent to the principal investigators of the DOE grants, who were almost always the CEOs of the beneficiary firms. Of 99 responses, 55.6 per-

cent confirmed they used backloaded contracts because of financial constraints, 21.2 percent said they didn't, and 23.2 percent did not directly answer the question.

"If the firm is financially constrained but can commit to long-term contracts, employees can offer financing to the firm," the researchers explain. "The worker initially agrees to be underpaid relative to some benchmark (such as his outside option) in exchange for a higher wage later when the firm's situation improves."

The researchers calculate that longtime employees not only received raises, but also collected a compensation premium for having accepted risky, lower-paying contracts initially. This deferred-compensation effect created more pay inequality within firms

that received grants.

While the researchers acknowledge other potential explanations for the findings, these are less consistent with the data. For example, a federal grant boosts a firm's revenue and employment, which could result in higher productivity and hence higher wages. However, the bump in workers' pay happens in the first two quarters after the grant while productivity does not rise substantially for the first two years after the grant. Some might also suggest that workers gain bargaining power as their tenure grows, but the researchers argue that the receipt of a grant should not change a particular employee's bargaining power, yet it does affect wages.

—Laurent Belsie

Blacks Waited Longer to Vote in 2016, but Not Due to Partisanship

Black people waited longer to vote than whites during the 2016 election, and there was no association between the length of the waiting time and which political party was in power in the voting jurisdiction. Those are two of the findings in **Racial Disparities in Voting Wait Times: Evidence from Smartphone Data** (NBER Working Paper 26487), by M. Keith Chen, Kareem Haggag, Devin G. Pope, and Ryne Rohla.

The study draws on nationwide records of smartphone pings for 154,495 individuals identified as likely voters across 43,414 polling locations. It used anonymized data provided by SafeGraph, a company that aggregates location data from smartphone applications. Close to 80 percent of US adults were estimated to have owned smartphones in 2016. The researchers used cellphone pings to pinpoint people who came within a 60-meter radius of a polling place on election day. They

Voters in entirely black neighborhoods were 74 percent more likely to spend more than 30 minutes at the polls than those in entirely white neighborhoods.

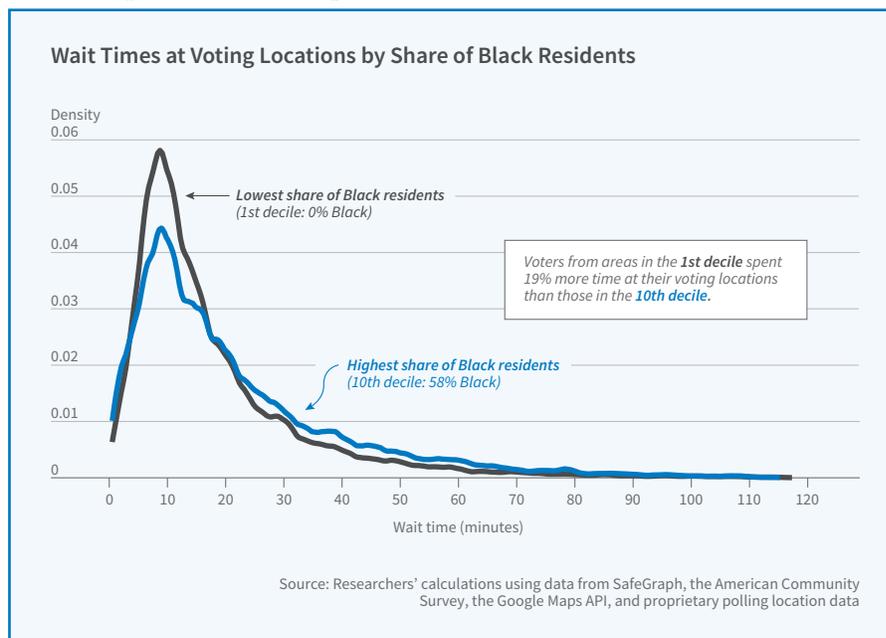
checked cell data for the week before and after the election to eliminate from the sample individuals who may live or work near a polling station. Also filtered out were individuals who spent more than two hours at

the polling location, such as election workers.

The study found that, nationwide, voters spent an average of 19 minutes at polling locations, with 18 percent spending more than 30 minutes. The states with the lon-

gest average wait times were Utah (28 minutes) and Indiana (27 minutes) and the shortest, Delaware and Massachusetts (12 minutes each).

Voters at polls in all-black areas waited an average of five minutes longer at the polls than voters in neighborhoods with no black voters. Wait times were also higher in Hispanic neighborhoods than they were



in white areas, but the differential was not as pronounced as it was for black neighborhoods.

What accounts for the racial disparity? Not partisan politics. Whether a precinct was located in a Republican-dominated county or state made no difference in wait times. Differences in voter ID and early vot-

ing laws were not significant factors either. The researchers did find that the racial disparities were larger at high-volume polling places. At polling places that fall in the 10th percentile (1,150 registered voters), the average black-white disparity was 3.7 minutes, compared with 7 minutes at polling places in

the 90th percentile (5,242 registered voters).

Looking ahead to the 2020 election, they say that mining smartphone data could be a relatively cheap and efficient way to track wait times and racial disparities across different regions.

—Steve Maas

Tighter Prescription Regulations Limited the Rise of Opioid Use

The opioid epidemic struck with different force in different states. The average per capita usage rate over the last two decades of OxyContin, a widely used prescription opioid that was introduced in 1996, was about 50 percent lower in California, Idaho, Illinois, New York, and Texas than in other states. In **Origins of the Opioid Crisis and Its Enduring Impacts** (NBER Working Paper 26500), [Abby E. Alpert](#), [William N. Evans](#), [Ethan M.J. Lieber](#), and [David Powell](#) show how regulations in these states influenced the marketing strategy of Purdue Pharma, the maker of OxyContin.

The researchers conclude that what separated the five states which experienced less OxyContin use from the pack was “paperwork.” In 1996, the year the blockbuster painkiller came on the market, these states had the most stringent opioid regulations in the nation, known as triplicate prescription programs. Doctors were required to fill out triplicate prescription forms, sending a copy to the state drug monitoring agency and keeping one on file. While OxyContin prescriptions were lower in the tripli-

cate states, use of other painkillers that were not subject to stringent regulations was just as high in triplicate states as in other states.

According to internal company com-

munications that were revealed in court documents, Purdue Pharma decided against mounting a significant marketing effort in the triplicate states after learning from focus groups that providers would be less willing to prescribe OxyContin in these states. To disentangle the impact of the triplicate rules themselves from the reduced marketing of OxyContin, the researchers compared the five triplicate states with two other groups of states that had had similarly

Five states that required doctors to fill out triplicate forms and report opioid prescriptions experienced slower growth in OxyContin use.

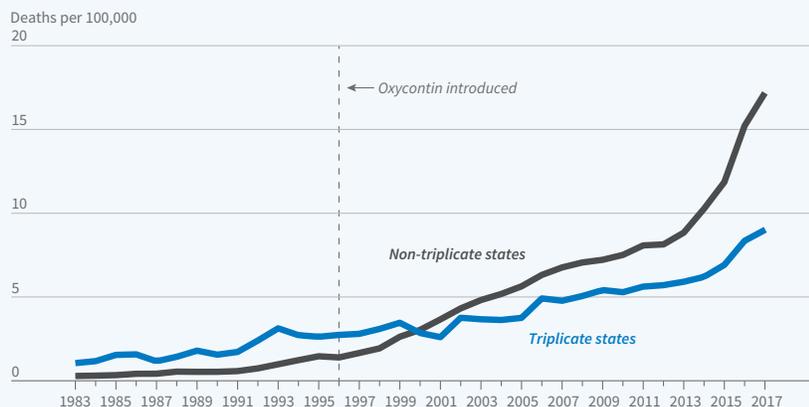
stringent prescribing cultures: five non-triplicate states that had the lowest oxycodone prescribing rates in 1991–95; and two states that had dropped triplicate regulations just prior to OxyContin’s introduction. In all non-triplicate states as well as both sets of comparison states with similar prescribing cultures, OxyContin use and opioid overdose deaths were substantially higher on average than in the five states that had triplicate policies in place when the drug came on the market.

By 2004, all the triplicate states had dropped the triplicate regulations in favor of electronic record-keeping. However, Purdue appears to have continued to concentrate its marketing efforts elsewhere. Internal documents show that the company pushed its sales force to target the top OxyContin prescribers, thus reinforcing prior geographical trends. In 2013–16, total per capita payments to physicians for meals, travel and gifts linked to OxyContin promotion were between 42 and 72 percent higher in the non-triplicate states than in the five states that had triplicate policies in 1996.

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Opioid Overdose Deaths, 1983–2017



Triplicate prescription programs require doctors to write prescriptions for some controlled substances using multiple copies, with the extra copies retained by the doctor and the state drug monitoring agency
Source: Researchers’ calculations using data from the National Vital Statistics System

The researchers conclude that the cross-state disparities in marketing efforts for OxyContin that originated in the era of triplicate prescriptions help to explain why residents of some states were shielded from the worst of the opioid crisis. Over

the 1996–2017 period, non-triplicate states would have had an average of 36 percent fewer drug overdose deaths and 44 percent fewer opioid deaths if they had been triplicate states and experienced the concomitant lower level of marketing. This

evidence suggests that the introduction and marketing of OxyContin played a significant role in the beginnings of the opioid crisis and continue to affect overdose rates even today.

—Steve Maas

Can an Increase in Government Spending Lower Local Interest Rates?

Textbook macroeconomic theory holds that unless there are slack resources in the economy, an increase in government spending will put upward pressure on interest rates, thereby lowering consumer spending and business investment. But new empirical findings suggest that, at least at the local level, higher government spending actually may lead to a decline in interest rates.

In **Effects of Fiscal Policy on Credit Markets** (NBER Working Paper 26655), Alan J. Auerbach, Yuriy Gorodnichenko, and Daniel Murphy find that fiscal stimulus can not only expand output but can also contribute to lowering the cost of credit. They conclude that fiscal policy may therefore be able to push rates lower when monetary stimulus is constrained by interest rates at already-low levels raise, but also collected a compensation premium for having accepted a risky, lower-paying contract initially. This deferred-pay effect created more, a channel of fiscal policy transmission that has not been emphasized previously.

The researchers examine the effect of US Department of Defense (DOD) contracts on the interest rates prevailing in the cities in which the contract work was performed. Although US credit markets are integrated, local banks set their own rates for consumer loans. The researchers find that a

1 percent increase in expected DOD outlays from ongoing contracts, which may be interpreted as an injection of liquidity, is associated with a 0.24 basis point reduction in auto

may raise the expected future income and wealth of city residents, which could in turn reduce default risk and hence the risk premium charged for riskier loans. This would

Rising Department of Defense outlays in a community are associated with lower auto and home equity loan rates, perhaps because they increase expected future income and wealth.

loan rates and a 0.30 basis point reduction in the rates charged for home equity lines of credit with a high loan-to-value ratio. In contrast, outlays associated with new production contracts have interest rate effects on auto loans that are an order of magnitude higher, with rates declining by 1.26 basis points in response to a 1 percent increase. The effect of new contracts on mortgage loan rates was small, and there was no statistically significant effect on credit card rates.

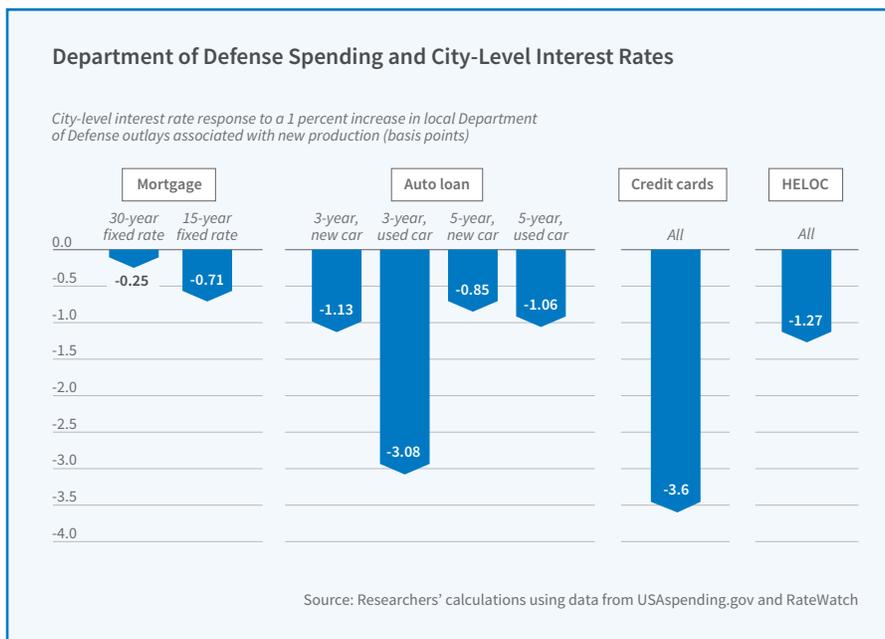
Outlays for new DOD production

be a more significant consideration for loans backed by riskier, less marketable collateral. In fact, a 1 percent increase in DOD outlays for new production reduced rates for riskier, less marketable, short-term used car loans by 3.08 basis points while reducing short-term loan rates for new cars by only 1.13 basis points.

The researchers suggest that their findings are explained by the notion that government spending relaxes credit markets through a liquidity injection and by reducing the perceived riskiness of borrowers.

Even if an increase in outlays on a prior contract was expected, it could nevertheless represent an ongoing injection of liquidity into the local economy. As the earnings of local contractors rise, whether because of old or new outlays, local borrowers may become more creditworthy. Local banks may make more loans, their balance sheets may improve, and credit may expand along with their lending.

—Linda Gorman



Affective Polarization in the Wealthy, Democratic World

Affective polarization — people’s negative feelings toward members of opposing political parties — has been increasing in the United States, causing concern not just because of the accompanying decline in the civility of public discourse but also because high levels of polarization are associated with reduced government efficacy.

In the study **Cross-Country Trends in Affective Polarization** (NBER Working Paper 26669), [Levi Boxell](#), [Matthew Gentzkow](#), and [Jesse M. Shapiro](#) conduct an analysis of polarization levels over the last 40 years in nine relatively wealthy, established democracies: the United States, Canada, Britain, Germany, Australia, New Zealand, Norway, Sweden, and Switzerland.

To measure affective polarization, the researchers use the gap between individuals’ self-reported feelings toward members of their own political party and members of the opposing party. Although the surveys that underlie this study differ somewhat across nations, the researchers construct a single measure for each country for each point in time, calculated on a scale of 0 to 100, that summarizes negative feelings toward members of opposing parties relative to one’s own.

The researchers find that over time, affective polarization — the extent of negative feelings toward those in the other party — has increased more in the US than in any of the other countries.

The gap in the US increased by almost 70 percent between 1978 and 2016. Canada, Switzerland, and New Zealand saw smaller upward trends. In Canada, the gap increased by more than 50 percent between 1988 and 2015. Australia, Britain, Norway, Sweden, and Germany saw declining trends in measured

polarization, with statistically significant trends in the last two countries. Affective polarization in Germany declined by more than 35 percent between 1977 and 2016.

Negative feeling toward opposing political parties is up most sharply in the United States. It has also risen in Canada, Switzerland and New Zealand while falling elsewhere.

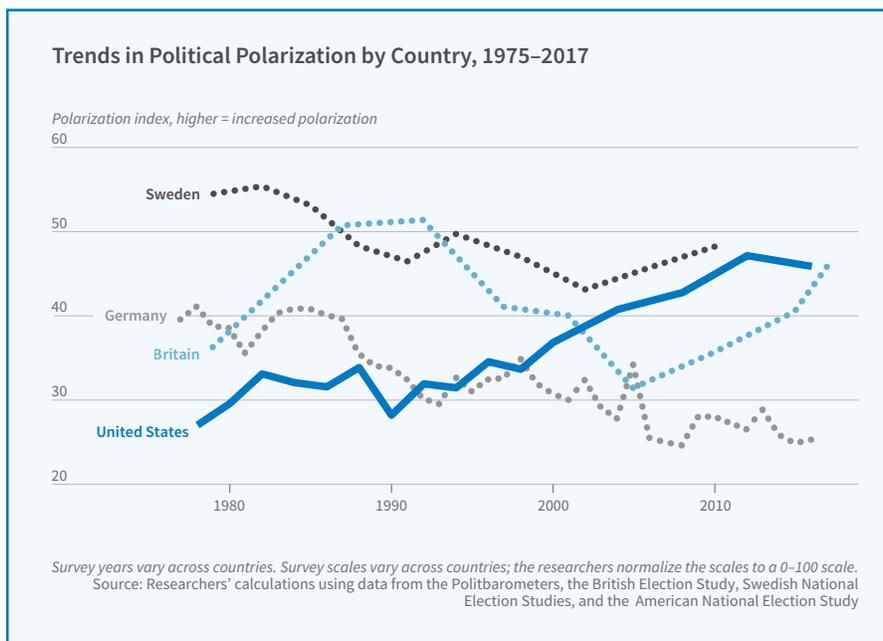
The researchers exploit cross-country comparisons to evaluate some of the explanations that have been proposed for increasing polarization in the US. They discount the spread of broadband internet access as an explanation, noting that all the countries in the sample saw increases in internet penetration during the decades studied. In fact, countries that saw polarization decline actually enjoyed a faster rise in internet penetration than other countries.

party sorting. In recent years, the political party that people identify with has become more correlated with both ideology and important individual attributes like race and religion.

Political scientists have suggested that this party sorting—which has resulted in members of different political parties having less in common in the modern era than in years past—could increase affective polarization. Both Canada and the US have seen ideological differences between political parties increase more quickly than other countries. Increased party sorting by race, which may be driven by increases in the non-white share of the population, also appears to be important. The researchers find that “the increase in the non-white share has been twice as large in countries with rising affective polarization as in those with falling affective polarization.”

Finally, the rise of partisan cable news networks has been more pronounced in the US than in other countries and coincides with increasing polarization. “The timing of the introduction of Fox News appears roughly consistent with the acceleration

of the growth in affective polarization during the 1990s, as well as with the observation that older demographic groups both consume more partisan cable news and have polarized more quickly than younger demographic groups in the US...” the researchers write. They also note that the countries in which affective polarization declined devote more per-capita resources to public media.



The researchers similarly see evidence against three other factors— income inequality, openness to trade, and the foreign-born share of the population — as potential drivers of trends in affective polarization. They note that all three factors increased in almost every country in the sample.

Two other popular explanations for rising polarization in the US, however, do align with the cross-country data. The first is political

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—Dwyer Gunn

Building in Wildland-Urban Interface Areas Boosts Wildfire Costs

Annual wildland firefighting costs for the US federal government have more than doubled in real terms over the past 30 years and are expected to keep growing. Firefighting costs for federal agencies totaled some \$43 billion in the period 1985–2017, mostly in Western states in which the federal government is responsible for fire controls on large areas of public land.

In *Moral Hazard, Wildfires, and the Economic Incidence of Natural Disasters* (NBER Working Paper 26550) Patrick Baylis and Judson Boomhower show that a large share of the costs of fighting wildfires is spent trying to prevent damage to private homes that are built in high fire-risk areas near federal and state lands. They argue that having state and federal governments bear the firefighting costs while localities and individual homeowners decide where and how to build those homes contributes to development in areas with elevated risk of wildfires at the interface between wild lands and urban areas.

The guarantee of federal protection generates moral hazard, because homeowners do not internalize the expected costs of future fire protection when

choosing where to live or how to design and maintain their homes. Similarly, local governments do not take firefighting costs into account when making zoning, land use, and building code decisions. The guarantee of fire

as high as 36 percent of a home's value. In the lowest risk higher density areas, the subsidy averages about 0.8 percent of a home's value.

The researchers estimate that about 84,000 more homes have been built in high

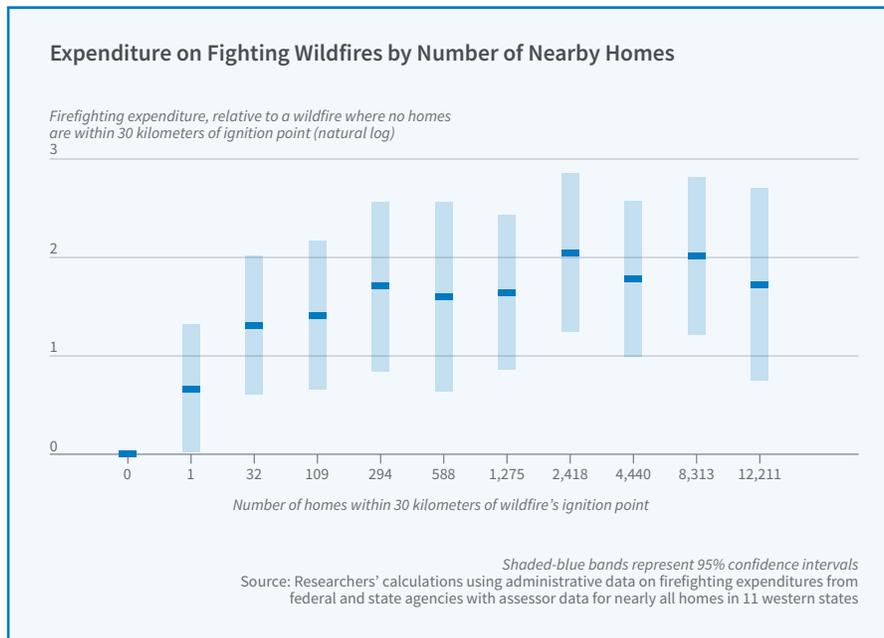
Fire protection costs — paid for by the federal government — are not considered by prospective homeowners and local authorities when making development decisions.

protection subsidizes development in high-risk locales.

The net present value of fire protection subsidies can exceed 20 percent of a home's value. For the 11,000 homeowners in the “highest fire risk, lowest-density parts of the West,” the researchers calculate a subsidy rate

fire risk areas than would have been the case had federal wildfire protection not lowered the cost of ownership in those areas. Fire protection effectively subsidizes large lot sizes and low-density development, and may reduce private incentives to choose fire-proof building materials and clear brush around homes.

Overall, federal fire protection may have increased development in high fire risk areas by 2.5 percent, and substantially more than that in the highest-risk areas. Fire protection costs level off at a median net density of about 6 acres per home, suggesting substantial benefits from clustered development rather than continued conversion of sparsely developed wildland places to low-density housing use.



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