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INSIDE THIS ISSUE

Secular Stagnation and the Decline in Real Interest Rates

The long decline of real interest rates in developed nations is one of the central macroeconomic trends of the last half-century. Łukasz Rachel and Lawrence H. Summers present new evidence on the causes of this decline in **On Secular Stagnation in the Industrialized World** (NBER Working Paper 26198).

The researchers focus on "the advanced economy interest rate," an aggregate constructed from the prevailing interest rates in the OECD nations. They find that the neutral real global interest rate — the rate which balances desired saving and investment and thus leads to full employment and stable inflation — has fallen about 3 percentage points since the 1970s. Today, they conclude, the average neutral real rate is around zero in industrialized nations. Crucially, absent growing government debt and deficits and increasingly generous social insurance programs, the neutral rate would have fallen nearly 7 percentage points and would now be significantly negative.

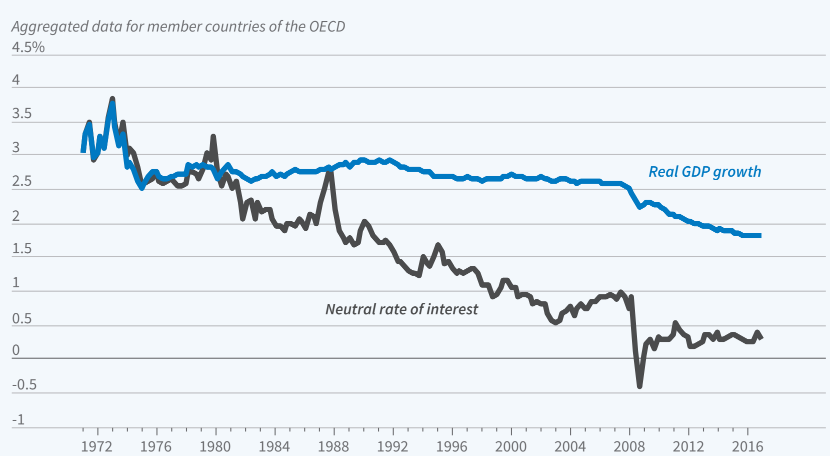
It is difficult to calculate the neutral real rate for any single open economy because it depends on a nation's current account position, which depends on its real exchange rate, which in turn is affected by current and expected future real interest rates. To overcome this problem, the researchers combine data from all developed countries and treat them as a single economic entity. They justify this by pointing out that the aggregate current account balance of this bloc has varied within a narrow range — less than 1.5 percent of GDP — since the 1970s. And it has been on the rise in recent years, suggesting that international capital flows, all else equal, have raised interest rates. The researchers also assume perfect internal capital mobility, given the large capital flows between the developed nations and common trends in long-term real rates and stock markets.

> Real interest rates would have fallen much further in the last half century if governments had not expanded social insurance programs and taken on more debt.

In addition, instead of focusing on traditional measures of liquidity and risk, the researchers examine factors relating to saving and investment trends to analyze long-term changes in neutral real rates. They note that interest rates on highly liquid securities have declined in tandem with those on relatively illiquid government-issued inflation-indexed bonds and bond-like financial derivatives. While risk premiums on stocks have risen, the increases are small relative to the decades-long decline in real interest rates.

The researchers' base-

Neutral Rate of Interest and GDP Growth for OECD Members



Source: Researchers' calculations using data from the Organisation for Economic Co-operation and Development line analysis indicates that if real interest rates had not gone down over the last half century, savings would have exceeded investment in OECD countries by between 9 and 14 percentage points of GDP. They point to several policy changes over this period that counterbalanced this potential excess.

Government policies have played a central role in offsetting potential excess savings. For example, developed nations have increased their debt dramatically during this period of study, from about 20 to 70 percent of GDP. They have boosted old-age payments from an average of 4 to 7 percent of GDP, and raised old-age healthcare spending from 2 to 5 percent of GDP.

Drawing on the existing empirical estimates of the impact of these policies on interest rates, the researchers perform calculations which suggest that the effect of these policies on interest rates has been substantial. For example, holding other variables constant, the increase in public debt should have raised real rates by between 1.5 and 2 percentage points over the last four decades. Increased social security and healthcare provision likely had a similar, if not slightly larger, effect.

To better understand and further quantify the impact of these policies on real interest rates, the researchers use two models of household saving: one focusing on lifecycle considerations; the other emphasizing idiosyncratic risk and precautionary saving. The baseline calibration of these models confirms the earlier results. The researchers conclude that the policy changes taken together may have raised equilibrium real interest rates by between 3.5 and 4 percentage points.

"The implication of our analysis that but for major increases in deficits, debt, and social insurance, neutral real rates in the industrial world would be significantly negative by as much as several hundred basis points suggests substantial grounds for concern over secular stagnation," the researchers conclude. "[T]he private economy is prone to being caught in a low inflation underemployment equilibrium if real interest rates cannot fall far below zero."

— Laurent Belsie

Common Application Has Had Wide-Ranging Effects on College Admissions

The rapid expansion of a program enabling students to fill out a single application when applying to multiple colleges and universities has enabled participating institutions to enroll a larger percentage of out-of-state and foreign students as well as more freshmen who excelled on standardized tests.

> After they join the program, colleges experience a 10 percent jump in the number of applications for admission; over a decade, that growth rises to 25 percent.

In **Reducing Frictions in College Admissions: Evidence from the Common Application** (NBER Working Paper 26151), Brian G. Knight and Nathan M. Schiff focus on the years 1990 through 2016, when the Common Application became a major platform in the admissions process on the US academic scene.

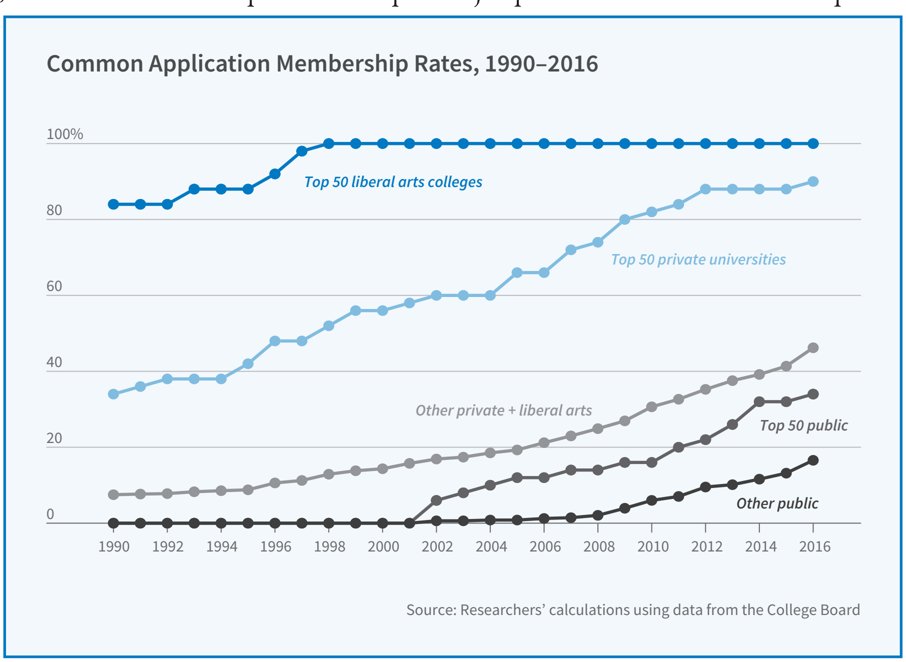
The platform was launched in 1975 with just 15 colleges; today, it includes more than 700 institutions that together annually receive 4 million applications from 1 million students. The founding colleges were selective liberal arts colleges. The program has grown to include public universities, with more-selective institutions joining at a much more rapid clip than their less-selective counterparts.

Using the Common Application makes it simpler and less time-consuming for students to apply to multiple colleges and it exposes them to a geographically broader range of institutions.

The researchers find that in the years right after they join the program, colleges experience a 10 percent jump in the number of applications for admission. Ten years after joining, the effect is 25 percent. They attribute the sustained and accelerating pace of increase to the snowball effect of increasing participation and the rapid growth of the internet.

As the Common App has become more widely used, institutions have seen the fraction of accepted students choosing to go elsewhere increase, presumably because these students have applied to more colleges and received more competing offers of admission. This effect on colleges, however, is more than offset by the increase in applications. Schools that joined the Common App also slightly increased their enrollment on average, either because they were previously below capacity or because they elected to expand.

The fraction of out-of-state students enrolled expands by 1.5 percent-



Common Application Membership Rates, 1990–2016

Source: Researchers' calculations using data from the College Board age points in the years after a college or university joins the Common App. The average was about 30 percent out-of-state just before schools joined the program. The out-of-state students disproportionately come from states that have a high concentration of colleges participating in the Common Application program.

The study finds some evidence that the Common Application program has increased freshman SAT scores at participating institutions. Before the program became widespread, some higher-achieving students may have restricted their search to local schools, even if they were less selective. Given that highly selective schools make up a disproportionate share of schools in the application program, the increase in SAT scores has widened the gap in the academic ability between students at less-selective and more-selective schools. The researchers conclude that, by streamlining the application process, the Common Application has created a more robust academic marketplace.

— Steve Maas

On Improving Tax Revenue Collections in Developing Countries

Most low-income countries collect between 10 and 20 percent of their GDP in tax revenue, in comparison to high-income countries' average of nearly 40 percent. This may in part be due to fundamental characteristics of developing economies, such as their less sophisticated banking systems or prevalence of informal labor market relationships. These considerations suggest that there is little these nations can do to increase tax revenues.

The findings of a study by M. Chatib Basri, Mayara Felix, Rema Hanna, and Benjamin A. Olken, **Tax Administration vs. Tax Rates: Evidence from Corporate Taxation in Indonesia** (NBER Working Paper 26150), challenge this idea. The study focuses on how two corporate tax reforms in Indonesia affected tax revenues.

In the first decade of this century, Indonesia established a number of Medium Taxpayer Offices (MTOs) and transferred responsibility for overseeing tax administration with respect to large corporations in each region with an MTO to that office. The MTOs had the same structure as the country's regular tax offices, which are called Primary Taxpayer Offices (PTOs), but boasted higher staff-to-taxpayer ratios, allowing for better customer service and tax administration. The country's several hundred largest taxpayers were serviced out of a central Large Taxpayer Office in Jakarta.

The researchers found that assignment to an MTO, as opposed to a PTO, increased tax revenue significantly — by 128 percent for the firms affected — at a cost of less than 1 percent of the increase in revenues. The increases were broad, occurring across corporate income taxes, VAT payments, and other kinds of tax payments. The MTO policy raised at least $4 billion from the firms it affected — just 4 percent of Indonesian corporations. The researchers also found that the establishment of the MTOs resulted in an increase in the reported number of permanent employees, and in reported wages, at the affected companies, perhaps because increased administration increased formalization.

> A study of Indonesian reforms finds that sharpening focus and boosting staff-to-taxpayer ratios produced major revenue gains at minor expense.

The positive effect of MTOs on tax revenue increased over time. The researchers hypothesize that, before the advent of MTOs, overburdened tax workers may have focused more on larger corporations than on their smaller counterparts, effectively levying an additional "enforcement tax" on growth. The MTOs may have eliminated this tax, equalizing effective tax rates across different-sized firms.

Indonesia's 'Medium Taxpayer Offices' Reform and Taxes Paid

Average change in income tax and value-added taxes paid by taxpayers affected by the Medium Taxpayer Offices (MTOs) reform, relative to the year before the reform

Shaded-blue area represents 95% confidence interval
Source: Researchers' calculations using anonymized data from the Indonesian Ministry of Finance

The researchers also study a second tax reform: a 2009 change from a progressive corporate income tax rate to a flat rate of 28 percent with revenue-based discounts, and a 2010 tax cut of the flat rate to 25 percent. Reported taxable income increased as the tax rate declined: a 10 percent increase in the share of after-tax profits retained by firms — equivalent to a tax rate cut from 30 to 23 percent — is associated with an increase of about 6 percent in reported taxable income. This response is similar to the value found in many developed countries; it implies that Indonesia's revenue-maximizing corporate tax rate is 56 percent.

Benchmarking the MTO reform against a counterfactual tax rate increase, the researchers find that the increased corporate income tax revenue from improvements in tax administration would be equivalent to raising the marginal corporate tax rate on affected firms by about 23 percentage points.

The findings indicate that tax administration improvements can be effective in raising revenue in developing nations. "Meaningfully large increases in tax revenue from medium-sized firms can be obtained through feasible administrative improvements in a relatively short period of time," the researchers conclude.

—Dwyer Gunn

Foreclosures Can Amplify Downward Spirals of House Prices

Between 2006 and 2013, mortgage lenders foreclosed on about 8 percent of the homeowners in the United States. Foreclosures play a complex role in housing market dynamics, and a number of policies that were adopted during the Great Recession were designed to lower the foreclosure rate.

In a new study of the co-movement of house prices and foreclosures, **How Do Foreclosures Exacerbate Housing Downturns?** (NBER Working Paper 26216), Adam M. Guren and Timothy J. McQuade explore how foreclosures magnify the impact of shocks to housing demand.

The researchers identify three channels through which foreclosures affect demand. First, buyers who default on their mortgages have a foreclosure flag placed on their credit record. This means that they are locked out of the housing market, because they cannot obtain another mortgage until this flag is cleared. Second, banks and other lenders face capital constraints, and when loans default these constraints become tighter. It is more difficult for lenders to extend new mortgages when they are more constrained. Finally, when distressed lenders sell foreclosed properties for less than they sell equivalent homes that are not in foreclosure in order to remove these properties from their books, recover part of their investment, and relax their capital constraints, remaining buyers become choosy and demand that other sellers, those who are not distressed, also lower prices.

When the housing market is hit by a shock that lowers housing demand and induces some foreclosures—for example a drop in employment—all three of these effects place further downward pressure on home prices and on the number of transactions in the housing market. The dynamic interactions between falling prices, defaults, and credit constraints keep growing numbers of buyers out of the market. The scarcity of buyers lowers prices, intensifies the buyers' market, and leads to a downward price-default spiral.

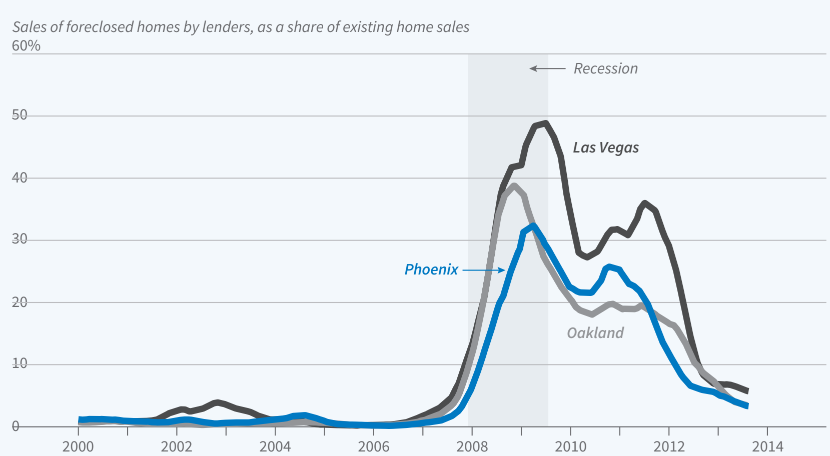
Home mortgage defaults exclude defaulting households from the housing market and tighten capital constraints on lenders. Both effects push down home prices and create a potential role for policy.

To quantify the effect of foreclosure-related factors on the housing market, the researchers construct a model of the US housing market and calibrate it using data for the 2006-13 period. They analyze monthly data provided by CoreLogic for 99 of the 100 largest core-based statistical areas. Across cities, they find that the size of the preceding local housing boom was the best predictor of the size of the next local bust. But cities with a larger boom—and more foreclosures in the bust—had a more-than-proportionately larger bust, which the model attributes to price-default spirals.

The researchers estimate that foreclosure-related dynamics played a key role in the decline in non-foreclosure house prices in their sample period. They attribute 22 percent of the drop to a substantial number of potential home buyers being excluded from the market because of bad credit associated with past foreclosure flags. Lender rationing—the effect of tighter credit constraints on financial institutions—can account for another 23 percent of the price decline, and for a larger share, about 40 percent, of the decline in home sales. The "choosey buyer effect" contributed another 3 percent to the price decline. Persistent declines in home valuations account for the remaining 52 percent, implying significant overshooting due to foreclosures.

The researchers also study how various policy interventions might have slowed the rate of foreclosures and the decline in house prices. Such interventions have the greatest benefit when shocks to

Lender-Owned Sales during the Great Recession



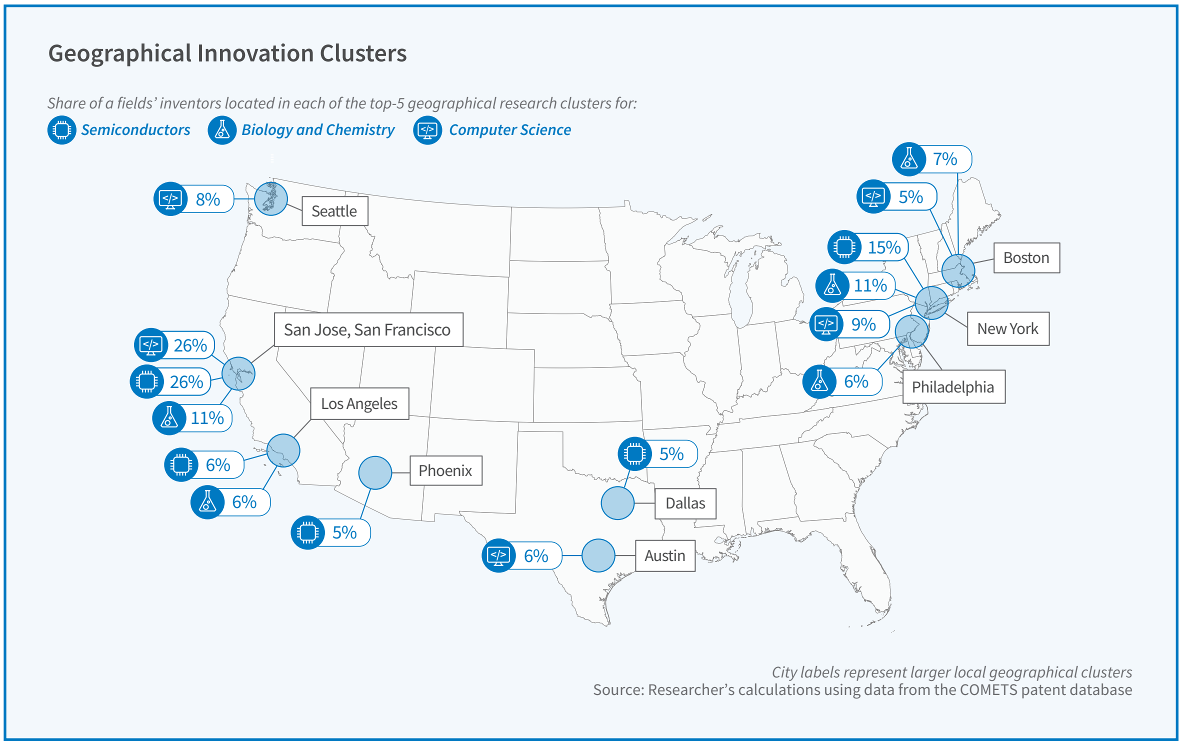
City labels represent respective metropolitan statistical areas
Source: Researchers' calculations using data from CoreLogic

housing demand are transitory. By allowing borrowers time to become current on their loans, these policies reduce the overall foreclosure rate.

A government policy of injecting cash or equity equal to 50 percent of bank losses would have reduced foreclosures by 19.3 percent and price declines by 23.9 percent at a cost of $2,175 per household. Reducing principal with a $10,000 payment up to a loan-to-value ratio of 115 percent would have reduced defaults by 16.4 percent and price declines by 10.5 percent at a cost of $1,917. Had the government purchased foreclosed homes and sold them after a year, reducing both foreclosures and lender credit rationing, the number of foreclosures would have declined by 40.3 percent and price declines would have been reduced by 44.8 percent at a cost of $2,150 per household, the researchers conclude. The analysis indicates that the most cost-effective policies directly address the imbalance of supply and demand in the market.

—Linda Gorman

Most US High-Tech Inventors Live in Just a Few Urban Clusters



More than half of all inventors in the United States in three high-tech fields—computer science and information technology; semiconductors; and biology and chemistry—work in clusters of 10 cities, and this concentration of talent into geographical high-tech centers has increased over time, Enrico Moretti reports in **The Effect of High-Tech Clusters on the Productivity of Top Inventors** (NBER Working Paper 26270). He asks why inventors tend to locate near one another in tech centers such as San Francisco and Seattle despite the high costs of living in these locations.

The study uses data from 1971 to 2007 on the patents of 823,359 inventors located in 179 cities to assess where innovation occurs. The semiconductor field emerges as one of the most highly concentrated, with 77 percent of all inventors located in 10 clusters. San Jose-San Francisco leads this field with 25.5 percent of all semiconductor inventors, followed by the New York region with 14.9 percent, and Los Angeles with 6.1 percent. Ten tech clusters also account for almost 70 percent of all inventors in computer science, again led by San Jose-San Francisco (26.1 percent) and New York (9.1 percent). In this field, Seattle (8.3 percent) is third. In biology and chemistry, the top 10 clusters account for 59 percent of the total share of innovators, led by New York (11.3 percent), San Jose-San Francisco (11.1 percent), and Boston (6.9 percent). The geographic concentration of inventors in all research fields was significantly higher in 2007 than in 1971, despite the proliferation of affordable communications that allow for remote or virtual work opportunities.

The study finds that when inventors move from smaller tech clusters to larger ones, their productivity rises significantly, as measured by their number of patents filed and the resulting citations. There is no evidence that inventors who moved were on a rising productivity trajectory before the move. For example, a computer scientist who moved from Gainesville, Florida, which is a median cluster, to a larger, 75th percentile cluster such as Richmond, Virginia, would see on average a 12 percent increase in productivity. A similar move by inventors in biology and chemistry would be followed by an average 8.4 percent productivity boost.

Moretti presents a counterfactual calculation of the number of patents that would have been produced annually in each field if some inventors were relocated so that the clusters in every city were of the same size within each research field. This redistribution would increase the productivity of inventors in previously smaller clusters, and reduce it among inventors in previously larger clusters. This calculation suggests that the total number of computer science patents would have been 13.2 percent lower in 2007 had the inventors been distributed uniformly across the nation. Overall, such a redistribution would have reduced patent output by 11 percent across all fields.

—Jennifer Roche

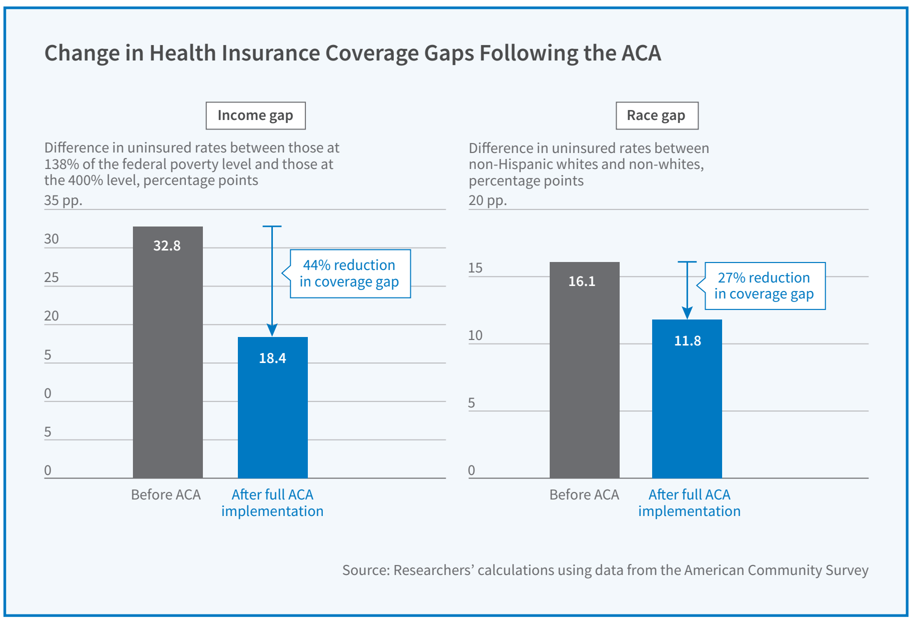
Assessing the ACA's Impact on Insurance Coverage, 4 Years On

Implementation of the Affordable Care Act (ACA), which began in 2014, has reduced health insurance coverage gaps across American citizens in different income, age, race, and marital status groups, according to a study by Charles J. Courtemanche, Ishtiaque Fazlul, James Marton, Benjamin D. Ukert, Aaron Yelowitz, and Daniela Zapata.

From 2014 to 2017, the ACA — which includes subsidized private insurance plans, state Medicaid expansion, and insurance market reforms — reduced the coverage gap across both age and income groups by 44 percent. It lowered the differences across racial groups by 27 percent, and that between single and married individuals by 45 percent, according to **The Impact of the ACA on Insurance Coverage Disparities after Four Years** (NBER Working Paper 26157).

The reduction in inter-group differences resulted from a combination of Medicaid expansion programs, growth in employer-sponsored insurance, and expansion of the private insurance market. For low-income citizens, the reduction was almost all due to Medicaid expansion. The researchers analyze changes in health insurance coverage using 2014-2017 data from the government-mandated American Community Survey (ACS), which includes more than 3 million observations per year as well as questions about socio-demographic characteristics, multiple categories of insurance coverage, and geographic identifiers.

The health-care legislation has reduced the coverage gap between low-income and other citizens by 44 percent and the gap between non-whites and whites by 26.7 percent.



The insurance coverage gap between whites and non-whites also shrank during this period. In 2013, non-whites were 16 percent more likely to be uninsured than whites: uninsured rates were 31 and 15 percent, respectively. After the ACA had been fully implemented, this gap narrowed by 4.3 percentage points, with gains for non-whites in all categories of coverage. The ACA also narrowed the gap between single individuals and married couples. In 2013, singles were much more likely to be uninsured (27 percent) than married couples (14 percent). This gap fell from 13 to 9 percent after the ACA was fully effective, largely because of expanded Medicaid coverage for single individuals.

In studying the four years since ACA implementation, the researchers find ongoing reductions in disparities, but the reductions are taking place at a slower rate. A reduction in private, employer-sponsored insurance coverage accounts for the majority of this reduction, but there is also a dip in reports of individually purchased coverage.

— Jennifer Roche

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