

March 2018

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Confiscation of German Copyrights Boosted U.S. Math and Science

In **Effects of Copyrights on Science—Evidence from the U.S. Book Republication Program** (NBER Working Paper No. 24255), [Barbara Biasi](#) and [Petra Moser](#) estimate the welfare costs of long-lived copyrights in fields in which new advances depend critically on access to existing work. They do this by tracking the 1920 to 1970 English-language citation rates for 283 German-language chemistry and mathematics books affected by President Franklin Roosevelt's executive order of July 6, 1942, confiscating the copyrights protecting more than 100,000 German book titles. U.S. publishers were given the chance to bid for six-month licenses to republish the German books under the U.S. Book Republication Program (BRP).

At a time when most U.S. scientists could read German, publishers began producing exact copies of important German science books. Prices fell by an average of 25 percent, and in some cases by much more. For example, Springer, a major German pub-

lisher, had sold the set of Frederick Konrad Beilstein's *Handbuch der Organischen Chemie* for \$2,000; U.S. publishers sold the same set for \$400. In addition to tracking citation rates

WWII-era Book Republication Program lowered prices for German books, facilitating a broad geographical diffusion and utilization of the information in these volumes.

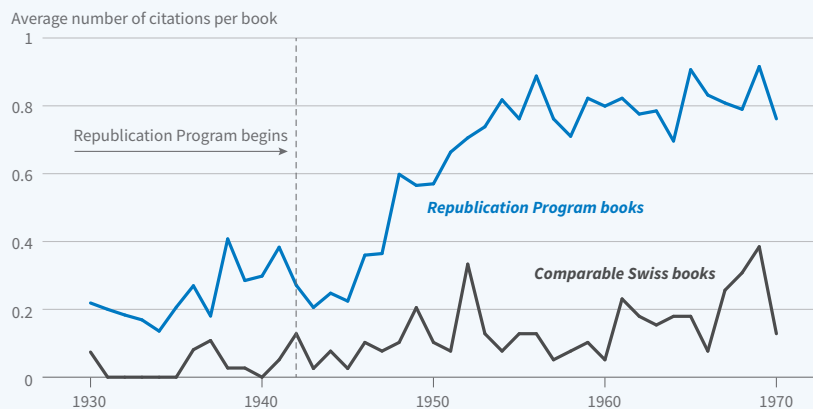
and costs, the researchers measure the books' rate of diffusion in U.S. library holdings, their role in U.S. patents, and the growth in the number of new U.S. mathematics PhDs.

They find that each 10 percent decline in the price of an affected book was associated with a 43 percent increase in citations. They conclude that the change in

copyright policy raised English-language citations to BRP books by 67 percent. A 10 percent decline in a book's price produced an additional 88 percent increase in citations for mathematics compared with chemistry. The difference may stem from the fact that while knowledge creation in mathematics depends primarily on human capital, chemists also require equipment, chemicals, and lab space.

The lower prices of BRP books encouraged their purchase by libraries that were not affluent enough to acquire the books at the prices charged by the German publishers. Dates on the library lending

The U.S. Book Republication Program and Citation Rates



Source: Researchers' calculations using data from nearly 10,000 new articles and books that cite 283 Reproduction Program books and a control group of 247 Swiss books

cards in 127 of the BRP books in the Stanford University Library, for example, suggest that loans began around 1941 and peaked around 1955. These dates correspond well with the temporal pattern of increasing citations. The growth in the number of mathematics PhDs also corresponds well with BRP book availability. Locations within 25 miles of a copy of a BRP book produced almost 0.8 more mathematics PhDs per year after 1942 than before. Citations to BRP books within patents increased by 15 percent.

Swiss scientists were also leaders in chemistry and mathematics, and many Swiss scientists published in German. But because Switzerland was neutral, Swiss publishers retained their copyrights in the United States and their book prices remained high. Few copies were available outside of libraries at Yale, Harvard, the University of Illinois, and the New York and Chicago public library systems. The trends in Swiss and German citations were comparable until 1942 but they diverged after the BRP program began,

with citations to German works rising more quickly.

The researchers note that their findings highlight a key tradeoff for intellectual property rights. Although copyrights provide an incentive for people to publish books, long-lived copyrights in fields that depend on access to existing work can produce large welfare losses. These distortions may be particularly important in scientific publishing, where the incentive effects of copyright are likely to be relatively small.

—Linda Gorman

Fracking, Oil Prices, and the Pass-Through of Input Costs

In market equilibrium, the prices a firm sets for its products depend not only on its own production costs, but on the production costs of its competitors as well. The recent fracking boom generated cost shocks that differed for different firms, providing researchers with an opportunity to study the extent to which prices respond to a firm's own costs, rather than those of its competitors.

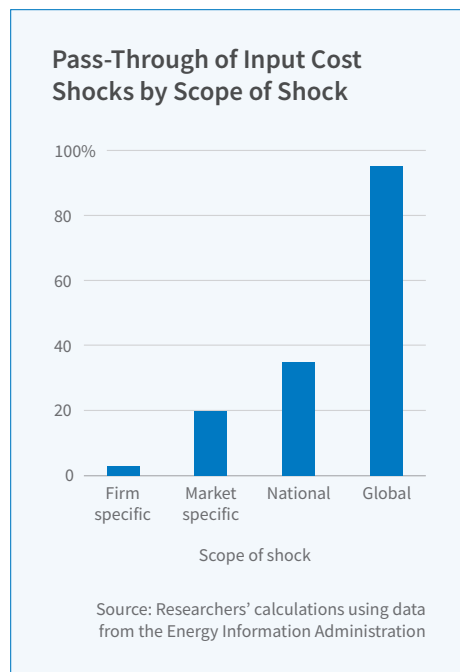
Between 2005 and 2015, U.S. oil production nearly doubled. The advent of hydraulic fracking coupled with a ban on

export of domestically produced oil — only lifted in December 2015 — led to an unprecedented divergence between U.S. and worldwide crude oil prices.

The benefits of lower costs were spread

discounts in crude prices that resulted from a supply glut in the upper Midwest and plains states, regions of high fracking activity. From 2000 to 2010, the West Texas Intermediate (WTI) spot price for crude oil hovered at

Deep discounts in crude prices resulting from a supply glut in the upper Midwest and plains states produced varying cost shocks for producers.



unevenly among refiners and their customers. [Erich Muehlegger](#) and [Richard L. Sweeney](#) analyze factors at the firm, market, and industry level that affected how the fracking boom impacted the prices consumers paid for petroleum products. In **Pass-Through of Input Cost Shocks Under Imperfect Competition: Evidence from the U.S. Fracking Boom** (NBER Working Paper No. 24025), they draw on detailed information compiled by the Energy Information Administration on every refinery in the United States. The database enabled them to pinpoint firm-level costs, and — because they could identify the states where refiners' products were sold — to distinguish between cost shocks affecting close rivals and those affecting firms not in direct competition with one another.

The researchers find that 20 percent of market specific costs, 35 percent of national cost shocks, and 95 percent of global cost shocks are passed through. In the case of fracking, the cost shocks came in the form of deep

about \$1.40 more per barrel than the Brent spot price, the benchmark for crude prices for the United States and Europe. Between 2011 and 2015, the WTI price averaged \$12 per barrel less than Brent crude.

Bottlenecks in the crude oil distribution system hampered oil producers' efforts to transport crude to locations with greater refining capacity. But geography was not the only factor influencing input costs for various refiners. Some refineries close to shale oil sources could not partake in the fracking bonanza because they were equipped to process mainly heavy crude, not the light crude that comprised most of the shale production. Others, such as the international giants Citgo and Aramco, had to continue relying on imported crude produced by their vertically integrated parent companies.

The extent to which refineries benefited from the decline in crude prices also depended on their market share. Those that dominated their markets reduced prices less, and earned higher profits, relative to those

in more competitive markets, where most of the cost savings were passed along to consumers.

The researchers extrapolate from their results to a scenario in which there is a

broadly applied tax on carbon emissions. They conclude that, on average, refineries would be able to pass most of this tax burden on to customers. They conclude that “while refineries have little ability to pass on idio-

syncratic cost shocks, shared cost changes have increasingly larger impacts, culminating in slightly greater than full pass-through for an industry-wide shock.”

— Steve Maas

Older Americans Would Work Longer if Jobs Were Flexible

The share of Americans over 65 is projected to hit 40 percent by 2050, up from 20 percent in 2007. As the percentage of older Americans rises, concern is growing about the financial strains associated with a larger number of retirees being supported by each active worker. There’s also worry that some employers may face labor shortages.

A possible response would be to enact or encourage policies that would allow older Americans to work beyond traditional retirement ages. In **Older Americans Would Work Longer if Jobs Were Flexible** (NBER Working Paper No. 24008), [John Ameriks](#), [Joseph S. Briggs](#), [Andrew Caplin](#), [Minjoon Lee](#), [Matthew D. Shapiro](#), and [Christopher Tonetti](#) find that there is a large, untapped pool of older Americans who have a strong desire to keep working, sometimes at wages significantly lower than the ones they earned previously, but only if they could have flexible work schedules.

Determining what sort of policies would encourage longer working lives is challenging because it is difficult to disentangle the roles of labor supply and labor demand in determining existing patterns of later-life labor market behavior. Are employers unwilling to adapt pay and work schedules to accommodate those who want to slow down but keep working? Is there a low willingness on the part of older individuals to continue working under current market and incentive conditions? The researchers sought to separate the supply- and demand-side factors by surveying older households.

Their primary data source was the Vanguard Research Initiative, a linked survey-administrative data panel drawn from account holders at The Vanguard Group, Inc. The researchers used the sample of 3,000 respondents who completed a survey related to later-in-life labor market activities. The survey focused on labor

market participation and retirement, including a detailed history of employment, job search behavior, retirement paths, and employment in post-career “bridge” jobs.

About 40 percent of retirees—33 per-

cent only 11 percent had searched for a job opportunity after leaving their career job, but a third of them would be willing to work again in a job that had characteristics similar to their previous one.

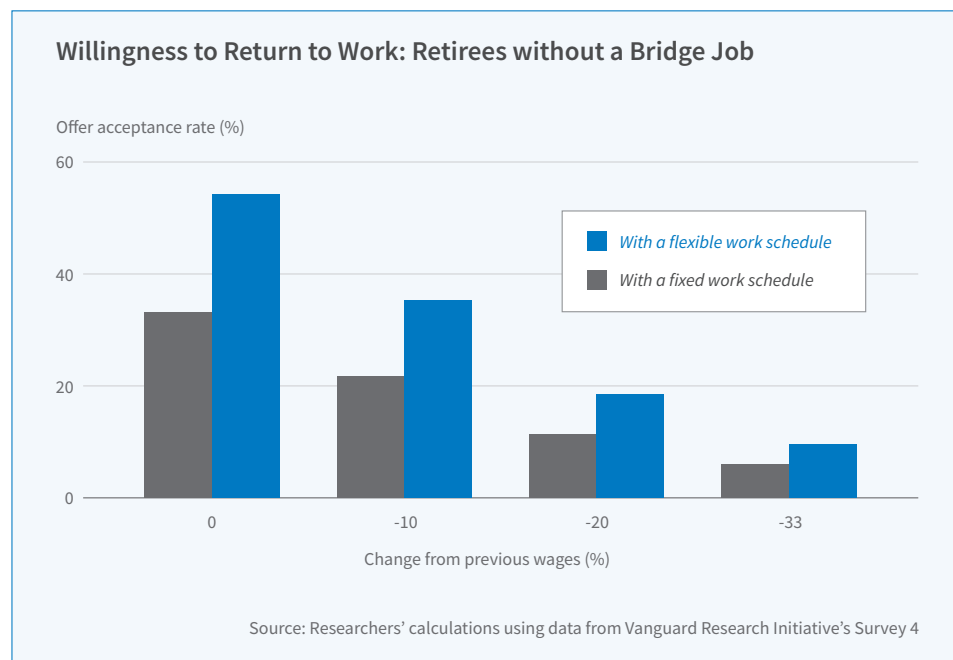
About 40 percent of retirees surveyed were willing to return to work in a job like their previous one, but 60 percent would return if the schedule were flexible.

cent of those who did not have a bridge job, 44 percent of those who did—said they were willing to work if all the conditions were the same as in their last job, including wages and total hours, but 60 percent would be willing to return to work with a flexible schedule. In addition, 20 percent of retirees would be willing to take an hourly wage reduction of 20 percent or more in return for more flexible hours.

Among those who had not held a post-career “bridge” job, the researchers found

The researchers conclude that demand-side factors play an important role in explaining later-life labor market behavior, writing that “older Americans’ labor force participation near and after normal retirement ages is limited more by a lack of acceptable job opportunities or low expectations about finding them, in particular jobs with part-time or flexible schedules, than by unwillingness to work longer.”

— Jay Fitzgerald



Competition and Search in Internet Markets for Used Books

Online shopping has become ubiquitous. Has this raised profits or raised consumer welfare? Both, at least in one market. In **Match Quality, Search, and the Internet Market for Used Books** (NBER Working Paper No. 24197), Glenn Ellison and Sara Fisher Ellison find that digitization of the used book market increased prices and price dispersion in online relative to offline sales. Profits on used books were 80 percent higher online, but the higher prices facing buyers were more than compensated for by the expanded access to hard-to-find volumes that the internet provided.

By visiting physical bookstores in 2009, the researchers created a sample of 335 books. They then collected online prices for the same titles in 2009 and in 2012. Contrary to what many might have expected, they found that the used books were typically more expensive online than in brick-and-mortar stores: the average online price was about \$20, while the equivalent offline price was roughly \$11. There was also a lot of dispersion in the online prices. The accompanying figure provides one illustration: online prices for what the researchers call “standard” titles — fairly obscure, typically out-of-print books — were much higher and much more dispersed than offline prices.

Normally, price dispersion is interpreted as a sign that markets are not working well, and higher prices are interpreted as evidence that buyers are worse off. But the researchers note that neither is necessarily true. They point out two avenues through

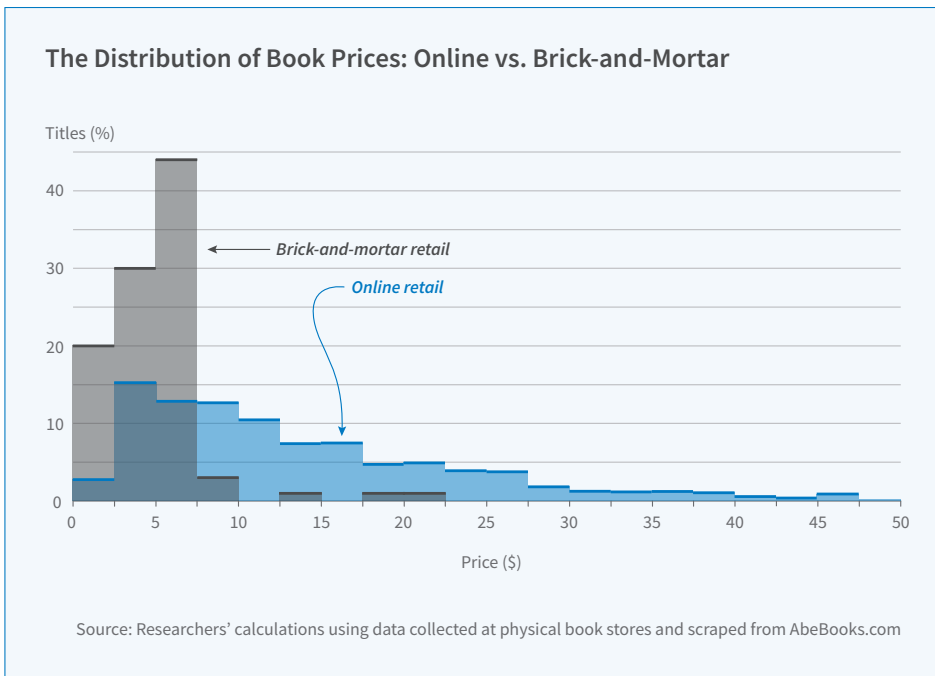
which the rise of internet markets and the associated availability of online search technologies could affect prices. Better search technologies could lead to buyers being

The advent of the online market for used books has raised prices but improved welfare for both sellers and buyers, especially where unusual titles are concerned.

better informed, inducing sellers to reduce prices in an attempt to win business. This is the “competition effect.” Online markets could also make it easier to find products with unique value to a specific buyer — an increase in match quality. For example, a buyer searching for a specific 15-year-old

To explore the hypothesis that both effects are important in the used book market, the researchers examine how price levels and price dispersion vary across different

types of used books and over time, looking for patterns that would be expected if match quality effects were important. They find several different pieces of evidence consistent with the view that price increases reflect match-quality improvements and that search technologies have made consumers more informed. For example, they looked separately at what they termed “local interest” books — books about the history or geography of a specific area or otherwise associated with that area. They noted that brick-and-mortar bookstores in those areas had high prices for these books relative to online sellers, consistent with the notion that brick-and-mortar stores were already providing about the best match quality one could imagine for such



used book may have a hard time tracking it down at a brick-and-mortar store. The internet facilitates search, thereby increasing demand for unusual titles. The latter effect benefits buyers, but will also tend to increase prices. Knowing only that average prices are higher online does not permit any conclusion about whether this is because the “competition effect” was small or the “match effect” was strong enough to offset increased competitive pressure.

books. Whether buyers' welfare is higher or lower in the online market depends on the strength of the match quality effect. To address this issue, the researchers develop a model of competing sellers of unusual items, and infer important quantities like the rates at which potential consumers are arriving and the magnitudes of potential gains from selling to well-matched consumers. They use the

price data they collected as well as sales data they inferred from disappearances of specific online listings in sequential data gatherings. The researchers estimate that per-bookseller revenues were 80 percent higher online than offline in 2009, due

to both higher prices and a higher likelihood of sale. And, more strikingly, they estimate that the consumer welfare gains are not only positive, but roughly equally as large. In the case of the used book market, they therefore conclude that mov-

ing online has been a win-win process for sellers and buyers. More generally, the paper suggests that match quality may be an important and underappreciated source of welfare gains from online sales.

—Morgan Foy

Professionals Licensed at State Level Are Slow to Move Interstate

Between 1980 and 2010, interstate migration in the United States fell. In 1980, 3 percent of U.S. residents made an interstate move; that number dropped to about 1.5 percent in 2010. The fraction of the employed population changing jobs fell from 16 percent to 11 percent over the same period. The decline in geographic and employment mobility may be associated with reduced efficiency of the labor market, as workers are less inclined to take up their highest-value employment options.

In **Is Occupational Licensing a Barrier to Interstate Migration?** (NBER Working Paper No. 24107), [Janna E. Johnson](#) and [Morris M. Kleiner](#) examine whether a rising tide of state-level occupational licensing may be contributing to declining geographic mobility.

Today, about 30 percent of the U.S. workforce requires an occupational license, up from only 5 percent in 1950, and 15 percent in 1980. Licensing requirements for professionals vary from state to state, so those moving to a new state often must undergo an arduous re-licensing process. The researchers theorize that these state-level requirements might limit workers' willingness to move for better jobs, and thus their wage and employment prospects.

Using data from the American Community Survey, the researchers examine interstate migration patterns between 2005 and 2015 for workers across 22 licensed professions, ranging from pest control workers to psychologists and dentists. They find that the between-state migration rate for individuals in occupations with state-specific licensing exam requirements is 36 percent lower relative to members

of other occupations. By contrast, workers employed in professions that have national licensing exams—whose re-licensure costs are much lower when they make an inter-

state move—do not display lower interstate migration rates.

In contrast, members of licensed occupations with national licensing exams move across state boundaries at much higher rates.

state move—do not display lower interstate migration rates.

There are significant differences in the interstate migration rates of different licensed occupations: Some, such as

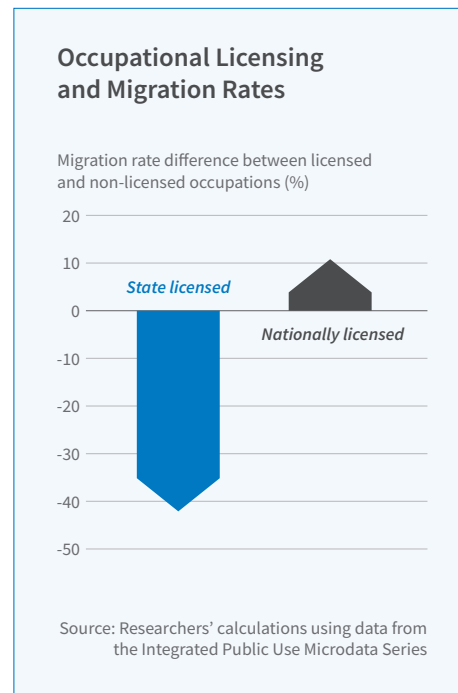
and physicians. The researchers hypothesize that these differences are driven by state-specific licensing requirements for professions that have national licensing exams. Social workers, for example, take a national licensing exam, but some states require specific additional courses. Likewise, dentists and dental hygienists must pass a national written exam, but must also pass a clinical exam that can vary from state to state.

In an effort to identify a causal link between occupational licensing requirements and mobility, the researchers look at what happens to the geographic mobility of lawyers when states enter into reciprocity agreements that reduce the barriers to migration. They find that the migration of lawyers into a state increases after a reciprocity agreement is introduced.

The cumulative effects of occupational licensing policies could be significant. The researchers calculate that licensing may lead to annual earnings losses of between \$178 and \$711 million for licensed workers, and that the increase in occupational licensing since 1980 could account for between 3 and 13 percent of the decline in interstate migration since then. They note that the aging of the U.S. population explains about 10 percent of the decline in migration in that period.

—Dwyer Gunn

pharmacists and teachers, exhibit particularly low relative rates of migration. The researchers find no reduction in mobility rates for other occupations, such as insurance agents and chiropractors. There are



The Effects of Uniform Pricing by U.S. Retail Chains

Large U.S. retailers manage chains of standardized food, drug, or merchandise stores with multiple locations in multiple states. In **Uniform Pricing in U.S. Retail Chains** (NBER Working Paper No. 23996) [Stefano DellaVigna](#) and [Matthew Gentzkow](#) use scanner data to show that such retail chains charge nearly uniform prices despite wide variations in customer preferences and household incomes from place to place. They estimate that uniform pricing reduces chain profits by 7 to 9 percent compared to profits from flexible pricing predicted by a benchmark model.

The researchers consider advertising, tacit collusion, pricing fairness, and managerial overhead to explain why uniform pricing prevails. They conclude that the most promising explanation is that the practice reduces managerial overhead. As information technology improves and managements adapt to the new environment, this could imply that chains will begin to increase inter-store price variation. They note that “both drug stores and mass merchandise chains appear to have doubled the flexibility of their pricing” in 2012–14 compared to 2006–08.

The analysis is based on store-level scanner data from the Nielsen Retail Scanner and Consumer Panel from 2006–14. The dataset includes information on 9,415 food stores from 73 chains, 3,288 mass merchandise stores

from five chains, and 9,977 drugstores, which typically carry a limited variety of both food and merchandise, from four chains. It contains prices for about a million unique products,

Firms may forego profits when their desire for reductions in managerial overhead leads them to abandon price discrimination.

along with information from about 60,000 shoppers. The researchers compared weekly average prices derived by dividing weekly revenue by the number of units sold for 10 commonly purchased items, including soup, toilet paper, and 12-pack cans of Coke. Demographic

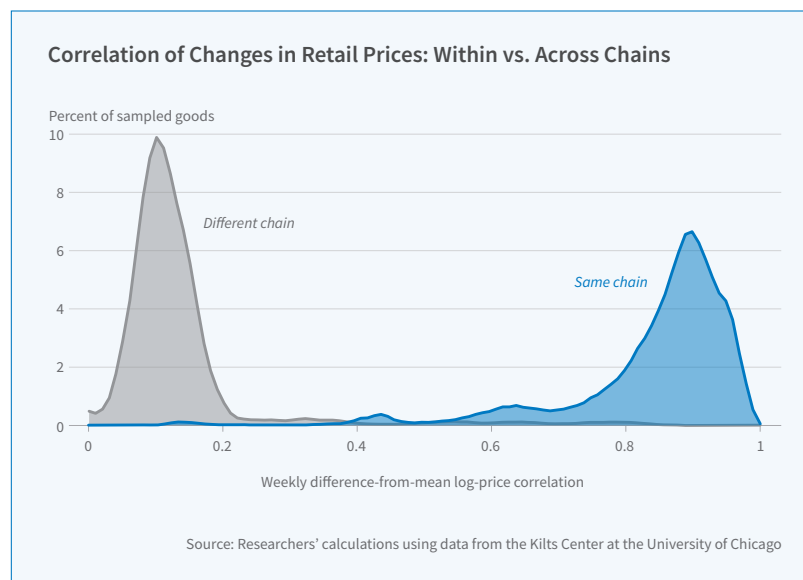
For 11 food chains and two major drugstore chains, prices varied at the level of large geographic zones. Estimates from the flexible-pricing model suggest the average chain

could increase its profits by 6.9 percent if prices in the highest income areas’ retail outlets were raised 18 percent in food stores, 29 percent in drugstores, and 11 percent in mass merchandise stores.

Per capita income in the sample ranged from \$22,700 at store locations in the 10th percentile of the income distribution to \$40,900 at stores in the 90th percentile. In general, shoppers in drug and grocery stores in areas with higher incomes face prices that are about 2 percent higher for each \$10,000 of additional income; shoppers in mass merchandise stores in those areas enjoy lower prices. The researchers conclude that uniform pricing “significantly increases the prices paid by poorer households relative to the rich” because people in the

lowest income decile pay about 0.7 percent higher prices than they would under flexible pricing, but consumers of stores in the top income decile pay about 9.0 percent less.

—Linda Gorman



data were constructed from the 2008–12 American Community Survey and were usually based on customers’ residential zip codes.

For the great majority of the 73 chains, measured prices varied little across stores.

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