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Rights to Carry Concealed Handguns and Urban Crime

When states enact Right-to-Carry (RTC) concealed handgun laws, incidents of violent crimes, robberies, and aggravated assaults involving firearms increase by around a third in major cities as a result of the altered behavior of gun permit holders, career criminals, and the police. These adverse crime effects from RTC laws are in part generated by a substantial increase in gun thefts as well as reduced police effectiveness, John J. Donohue, Samuel V. Cai, Matthew V. Bondy, and Philip J. Cook find in More Guns, More Unintended Consequences: The Effects of Right-to-Carry on Criminal Behavior and Policing in US Cities (NBER Working Paper 30190).

RTC laws have been enacted in a number of states over the last four decades. Before 1980, most American states had either prohibited the carrying of concealed firearms or required permits for concealed carry. Today, those strictures have been greatly relaxed. When states first allowed concealed carry, they tended to adopt "may issue" laws that allowed the state to issue a concealed-carry license but did not guarantee such a license as a basic right. Today, most RTC laws stipulate that the state "shall issue" a license to any individual who requests one, with certain narrow exceptions.

> Cities in states that adopt concealed-carry laws experience increases in aggravated assaults, robberies, and violent crimes involving firearms.
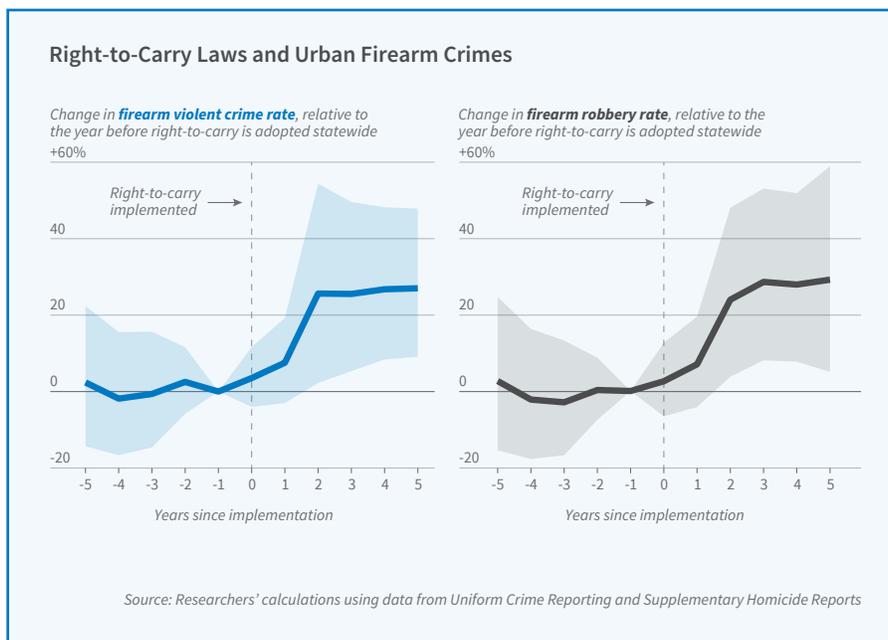
In 2019, the US experienced nearly 300,000 aggravated assaults, homicides, and robberies committed with a firearm. To study the impact of RTC laws, the researchers analyze data from the 1979–2019 period for 47 US cities with a population of at least 400,000 in 2019. They study monthly FBI and Bureau of Justice Statistics reports on firearm and non-firearm crimes, the rate at which police are able to identify and arrest the perpetrators of crime (the clearance rate), and stolen property. The last data series enables them to determine the monetary value of stolen guns.

The data include four categories of violent offenses: aggravated assault, robbery, violent crime, and homicide. The first three increased by between 11 and 15 percent after RTC laws were adopted. The number of these crimes that involved firearms increased even more, by between 24 and 32 percent. Firearm homicides increased nearly 13 percent and non-firearm homicides decreased by over 3 percent. While the overall homicide rate rose 8.5 percent, this increase was not statistically significantly different from zero.

Police effectiveness decreased in cities covered by RTC laws. Across the four violent crime categories, clearance rates fell

Right-to-Carry Laws and Urban Firearm Crimes

Change in **firearm violent crime rate**, relative to the year before right-to-carry is adopted statewide

Change in **firearm robbery rate**, relative to the year before right-to-carry is adopted statewide

Right-to-carry implemented

Years since implementation

Source: Researchers' calculations using data from Uniform Crime Reporting and Supplementary Homicide Reports

between 7 and 15 percent; the total violent crime clearance rate fell by 13 percent. This decrease in clearance rates is not explained by the increase in violent crimes. Rather, it may be due to factors such as the burdens on police time caused by greater gun carrying (investigating additional gun thefts, dealing with increases in accidental gun discharges and injuries, evaluating whether guns are being lawfully carried, or addressing wrongful gun carrying into sensitive locales), police hesitation to engage with a more heavily armed civilian population, or weakened police-community relations.

Enactment of RTC laws was also associated with a 35 percent increase in stolen gun value per capita. When these results are projected nationwide, they imply that the existence of RTC laws in 2015 was associated with an increase of more than 100,000 gun thefts.

—*Brett M. Rhyne*

The Effect of E-commerce Expansion on Local Retail

E-commerce has dramatically altered retail in the last two decades, with online sales growing from 0.63 percent of total retail sales in 1999 to 13.3 percent in 2021. In Creative Destruction? Impact of E-commerce on the Retail Sector (NBER Working Paper 30077), Sudheer Chava, Alexander Oettl, Manpreet Singh, and Linghang Zeng study how the rise of online selling has affected brick-and-mortar retail establishments and their employees.

The researchers measure the presence of e-commerce in an area using the staggered rollout of a major e-commerce retailer's fulfillment centers across the United States. This firm had only three such centers in 2000, but more than 90 by the end of 2016. Establishing a center reduces shipment delivery times in surrounding areas, which may encourage local consumers to shift towards e-commerce and away from traditional brick-and-mortar retailers. The researchers study the trends in retail outcomes before and after a fulfillment center is established in proximate counties, and compare them with the trends in a control group of counties near where centers would be built at a later date.

The researchers first use a detailed employer-employee payroll dataset covering 2.6 million retail workers to explore how e-commerce growth affects traditional retail workers. The establishment of a fulfillment center is associated with a drop of 2.5 percent on average in the income of hourly retail workers in the same county, or about $825 annually. The income drop is similar for retail workers in

> Establishment of an e-commerce fulfillment center reduces retail employment growth in the host county by an average of almost 1,000 jobs per quarter.

counties within 100 miles of the center, but is negligible beyond that distance. Hourly workers' income losses arise primarily from a reduction in hours worked.

Impact of E-Commerce Fulfillment Centers on Local Retail Sales and Income

Change in **local brick-and-mortar sales** after the establishment of a fulfillment center

← Fulfillment center (FC) established

Months since FC established

Change in **income of hourly retail workers** after the establishment of a fulfillment center

← Fulfillment center (FC) established

Months since FC established

Shaded regions represent 95% confidence intervals
Source: Researchers' calculations using data from a major credit bureau, the National Establishment Time Series Database, and the BLS

A new fulfillment center is not associated with lower income among salaried retail workers, and the impacts of e-commerce on hourly workers' income vary substantially with worker characteristics. Income falls the most among the youngest and oldest workers, with income falling by 3.6 percent among workers over age 64. Workers with longer tenure at retail firms see smaller losses in income, and income losses are larger among part-time workers. Income los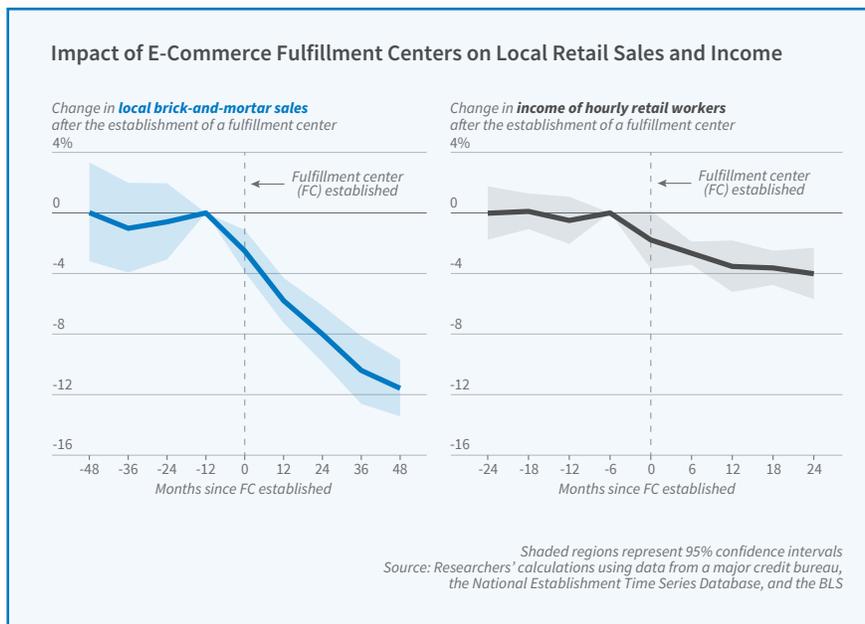ses are largest among workers in general-merchandise and home-improvement stores, two retail subsectors where customers may place less value on their in-store experience.

The researchers next use National Establishment Time Series data to examine the impact of e-commerce fulfillment centers on traditional retail stores. Sales in the average brick-and-mortar retail store fall by about 4 percent after a local fulfillment center opens. Stores react to these drops by reducing hours per worker and by cutting employee headcount by 2.1 percent on average, or about 36 workers per 100 stores. The opening of a fulfillment center coincides with a 3 percentage point increase in the annual likelihood that brick-and-mortar stores close. The largest impacts are found among smaller and newer stores. Likewise, new stores' rate of entry falls by 8.1 percentage points within 100 miles of a new center.

Finally, the researchers use data from the Quarterly Census of Employment and Wages

to examine how e-commerce expansion affects retail employment and wage growth at the county level. Establishment of a fulfillment center is associated with reduced employment growth in retail of 2.9 percent within the same county, a loss of about 938 jobs per county per quarter, with smaller losses within a 100-mile radius. These retail losses are partially offset by increased local employment in transportation and warehousing, which gain about 256 jobs, and in restaurants, which gain about 143 jobs. Opening a new fulfillment center also coincides with increased wage growth in warehousing.

— *Lucy E. Page*

Exploring 160 Years of the Black-White Wealth Gap

The wealth gap between White and Black Americans is nearly as large today as it was in the 1950s.

In Wealth of Two Nations: The US Racial Wealth Gap, 1860–2020 (NBER Working Paper 30101), Ellora Derenoncourt, Chi Hyun Kim, Moritz Kuhn, and Moritz Schularick construct a time series of the ratio of White-to-Black per capita wealth spanning a century and a half.

Delving into historical census data, state tax records, and multiple waves of the Survey of Consumer Finances, they construct a consistent measure of wealth by race. The ratio of White to Black per capita wealth, which was almost 60 in 1860 when 90 percent of Blacks were enslaved, fell rapidly in the decades immediately after Emancipation. By 1870, it was less than 30. Since Blacks were starting from virtually nothing, their wealth rose at a much faster rate than that of Whites.

In the last decade of the nineteenth century, the rate of decline in the White-to-Black wealth ratio slowed. It would take another 50 years for the gap to fall by half again, as the emergence of discriminatory laws and policies curtailed Black social, political, and economic advancement. With unequal pay and limited access to capital, Blacks faced challenges that made it difficult to save, invest, and accumulate wealth.

The researchers estimate that if Whites and Blacks had had equal opportunities for wealth accumulation over the last century and a half, the wealth gap today would be 3 to 1, rather than twice that.

With the migration of Blacks to the North, advances in civil rights, and the dismantling of legal segregation of housing and schools, the pace of racial wealth convergence increased between 1960 and 1980, averaging 1.5 percent per year — five times the 0.3 percent annual average value between 1900 and 1930.
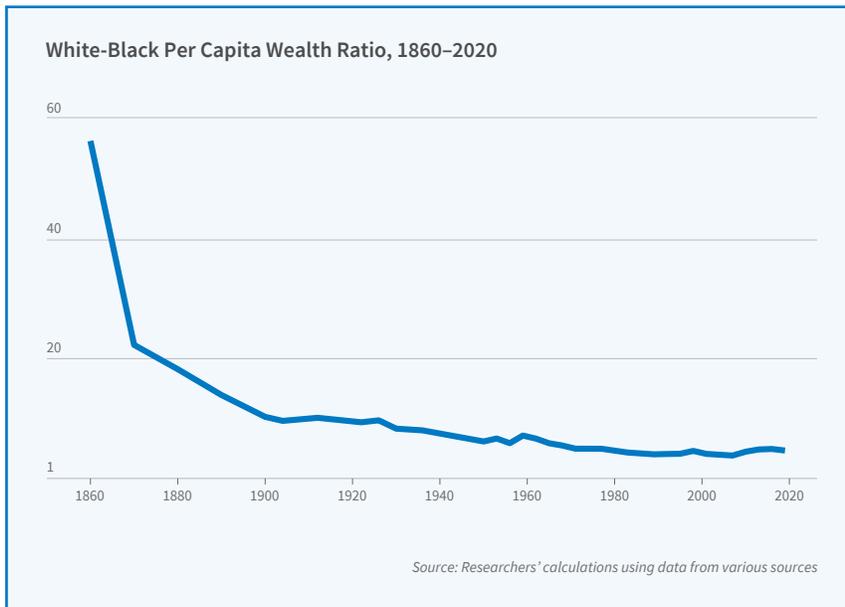
The racial wealth gap has widened in the last four decades. One contributing factor has been the slowdown in the rate of growth of Blacks' wages. In previous decades, Black wage growth was faster than that for Whites. That has not been the case in recent decades. Another critical factor has been the higher rate of price appreciation on assets owned by Whites relative to Blacks over the last 70 years.

Between 1950 and 1980, there was no difference between Blacks and Whites in the accruing rate of capital gains. Since 1980, however, Whites have accrued 0.65 percentage points more per year in gains.

Large racial disparities in wealth holding began to decline after slavery ended. The decline slowed in the segregation era, accelerated in the civil rights era, and has reversed since the 1980s.

All of these forces affect racial disparities in wealth. Over the 1950–2019 period, housing and other nonfinancial assets accounted for 67 percent of the average Black portfolio, compared with 41 percent for Whites. Corporate stock, held directly or indirectly through mutual funds and retirement accounts, accounted for 7 percent of Blacks' portfolios, compared with 18 percent for Whites. Since 1950, stock returns have been much greater than the price appreciation of housing. Investments in the stock market have increased in value five times as much as investments in housing, much to the advantage of White households.

During the COVID-19 period, wealth concentration in the US reached its highest level since World War II; the top 0.01 percent of households are estimated to own 36 percent of private wealth. The researchers conclude that "[g]iven that there are so few Black households at the top of the wealth distribution, faster growth in wealth at the top will lead to further increases in racial wealth inequality."

— *Steve Maas*

White-Black Per Capita Wealth Ratio, 1860–2020

Source: Researchers' calculations using data from various sources

The Changing Composition of Sovereign Debt Holdings

National governments that finance their activities by issuing debt must find someone to buy it. The interest rate they must pay to borrow depends on the cost of attracting new buyers, a cost that generally rises along with the outstanding stock of debt. Due in part to government responses to the COVID-19 pandemic, the aggregate government debt-to-GDP ratio is now at its highest level since 2003. Outstanding government debt now exceeds GDP in advanced economies, and is greater than half of GDP in emerging economies.

In Who Holds Sovereign Debt and Why It Matters (NBER Working Paper 30087) Xiang Fang, Bryan Hardy, and Karen K. Lewis use International Monetary Fund (IMF), World Bank, and Bank for International Settlements data to calculate who holds sovereign debt issued by 95 countries from 1991 through 2018. They divide holders of debt into foreign and domestic investors, and then subdivide those groups into three types of investors: private banks, nonbank private investors, and official creditors. Nonbank private investors include organizations such as pension funds, insurers, endowments, mutual funds, hedge funds, corporations, and households. The official creditors group includes central banks and supranational agencies such as the World Bank and the IMF. Domestic central banks are the official creditors in the domestic investor group.

The overall cost of borrowing depends on a country's stock of outstanding debt and the responsiveness of investor groups to the debt level and other country-spe-cific circumstances. Combining all emerging markets and all years in their dataset, the researchers estimate that an increase in sovereign debt of 1 percent of GDP raises borrowing costs by about 1.4 percent. For example, an emerging market that expands debt by 10 percent of GDP and currently pays 8 percent on current debt would see its costs rise to 9 percent (8 percent x 1.14).

The data suggest that private nonbank investors are important marginal investors. Over the full sample period being studied, nonbank investors acquired 69

Nonbank private investors have become increasingly important holders of government bonds.

percent of variations in sovereign debt, although they held only 46 percent of all outstanding sovereign debt on average. Banks absorbed just 20 percent of new debt, while holding 28 percent of all outstanding debt.

The composition of debt ownership evolved over the sample period. Government debt held by domestic investors decreased for advanced economies and increased for emerging market econo-mies. Estimated buyer responses differed for debt issued by advanced and emerging economies. Responses to yield increases in developed-economy sovereign debt mar-kets other than the US suggested that the banking sector's demand for debt is primarily for purposes of liquidity and capital market regulation. Central banks buy advanced economies' debt to hold as foreign reserves.
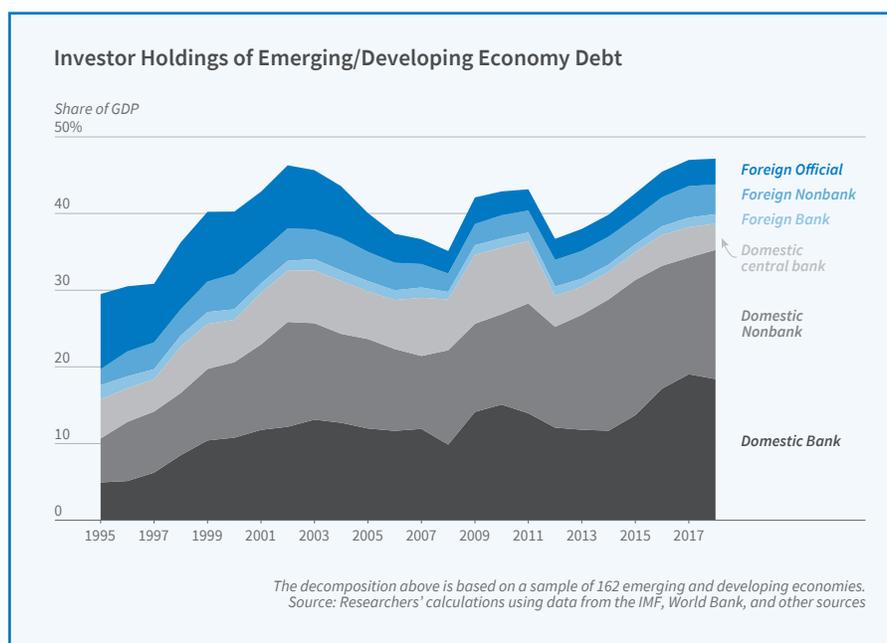
Foreign nonbank investors, followed by their domestic counterparts, were most sensitive to changes in advanced-country sovereign debt yields. For advanced economies in which sovereign debt is considered a safe asset, it appears that expansions of government debt do not meaningfully raise financing costs. All investor groups bought more advanced-economy sovereign debt when a country's export-to-GDP ratio increased, and none were sensitive to currency depreciation.

In emerging economies, foreign nonbank investors increased estimated sovereign debt demand by 1.7 percent when yields increased by 1 percent. Domestic banks' and nonbanks' demand increased by about 0.6 percent, and foreign private banks' demand rose by about 0.5 percent. This implied that if an emerging market sovereign lost its foreign nonbank investors, its borrowing costs could rise because it would be relying on less price-sensitive investors, which would require higher yields.

—Linda Gorman

Investor Holdings of Emerging/Developing Economy Debt

Share of GDP

Foreign Official
Foreign Nonbank
Foreign Bank
Domestic central bank
Domestic Nonbank
Domestic Bank

The decomposition above is based on a sample of 162 emerging and developing economies.
Source: Researchers' calculations using data from the IMF, World Bank, and other sources

Decision-Making Lessons from Online Chess

Many decisions involve choosing among complex options, and it may be difficult to assess the value of each alternative. In Complexity and Choice (NBER Working Paper 30002), Yuval Salant and Jörg L. Spenkuch use data on 227 million chess moves on an online chess server to study how complexity affects the quality of decision-making. They find that complex optimal options are chosen less frequently than other alternatives that are also optimal but simpler.

The researchers present a model of choice in which each option has both a true value and some degree of complexity. Decision-makers have some skill in assessing each option's value, perhaps from intelligence or experience. They can accurately assess the value of options with complexity up to their skill level, but they only estimate with error the value of options whose complexity exceeds their skill. Decision-makers then follow a process called "satisficing." Rather than estimating the value of all options and then choosing the highest one, satisficers set an aspiration level, or minimum value they would like to find, and accept the first option whose estimated value exceeds it.

The researchers test this theory using data from Lichess, a popular online chess platform. Their data cover all human-played chess games that were used to determine player rankings between January 2013 and August 2020.

Chess is a natural setting in which to study choices among complex options. On each turn, players choose from a set of available moves. Each one has an objective value. It either allows the current player to force a win if she plays optimally, no matter what her opponent does, allows her opponent to force a win, or allows both players to force a draw. While it is computationally infeasible to classify early-game moves as win, lose, or draw, computer algorithms have classified all moves when up to six pieces are left. The researchers study chess endgames in which they can clearly identify mistakes made when players face board configurations allowing for at least one win and at least one lose or draw move.

In addition to their objective values, chess moves also have an objective measure of complexity. Win moves and lose moves have a certain "depth to mate" (DTM) — the smallest number of turns in which one of the players could force a win or be forced into a loss. The researchers argue that the higher a move's DTM, the harder it is to identify it as a lose or a win move.

Mistakes are more common when moves are more complex. Players are less likely to choose a winning move if it is more complex, and they are less likely to mistakenly choose a losing move if it is less complex. As a result, mistakes are more common when the available moves

> Players appear to "satisfice," choosing simpler moves over equally valuable but more complex ones and making more errors when the choice set includes a greater share of complex moves.

are more complex. These choice patterns are not consistent with players evaluating all possible moves and choosing the one that they perceive to be best, but they are consistent with satisficing.

Skill offsets the costs of complexity. About 1.5 percent of chess turns in the dataset being analyzed are played by titled players like national masters and grand masters. These players make fewer mistakes than others, but only when all available winning moves are sufficiently complex. Chess games on Lichess are subject to varying time controls, and greater decision-making time also offsets the costs of complexity for choice quality, with better players benefiting more.
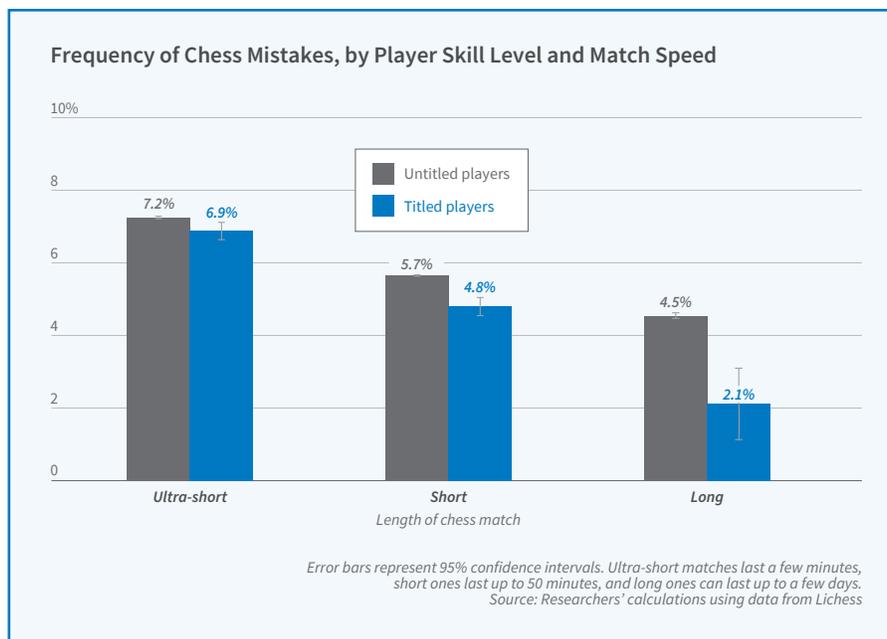
Finally, the researchers consider how the complexity of the set of available choices as a whole affects decision-making. They find that the choice set's composition, not its size, affects choice quality. Mistakes are less common as win moves are added to the set of available moves, while they become more common with additional draw or lose moves. Holding the share of each category of move constant, there is no evidence that players make more mistakes as the choice set grows.

— *Lucy E. Page*

Frequency of Chess Mistakes, by Player Skill Level and Match Speed

Untitled players
Titled players

Ultra-short: Untitled players 7.2%, Titled players 6.9%
Short: Untitled players 5.7%, Titled players 4.8%
Long: Untitled players 4.5%, Titled players 2.1%

Length of chess match

Error bars represent 95% confidence intervals. Ultra-short matches last a few minutes, short ones last up to 50 minutes, and long ones can last up to a few days.
Source: Researchers' calculations using data from Lichess

Impacts of Right-to-Work Laws on Unionization and Wages

Under the National Labor Relations Act of 1935, all workers covered by collective-bargaining agreements receive the full benefits of those agreements, such as wages and grievance redress, whether they are union members or not. In keeping with this approach, in most US states all covered workers must pay union dues regardless of union membership.

However, the Labor Management Relations Act of 1947, better known as the Taft-Hartley Act, allowed states to introduce "right-to-work" laws under which covered workers cannot be legally required to pay union dues. These laws can create a "free-rider" problem in union membership, undermining unions' financing and ability to organize workers. Some states passed right-to-work laws before 1980. Six additional states have adopted these provisions since 2001. In Right-to-Work Laws, Unionization, and Wage Setting (NBER Working Paper 30098), Nicole Fortin, Thomas Lemieux, and Neil Lloyd find that these laws significantly reduce unionization rates and wages.

They first test the impacts of right-to-work laws using data from five states — Indiana, Michigan, Wisconsin, West Virginia, and Kentucky — between 2011 and 2017. They use worker-level data from the Current Population Survey to test for differential trends in a state's wage and unionization rates in the years after it adopted a right-to-work law, relative to states that had never done so.

Using this event-study design, the researchers find that right-to-work laws are associated with a drop of about 4 percentage points in union-

> In the five states that adopted right-to-work laws in 2011–17, unionization and wages both declined, particularly in construction, education, and public administration.

ization rates five years after adoption, as well as a wage drop of about 1 percent. These impacts are almost entirely driven by three industries with high unionization rates at baseline — construction, education, and public administration — where right-to-work laws reduce unionization by almost 13 percentage points and wages by more than 4 percent, again over five years. The impact of right-to-work laws on wages and unionization rates is also larger for women and public-sector workers, two groups that are over-represented in highly unionized industries.
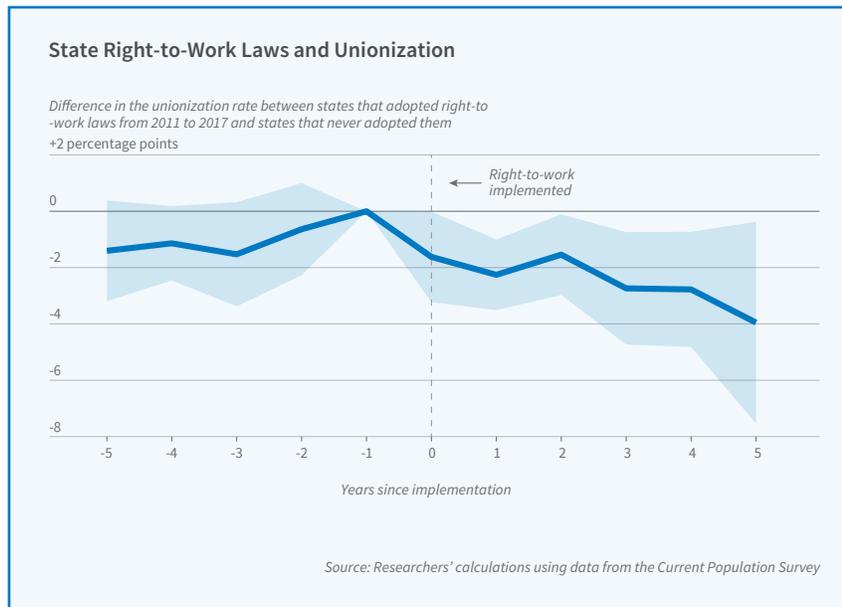
The researchers complement these results with a second approach based on the differential effects of right-to-work laws on the highly unionized industries. This strategy rests on the assumption that without right-to-work laws all states would have the same relative distribution of unionization rates and wage levels across industries. They estimate the impacts of these laws by testing whether right-to-work states have especially low unionization rates and wages in highly unionized industries. They find a difference of nearly 20 percent in the unionization rate between states with and without right-to-work laws. Right-to-work laws are also associated with 7.5 percent lower wages.

Finally, the researchers use both of these empirical strategies to examine a key labor-market question: how does unionization affect workers' wages? If right-to-work laws only affect wages by lowering unionization rates, the causal effects of unions on wages can be estimated by dividing the effects of right-to-work laws on wages by their effects on unionization. Under this assumption, unionization appears to raise wages by approximately 40 percent.

—Lucy E. Page

State Right-to-Work Laws and Unionization

Difference in the unionization rate between states that adopted right-to-work laws from 2011 to 2017 and states that never adopted them

+2 percentage points

← Right-to-work implemented

Years since implementation

Source: Researchers' calculations using data from the Current Population Survey