

# Economic Insights

Second Quarter 2021  
Volume 6, Issue 2



Is Rising Product Market Concentration  
a Concerning Sign of Growing Monopoly  
Power?

Q&A

Why Credit Cards Played a Surprisingly Big  
Role in the Great Recession

Research  
Update

Regional Spotlight

Data in Focus

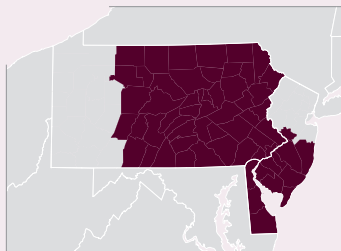
# Economic Insights

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*Economic Insights* features nontechnical articles on monetary policy, banking, and national, regional, and international economics, all written for a wide audience.

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## About the Cover

### First Bank of the United States

The nation's first congressionally chartered bank, the First Bank of the United States, opened on South 3rd Street in 1797. Like much architecture of this era, the First Bank was designed in the neoclassical style. The Greek and Roman republics of antiquity were a natural inspiration for citizens of this modern democracy, and many new buildings adopted the tall, slender columns and classical friezes being unearthed in Pompeii and Herculaneum. However, just as those ancient republics were riven by political rivalries, so too was the new United States, thanks in part to this very building. Secretary of the Treasury Alexander Hamilton campaigned hard for a national bank as a way to steady the country's finances. His biggest opponent, Secretary of State Thomas Jefferson, opposed any centralization of economic power. Hamilton won the debate, but the political factions founded by the two secretaries would clash again when the bank's charter was up for renewal in 1811.

Illustration by Antonia Milas.

# Q&A...

with Lukasz Drozd, an economic advisor and economist here at the Philadelphia Fed.



## Lukasz Drozd

Lukasz Drozd grew up in Poland. After graduating from the Warsaw School of Economics in 2001, he moved to the United States to attend graduate school at the University of Minnesota. He's taught economics at the University of Minnesota, the University of Wisconsin, and the Wharton School of the University of Pennsylvania. Since 2015 he's been a member of the Philadelphia Fed Research Department, where he specializes in many topics, including the macroeconomic implications of consumer finance. In this issue of *Economic Insights*, he writes about the role zero-APR credit cards played in the Great Recession.

### How did you become interested in economics?

After communism ended in Poland, economics was a new thing. Before, you had socialist economics, so even professors were not trained in what you would call economics. It was more how to do central planning. The Ford Foundation was bringing top U.S. economists to Poland to retrain professors, and then they were teaching college students too. That was my first time studying economics. I became hooked.

### Did that play a role in your decision to attend the University of Minnesota?

Definitely. Doctorate-level education in economics at the time was not very good in Poland. Going abroad seemed like the only way to get good training, and Minnesota was renowned for studying macroeconomics. Doctorate-level education in Poland is much better now, but that was the reality at the time.

### Have you ever accepted a zero-APR offer on a credit card?

Of course! (laughs) How do you think I survived graduate school? Many graduate students used zero-APR credit cards. What was amazing was that we were foreigners with no credit history and yet we were getting flooded with offers. I was puzzled back then and I am puzzled now. I was reluctant to use these offers, but it was me and my wife on a single stipend. At some point it was really difficult to make ends meet, and zero-APR credit cards came in handy.

### Do you feel like you were clear-eyed about the risks?

I tried to be responsible, or at least that is how I like to think about it. (laughs) The biggest increase in my debt was when I already had a job offer and knew I would be able to pay it back. We paid off a lot by the time Lehman Brothers collapsed, but there was still some debt left, and I wanted to transfer it to another zero-APR card, but there were no offers anymore. I squeezed my budget as much as possible to quickly pay that down, but I thought about other people who were not as lucky to have a job. That inspired my research on this topic.

### Some people reading your article may think that when researchers start off with a concept of a free market and then study market frictions, they miss other issues, such as somebody wanting a product that isn't good for them.

I did not mean it this way. At some point, we call people adults and they should be allowed to be as free as possible, even if they make a "wrong" decision for themselves. If people roll over their debt, this is not such a huge deal. Maybe some of them get caught by fees, and they suffer, but they brought that upon themselves. Maybe they will learn a lesson. What is dangerous here is that the market may dry up—as the Great Recession episode illustrates—and all zero-APR customers at the same time get hammered. This can result in a major recession, which then affects everyone. It is also more difficult for people to foresee such risks. The art of regulating the markets is balancing these risks, and what I am saying in the article is that policymakers should take it into consideration.

### So, it might not be a problem if an individual makes the "wrong" decision for themselves, but if too many people act the same way, it could bring the whole market down.

That's right. And in this case that is a stronger case for a policy intervention, because now we are less paternalistic. (laughs) We are just saying, don't create problems for the rest of us, and that is fair. Some people may lose their freedom to get free and easy credit, but you stabilize the market and create less vulnerability. There is an inherent trade-off in macroprudential regulation of financial markets, and policymakers have to carefully balance the pros and cons.

### What else are you working on?

I like to combine theory with data to uncover something that is not easy to see. I'm looking right now at how automation affects the division of income between capital and labor. It is a very exciting topic and quite timely. I hope we will have an opportunity to discuss it next time. □





Photo: RainervonBrandis/iStock

# Is Rising Product Market Concentration a Concerning Sign of Growing Monopoly Power?

Big firms are coming to dominate markets, but that need not imply it's time for government to step in.

**By Leena Rudanko**

Economic Advisor and Economist  
FEDERAL RESERVE BANK OF PHILADELPHIA.

*The views expressed in this article are not necessarily those of the Federal Reserve.*

Recent evidence suggests that product market concentration has been on the rise in the U.S. since the early 1980s.<sup>1</sup> This means that sales in a broad set of markets appear to be concentrating in a smaller share of firms. In other words, big firms are coming to dominate markets. This rise in concentration concerns policymakers, as it suggests that product markets are becoming less competitive. Healthy competition, most economists agree, is an important feature of a well-functioning market, allowing consumers to get the best possible prices, quantity, and quality of goods and services. And to ensure that competition prevails, government should enact and enforce antitrust regulations.

Rising concentration has coincided with other, related long-run changes: rising firm profit rates and markups, weak wage growth (and a related decline in the share of output paid as compensation to workers), low firm investment, low productivity growth, and a decline in firm entry.

In this article, I review recent studies related to this rise in concentration and consider the economic significance of this trend. I suggest a more positive interpretation of the evidence. It may be that firms are growing larger due to a change in productive technologies that favors larger firm size, as development in information technologies is making it feasible to operate on a larger—even global—scale. In this context, the benefits of concentrating economic activity may outweigh



the costs of larger firms profiting from their market power. But to fully understand the situation, we need more detailed analyses of specific markets.

## Interpreting the Evidence

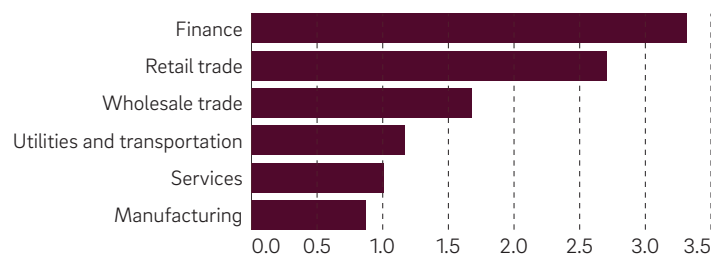
Economists often interpret market concentration as a measure of market power. It's a straightforward analysis: Just use sales revenues to calculate the share of market activity accounted for by large firms.<sup>2</sup>

The U.S. Census Bureau tracks market concentration by industry, providing measures of industry-level concentration with comprehensive coverage of economic activity across the U.S. This evidence reveals increased concentration since the early 1980s, with product markets in most industries becoming more concentrated (Figure 1). Between 1982 and 2012, the market share of the top four firms increased from 14 to 30 percent in the retail trade, 22 to 29 percent in the wholesale trade, 11 to 15 percent in services, and 39 to 43 percent in manufacturing. In utilities and transportation, furthermore, the same measure increased from 29 to 41 percent between 1992 and 2012.<sup>3</sup>

FIGURE 1

### Top Firms Have Seen Their Share of Total Sales Grow

5-year percentage point increase in share of industry sales going to 20 largest firms in each industrial sector, 1982–2012 for retail trade, wholesale trade, services, and manufacturing, 1992–2012 for finance and utilities and transportation.



Sources: U.S. Economic Census; Autor et al. (2020).

Rising concentration appears to be an international phenomenon. Evidence from Organisation for Economic Co-operation and Development (OECD) sources shows measures of concentration rising between 2001 and 2012 in Europe, with a 2 to 3 percentage point increase in the share of industry sales going to the largest 10 percent of firms.<sup>4</sup>

Before drawing conclusions from this evidence, it is good to recall that market concentration is an imperfect measure of market power because it represents an outcome of competition that in turn depends on various features of the market environment. Market power refers to the ability of a firm to influence the prices it charges, which generally leads to higher prices than in a competitive market. Although market power is generally associated with concentrated product markets, a very competitive product market could also raise market concentration by preventing all but the lowest-cost providers from entering. In other words, the relationship between competition and concentration can go either way.<sup>5</sup>

It is also important to define a product market thoughtfully when calculating market concentration. Concentration statistics

are generally aggregated, so they ignore more-detailed product heterogeneity as well as the geographic aspect of product markets, which can be local rather than nationwide.

Due to these caveats, I see if two alternative indicators of market power are consistent with the suggested increase in monopoly power.

## Alternative Measure No. 1: Profit Rates

During this increase in market concentration, the average corporate profit rate for publicly traded firms has risen substantially, from 1 percent in 1980 to 8 percent in 2016.<sup>6</sup> The increase has been driven by growth in the profitability of the most profitable firms, rather than by an across-the-board increase in firm profitability. The most profitable firms have become even more profitable, attaining profit rates of 15 percent or more.

Extending these calculations to the broader universe of firms is challenging, because information on the balance sheets of privately held firms is private. However, studies using more-aggregated (and hence less-detailed) data covering the broader universe of firms show a rising share of aggregate firm profits since the early 1980s, too.<sup>7</sup>

These calculations suggest that the share of output paid to workers as well as the share of output paid to capital have both declined over this period. As a result, the share of output going to firm profits has risen. We should remain cautious in interpreting these intriguing findings, however, as calculating the share of output paid to capital involves making a number of assumptions that influence the results. Firms own various kinds of capital but do not generally report estimates of the corresponding costs of holding these assets. Moreover, a share of firms' productive assets—such as software and product designs—are not even physical, making it even more difficult to assess the corresponding costs.<sup>8</sup>

Aggregated data have the benefit of allowing us to study the evolution of profits over a longer time horizon. (The data on publicly held firms are less suited to this purpose because, earlier on, fewer firms chose to become publicly traded.) Thanks to the longer time frame, we see that even though the average of firm profits has risen since the 1980s, today's average is not particularly high relative to the broader period since World War II. From this perspective, the changes in profitability are not so alarming.

In any case, firm profitability is also an imperfect measure of market power. Even though there are circumstances where a fully competitive market should drive profits to zero, there are natural circumstances where one would expect to observe positive profits in a competitive market—for example, when firms invest in capital up front and recover related profits later. This capital may be tangible, like equipment and structures (and hence more easily measured), or it may be intangible and thus harder to measure. The growing importance for firms of intangible capital, which is associated with the development of new technologies for producing goods and serving customers, may contribute to the recent changes in profit rates.

## Alternative Measure No. 2: Markups

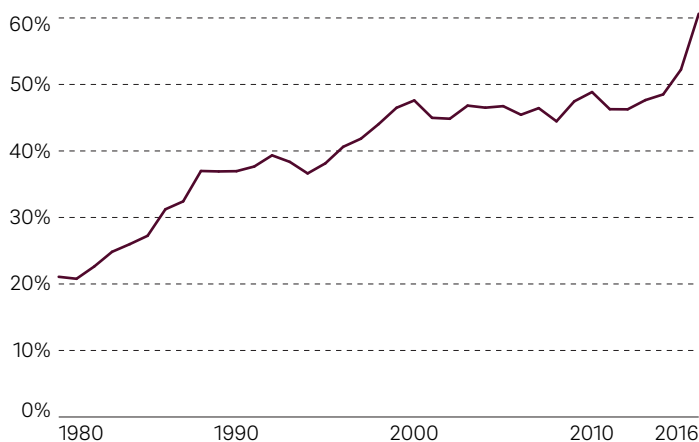
Recently, economists have closely observed an alternative measure of market power, the price-cost markup that firms charge (that is, the ratio of price to the cost of producing an additional unit of output to sell). In a fully competitive market, competition should drive prices down to zero markup. A monopoly producer, on the other hand, would generally set a higher price, selling fewer units at a positive markup.

Recent studies have found that markups, like profit rates, have indeed increased: Based on evidence on public firms, the average markup has risen significantly, from 20 percent in early 1980 to as high as 60 percent in 2016 (Figure 2). And as with profits, this rise in average markups was driven by high-markup firms growing larger and taking over a larger share of industry sales.

FIGURE 2

### Average Markup Rose as the Largest Firms Took a Greater Share of Sales

Average markup for publicly traded firms, 1980–2016



**Sources:** Compustat North America Fundamentals Annual via Wharton Research Data Services (WRDS); De Loecker et al. (2020).

**Note:** The average markup is revenue weighted.

Again, we must be cautious in interpreting these findings due to the assumptions behind the measurement. Firms use different types of inputs; taking them all into account appropriately poses a challenge, especially when seeking to calculate markups across a broad range of industries at the same time.<sup>9</sup>

If anything, the increase in markups appears to have been larger than the increase in profit rates. We can reconcile the magnitudes of the two effects (that is, the size of the increases in profits vs. markups) if we consider the increase in overhead expenses. If a growing share of firm costs take the form of overhead, markup measures tend to grow for that reason alone. Even in a fully competitive environment where profits remain zero throughout, an ongoing increase in overhead requires firms to raise markups to cover these expenses.<sup>10</sup>

## Making Sense of It All

Profit rates and markups, in addition to the increase in concentration, suggest that market competition is declining. It seems that sales in many markets are increasingly dominated by large firms making greater profits through higher markups (while leaving their workers with a smaller share of the pie). This suggests that the government needs to use antitrust law to limit the growth in market power of large firms. However, there remain reasons to be cautious when considering this evidence.

For one, the phenomenon is affecting not just the U.S., so it is likely not driven by U.S.-specific policies. This suggests that the underlying causes may be technological rather than institutional. Perhaps modern technology, most notably the development of information technologies, favors a larger scale of operations. There may be social costs associated with firms profiting from their market power, but if the technology has changed to favor operating at a larger scale, the benefits of increased firm size may outweigh the costs.<sup>11</sup>

Although this economywide evidence helps us observe broad patterns, to ultimately understand what is happening we must analyze individual industries and the concrete changes affecting them. There is substantial heterogeneity across markets, after all. To illustrate this point, I revisit the trends in market concentration from two alternative perspectives. One perspective defines a market as a narrow geographic area, instead of considering total industry sales across the U.S., while the other defines a market in terms of a product.

## The Importance of Localized Product Markets

Many product markets are local. Examples include grocery stores, and the retail sector more generally, as well as many services, like haircuts. In these product markets, transportation costs limit the number of providers of goods and services that individual consumers (or firms) can choose from in practice, an issue that economists ignore when they calculate concentration measures using all providers nationwide. It turns out that when we re-define a market as a localized geographic area, we no longer find rising product market concentration.<sup>12</sup>

When a recent study defined a market as all firms in a specific industry in a specific county, it found that average market concentration fell from 1990 to 2014, even while the more broadly defined measures of concentration rose. Local product markets have thus seen sales spreading out among more firms over this period, rather than the opposite.

The finding of falling concentration in more narrowly defined product markets holds across a broad range of industries. This means that for product markets that are truly local, such as many markets for services and retail, the nationwide statistics are misleading. On a national level, sales may be concentrating in a smaller number of large firms, but in local product markets we see the opposite.

How can we reconcile these two opposing trends? National sales may be concentrating in a smaller number of large firms, but these large firms may be expanding into a growing number of local markets served by smaller local firms. Indeed, the study found that the expansion of the largest firms explains much of the divergence in these trends, while local competitors persist despite the entry of these large firms into their local markets.

## The Importance of Product-Level Markets


Industry-level concentration statistics also aggregate over different types of products, sometimes more appropriately viewed as separate product markets. A recent study looked at changes in product-level markets, focusing on the retail trade and items generally found in grocery stores.<sup>13</sup>

The study documented a growing number of product varieties per product category available to households. Households' options have thus increased, whatever may have happened to firm competition during this time. And correspondingly, aggregate household spending has also spread out across varieties, with households taking advantage of this increase in options.

Yet the study found that individual households are concentrating their spending on a shrinking number of varieties. Even though the product space is expanding with options, suggesting increasing competition in these markets, individual households are self-selecting into smaller niche markets—making it less clear whether competition in the relevant product markets is increasing or decreasing.

To connect these product-level observations to competition among firms, we must connect product varieties to the relevant firms, something the study did not attempt. However, this example highlights the need to carefully consider the changing competitive environment in individual markets before drawing conclusions from broader aggregate-level patterns.

## Conclusion

Faced with evidence of rising concentration, profits, and markups, it is hard to avoid thinking that the economy is seeing a widespread increase in monopoly power, which calls for increased government intervention in markets. However, this conclusion might not be warranted. Technological change may favor a larger scale of operations, justifying larger firm size despite corresponding increases in market power. What's more, aggregated evidence can mask what is actually happening. The bird's-eye view has its benefits, but we need to consider specific markets in more detail before taking action. 

## Notes

**1** See Council of Economic Advisors (2016) and Autor et al. (2020).

**2** The two most common measures of market concentration are the Herfindahl-Hirschman Index—the sum of squared market shares across firms in the market—and the combined market shares of the largest firms in the market.

**3** See Autor et al. (2020).

**4** See Bajgar et al. (2018) and Criscuolo (2018).

**5** See Syverson (2019). There is corroborating evidence that the share of output paid as compensation to workers has declined more in industries that are more affected by rising concentration, which is consistent with firms in these industries retaining greater profits. See Autor et al. (2020)

**6** See De Loecker et al. (2020).

**7** See Barkai (2020).

**8** See Karabarbounis and Neiman (2018).

**9** See Basu (2019), Syverson (2019), and Traina (2018).

**10** See De Loecker et al. (2020).

**11** See Autor et al. (2020) and De Loecker et al. (2020).

**12** See Rossi-Hansberg et al. (2020).

**13** See Neiman and Vavra (2020).



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# Why Credit Cards Played a Surprisingly Big Role in the Great Recession

When economists and policymakers try to understand how a credit crunch within the financial sector affects consumers, they usually don't think of the credit card market. They should.

**By Lukasz Drozd**

Economic Advisor and Economist  
FEDERAL RESERVE BANK OF PHILADELPHIA.

*The views expressed in this article are not necessarily those of the Federal Reserve.*

**T**welve years after the Great Recession, one of the biggest economic disasters of the modern era, economists still debate exactly what led to its persistent declines in employment and output. The basic narrative is clear: The collapse of the housing price bubble destroyed swaths of wealth, and the ensuing credit crunch within the financial system tightened borrowing constraints on firms and households, depressing consumption and investment across the

economy. But this basic narrative raises further questions. Which was more important, the destruction of wealth or the tightening of borrowing constraints? How much of the decline in output was directly caused by these initial shocks, and how much by the subsequent, domino-like propagation mechanisms? What *were* these propagation mechanisms? Finally, what does the Great Recession teach us about the macroprudential regulation of credit markets?!

Economists are still answering these questions, but one of their key insights is that severed access to credit played a big role.<sup>2</sup> This insight has spurred renewed interest in mapping the exact mechanisms that drove the tightening of credit to firms and households across different markets, and in these mechanisms' macroprudential ramifications.

When economists and policymakers try to understand how a credit crunch within the financial sector affects consumers, they usually don't think of the credit card market. Historically, credit card borrowing has been small, and credit card debt involves a soft long-term commitment of lenders to terms—an arrangement known to be more stable and less prone to credit supply disruptions than other forms of debt—so it's not obvious how, to the detriment of borrowers, tightening of credit conditions within the financial system could severely contract available credit, force early debt repayments, or unexpectedly hike interest payments on outstanding credit card debt.

But, as I will explain, by 2008 the credit card market had grown enough to have a notable impact on aggregate consumption demand. More importantly, by 2008 a large fraction of credit card debt was de facto short-term debt. In particular, by 2008 many credit card borrowers were reducing their interest rate payments by moving balances from card to card to take advantage of the then-ubiquitous zero-APR promotional credit card offerings.<sup>3</sup> After Lehman Brothers collapsed in mid-2008, triggering a credit crunch within the financial sector, the zero-APR offers that had sustained the low cost of credit card debt vanished from the market, leading to a massive and, for many borrowers, unexpected interest rate hike on expiring promotional debt. As I will argue, this led such borrowers to cut their consumption so they could repay debt early, which contributed to the decline in consumption demand during the Great Recession.

Policymakers should keep an eye on promotional lending, and perhaps even reserve a permanent spot for credit cards in their macroprudential policy considerations. The COVID-19 crisis reminds us that credit card borrowing remains fragile.

## The Rise of Credit Card Debt

Until the 1950s, credit cards were a form of store credit, limited to purchases of goods and services from a single issuing merchant and too inconvenient to become a major source of credit for households. It was the success of the first general-purpose charge card, issued by Diners Club in the early 1950s, that inspired Bank of America to combine a credit line with a charge card and offer BankAmericard, the first general-purpose credit card. By the 1970s, more than 100 million such cards were in circulation. Bank of America began licensing its BankAmericard to other banks that were issuing credit cards, eventually spinning off BankAmericard as a separate company called Visa.

But the revolution in payment technology did not spur a revolution in lending right away. In the 1960s and 1970s, credit cards were mainly used as a payment instrument, and borrowing on credit cards did not take off until the 1980s. What delayed the growth of credit card lending was the combination of high inflation and usury laws that capped interest rates.<sup>4</sup> With a tight cap on interest rates, and with inflation driving up the cost of funds for lenders, credit card lending struggled to make a profit in the 1970s. In fact, by the end of the decade, due to a double-digit spike in inflation, many credit card lenders found themselves on the brink of collapse.<sup>5</sup>

The credit card industry was saved in 1978, when the U.S. Supreme Court, in *Marquette National Bank of Minneapolis v. First of Omaha Service Corporation*, ruled that if the interest rate cap in the state where the bank is chartered is higher than in the state where it offers its product (in this case, a credit card), that bank may charge a rate subject to the higher cap. In other words, the court allowed a bank to "export" its interest rate cap to other states, which in the case of First of Omaha meant that the company could issue a credit card in Minnesota and charge an interest rate in excess of Minnesota's comparatively low cap of 12 percent.<sup>6</sup>

The broader implication of the Supreme Court ruling, however, was that, by creating competition between states to attract bank headquarters, it not only relaxed usury laws for lucky issuers—such as First of Omaha—but dismantled usury

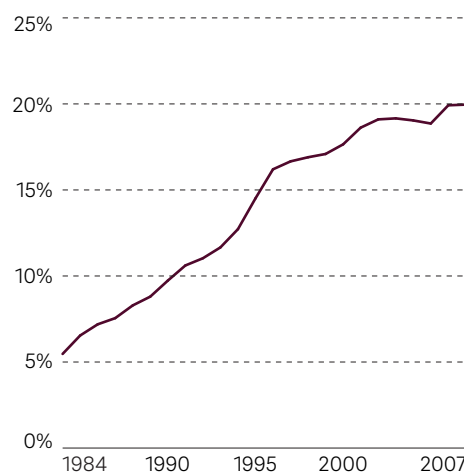
laws for the credit card industry altogether. Recognizing an opportunity for additional tax revenue, South Dakota and Delaware were the first states to raise their usury laws' ceilings on interest rates. Credit card issuers did not wait long to relocate their operations to these lender-friendly states, and to this day their major offices can be found in Wilmington, DE (for example, JPMorgan Chase), or Sioux Falls, SD (for example, Citibank). To retain their financial institutions, other states began loosening their usury laws as well, and today many states have no limit on credit card interest rates.

Following the *Marquette* decision, credit card borrowing steadily rose, notably crowding out nonrevolving consumer credit and gradually turning America into a credit card debtor nation (Figure 1). What fueled this expansion—especially in the 1990s—was the steady spread of credit card lending among lower-income and riskier households. Credit card debt per household relative to the annual median household income roughly doubled every decade until the 2008 financial crisis, topping 20 percent for a household with

FIGURE 1

### Credit Card Borrowing Rose to Prominence in the 1990s...

Credit card debt per family as a percentage of median annual family income, 1984–2007



Sources: Board of Governors of the Federal Reserve System (U.S.), G.19 Consumer Credit, Total Revolving Credit Owned and Securitized, Outstanding [REVOLSL], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/REVOLSL>, September 29, 2020. U.S. and Census Bureau, Current Population Survey, March and Annual Social and Economic Supplements, 2019 and earlier.



at least one card by early 2008.<sup>7</sup> Since much income growth over the last several decades has occurred among the top 1 percent of earners, and these earners do not borrow on credit cards as much, the median rather than the mean household income provides a better picture of how important credit card lending had become for the majority of households.<sup>8</sup> For low-income households, credit cards often replaced far more expensive options, such as “loan sharks” or payday lenders, and so the growing availability of credit card debt has importantly contributed to the “democratization of credit” in the U.S. (Figure 2).

Although the Supreme Court ruling enabled the industry to grow, it was, according to economic research, the convenience of credit card debt and the rapid progress in information technology that drove the unprecedented, decades-long expansion in credit card borrowing. Information technology affected both the direct costs of lending and indirect costs associated with debt collection—a less visible but equally important pillar that sustains unsecured lending.<sup>9</sup> By reducing lending costs that creditors must cover to break even, technology increased the affordability of credit card debt, fueled borrowing, and even had a somewhat counterintuitive effect of increasing default risk on a statistical dollar of outstanding credit card debt despite all

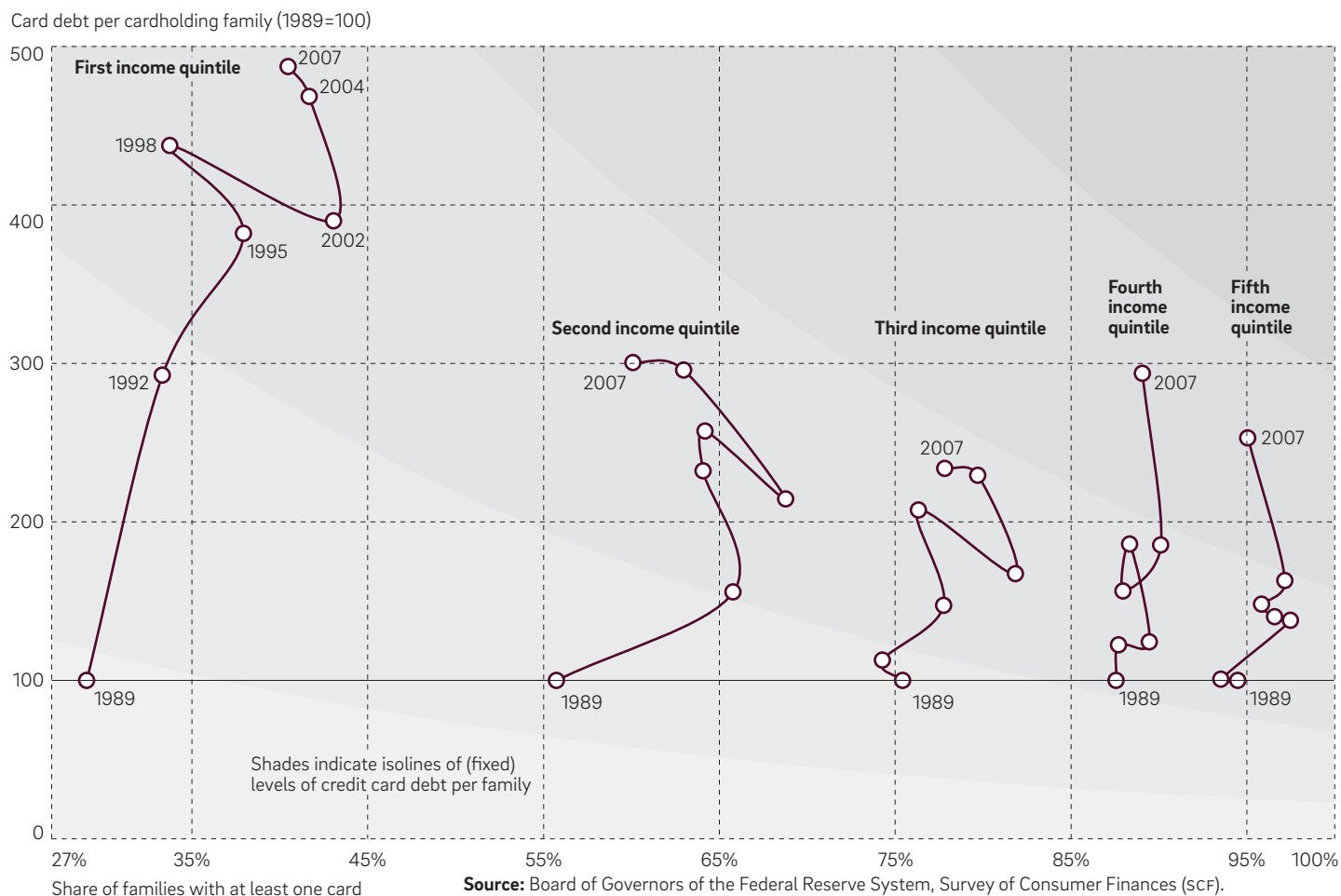
the progress in credit scoring technology.<sup>10</sup> The overhaul of the U.S. personal bankruptcy regulations in the Bankruptcy Reform Act of 1979, which made discharging credit debt in court far easier, and the overall increasing demand for debt by U.S. households were two other factors that contributed to the growth of borrowing on credit cards on the demand side.

By the 2000s, credit card companies were making more money from credit card lending than from merchant or interchange fees. (Merchant or interchange fees are the fees paid by merchants on each transaction settled using a credit card.) By 2003, of \$95 billion in the credit card industry’s total revenues, interest revenue (that is, revenue earned from finance charges) amounted to \$65 billion, with lending-related penalty fees and cash advance fees contributing another \$12.4 billion. In comparison, merchant fees contributed just \$16 billion to revenue. Even after subtracting \$50 billion in costs and default losses, lending, though a more costly part of the business, still came out on top in 2003. These numbers did not change dramatically until 2008, and lending maintained its prominent role.<sup>11</sup> At that point, with its \$1 trillion in debt outstanding, credit card lending had grown big enough to affect the entire economy.

FIGURE 2

### ...and Contributed to the Democratization of Credit in the U.S.

Growth of credit card borrowing by income quintile, 1989–2007



## The Origins of “Zero”

As the credit card market became saturated in the late 1990s and early 2000s, competition for customers intensified. Balance transfers and promotional-rate offers proliferated as the leading marketing tools.<sup>12</sup> The *Marquette* ruling, by unifying regulations, set the stage for massive, nationwide mail-marketing campaigns and permitted lenders to realize economies of scale in marketing and processing. By the end of the 1990s, an ever-increasing volume of mail-in offers defined the credit card industry, and does so to this day.<sup>13</sup>

In the mid-1990s, Providian Financial Corporation became the first issuer to drop a seemingly unprofitable offer into people’s mail: a credit card with a zero APR on balance transfers. This offer allowed consumers to transfer their outstanding balance from any other credit card account into their new Providian account (just like any other balance-transfer offer) and pay no interest for an introductory period. The bank could profit later only if consumers for some reason did not repay debt after the promotional rate expired, or if they violated the “fine print” of the contract, triggering a penalty rate reset.

At the time, Providian had a highly profitable credit card business and was on the forefront of the industry’s expansion to low-income customers.<sup>14</sup> The new market looked promising but risky: Lower-income customers had lower balances and were more likely to default, making it difficult for credit card companies to cover the fixed costs of opening and operating their accounts. Such conditions normally necessitate higher interest rates, but high interest rates may also discourage borrowing, leaving lenders exposed to default losses and bringing too little interest income on borrowing to make a profit.

Litigation against Providian in the late 1990s, which led to the credit card industry’s largest Office of the Comptroller of the Currency (OCC) enforcement action, offers a unique glimpse into how the company approached the marketing of credit cards and what led it to offer zero APR. This evidence suggests that behavioral psychology rather than competition was the key factor behind the invention of “zero.”

For example, in one of 12 internal memos to Providian’s top executives that became public in the course of litigation, Andrew Karr—the founder of Providian, its CEO, and later a strategic adviser to the company—described in this way how the company planned to profit on subprime customers: “Making people pay for access to credit is a lucrative business wherever it is practiced.... Is any bit of food too small to grab when you’re starving and when there is nothing else in sight? The trick is charging a lot, repeatedly, for small doses of incremental credit.”<sup>15</sup> The memo confirmed that the company was indeed concerned that raising interest rates to compensate for higher lending costs might backfire, and it explained why its marketing strategy was aimed at mitigating this issue by obscuring the true cost of debt from borrowers—as the litigation showed.

Karr later echoed the content of this memo in a rare interview by explaining that he suggested zero promotional

rates to Providian executives because seeing “zero” leads borrowers to “believe what they want to believe,” which one can infer he saw as being conducive to increased borrowing by consumers even if competition ensues.<sup>16</sup>

Providian paid a hefty price for its aggressive practices in the early 2000s, but the litigation was about the company’s deceptive practices, not the products themselves, and zero APR lived on to become the hallmark of the credit card industry in the 2000s.<sup>17</sup> Providian’s approach may not be representative of the industry as a whole, but recent research shows that behavioral psychology provides a good explanation for the widespread use of zero APR.

## The Behavioral Economics of Zero APR

Zero-APR offers challenge standard economic theory featuring rational consumers. When Boston Fed economist Michal Kowalik and I studied a standard model of credit card lending in which lenders can offer any introductory promotional rate to (rational) borrowers, we found that, under standard economic theory, rates should fully price in the risk of default and the cost of funds, resulting in flat interest schedules and few introductory promotions. Although the model can generate introductory promotional offers when the default risk of a borrower is expected to decline sharply, such occurrences are rare, and under plausible conditions the model does not even come close to accounting for the large volume of such offers in the data.

The key reason is that *rational* consumers are best served by prices that closely reflect the true resource cost of lending them money—which, among other items, includes the compensation to the lender for bearing the risk that the borrower may default under some circumstances (default risk premium).<sup>18</sup> In particular, when the price of credit is too low for a period of time, as is the case with a promotional introductory offer, credit card customers borrow too much: The benefit that accrues to them exceeds the cost implied for the lender by the fact that the customer may default on this amount later on. Rational borrowers realize that this cost must eventually be passed onto them because lenders must break even, and for this reason they prefer flat schedules. The key virtue of a competitive market is that competition between lenders drives down prices to a common break-even point, which implies that, to attract customers, lenders must offer the product that best suits the customer.<sup>19</sup>

So why do we keep finding zero-APR offers in our mailboxes? Research in behavioral economics may have the answer. This research suggests that zero APR may indeed let people “believe what they want to believe.”

The best-known piece of evidence supporting this theory comes from an influential albeit unpublished study by University of Maryland economists Lawrence M. Ausubel and Haiyan Shui. In collaboration with a major credit card issuer, Ausubel and Shui performed a unique study of credit card marketing that involved an experiment of

simultaneously mailing several different offers to tease out customer bias for promotional introductory offers. In cooperation with the issuer, the researchers tracked the activity on the accounts after the offers were accepted. To assess the customer's choice, they also calculated the interest rate payments the customer would have faced had they chosen a different offer.

Surprisingly, customers on average chose what the rational model would deem a “wrong” offer. More importantly, they were not simply accepting offers at random, possibly ignoring the offered terms; to the contrary, customers were attracted to offers that minimized their immediate interest payments, even if choosing such offers cost them more later. Ausubel and Shui concluded that consumers fail to accurately predict their future behavior, which leads them to erroneously think that they are picking the best offer.

In particular, Ausubel and Shui have demonstrated that the results of their experiment are consistent with naïveté hyperbolic discounting—the leading theory of consumer myopia put forth by Harvard economist David Laibson and earlier shown successful in addressing several puzzling observations in consumer credit markets. According to this theory, borrowers have an idealistic view of their future self, incorrectly believing that their future self will have almost no debt and pay no interest. This idealistic view leads them to underestimate the burden of the interest-rate hike associated with the expiration of an introductory offer. As a result, they prefer introductory offers and underestimate the significance of these offers' high reset rates.

Ausubel and Shui also found that this theory fits the data well for parameter values consistent with earlier work with this model. By assuming the same parameter values, Michal Kowalik and I showed that this theory can explain the widespread use of zero APR in the U.S. credit card market, where competitive lenders are free to design the credit card offers they send to consumers.<sup>20</sup>

Of course, the fact that the leading theory of consumer myopia may explain the U.S. credit card market doesn't imply that the entire population is prone to zero-APR offers. It may be that credit card customers who did not accept a zero-APR offer in the Ausubel and Shui study are the rational ones and only the overoptimistic found promotional offers particularly attractive, leading to selection bias among study respondents. Their finding only shows that there are enough customers prone to these offers to drive promotional lending.

## The Makings of a Perfect Storm

Before my work with Kowalik, surprisingly little was known about the prevalence of promotional offerings in the U.S. credit card market and their effect on the functioning of the market. Data provided by the three credit bureaus lack interest rates, and their data are the most comprehensive commercially available source of information about credit market activity in the U.S. Without interest rate data, we

can't study promotional activity as carefully as we would like, and consequently we did not know much about it.<sup>21</sup> In our work, for the first time, we could uncover evidence of the widespread and intricate use of promotional lending owing to the availability of regulatory account-level data covering the majority of the general-purpose credit card accounts in the U.S. right before the 2008 financial crisis—a data set large and detailed enough to characterize promotional lending in the economy as a whole. Although we suspected some use of introductory offers to reduce interest rate payments, what we found surpassed our expectations.<sup>22</sup>

By 2008, the credit card market was essentially in the grips of zero-APR offers, with a vast amount of credit card debt being de facto short-term debt and prone to disruptions during crises. In particular, as of the first quarter of 2008, we found that 35 percent of credit card debt held on general-purpose credit card accounts was on promotional terms with rates close to zero, with an average yearlong expiration of the promotional terms. Among prime borrowers with a good credit history (that is, a credit score above 670), the percentage was even higher: 42 percent. When we factored in a typical fee of 3 percent for transferring funds at the time, and a rate on the promotional debt near zero, promotional accounts provided an average discount of about 10 percentage points from the average reset rate on those accounts—and a similar discount vis-à-vis the average interest rate paid on nonpromotional credit card debt. This was true for both the prime segment and the whole market, which shows that promotional debt importantly contributed to making credit card debt affordable to borrowers.

Crucially, balances that fed promotional accounts before the crisis were mainly transfers of debt from other accounts—as opposed to debt accrued from purchases using the new card.<sup>23</sup> This finding implies that consumers were not only using promotion on a massive scale but also moving funds to reduce the interest rate paid on their credit card debt, something we corroborated by showing that some borrowers were chaining promotional cards to extend the duration of promotional rates. As for the market as a whole, this observation is key, since it implies that at the onset of the Great Recession the affordability of credit card debt hinged on an uninterrupted flow of promotional offers.

Three percent on zero APR may not sound like enough for lenders to be able to break even, but lenders too could profit on the promotional offers, since they attract borrowers who later may have to pay the reset rate on the account when they are unable to switch to a new card or when their rate resets early because they violated the contract's “fine print.” Basic economic theory implies that lenders put up with this behavior precisely because they could break even and borrowers preferred such offers.<sup>24</sup> As explained earlier, a competitive market leads to the outcome that best suits the borrowers, and the evidence suggests that promotional offers suited them best.



## The Perfect Storm

The September 2008 collapse of Lehman Brothers, by triggering a panic within the financial sector, set the stage for a perfect storm in the credit card market. Starved for liquidity, and expecting a recession that would harm consumers, the financial sector tightened the supply of credit to firms and households, whereupon many credit card borrowers suffered because of their heavy reliance on the constant flow of promotional offers to reduce interest payments.

The data show that preapproved and prescreened promotional balance-transfer offers had fallen more than 70 percent by mid-2008 (Figure 3), suggesting that many credit card borrowers who had previously hoped to transfer balances onto a promotional account might have had trouble getting a new card during the crisis.<sup>25</sup> Consistent with the decline in mail-in offers, promotional balance transfers dived, falling 70 percent by early 2009 (Figure 4). Not surprisingly, the fraction of promotional debt began to decline, bottoming out in 2011 at about half of its precrisis value of 35 percent. This was true for all accounts in our sample as well as just those with a good credit history (Figure 5).

Kowalik and I further investigated to what extent the deteriorating financial health of the lenders might have driven the decline, which is a proxy for the impact of the crisis on each individual lender's financing conditions. We analyzed how the county-level credit card lender health index, which we constructed, correlates with the decline in the share of promotional debt and balance transfers in each county. If a credit card issuer has a large presence in a U.S. county, and if its financial health worsens more than that of creditors in other counties, we should see a larger decline in balance transfers and promotional debt in that

county relative to other counties. This we did see, indicating that the financial sector's credit crunch was in part responsible for the declining share of promotional balances.<sup>26</sup>

Of course, other factors may have also contributed to the decline in the availability of promotional credit card offers, and our research design does not allow us to quantitatively assess the relative importance of those factors. The most straightforward reason is that lenders might have discontinued promotional offers because they themselves feared a recession-related spike in defaults on credit card debt due to falling incomes and employment. Credit card debt is unsecured, which is one reason why default rates spike during recessions. By reducing credit during a recession, banks can avoid losses from rising defaults.

## Connecting the Dots

The second half of 2008 was a turning point for credit card borrowing overall.<sup>27</sup> Credit card debt, despite rising steadily for decades, fell markedly relative to median household income and other types of consumer debt (Figure 6). In our work, Kowalik and I have hypothesized that the decline in credit card borrowing relative to the previous trend was driven by the collapse of promotional offerings, which then led credit card customers to either default on debt more frequently or make early debt repayments, contributing to the decline of aggregate demand during the Great Recession.

It's difficult to assess exactly how much the collapse in promotional offerings contributed to the decline in credit card

See *How Chaining of Zero-APR Offers May Amplify a Recession.*

FIGURE 3

### Recession Brought an End to the Abundance of Zero-APR Offerings...

Number of mail-in preapproved credit card solicitations with a promo balance transfer offer, in millions, 2007–2013



Source: Mintel Comprehedia Inc., Direct Mail Monitor Data. Note: Gray bar indicates recession.

FIGURE 4

### ...Promotional Balance Transfers Collapsed...

Promotional balance transfers as a percentage of credit card debt outstanding, annualized, 2008–2013

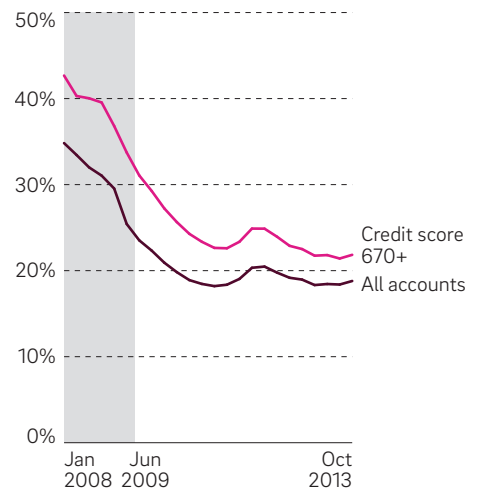


Source: Federal Reserve, Y14M. Notes: The OCC/Y14M sample includes six largest banks, eight banks in total; gray bar indicates recession.

FIGURE 5

### ...and the Share of Promotional Card Debt Began to Shrink...

Promotional credit card debt as a percentage of credit card debt outstanding, all accounts and accounts with at least a 670 credit score, 2008–2013



Source: Federal Reserve, Y14M. Notes: The OCC/Y14M sample includes six largest banks, eight banks in total; gray bar indicates recession.

borrowing or consumption demand. In the data, both the collapse in offerings and the decline in borrowing or consumption involve changes that triggered the recession and changes that were the product of the recession. For example, such a decline may have been partly due to a hike in defaults on credit card debt triggered by job losses during the Great Recession, which was part of a feedback mechanism rather than the trigger.

To isolate the contribution of the withdrawal of promotional offers, Kowalik and I used an economic model of the credit market that replicates what happened during the Great Recession. Using the model, we asked, what would have happened had fairly priced promotions held steady during the recession?

The results we found were troubling. According to the model, there would have been no decline from the precrisis trend in the ratio of median personal income to credit card debt per adult. Indeed, the ratio would have gone up (Figure 6).

But was the collapse in promotional offerings enough to affect consumption demand across the economy? To find out, we also compared the model's ratio of aggregate consumption to disposable income

to the same ratio in the data. This ratio is an imperfect proxy for consumption-depressing factors other than declining income, which may be a product of the recession itself and not a trigger. We estimated that, according to our model, peak-to-trough, the decline in the availability of promotional offerings contributed to about a quarter of the decline in this ratio from 2009 through 2011.<sup>28</sup>

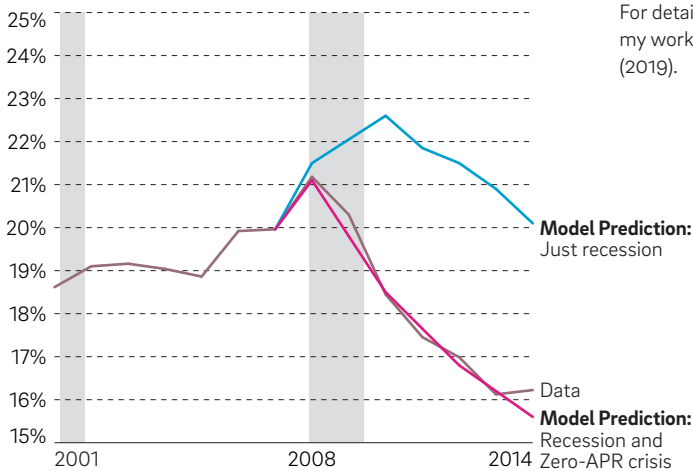
### The COVID-19 Crisis: A Silent Alarm?

Fast-forward to 2020 and both balance-transfer activity and zero-APR offers have not rebounded to their respective 2008 levels (Figure 7), which has made the credit card market more stable. We do not know why the decline has persisted for so long after the recession, but the most prosaic explanation may be the right one: Having had a bad experience with zero-APR, borrowers avoided such offers after the Great Recession. Nonetheless, promotional activity and balance transfers did not disappear and may rise again in the future, which raises the question: How has promotional credit card lending fared during the more recent COVID-19 crisis?

FIGURE 6

### ... which Turned the Decades-Long Borrowing Boom into a Bust

Actual and model-predicted credit card debt per adult as percentage of median personal income, 2001–2014



**Note:** Model predictions are approximate due to minor differences in data formatting and sources. For detailed analysis, see my work with Kowalik (2019).

**Sources:** Board of Governors of the Federal Reserve System, G.19 Consumer Credit, Total Revolving Credit Owned and Securitized, Outstanding [REVOLSL], FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/REVOLSL>. U.S. and Census Bureau, Current Population Survey, March and Annual Social and Economic Supplements, 2019 and earlier.

FIGURE 7

### The COVID-19 Recession Had a Similar Effect on Balance Transfers...

Promotional balance transfers as a percentage of credit card debt, annualized, 2018–2020



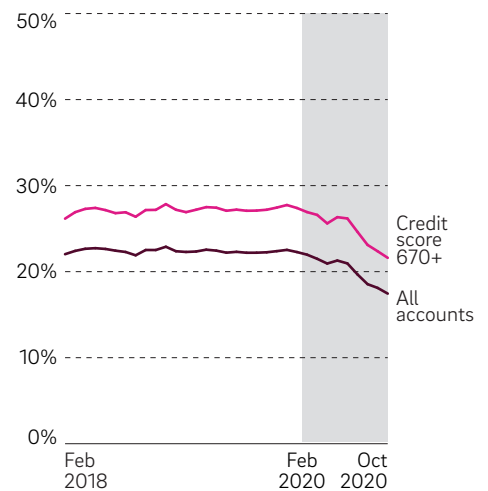
**Source:** Federal Reserve System, Y14M.

**Notes:** The data in Figure 4 pertain to a smaller sample of eight banks and are not directly comparable to data in the figure; gray bar indicates recession.

FIGURE 8

### ... and the Share of Promotional Debt Also Began to Shrink

Promotional credit card debt as a percentage of credit card debt outstanding, all accounts and accounts with at least a 670 credit score, 2018–2020



**Source:** Federal Reserve System, Y14M.

**Note:** Gray bar indicates recession.

## How Chaining of Zero-APR Offers May Amplify a Recession

Here is how credit card borrowers chain promotional zero-APR offers: First, they charge purchases on their zero-APR credit card. Then, before the card's new, higher base rate kicks in, they apply for another zero-APR card and transfer the debt to the new card. In effect, they are extending the duration of the promotional interest rate.

For economists, there is nothing unusual about "chaining" of promotional credit card offers. It's just another instance of borrowing via rolling over short-term debt obligations—a widespread practice across the economy. However, this type of borrowing is known to be vulnerable to disruptions of the credit supply and may trigger or contribute to a recession, which is why it is monitored

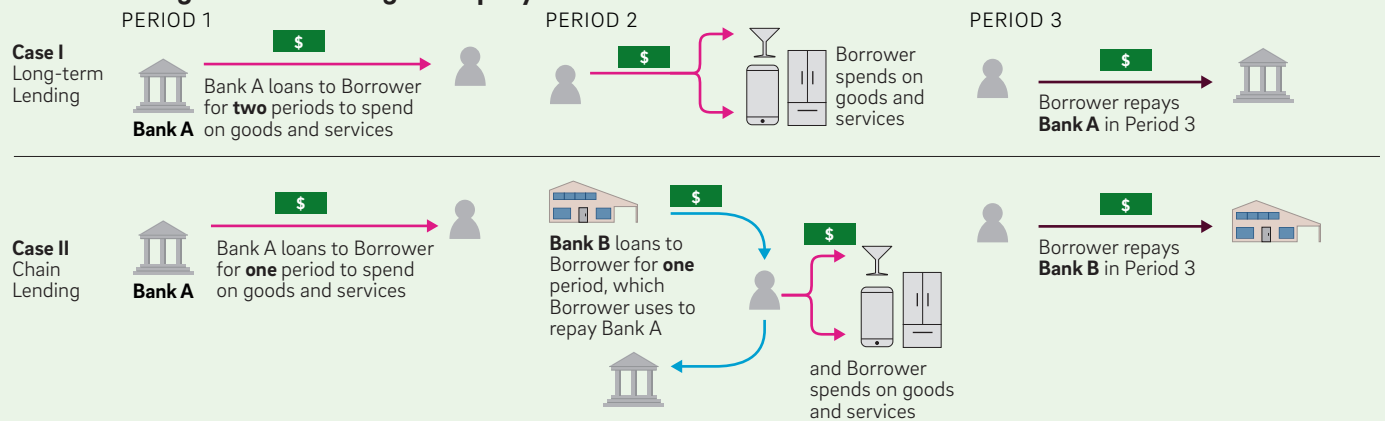
and regulated as part of macroprudential policies. (See Endnote 1 for an explanation of macroprudential regulation.)

Here is how it happens. Consider a situation where a borrower takes out a long-term loan and borrows for two periods from Bank A using two different strategies. In the first situation (Case I), debt does not become due until Period 3, and Bank A cannot request funds early. In the second situation (Case II), the borrower "chains" lenders by repaying Bank A with funds borrowed from Bank B in Period 2. Both cases lead to the same outcome when credit flow is uninterrupted: The borrowers borrow in the first period and repay in the third, effectively borrowing funds for a duration of two periods. But the

second case (Case II) is vulnerable to a credit supply disruption and the first is not. Say, for example, that in Period 2, banks decide not to lend as much, so that the borrower in Case II has a hard time finding another lender (Figure 9). This borrower will be forced to repay debt early and cut down on their spending on purchases of goods and services. Alternatively, the borrower, unable to make the payment, will default on their debt, in which case Bank A will be hurt and will possibly reduce the credit supply to other customers, which will hurt their consumption (or investment). In both situations, if banks, amid a recession, withdraw funds from the market to reduce their losses, they may amplify that recession due to reduced consumption or investment demand.

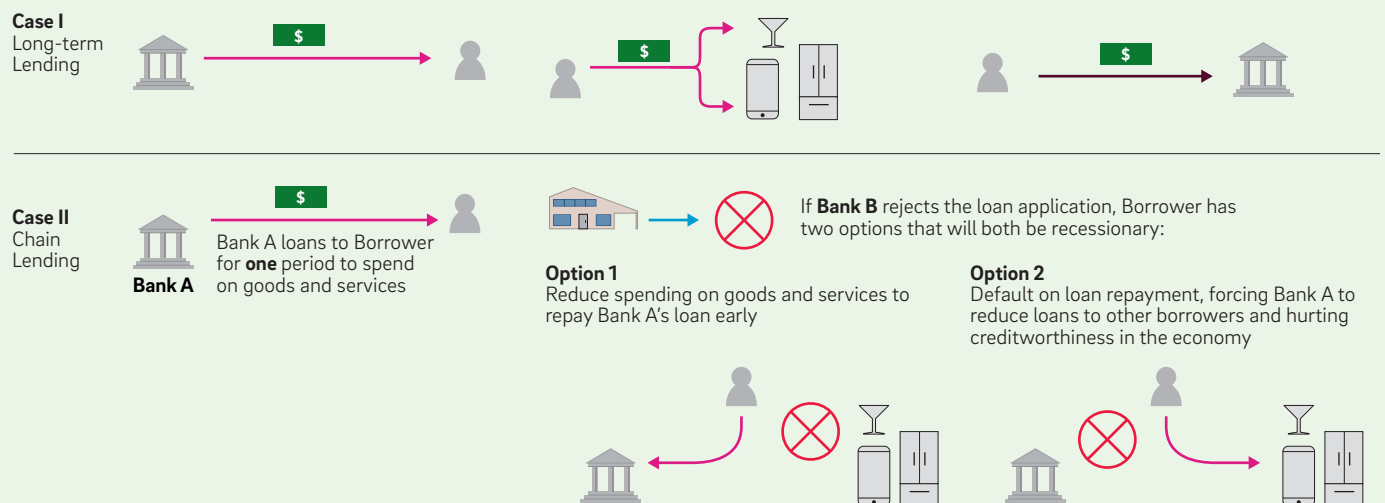
FIGURE 9

### Chain Lending and How It Might Amplify a Recession



### But What Might Happen If the Credit Supply Is Disrupted in Period 2?

Because the Borrower does not need a loan in Period 2, the outcome is the same.




The answer to this question is important because it helps us address another question: How vulnerable is promotional lending during a recession not triggered by a financial crisis?

Credit markets fared well during the crisis, but as for promotional credit cards, the data from the first half of 2020 are troubling because it suggests that promotional offerings might have been similarly depressed, and the overall impact of this development was lower because the starting volume was lower. In particular, the data for the first half of 2020 show a modest 4 percentage point decline in the share of promotional debt, which fell from about 22 percent prior to the Great Recession to about 18 by October 2020 (Figure 8). Worryingly, the decline in promotional balance transfers is almost as striking as during the Great Recession, falling by over 50 percent peak to trough, albeit from a volume that is less than a third of that at the onset of the Great Recession (Figure 7). As more data become available, we will be able to examine this crisis more closely, but the early indication is that promotional credit card borrowing is vulnerable during recessions that do not involve a financial crisis.

## Conclusion

The 2008 financial crisis taught us that the proliferation of zero APR on balance transfers can threaten economic stability. The COVID-19 crisis reminds us that a significant fraction of debt still originates as promotional transfers, and nothing prevents that fraction from rising again. At the very least, then, the volume of zero-APR debt and balance transfers should be carefully monitored. The credit card market is now large enough to affect the whole economy, and policymakers should keep it in mind when they craft their regulatory agendas.

Laissez faire theory holds that, if both sides of a market transaction decide to use a particular credit instrument, this credit instrument is likely socially beneficial, and the government shouldn't regulate it. But the research points to the role of flawed human psychology in the rise of zero-APR offers, and this should raise concerns about the application of the laissez faire principle. What's also worrisome is that the way lenders break even falls outside of the contract. For example, consumers may get hit with the reset rate when they cannot find another offer, or when they violate the contract's "fine print," thus exposing themselves to an imminent and unexpected rate hike on debt. The contract doesn't specify how much they will pay for borrowing—a departure from how most loan contracts are written. Such an arrangement is conducive to abuse and predatory practices. 

## Notes

**1** Macroprudential regulation of credit markets is an approach to regulation guided by the principle of mitigating risks to the financial system and the economy as a whole. Stress testing of banks to ensure their resilience in times of distress is an example of macroprudential regulation implemented in the aftermath of the Great Recession by the Dodd–Frank Wall Street Reform and Consumer Protection Act of 2010.

**2** For an accessible discussion, see the *Economic Insights* article by my colleague Ronel Elul. See also the work by Gilchrist, Siemer, and Zakrajsek; Mondragon; and Aladangady. The study by Mian and Sufi initially suggested a modest role for credit markets.

**3** The annual percentage rate (APR) refers to the annual rate of interest charged to borrowers for carried-over balances after the credit card statement closes. In a zero-APR offer, the credit card holder pays no interest on charges to their credit card for an introductory period. Thereafter, a new APR kicks in for the outstanding balance and all future charges.

**4** Usury laws govern the maximum amount of interest that can be charged on a loan.

**5** High levels of fraud and defaults also contributed to low profits during this early period. See Evans and Schmalensee (page 72) for more details.

**6** According to the court's unanimous opinion, the National Bank Act of 1864 created a path toward a national consumer lending economy.

**7** See Livshits, MacGee, and Tertilt; Drozd and Serrano-Padial; and Athreya, Tam, and Young for detailed analyses of the growth of credit card borrowing in the U.S. Jaromir Nosal and I provide an analysis of how a decline in the fixed cost of lending leads to an expansion in access to lending.

**8** According to data from the Survey of Consumer Finances (SCF), the mean credit card debt per household whose income is close to the median (that is, between the 40th and 59th percentiles of income) has been almost identical to the overall mean credit card debt per household between 1989 and 2007. This is not true for income. In the same data source, income per household close to the mean was lower by 50 percent in 1989 and by 70 percent



in the 2000s. This shows that income is more concentrated at the top of the income distribution than debt, and hence the burden of debt for the majority of households is best captured by using median income instead of mean income. For more details on the income growth among top earners, see the *Economic Insights* article by my colleague Makoto Nakajima.

**9** See my work with Ricardo Serrano-Padial for more details on the connection between debt collection and credit card lending.

**10** See my work with Ricardo Serrano-Padial. “Default risk” measures the fraction of debt that lenders expect will not be paid back because some credit card borrowers may default, and debt may be deemed nonrecoverable. Because credit card debt is unsecured, and debt can be discharged in court, default risk is substantial on credit cards. One measure of default risk is the so-called charge-off rate on a credit card debt portfolio: the fraction of debt charged off the creditor’s books after 180 days of being delinquent during a period, net of any recovered and previously delinquent debt over the same period.

**11** See the article by James J. Daly. In their monograph, Evans and Schmalensee report very similar numbers in the credit card market for the preceding year.

**12** In 1991, Capital One became the first issuer to introduce a balance-transfer offer.

**13** Evans and Schmalensee report that, by the 2000s, 75 percent of credit accounts were initiated via prescreened offers.

**14** The company was known to use advanced (for that time) modeling to thoroughly understand the behavior of its customers. See online post by Andrew Becker.

**15** The memos were published by the *San Francisco Chronicle* after a year-long legal battle with Provident to make them public. Excerpts of the 12 released memos can be found in the *Chronicle* article by Sam Zuckerman.

**16** The interview appears in the 2004 PBS *Frontline* documentary “Secret History of the Credit Card.” The documentary can be found at <https://www.pbs.org/wgbh/pages/frontline/shows/credit/>.

**17** Provident settled in 2000 for \$105 million after already reimbursing customers at least \$300 million. The company was sold to Washington Mutual in 2005 for approximately \$6.5 billion. Its credit card portfolio at the time amounted to 10 million card holders.

**18** In the case of credit cards, the risk of default is significant given the unsecured nature of credit card debt. Borrowers may default on unsecured debt by filing for bankruptcy. Since the borrower does not have to offer collateral as potential compensation to the lender, the lender is at risk of never receiving payment on the principal amount owed. And, even if the borrower does not file for bankruptcy, their (usually) small amount of debt may make debt collection prohibitively costly for the lender, leading to a widespread phenomenon of “informal bankruptcies.” For more details, refer to my work with Ricardo Serrano-Padial.

**19** Consider a situation in which a borrower is encouraged to draw an additional dollar of debt because of a low promotional interest rate. Suppose this borrower will default on this additional dollar of debt when they lose their job. In a competitive market, the borrower must compensate the lender by paying more interest in the future for the additional risk of default because the lender must break even on average. In the model, the additional benefit from the dollar when the borrower becomes unemployed outweighs the cost of paying more interest when the borrower keeps their job—an effect that makes introductory offers suboptimal for rational borrowers.

**20** The evidence that Ausubel and Shui found has been confirmed in other studies, which point to similar biases in investing and saving behavior. For example, in a closely related study, Agarwal et al. show that credit card customers prefer low-annual-fee cards, even though they end up later overpaying in interest in excess of the fee.

**21** Promotional lending can be studied using proprietary account-level data, but such data are typically not available at a scale that allows researchers to see how borrowers transfer balances across accounts and lenders. Prior to the Dodd–Frank Act, the OCC was the only institution we knew of that possessed an account-level data set covering a large fraction of U.S. credit card accounts. The Federal Reserve System later acquired this data set for its stress testing. The numbers reported in this article come from this merged data set.

**22** These data are collected by the Federal Reserve System under Dodd–Frank to help the Fed conduct stress testing of banks. The data are available for economic research conducted within the Federal Reserve System, providing new insights into the inner workings of credit markets.

**23** See figures in my work with Kowalik.

**24** Our data does not allow us to calculate lender costs on the account level, and it is not possible to precisely assess profitability of zero-APR accounts. Initially, lenders do lose money on zero-APR accounts in the data, but over time we did not find any indication that these accounts are less profitable than comparable accounts.

**25** Prescreened offers mailed out by credit card issuers are the main tool of customer acquisition in the credit card market, so the number of mailed-out solicitations is a reliable measure of the credit card industry’s hunger for new customers. Evans and Schmalensee report that in the early 2000s about 75 percent of credit accounts were initiated via prescreened offers.

**26** Using a different approach, Keys, Tobacman, and Wang reach a similar conclusion.

**27** Credit card borrowing takes place when a credit card holder does not pay back the balance in full after the credit card statement closes and “rolls over” the outstanding balance to the next billing cycle (partly or fully).

**28** Consumption demand was an important factor in the Great Recession. Mian and Sufi have shown that the decline in consumption was key to explaining the fall in aggregate demand.

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Photo: Faina Gurevich/iStock

## Regional Spotlight

# Labor Market Disparities

A region's big businesses can help monitor racial progress in the labor market.

**By Paul R. Flora**

Manager of Regional Economic Analysis  
FEDERAL RESERVE BANK OF PHILADELPHIA.

*Thank you to Sydney Lodge, who performed the initial data collection and analysis for this research.*

*The views expressed in this article are not necessarily those of the Federal Reserve.*

In the wake of last summer's Black Lives Matter protests, Black CEOs forcefully called on large corporations to act. As Darren Walker, president of the Ford Foundation and a member of the board of Pepsi, told the *New York Times*, "Boards should hold themselves and management accountable for specific objectives around recruitment, retention and promotion of African-Americans and other minorities.... Only when companies and management are accountable in ways that are quantifiable will we see real systemic transformation of corporate America."<sup>1</sup>

Data from large Philadelphia companies do show that when compared with the region's population distribution, non-Hispanic Black workers are underrepresented in high-wage occupations and overrepresented in low-wage occupations.<sup>2</sup> Philadelphia is not unlike other regions in this respect.<sup>3</sup>

Of course, responsibility for these disparities does not lie solely at the door of the business community. Labor market disparities have many causes. Some of these causes may reach back to a person's early life experiences or to those of prior generations. Past lack of access to neonatal health care, insufficient pre-K and K-12 education, or lack of career-training opportunities may limit an individual's life prospects. Moreover, historic patterns of discrimination in employment, housing, lending, and criminal justice have lowered the incomes and wealth of prior generations. These patterns can lower the human capital (and incomes) of subsequent generations and reduce intergenerational wealth transfers. These channels can account for some current labor market disparities.

See [Why Racial Inequality Matters](#)



Moreover, although a lack of diversity within a region's large-business community, defined as firms with at least 100 employees, may indicate ongoing underlying problems, such disparities might still exist even if we removed all of these causes.<sup>4</sup>

Still, a call to focus on workplace diversity within a region's business community may serve two valuable functions. First, providing firms with a benchmark against which to compare themselves may encourage them to participate in regional efforts to address the underlying causes of these disparities. Second, a well-designed benchmark could serve as a useful metric of overall progress if the region were to adopt a comprehensive plan to address the many complex underlying problems that engender racial and ethnic inequality.

### A Straightforward Measure of Inequality

Fortunately, we already have a straightforward measure of workplace diversity for most of a region's larger businesses: occupational data by race and ethnicity (known as EEO-1 data) from the Equal Opportunity Employment Commission (EEOC).<sup>5</sup>

See **Enforcement Efforts Motivate Basic Data Collection**

EEO-1 data show that Black workers are underrepresented in Philadelphia's higher-paying occupations and overrepresented in lower-paying occupations. According to Census data, Philadelphia's Black population accounted for a little over 20 percent of the region's total population (ages 15 to 74) in 2018, but just 10 to 12 percent of managers, professionals, and craft workers in the EEO-1 data were Black.<sup>6</sup> In Philadelphia, these occupations command annual average salaries of \$140,000, \$86,000, and \$59,000, respectively.<sup>7</sup> And Black workers held just 4 percent of executive positions, which pay an average of \$251,000. In contrast, Black workers held 35 percent of laborer positions, which pay \$35,000 on average, and nearly half of service worker positions, which pay an average of only \$31,000.

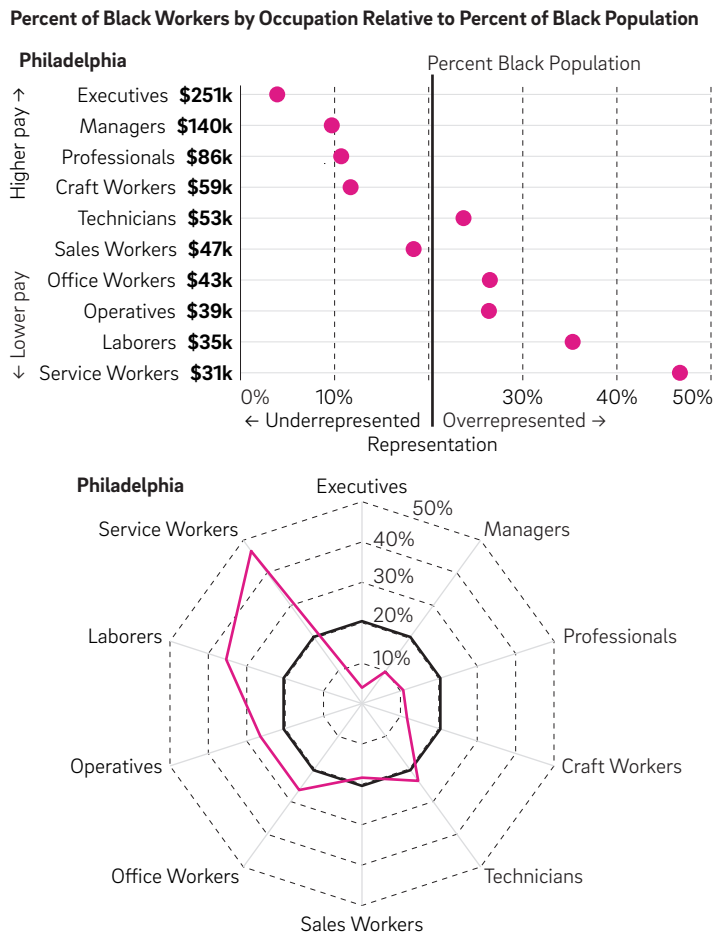
**As of 2018, Black workers were underrepresented in Philadelphia's higher-paying occupations and overrepresented in lower-paying occupations.**

According to the EEO-1 data, Philadelphia's lack of diversity is comparable to that of six other regions of a similar size.<sup>8</sup> The patterns of over- and underrepresentation across the 10 broad occupational categories look very similar in all seven regions (Figure 1). Just like in Philadelphia, Black workers in these other regions are overrepresented in low-wage occupations and underrepresented in high-wage occupations.

FIGURE 1

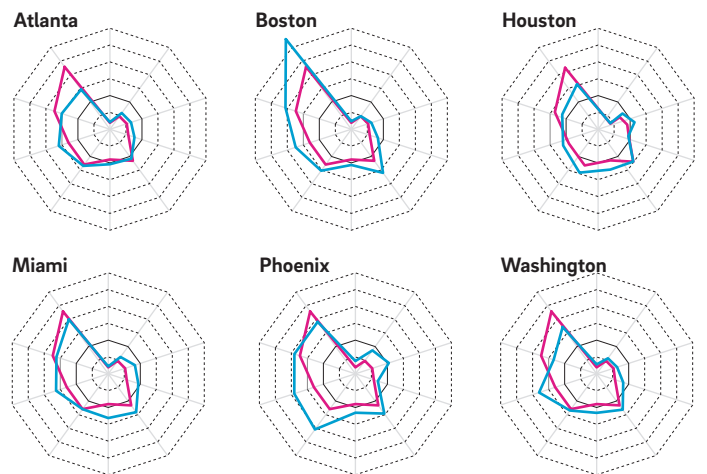
### Philadelphia's Black Workers Are Overrepresented in Occupations with Low Average Salaries

This pattern is comparable to that of six regions of similar size. Percentage of Black workers (ages 15–74) in 10 broad occupational categories with mean annual salary, Philadelphia MSA, 2018



### Other MSAs Relative to Philadelphia MSA

Standardized for differing ratios of percent Black population.



Sources: U.S. Bureau of Labor Statistics (BLS), U.S. Census Bureau, and U.S. Equal Opportunity Employment Commission (EEOC).



## Broad Groupings May Mask Greater Workforce Inequality

Researchers have long used EEO-1 data to study labor market inequality. For example, using this data, sociologists Philip Cohen of the University of Maryland and Matt Huffman of the University of California, Irvine, found that significant underrepresentation of Blacks in management jobs was more likely for firms operating in regions with a high proportion of Black workers in the labor market.<sup>9</sup>

However, EEO-1 data do not reveal how race and ethnicity are distributed within each category's wide range of salaries. Salaries for sales workers, for example, are highly skewed (Figure 2). Retail salespersons and cashiers are the two largest subcategories of sales workers, representing 54 percent of all sales workers. They are also the two lowest-paid subgroups. With an average salary of \$30,810, retail salespersons earn just \$7,600 more than the \$23,240 drawn by the lowest-paid cashiers.

The typical worker in these two subgroups, however, earns far less than the average \$47,056 salary for the sales worker category. Meanwhile, the typical sales representative—the next largest subcategory, with 18 percent of all sales workers—earns more than twice that of retail salespersons and more than three times that of cashiers. If sales representatives are more likely to be white, and if retail salespersons and cashiers are more likely to be Black, then there may be further racial disparities even within this broad category. More-refined occupational categories would help researchers quantify racial inequality within each category.

Still, the EEO-1 data have the significant advantage of being a full count of large employers in a region. For the Philadelphia region, EEO-1 data counted nearly 1.3 million employees in 2018, capturing over 40 percent of the 2.9 million regional employees estimated by the Bureau of Labor Statistics. The next best alternative is occupational data from the American

Community Survey, but its 2018 sample size from the Philadelphia region contained only 36,200 households. The EEO-1 data, despite their limitations, provide the best starting point for tracking economic inequality by race and gender—but greater occupational detail would make them even better.

## Large Businesses Can Be More Transparent

Few firms release their EEO-1 reports. Just Capital, a nonprofit that supports corporate responsibility to the public at large, reports that “as of January 2021, only 6.3% of America’s largest corporations disclosed the type of intersectional data that could be derived from an EEO-1 Report.”<sup>10</sup> (The report does note that out of 931 companies, the number of firms disclosing their employment diversity had nearly doubled from 32 in December 2019 to 59 in January 2021.)

As one example of transparency, the

### Why Racial Inequality Matters

The current pandemic-induced recession has provided a grim reminder that recessions increase hardship for low-wage workers. Because minorities are disproportionately represented in low-wage occupations, they are more vulnerable to the negative impacts of recessions. As Melody Hobson, the co-chief executive of Ariel Investments and a board member at JPMorgan and Starbucks, told the *New York Times* last summer, “We’ve been disproportionately affected in layoffs and unemployment.”<sup>22</sup>

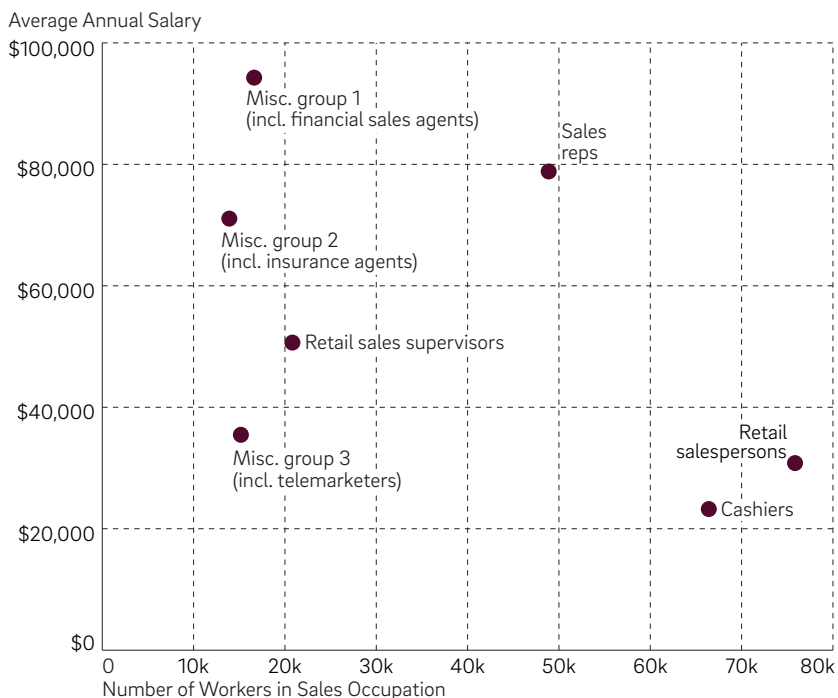
Subsequent research from the Federal Reserve Bank of Philadelphia supports Hobson’s claim. In September 2020, the fourth in a series of COVID-19 surveys of U.S. consumers found that “Black respondents, those who earn less, younger respondents, and women all continue to report experiencing more adverse [economic] effects.”<sup>23</sup>

These survey results were further corroborated by research using monthly data for the three states of the Third District. This research found that “three groups of workers with no more than a high school diploma—Black men, Black women, and Hispanic women—have experienced far worse outcomes during the current downturn.”<sup>24</sup>

FIGURE 2

### Average Salaries Vary Within the Sales Workers Category

Without more-refined occupational categories, it’s impossible to know if Black workers are overrepresented in each category’s lower-paying occupations. Average annual salary and number of workers by subcategory within the sales workers occupational category, out of 265,320 sales workers, Philadelphia MSA, May 2019



Source: U.S. Bureau of Labor Statistics.

Federal Reserve Bank of Philadelphia releases its own EEO-1 data as part of an annual Office of Minority and Women Inclusion report. The 2020 report revealed that Black employees make up about 15 percent of the total workforce at the Philadelphia Fed.<sup>11</sup> While the racial and ethnic representation is more balanced than among all the region's businesses, a similar pattern of over- and underrepresentation is present.

## Alternatively, Large Businesses Can Collectively Track Progress

Firms that are reluctant to release their EEO-1 reports can nonetheless collectively track progress—ideally on an annual basis and with greater occupational detail than the EEO-1 data provide.<sup>12</sup> For example, signatories to Boston's 100% Talent Compact, designed in partnership with the Boston Women's Workforce Council (BWWC) to close gender and racial wage gaps, pledge to share their anonymized EEO-1 data for aggregate analysis.<sup>13</sup>

While the Talent Compact ensures anonymity and also requests pay data, firms are only asked to submit data every other year and only for the 10 EEO-1 occupational categories.<sup>14</sup> This prompted the Talent Compact to warn against comparing one year's results against prior-year results<sup>15</sup> and to further warn that wage gaps in any category may be overstated.<sup>16</sup>

For most large businesses, these data are already available

in-house. And the Talent Compact's success indicates a willingness on the part of some large businesses to participate. Adding greater occupational detail would provide a far more accurate picture of equal opportunity in the region, and submitting data annually would increase the metric's value for tracking.

However, while tracking the data is needed to *gaug*e progress, ultimately program efforts will be needed to *make* progress. And these programs would likely benefit by paying close attention to research into the causes of inequality.

## Making Progress

A long literature across multiple disciplines examines the “stubborn persistence of racial differences in socioeconomic outcomes.”<sup>17</sup> This literature attempts to identify the main causes of and most effective remedies for these unequal outcomes.

For example, Harvard economist Roland G. Fryer Jr. argues that most of the racial differences in socioeconomic outcomes would be greatly reduced if educational opportunities and school quality were equalized from early childhood through high school.<sup>18</sup>

Economists Patrick Bayer of Duke University and Kerwin Kofi Charles of Yale note that as earnings inequality has risen in the U.S., the gap has widened further among Black men.<sup>19</sup> Well-educated Black men at the top of the earnings distribution have

## Enforcement Efforts Motivate Basic Data Collection

The EEOC is charged with enforcing laws that prohibit discrimination against employees and job applicants on the basis of race, color, religion, national origin, sex (including pregnancy, transgender status, and sexual orientation), age (40 or older), disability, or genetic information. To assist its investigations into specific allegations of discrimination, the EEOC has collected mandated, basic data from most private and public employers since the mid-1960s. Because EEO-1 data are protected by confidentiality requirements, however, the data have been heavily aggregated to obscure individual firm reports. As a result, publicly available measures of occupational employment diversity are not nearly as precise and robust as they might be.

In September 2016, the EEOC decided to begin collecting more detail on a new EEO-1 form—revised to include employees' earnings and hours worked by pay band. Known as Component 2 pay data, the additional confidential detail provides greater insight into a firm's pay patterns. The EEOC is collecting this data so that it can ensure pay equity on the basis of sex, race, and ethnicity.

In August 2017, the Office of Management and Budget (OMB) under the new administration of President Trump blocked this effort. However, the National Women's Law Center and other plaintiffs took the OMB to court and compelled it to allow the EEOC to resume this data collection.

Component 2 data were collected only in 2018 and 2019; these data are now being evaluated by an expert panel convened by the National Academies of Sciences, Engineering, and Medicine. The panel will assess the quality and value of the compensation data for various uses and will recommend improvements to the methodology.

Although nondisclosure rules prevent the public disclosure of details from the additional data, the panel may identify new summary measures that provide greater insight for a region while preserving employer and employee confidentiality. Meanwhile, further collection of Component 2 data is suspended pending the panel's recommendations.

At the state level, California recently passed legislation to effectively require what the EEOC has suspended. States normally maintain their own body of equal employment opportunity laws, which complement or augment federal laws. In September 2020, California Governor Gavin Newsom signed a law that requires employers to annually submit a report identical to an EEO-1 with Component 2 pay data, beginning in 2021.


However, pay data attached to the current 10 broad occupational categories offer little insight into potential pay inequities for the same reasons that the broad groupings make it difficult to quantify occupational employment diversity.

Moreover, one can't easily test for the presence of pay inequities, much less explicit discrimination. Statistically significant pay inequities by race or gender may be suggestive of discrimination, but they are not definitive without data on additional individual employee characteristics such as education, tenure, and performance assessments.

benefited, as have well-educated white men, while lower-skilled Black men face ever fewer job options and contend with higher incarceration rates than their white counterparts. Because Black men are overrepresented in the lower and middle portions of the earnings distributions, they write, “race-neutral economic changes and related public policy decisions that improve the prospects of all workers in the lower and middle portions of the earnings distributions will have the side effect of reducing racial economic inequality.”

Harvard economist Raj Chetty and his coauthors have documented that Black-white income gaps persist in the U.S. primarily because of significant differences in the outcomes of Black and white men from families with similar incomes.<sup>20</sup> They recommend creating greater opportunities for Black children—especially for Black boys—and fostering substantial improvements in neighborhood environments to increase upward mobility and narrow the outcome gap.

Harvard sociologists Mario L. Small and Devah Pager have gone beyond the traditional economic models of racial discrimination, which focus on preferences for discrimination or on statistical discrimination. They argue that discrimination also arises from unconscious bias and from racism that has become integrated into organizational practices or been written into laws.<sup>21</sup> For example, they have shown that the negative wealth effects from the redlining practices of the past persist across generations in minority neighborhoods. They also note that the cumulative effect of everyday discrimination has negative consequences for physical and mental health, as does the perception (or presumption) of discrimination when the reality itself may be uncertain. Economic research into these and other examples of institutional discrimination, they argue, could uncover still more opportunities to address the underlying causes of inequality.

This and related studies suggest that remedies for these and other factors are needed. If these efforts succeed, improvement should be evident in overarching measures of inequality, such as occupational diversity in a region’s large businesses. And the perception of discrimination should diminish. 

## Notes

**1** Gelles (2020).

**2** For the remainder of this paper, “Black” will refer to non-Hispanic Black.

**3** Unless otherwise noted, “region” and “metro area” refer to an official metropolitan statistical area (MSA). Analysis in this article is based on data for each MSA as delineated in the Office of Management and Budget Bulletin No. 13-01, issued February 28, 2013. This article truncates these official names to the names of their largest principal cities.

**4** For example, a preference within one demographic group for working in a small business or owning one’s own business might lower the proportional representation of that demographic in large businesses.

**5** EEO-1 reports must be filed with the EEOC each year by employers with at least 100 workers. The data alone cannot prove hiring discrimination or pay inequities.

**6** General population data were drawn from 2018 Census Bureau estimates.

**7** Salaries reported in this article were drawn from 2019 Bureau of Labor Statistics wage data by occupation for the Philadelphia metro area.

**8** In addition to Philadelphia, we examined the next three larger regions (Houston, Miami, and Washington, D.C.), and the next three smaller regions (Boston, Miami, and Phoenix) based on population.

**9** Cohen and Huffman (2007).

**10** Vaghul (2021).

**11** Office of Minority and Women Inclusion (2020).

**12** A guarantee of anonymity might encourage reluctant firms to share their data as part of such an effort.

**13** There were 38 signatories at the launch of the Compact in 2013; as of February 2021, there were 250.

**14** Data are shared with Boston University’s Hariri Institute for Computing, which employs a secure multiparty computation process to ensure anonymity and protect private information while it analyzes data for wage gaps.

**15** Since firms are only asked to submit data every other year, but the report is issued annually, the composition of the sample changes year to year, thus weakening its value as a tracking tool. Specifically, “comparing reporting cycles should not be done because of the variation in the number

of employees represented and the types of jobs they fill" (Boston Women's Workforce Council Report, 2019).

**16** As an example, "Our sample likely includes the overrepresentation of women professionals in lower paying professions. This means that even if there were full wage equity in lower paying professions (such as nursing), and full wage equity in male-dominated higher paying positions (such as physicians), our sample might still reflect a larger wage gap than exists in the entire Boston workforce" (Boston Women's Workforce Council Report, 2019).

**17** Bayer and Charles (2018).

**18** Fryer (2011).

**19** Bayer and Charles (2018).

**20** Chetty et al. (2020).

**21** Small and Pager (2020).

**22** Gelles (2020).

**23** Akana (2020).

**24** Wardrip (2021).

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# Research Update

These papers by Philadelphia Fed economists, analysts, and visiting scholars represent preliminary research that is being circulated for discussion purposes.

The views expressed in these papers are solely those of the authors and should not be interpreted as reflecting the views of the Federal Reserve Bank of Philadelphia or Federal Reserve System.

## A Survey of Fintech Research and Policy Discussion

The intersection of finance and technology, known as fintech, has resulted in the dramatic growth of innovations and has changed the entire financial landscape. While fintech has a critical role to play in democratizing credit access to the unbanked and thin-file consumers around the globe, those consumers who are currently well served also turn to fintech for faster services and greater transparency. Fintech, particularly the blockchain, has the potential to be disruptive to financial systems and intermediation. Our aim in this paper is to provide a comprehensive fintech literature survey with relevant research studies and policy discussion around the various aspects of fintech. The topics include marketplace and peer-to-peer lending; credit scoring; alternative data; distributed ledger technologies; blockchain; smart contracts; cryptocurrencies and initial coin offerings; central bank digital currency; robo-advising; quantitative investment and trading strategies; cybersecurity; identity theft; cloud computing; use of big data, artificial intelligence, and machine learning; identity and fraud detection; anti-money laundering; Know Your Customers; natural language processing; regtech; insuretech; sandboxes; and fintech regulations.

**WP 20-21 Revised.** Franklin Allen, Imperial College London; Xian Gu, Durham University; Julapa Jagtiani, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department.

## The Behavioral Relationship Between Mortgage Prepayment and Default

An implication of the dual trigger theory of default is that mortgage borrowers who experience an unexpected financial reverse will prepay their mortgage rather than default if their equity in the house is positive. We test this idea with a new data set created by matching mortgage servicing records and credit bureau records to classify prepayments by what happens subsequently. In particular, we can identify a subset of prepayments that seems consistent with the dual trigger theory. If the theory is correct, these prepayments should exhibit similarities to defaults in the data set rather than other prepayments. We test this idea and find that these prepayments are in fact more closely related to defaults than to other prepayments. However, our data also support a role for strategic default. Understanding these relationships may be critical in predicting mortgage default when house prices decline after a long period of increases. While our work is only a first step in this direction, we believe that a better understanding of how prepayments may be driven by financial reverses would be valuable for participants in and regulators of mortgage markets.

**WP 21-12.** Arden Hall, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department; Raman Quinn Maingi, New York University.

## Is a Friend in Need a Friend Indeed? How Relationship Borrowers Fare During the COVID-19 Crisis

We analyze loan contract terms, investigating whether relationship borrowers fare better or worse than others in times of need, using the COVID-19 crisis as a quasi-natural experiment. COVID-19 is superior to prior crises for such analysis because its public health and government restrictions shocks directly harm borrowers, rather than banks. Our data set includes Y-14Q, covering syndicated and nonsyndicated loans and small and large firms, unlike some other data sets. We find the dark side of relationships dominates across four relationship measures, 14 COVID-19 shocks, and PPP participation. There are limited pockets of bright-side findings associated with smaller firms and smaller banks.

**WP 21-13.** Allen N. Berger, University of South Carolina and Wharton Financial Institutions Center European Banking Center; Lars Norden, Getulio Vargas Foundation; Gregory F. Udell, Indiana University; Christa H.S. Bouwman, Texas A&M University, ECGI Wharton Financial Institutions Center; Raluca A. Roman, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department; Teng Wang, Federal Reserve Board of Governors.

## Factor Models with Local Factors—Determining the Number of Relevant Factors

We extend the theory on factor models by incorporating “local” factors into the model. Local factors affect only an unknown subset of the observed variables. This implies a continuum of eigenvalues of the covariance matrix, as is commonly observed in applications. We derive which factors are pervasive enough to be economically important and which factors are pervasive enough to be estimable using the common principal component estimator. We then introduce a new class of estimators to determine the number of those relevant factors. Unlike existing estimators, our estimators use not only the eigenvalues of the covariance matrix but also its eigenvectors. We find that incorporating partial sums of the eigenvectors into our estimators leads to significant gains in performance in simulations.

**WP 21-15.** Simon Freyaldenhoven, Federal Reserve Bank of Philadelphia Research Department.

## “Sort Selling”: Political Polarization and Residential Choice

Partisanship and political polarization are salient features of today’s society. We merge deeds records with voter rolls and show that political polarization is more than just “political cheerleading.” Descriptively, homeowners are more likely to sell their homes and move when their next-door neighbors are affiliated with the opposite political party. We use a novel, new-next-door-neighbor identification strategy along with rich demographic control variables and time-by-geography fixed effects to confirm causality. Consistent with a partisanship mechanism, our results are strongest when new next-door neighbors (i) are more likely to be partisan and (ii) live especially close by. Our findings help explain increases in political segregation, improve our understanding of residential choice, and illustrate the importance of political polarization for economic decision-making.

**WP 21-14.** W. Ben McCartney, Purdue University and Federal Reserve Bank of Philadelphia Consumer Finance Institute Visiting Scholar; John Orellana, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department; Calvin Zhang, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department.

## Owner-Occupancy Fraud and Mortgage Performance

We identify occupancy fraud—borrowers who misrepresented their occupancy status as owner-occupants rather than investors—in residential mortgage originations during the housing bubble. Unlike previous work, we show fraud was broadly based and appeared in the GSE market and bank portfolio loans, not just private securitization; accounting for that fraud increases the effective investor share by more than one-third. Occupancy fraud allowed riskier borrowers to obtain lower interest rates, and we show that fraudulent borrowers performed substantially worse than similar owner occupants and declared investors, constituting nearly one-sixth of the share of loans in default by the end of 2008. Their defaults were also much likelier to be “strategic.”

**WP 19-53 Revised.** Ronel Elul, Federal Reserve Bank of Philadelphia; Aaron Payne, University of Pennsylvania; Sebastian Tilson.

## The Trade-Comovement Puzzle

Standard international transmission mechanism of productivity shocks predicts a weak endogenous linkage between trade and business cycle synchronization: a problem known as the trade-comovement puzzle. We provide the foundational analysis of the puzzle, pointing to three natural candidate resolutions: i) financial market frictions; ii) Greenwood–Hercowitz–Huffman preferences; and iii) dynamic trade elasticity that is low in the short run but high in the long run. We show the effects of each of these candidate resolutions analytically and evaluate them quantitatively. We find that, while i) and ii) fall short of the data, iii) goes a long way toward resolving the puzzle.

**WP 20-01 Revised.** Lukasz A. Drozd, Federal Reserve Bank of Philadelphia Research Department; Sergey Kolbin, Amazon; Jaromir B. Nosal, Boston College.

## Household Mortgage Refinancing Decisions Are Neighbor Influenced

Can social influence effects help explain regional heterogeneity in refinancing activity? Neighborhood social influence effects have been shown to affect publicly observable decisions, but their role in private decisions, like refinancing, remains unclear. Using precisely geolocated data and a nearest-neighbor research design, we find that households are 7 percent more likely to refinance if a neighbor within 50 meters has recently refinanced. Consistent with a word-of-mouth mechanism, social influence effects are weaker when neighbors are farther away and nonexistent for nonoccupants. Our results illustrate the importance of the proximate community for household wealth accumulation and the transmission of monetary policy.

**WP 21-16.** W. Ben McCartney, Purdue University and Federal Reserve Bank of Philadelphia Consumer Finance Institute Visiting Scholar; Avni M. Shah, University of Toronto.

## Which Lenders Are More Likely to Reach Out to Underserved Consumers: Banks versus Fintechs versus Other Nonbanks?

There has been a great deal of interest recently in understanding the potential role of fintech firms in expanding credit access to the underbanked and credit-constrained consumers. We explore the supply side of fintech credit, focusing on unsecured personal loans and mortgage loans. We investigate whether fintech firms are more likely than other lenders to reach out to “underserved consumers,” such as minorities; those with low income, low credit scores, or thin credit histories; or those who have a history of being denied for credit. Using a rich data set of credit offers from Mintel, in conjunction with credit information from TransUnion and other consumer credit data from the FRBNY/Equifax Consumer Credit Panel, we compare similar credit offers that were originated by banks, fintech firms, and other nonbank lenders. Fintech firms are more likely than banks to offer mortgage credit to consumers with lower income, lower credit scores, and those who have been denied credit in the recent past. Fintechs are also more likely than banks to offer personal loans to consumers who had filed for bankruptcy (thus also more likely to receive credit card offers overall) and those who had recently been denied credit. For both personal loans and mortgage loans, fintech firms are more likely than other lenders to reach out and offer credit to nonprime consumers.

**WP 21-17.** Erik Dolson, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department; Julapa Jagtiani, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department.

## Bayesian Estimation of Epidemiological Models: Methods, Causality, and Policy Trade-Offs

We present a general framework for Bayesian estimation and causality assessment in epidemiological models. The key to our approach is the use of sequential Monte Carlo methods to evaluate the likelihood of a generic epidemiological model. Once we have the likelihood, we specify priors and rely on a Markov chain Monte Carlo to sample from the posterior distribution. We show how to use the posterior simulation outputs as inputs for exercises in causality assessment. We apply our approach to Belgian data for the COVID-19 epidemic during 2020. Our estimated time-varying-parameters SIRD model captures the data dynamics very well, including the three waves of infections. We use the estimated (true) number of new cases and the time-varying effective reproduction number from the epidemiological model as information for structural vector autoregressions and local projections. We document how additional government-mandated mobility curtailments would have reduced deaths at zero cost or a very small cost in terms of output.

**WP 21-18.** Jonas E. Arias, Federal Reserve Bank of Philadelphia Research Department; Jesús Fernández-Villaverde, University of Pennsylvania and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar; Juan F. Rubio-Ramírez, Emory University and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar; Minchul Shin, Federal Reserve Bank of Philadelphia Research Department.

## Piercing Through Opacity: Relationships and Credit Card Lending to Consumers and Small Businesses During Normal Times and the COVID-19 Crisis

We investigate bank relationships in a rarely considered context—consumer and small-business credit cards. Using over 1 million accounts, we find during normal times, consumer relationship customers enjoy relatively favorable credit terms, consistent with the bright side of relationships, while the dark side dominates for small businesses. During the COVID-19 crisis, both groups benefit, reflecting intertemporal smoothing, with more benefits flowing to safer relationship customers. Conventional banking relationships benefit consumers more than credit card relationships, with mixed findings for small businesses. Important identification issues are addressed. The Coronavirus Aid, Relief, and Economic Security (CARES) Act consumer-delinquency reporting impediments reduce the informational value of consumer credit scores, penalizing safer borrowers.

**WP 21-19.** Allen N. Berger, University of South Carolina, Wharton Financial Institutions Center, European Banking Center; Christa H.S. Bouwman, Texas A&M University, ECGI, Wharton Financial Institutions Center; Lars Norden, Getulio Vargas Foundation; Raluca A. Roman, Federal Reserve Bank of Philadelphia; Gregory F. Udell, Indiana University; Teng Wang, Federal Reserve Board of Governors.

## How Resilient Is Mortgage Credit Supply? Evidence from the COVID-19 Pandemic

We study the evolution of U.S. mortgage credit supply during the COVID-19 pandemic. Although the mortgage market experienced a historic boom in 2020, we show there was also a large and sustained increase in intermediation markups that limited the pass-through of low rates to borrowers. Markups typically rise during periods of peak demand, but this historical relationship explains only part of the large increase during the pandemic. We present evidence that pandemic-related labor market frictions and operational bottlenecks contributed to unusually inelastic credit supply and that technology-based lenders, likely less constrained by these frictions, gained market share. Rising forbearance and default risk did not significantly affect rates on “plain-vanilla” conforming mortgages, but it did lead to higher spreads on mortgages without government guarantees and loans to the riskiest borrowers. Mortgage-backed securities purchases by the Federal Reserve also supported the flow of credit in the conforming segment.

**WP 21-20.** Andreas Fuster, Swiss National Bank and CEPR; Aurel Hizmo, Board of Governors of the Federal Reserve System; Lauren Lambie-Hanson, Federal Reserve Bank of Philadelphia Consumer Finance Institute; James Vickery, Federal Reserve Bank of Philadelphia Research Department; Paul Willen, Federal Reserve Bank of Boston and NBER.



## Macroeconomic Forecasting and Variable Ordering in Multivariate Stochastic Volatility Models

We document five novel empirical findings on the well-known potential ordering drawback associated with the time-varying parameter vector autoregression with stochastic volatility developed by Cogley and Sargent (2005) and Primiceri (2005), CSP-SV. First, the ordering does not affect point prediction. Second, the standard deviation of the predictive densities implied by different orderings can differ substantially. Third, the average length of the prediction intervals is also sensitive to the ordering. Fourth, the best ordering for one variable in terms of log-predictive scores does not necessarily imply the best ordering for another variable under the same metric. Fifth, the best ordering for variable  $x$  in terms of log-predictive scores tends to put the variable  $x$  first while the worst ordering for variable  $x$  tends to put the variable  $x$  last. Then, we consider two alternative ordering invariant time-varying parameter VAR-SV models: the discounted Wishart SV model (DW-SV) and the dynamic stochastic correlation SV model (DSC-SV). The DW-SV underperforms relative to each ordering of the CSP-SV. The DSC-SV has an out-of-sample forecasting performance comparable to the median outcomes across orderings of the CSP-SV.

**WP 21-21.** Jonas E. Arias, Federal Reserve Bank of Philadelphia Research Department; Juan F. Rubio-Ramírez, Emory University and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar; Minchul Shin, Federal Reserve Bank of Philadelphia Research Department.

## Measuring Employer-to-Employer Reallocation

We revisit the measurement of Employer-to-Employer (EE) transitions in the monthly Current Population Survey. We detect sharp increases in the incidence of missing answers to the relevant question starting in 2007, when the U.S. Census Bureau introduced the Respondent Identification Policy. We show evidence of nonresponse selection by both observable and unobservable worker characteristics that correlate with EE mobility. We propose a selection model and a procedure to impute missing answers, thus EE transitions. Our imputed EE aggregate series restores a close congruence with the business cycle after 2007, including the COVID-19 recession, and exhibits no downward trend since 2000.

**WP 21-22.** Shigeru Fujita, Federal Reserve Bank of Philadelphia Research Department; Giuseppe Moscarini, Yale University and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar; Fabien Postel-Vinay, University College London.

## Aging and the Real Interest Rate in Japan: A Labor Market Channel

This paper explores a causal link between aging of the labor force and declining trends in the real interest rate in Japan. We develop a search/matching model that features heterogeneous workers with respect to their ages and firm-specific skills. Using the model, we examine the long-run implications of the sharp drop in labor force entry in the 1970s. We show that the changes in the demographic structure induce significant low-frequency movements in per capita consumption growth and the real interest rate. The model suggests that aging of the labor force accounts for 40 percent or more of the declines in the real interest rate observed between the 1980s and 2000s in Japan. We also examine the impacts of other long-term developments such as a slowdown of TFP growth and higher shares of female and nonregular workers.

**WP 21-23.** Shigeru Fujita, Federal Reserve Bank of Philadelphia Research Department; Ippei Fujiwara, Keio University, Australian National University.

## Capital Buffers in a Quantitative Model of Banking Industry Dynamics

We develop a model of banking industry dynamics to study the quantitative impact of regulatory policies on bank risk-taking and market structure as well as the feedback effect of market structure on the efficacy of policy. Since our model is matched to U.S. data, we propose a market structure where big banks with market power interact with small, competitive fringe banks. Banks face idiosyncratic funding shocks in addition to aggregate shocks, which affect the fraction of performing loans in their portfolio. A nontrivial bank size distribution arises out of endogenous entry and exit, as well as banks' buffer stock of net worth. We show the model predictions are consistent with untargeted business cycle properties, the bank-lending channel, and empirical studies of the role of concentration on financial stability. We then conduct a series of policy counterfactuals motivated by those proposed in the Dodd-Frank Act (size- and state-dependent capital requirements and liquidity requirements). We find that regulatory policies can have an important impact on banking market structure, which, along with selection effects, can generate changes in allocative efficiency and stability.

**WP 21-24.** Dean Corbae, University of Wisconsin-Madison, NBER, and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar; Pablo D'Erasmus, Federal Reserve Bank of Philadelphia Research Department.

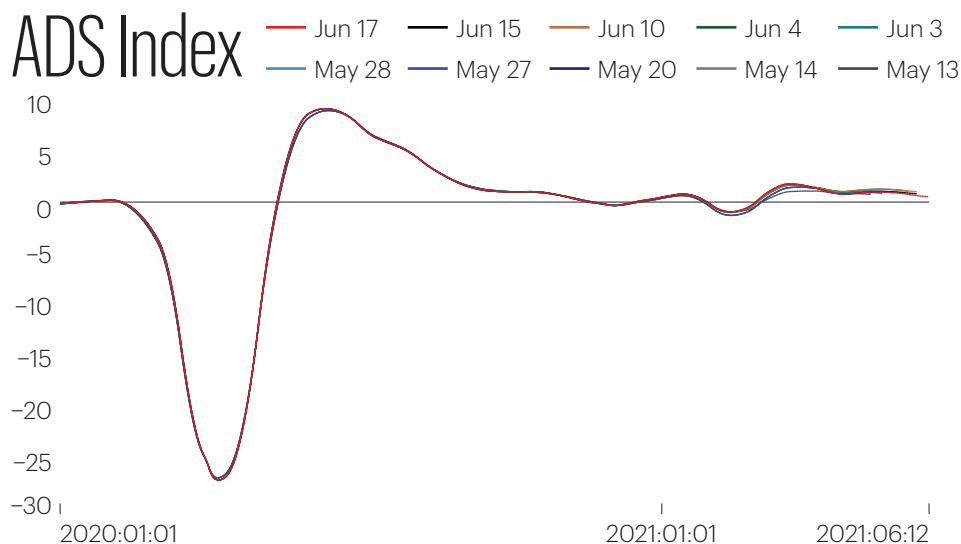
## Data in Focus

# Aruoba-Diebold-Scotti Business Conditions Index


The Philadelphia Fed collects, analyzes, and shares useful data about the Third District and beyond. Here's one example.

In the mid-2000s, three economists—S. Borağan Aruoba of the University of Maryland, Francis X. Diebold of the University of Pennsylvania, and Chiara Scotti of the Federal Reserve Board of Governors—joined forces to build a framework for constructing a timely measure of daily economic activity based on somewhat less timely information from the U.S. government. Before then, business owners, heads of household, and policy-makers had to wait weeks or months for a clear picture of the economy to develop, leaving them in the dark when making important, time-sensitive decisions. By providing a timely snapshot of the entire economy, the Aruoba-Diebold-Scotti (ADS) index quickly illuminates current conditions for these decision makers.

The average value of the ADS index is zero. Positive values indicate better-than-average conditions; negative values indicate worse-than-average conditions. These values are comparable across time: Two quarters that are several years apart and that both had a value of -1 were equally below average. The index reproduced above shows the stunning drop in business conditions in the early months of the COVID-19 pandemic and their sharp



**Source:** Federal Reserve Bank of Philadelphia Aruoba-Diebold-Scotti Business Conditions Index.

rebound a few months later. Because the ADS index is recomputed frequently (and always using the latest information from the U.S. government), the graph reproduces, at its tail end, the small revisions among the most recent index values that arise when the U.S. government releases more information. 

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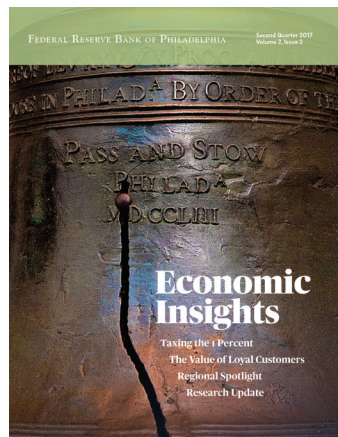
The Philadelphia Fed launched its new website. Visit [www.philadelphiafed.org](http://www.philadelphiafed.org) to see how our improved user-centric navigation and content gives you an easier way to find the data and information you want—current bookmarks will need to be reset under the new navigation system—and explore everything the Philadelphia Fed has to offer to help communities thrive.

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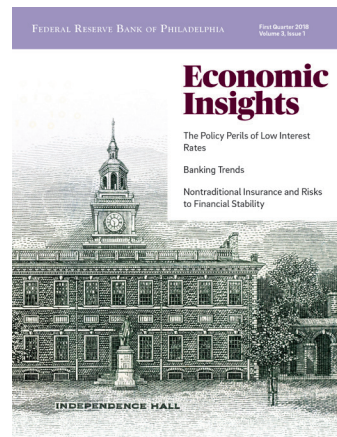
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Featuring articles about how Americans work, invest, spend...and so much more.



2020 Q1



2020 Q2



2020 Q3



2020 Q4