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New Moneys in the Digital Era

The Pros and Cons of Housing Market Investors

Regional Spotlight

Q&A

Research Update

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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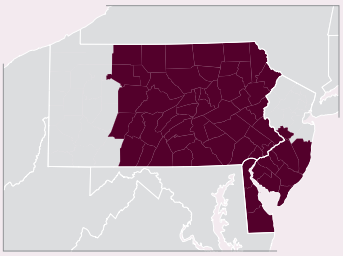

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About the Cover

The Liberty Bell and Independence Hall

This issue's cover photo depicts the Liberty Bell, long associated with both Philadelphia and the United States of America. The bell was cast for the Pennsylvania State House in 1751 and bears the Biblical inscription, "Proclaim Liberty Throughout All the Land Unto All the Inhabitants thereof." After the American War of Independence, antislavery abolitionists embraced the inscription as their motto. In 1915, the bell was used to rally support in Pennsylvania for women's suffrage. To this day, people around the world celebrate the bell as a symbol of humanity's quest for liberty. The Pennsylvania state capital long ago moved to Harrisburg, and the Pennsylvania State House, visible in reflection in the glass walls around the bell, is now known as Independence Hall.

Photograph by Rich Wood.

Q&A...

with Kyle Mangum, a senior economist here at the Philadelphia Fed.

Kyle Mangum

Senior economist Kyle Mangum grew up in exurban Philadelphia, watching developers turn his neighbors' farms into housing subdivisions. This triggered a lifelong interest in how markets work for specific physical locations, how people choose where to locate economic activities, and how locations themselves are priced. After earning his master's and doctorate degrees from Duke University, he taught economics at Georgia State University. Since 2018, he has conducted his economic research at the Philadelphia Fed.

Where did you grow up?

I grew up about an hour outside Philadelphia. It was a farming community when my grandparents lived there—they would come down to Philadelphia and sell their farm goods—but now it's a suburb, and I saw that transition happening. Houses going up. Farms being converted to housing development.

Is that when you became interested in housing market investors?

It made me interested in the spatial organization of land development—and in how that development depends on the way things were in the past. In a community like the one I grew up in, it was easy to convert a barely profitable farm into 500 single-family homes. You can't add 500 homes nearly as easily in Philadelphia.

You majored in economics at Taylor University. What drew you to economics as early as age 18 or 19?

I had two majors: economics and political science. I thought that economics would be a good way to understand how to make good policy. As I got deeper into economics, I thought, these are fun problems. I drifted from policy analysis into economics. But since grad school, I've drifted back into thinking about policy.

In your *American Economic Review* article, "Speculative Fever: Investor Contagion in the Housing Bubble," you suggest that investors are sometimes naïve and prone to error. The profit motive, in other words, does not necessarily induce rational behavior. Does that mean that naïve investors are irrational?

Broadly, "rationality" is a matter of how you collect and synthesize information. You can be rational with a limited information set and make what turns out to be the wrong decision. The paradigm in economics is an agent maximizing an objective, subject to their constraints and their information set. That's criticized as being too robotic, but people do what they think is best. That's true by definition. And their information sets are sometimes limited. I think the "Speculative Fever" article gets to the heart of this issue. People see their close-by neighbors investing in the housing market, and they take that as a signal that this is a good idea. They can end up losing, but at the time, they did not have full and perfect information about the future.

So, what makes an investor naïve?

"Naïve" means you don't have a lot of information and don't know how to acquire it. It doesn't mean you're a bad person. It just means you could do a better job of acquiring information. In a model, we want to distinguish the actors who have more information from those who have less, but in real life it's the behaviors that matter most. You can't observe the information someone has, but you can observe the behaviors, and usually it's the behaviors that impact other people. And that's what policies should care about. So, if someone is naïve but doesn't harm society, then maybe there's no point in restricting their behavior.

What is the best way for a prospective investor to avoid being naïve?

This isn't business advice, it's just my thoughts. Investors should have knowledge of the market or diversification of their portfolio. If you're buying only one house and flipping or renting it, you need a business plan. When something breaks, who's going to fix it? Am I doing renovations myself? If not, how will I contract those out? Some of the frothiness of the housing bubble came from this idea that you don't need to worry about those things. You'll just ride the wave. If there's no business plan for the individual investment, maybe it'll work out. But that's a naïve way of behaving. Some of the more socially undesirable behaviors associated with small-scale investors, like capacity underutilization or market fluctuations, result from a lack of planning by those naïve investors: They're just holding property, keeping it vacant, doing nothing with it, not improving it, just waiting for a market wave to take them to a big payoff at resale. That can work out, but you're not guaranteed. Those investors are taking a big risk, and that can be socially undesirable.

Photo: Rich Wood and Melanie Edwards

New Moneys in the Digital Era

The history of money helps explain the recent turmoil in cryptocurrencies.

Daniel Sanches
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FEDERAL RESERVE BANK OF PHILADELPHIA

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

Cryptocurrencies such as Bitcoin and stablecoins such as TerraUSD have become enormously popular, triggering a public debate about if and how they should be regulated.[1] Although these private payment instruments are new, we can use standard monetary theory to make sense of them. Bitcoin, for example, is similar in many ways to gold, and stablecoins are like the bank notes provided by state banks in the 19th century. In this article, I explore the problems created by both traditional and digital moneys, and the solutions that have been adopted through years of trial and error. I find that cryptocurrencies have a long way to go before they are as safe and reliable as other moneys have become.

To understand the role of cryptocurrencies in the modern monetary system, it helps to distinguish between two types of money. Outside money is either fiat (unbacked by any asset) or backed by some asset that is not itself a liability for anyone in the private sector.[2] Historically, that asset was either gold or silver. But since 1914 the Federal Reserve has issued fiat money in the form of dollar bills. More recently, cryptocurrencies issued by private agents or firms are an example of unbacked outside moneys that are not issued by a government agency.

Inside money is created when two private parties engage in a transaction that involves the issuance of a liquid debt claim (that is, a claim that can circulate as a medium of exchange). When you deposit dollar bills at your commercial bank, you're creating inside money, because bank deposits can be easily transferred to other people as a means of payment, and because your bank account is an asset for one party (you) and a liability for the other party (your bank),

which has promised to pay you $1 (that is, a specific amount of outside money) for each unit of deposit. What's more, your bank can loan your $1 to someone else, essentially creating two (or more) inside dollars from your one outside dollar. Similarly, a money market mutual fund that offers you a checkable account is supplying inside money to your household. But unlike your bank account at a commercial bank, the value of your fund's share can vary over time because the assets backing the liabilities of the fund may fluctuate in value.

To sum up, in the modern monetary system, central banks control the amount of outside money created in the economy, and private financial firms issue inside money to facilitate private transactions. Inside money is usually a promise to pay outside money, and each dollar of outside money is backing several dollars of inside money. Next, I look at the U.S. experience during the past two centuries and identify the main features of the monetary system that contributed to monetary stability, paying particular attention to the interplay between inside and outside money.

What the U.S. Learned

The history of money in the U.S. has been a process of trial and error, with some hard-won lessons that also apply to cryptocurrencies. This history tells us two important things: First, an inelastic supply of outside money can impose severe constraints on economic growth and stability. And second, inside money is subject to unexpectedly large customer demands.

Outside money—which, in the 18th century, meant gold and silver coins that had to be imported—was scarce in colonial North America. The first settlers possessed the wealth but not the liquidity to run their farms. As business activity rapidly grew, the supply of these coins could not keep pace. In other words, the American colonies needed more money to support a growing economy.

Inside money—specifically, bank notes and, later, bank deposits—emerged as a means of payment to supplement a scarce supply of outside money.[3] As the supply of inside money gradually increased, it expanded aggregate liquidity in the economy and supported the growth of commercial activity during the second and third quarters of the 19th century. However, it became clear that the average growth of aggregate liquidity was not keeping pace with the expansion of the U.S. economy; most importantly, aggregate liquidity fluctuated considerably because of seasonal demand for liquidity and recurrent banking crises.[4]

As American economists Douglas Diamond and Philip Dybvig show in their Nobel Prize-winning research, bank runs are endemic to banks that create inside money. To understand why, imagine a simplified banking contract that gives depositors two options: They can either withdraw their funds next month and receive no interest, or withdraw their funds next year and receive interest payments. The bank invests the deposits in a portfolio containing illiquid assets, such as mortgages, and liquid assets, such as short-term government bonds. The bank can quickly sell the liquid assets at a predictable price if some depositors decide to withdraw next month. Meanwhile, the illiquid assets earn the bank interest income, which the bank can then use to make interest payments to the depositors who withdraw their money next year.[5] The bank accepts deposits from many depositors, some of whom will withdraw their money next month and some of whom will withdraw their money next year. Typically, only depositors who need to pay for something on short notice will withdraw their money next month. However, if all the depositors lose confidence in their bank and withdraw their money next month, there won't be enough money invested in the liquid assets to pay them all, and the otherwise stable bank may become bankrupt. This is called a bank run.[6] If many banks suffer a run at the same time, we say it is a *banking crisis*.

See ***The Diamond-Dybvig Theory of Bank Fragility.***

The Spanish milled dollar, minted from silver and worth eight reales, circulated more readily in North America than did British coins. After independence, Congress authorized the minting of U.S. dollar coins, equal to the value of the Spanish milled dollar. MJ0007/ISTOCK

A colonial-era bank note from the James River Bank of Virginia for 12 pounds. MAHER/ISTOCK

A mid-19th century bank note for $10. MAHER/ISTOCK

The Era of Bank Crises

Recurrent bank crises wracked the U.S. throughout the 19th century and into the 20th century. During this era, the international monetary system was based on precious metals (gold and silver until the early 1870s, and then solely gold until 1914). Under this standard, private payment instruments were essentially claims on a quantity of gold or silver, so available gold and silver supplies (that is, outside money) constrained the number of notes private banks could issue and the amount of the deposits they could accept (that is, the number and amounts of banks' inside money). As a result, the (inside and outside) money supply in the U.S. before the creation of the Federal Reserve was determined by the supply of gold. The gold standard provided remarkable price stability in the long run because of the convertibility of the money supply into gold.[7] However, it did not provide an automatic mechanism for expanding the supply of outside money during a banking crisis or any other distress in financial markets. In other words, the gold standard meant an inelastic supply of outside money.

This feature of the gold standard enabled recurrent banking crises.[8] In all these episodes, many banks suffering a run suspended the convertibility of their deposits to prevent further destruction of inside money. Normally, banks can obtain currency only by borrowing from other banks or by selling assets. But borrowing from other banks during a banking crisis was seldom an option because all nearby banks were also suffering large withdrawals from their own depositors. Selling illiquid assets at short notice resulted in severe losses to the distressed bank, which could make things worse. Because the first option was infeasible and the second unattractive, banks often suspended the convertibility of deposits, leaving depositors with no access to their funds—and no ability to pay their employees or bills, or make needed purchases or investments. The result for the aggregate economy was predictably disastrous.

One possible solution to these crises was to create a central bank with the legal authority to create more outside money—specifically, by making temporary loans to distressed banks in exchange for collateral (usually the banks' illiquid assets). This injection of liquidity into the banking system would enable a bank suffering a run to satisfy its depositors' demand for currency without having to sell its assets at fire-sale prices. When the panic was over, the central bank could remove the excess outside money from circulation by returning the collateral to the distressed banks. This form of intervention requires the central bank to have the ability to expand and contract the supply of outside money at short notice or at predictable times without external constraints. Economists refer to this property of the monetary system as an elastic outside money supply.

As previously mentioned, each dollar of outside money can back several dollars of inside money. During a banking crisis, depositors run to their banks to get currency (that is, outside money). As this process intensifies, inside money is destroyed. The central bank can provide emergency liquidity by issuing additional outside money and making temporary loans to the distressed banks. If the banks have enough outside money to pay all depositors who want to withdraw, people will be reassured about the safety of the banking system and will eventually redeposit their currency into the banking system. If everything goes well, all inside money initially destroyed during the crisis is

The Diamond-Dybvig Theory of Bank Fragility

The Diamond-Dybvig model of financial intermediation is a building block of financial economics because it provides a microeconomic account of banking activity that is distinct from other financial institutions. In particular, the model explains why banks issue a type of contract that is different from other financial contracts, such as bonds and equities, and why that contract is useful for households and firms. According to Diamond and Dybvig, the deposit contract offered by banks is inherently associated with the kind of intermediation provided by banking firms.

The deposit contract provides a solution to a simple problem. Investors want to earn the highest possible return on their savings and preserve their ability to tap into their savings to cover unexpected expenses. The assets that provide the highest rate of return are usually those that take a long time to mature and yield income. They are also hard to sell to other investors before maturity. Consider an entrepreneur with an excellent idea for a new product but with no funds to implement it. This person needs a loan to get started and won't be able to repay it until sales from the project start at a future date. This loan requires the lender to properly evaluate the borrower's business project and estimate its future income stream. Because the entrepreneur's project requires expertise to evaluate its profitability, and because it will be hard to find other investors who can properly evaluate the project so that the loan can be sold at a predictable price, the loan to the entrepreneur is an illiquid asset for the lender.

Investors can buy liquid assets to provide them with easy access to their funds. Liquid assets can be easily sold at a predictable price because the income stream associated with them can be easily evaluated by other investors. Precisely because liquid assets provide investors with convenient access to their funds, their yields are considerably lower than that of illiquid assets. (In fact, many liquid assets, such as short-term government bonds, yield a negative real rate of return for investors.)

Individual investors can directly invest in a portfolio containing both liquid and illiquid assets (assuming that they have the expertise to evaluate the income stream of these assets). They can sell their liquid assets if they need money at short notice and still earn a higher return on their illiquid assets. There is a problem with this investment strategy, though. Investors will end up holding a disproportionately large fraction of their portfolio in liquid assets to make sure they can cover larger-than-expected expenses under most scenarios. In other words, to insure against uncertainty, they sacrifice a higher return on their overall portfolios. Because investors are risk averse (that is, they avoid risk unless there is some advantage to be gained from accepting it), they tend to hold more liquid

An illustration of the Panic of 1873 outside the old New York Stock Exchange building on Broad Street. KEITH LANCE/ISTOCK

assets when they invest on their own. Diamond and Dybvig show that they can do better by depositing their money in a bank.

The bank's deposit contract allows investors either to withdraw their funds before maturity and earn a certain return or to withdraw their funds at maturity and earn a higher return. Because the bank collects funds from many investors, it can construct a portfolio of assets that pays a higher return to depositors who need to withdraw before maturity than can a portfolio of just liquid assets, provided the bank can confidently estimate the fraction of depositors who will not withdraw their funds until maturity. The return paid at maturity is lower than that of the illiquid assets, but the deposit contract offers insurance against uncertainty for all depositors, which is highly valuable to risk-averse investors who make their deposit decision without knowing the exact timing of their future disbursements. Thus, the deposit contract makes everybody better off. The bank attracts depositors and earns a profit, and the investors can readily access their funds without sacrificing too much of the higher return of the illiquid assets.

Diamond and Dybvig then show that this contract also implies that the bank is subject to runs. Recall that the bank gives all depositors the choice to withdraw before maturity if they need their funds early. What if a larger-than-expected fraction of depositors withdraw before maturity? Will the bank have enough funds left to pay out all depositors who wait until maturity? The bank can make good on the promised payment to depositors who wait until maturity only if it does not have to sell too many of its illiquid assets at a large discount to serve depositors who withdraw early. If it sells a large fraction of its illiquid assets to make good on a larger-than-expected number of early withdrawals, the remaining assets of the bank will not allow it to pay the promised return at maturity (because too many illiquid assets have been sold at a large discount). In fact, it is possible that the return paid at maturity is lower than that paid on early withdrawals.

If depositors believe that there will be a large number of withdrawals before maturity, they will run to the bank to withdraw their funds, even if they don't need the money. For this reason, a bank run can occur because investors believe that a sufficiently large number of other depositors will not wait until maturity to withdraw their funds, which will force the bank to sell its illiquid assets at a large discount, reducing the actual payment the bank can make to depositors who wait until maturity. This provides a perfectly rational explanation for a bank run, which is tied to the very nature of the deposit contract.

reissued. Because the banks did not have to suspend the convertibility of deposits or sell their illiquid assets at fire-sale prices during the crisis, economic activity is likely to return to its precrisis level. This requires that the central bank is not constrained by the quantity of gold in its vaults. In other words, the central bank must be able to create unbacked outside money in large quantities at short notice to prevent the collapse of inside money.[9]

The New Federal Reserve Confronts Major Challenges

The classical gold standard could not adjust quickly enough to respond to banking crises and other sudden fluctuations in financial markets, but outside money issued by the Federal Reserve could. Congress created the Federal Reserve in 1913 to provide an elastic supply of outside money that would smooth out fluctuations in short-term interest rates, and to serve as a lender of last resort for the banking system. Other advanced economies already had central banks, and economists understood the benefits of an elastic money supply provided by a central bank. However, although the Federal Reserve had the legal authority to provide liquidity to the financial system, it did not use this power to stop the collapse of the banking system during the early 1930s.

Without Federal Reserve intervention, widespread bank failures led to the contraction of inside money in the U.S. economy. In documenting the severe decline of the money supply at the outset of the Great Depression, American economists Anna Schwartz and Milton Friedman showed that the bank failures and the ensuing destruction of inside money accounted for the unprecedented decline in aggregate liquidity. From 1929 to 1933 the money supply declined by a third.

This severe contraction of the money supply was a painful learning experience for the Federal Reserve. As Schwartz and Friedman pointed out, had the Federal Reserve issued outside money at short notice by purchasing the illiquid assets of the banking system (that is, by making widespread loans to struggling banks), it could have prevented the destruction of inside money associated with bank runs.

Depositors run on American Union Bank early in the Great Depression in the aftermath of the stock market crash in 1929. GL ARCHIVE/ALAMY

The Federal Reserve learned its lesson: Since the Great Depression, it has been careful to provide emergency liquidity to failing banks.[10]

Therefore, the monetary system was remarkably stable until the 1960s. However, shadow banks (that is, financial institutions that operate outside of the federal regulatory framework but engage in the same activities as traditional banks) have blurred the boundaries between investment and commercial banking. Financial innovations and the deregulation of the financial system have changed the landscape of the monetary and banking systems, and new forms of inside and outside money have emerged.[11] Cryptocurrencies are one of those new forms.

What's New in Money

No matter what specific form they take, cryptocurrencies are either outside or inside money.

New Outside Moneys

Digital instruments such as Bitcoin and Ethereum have become enormously popular in recent years. Indeed, the market capitalization of just these two cryptocurrencies was $634 billion as of January 23, 2023. What makes cryptocurrencies like Bitcoin and Ethereum unique in monetary history is that they are unbacked (that is, fiat) outside money not issued by a government agency.

Can a cryptocurrency evolve into a currency system in which privately created outside money plays the same role as government-issued outside moneys in the existing payment systems?[12] In this scenario, the same relationship between outside and inside money would inevitably develop. For instance, we would expect to see crypto banks 1) issuing deposits that are a promise to pay Bitcoins to their depositors, and 2) holding Bitcoins as reserves to make good on their promises. In other words, each Bitcoin held by a crypto bank would be backing several Bitcoins of deposits. But if the supply of Bitcoin is inelastic, it will likely destabilize the monetary system, and that will severely limit its adoption by market participants worldwide and its development as a viable monetary standard. (Although I use Bitcoin as an example, my argument holds for other existing cryptocurrencies.)

The problem is that, to avoid major fluctuations in value, Bitcoin (and other cryptocurrencies) would have to fluctuate in value within a narrow band relative to a basket of major sovereign currencies. This would require frequent adjustments in the supply of Bitcoins in response to major events in financial markets. Every other currency that has evolved into a stable monetary system has necessarily developed mechanisms to provide sufficient elasticity to avoid major fluctuations in value.[13] But so far, no concrete steps have been taken to ensure that Bitcoin (or any other major cryptocurrency) operates as an elastic currency as defined in this article.

Can Bitcoin or any other cryptocurrency ever have this elasticity? Although a developer can predetermine certain features of a cryptocurrency, it is not clear how this elasticity can be programmed into a cryptocurrency protocol.[14] It appears that decentralization on the one hand, and the control of the supply of cryptocurrency in light of aggregate economic conditions on the other, are contradictory features of cryptocurrencies. These two features might never be reconciled within a unified framework.

Based on the accumulated experience and the theoretical research in monetary economics, it is hard to believe that any existing cryptocurrency will soon emerge as a sound monetary system, as opposed to a speculative investment vehicle.[15] Many issues need to be resolved before cryptocurrencies can revolutionize the international monetary system. After all, it took the incumbents many years to develop solutions for these problems. Why should it be any different for cryptocurrencies?

New Inside Moneys

As I have argued, one of the key functions of money is to be a store of value, which requires that the money have a relatively stable value. But cryptocurrencies have been quite volatile, making them more like a speculative investment than a stable source of value. To address this issue, stablecoins—a crypto inside money—were designed to provide a stable, temporary investment vehicle in the crypto environment as investors shifted their values from one cryptocurrency to another. Stablecoin issuers have learned that investors value this investment vehicle because its convertibility seems to promise stability. For this reason, stablecoins have emerged as an alternative to traditional investment vehicles. Indeed, some stablecoin issuers offer attractive interest payments on balances transferred to their stablecoins.

Because stablecoins work in such a simple way, their issuers can pitch them as being like another popular inside money: traditional bank deposits. Currently, the two major stablecoins according to their market capitalization are Tether and USD coin.[16] Tether is pegged to the U.S. dollar; its value has fluctuated within a narrow band around $1. Its issuer, Tether Limited, constantly manages the supply of Tether by creating and destroying tokens according to predetermined rules, and it publishes its reserves at a public web site, which enhances the credibility of the convertibility of Tether tokens into U.S. dollars.[17] USD coin is also pegged to the U.S. dollar. Its issuer, a consortium founded by Circle (a peer-to-peer payments technology company), claims that it is fully collateralized by U.S. dollars. Like Tether, USD coin had—until the recent collapse of Silicon Valley Bank, where USD coin had deposited its reserves—maintained its value within a narrow band around $1.

Stablecoin issuers report that the assets backing their tokens include deposit accounts at financial institutions, government bonds, and even some risky financial assets such as commercial paper. They report that these assets are held in custodial accounts at partner banks. In reality, it is not clear what types of assets stablecoin issuers hold as collateral for their tokens. Many stablecoin issuers claim that their tokens are fully backed by U.S. dollars, but the issuers do not specify the types of dollar assets it holds, so it is not clear whether all dollar assets backing stablecoins are safe assets, such as bank deposits and government bonds, or risky assets, such as commercial paper. No regulatory mechanism verifies the types of assets and corresponding balances in custodial accounts.

To sum up, stablecoins are digital tokens that promise to be

fully convertible into U.S. dollars, just like bank deposits. Stablecoin issuers use the proceeds from the issuance of tokens to buy dollar-denominated assets to serve as reserves. The issuers manage the supply of tokens so as to maintain a value of around $1 in secondary markets, which they believe makes the convertibility of their tokens into dollars credible. Issuers can then market stablecoins as being as safe as bank deposits.

The historical example of state banks in the antebellum U.S. can help us understand stablecoin issuers.[18] These early banks issued bank notes to finance their assets. Bank notes are a liability for the issuing bank, and antebellum banks were required to post state government bonds to secure their bank notes. Because state bonds fluctuated in value considerably in the antebellum period, bank runs could occur when the value of state bonds collapsed and depositors lost confidence in their bank.[19] Early banks did not have access to a lender of last resort, nor were their liabilities guaranteed by any federal insurance scheme. The same is true for stablecoins today.

The recent run on two major stablecoin issuers demonstrates the problems associated with creating inside money outside of the regulated financial system. TerraUSD is a stablecoin hosted by the Terra Network and created by South Korea's Terraform Labs. Investors were attracted to TerraUSD because they could earn returns of nearly 20 percent annually by lending their TerraUSD holdings via Anchor Protocol, a decentralized bank for crypto investors. Until May 2022, TerraUSD's value remained very close to $1, as intended by its issuer, and it was the third-largest stablecoin, with a market capitalization of $18 billion. But on May 9, its value declined suddenly to 90 cents following large withdrawals from Anchor Protocol. As in a typical bank run, the initial withdrawals on May 9 led to further withdrawals, and within a few days TerraUSD was trading at approximately 20 cents. TerraUSD has not recovered from that crisis and, as of the writing of this article, was trading at roughly 2 cents.

Recent crypto bank runs demonstrate that we can learn a lot from the existing banking system. Pointing to the history of the U.S. banking system, Yale University professor of economics Gary Gorton and Georgetown University law professor Jeffrey Zhang argue that only regulation can turn stablecoins into a stable form of inside money. They point out the similarities between stablecoins and the antebellum banking system, and they argue that we should expect stablecoins to be unstable stores of value subject to runs unless the government provides some form of regulation. If stablecoin issuers are not forced to fully back their tokens with short-term government bonds, they conclude, then stablecoins will likely suffer runs as investors test the implicit peg associated with the stablecoin contract.

Another possibility is to bring stablecoins under the banking regulatory framework, created after 1913. This would allow stablecoin issuers to back their tokens with a portfolio of assets, including privately issued assets such as commercial paper. Critics of this proposal argue that the regulation of stablecoins along the lines of traditional banks will stifle innovation. However, they do not provide a solution to the inherent instability of inside money that takes the form of demand deposits.

Final Remarks

It is likely that in the not-so-distant future, our money will be entirely digital, and cryptocurrencies will likely play an important role in this new monetary system. However, this transition will inevitably be slow and bumpy, requiring both experimentation and prudence. At the very least, a stable cryptocurrency standard requires that unbacked digital tokens—which are, despite their novelty, just another outside money—acquire the properties of an elastic currency, as defined in this article. And without government regulation, such as a requirement that stablecoins be fully backed by short-term government bonds, digital tokens that take the form of demand deposits via currency pegs—which, despite their novelty, are just another inside money—are likely to suffer runs. EI

Notes

1 Cryptocurrencies are digital tokens created in a network of computers. Network participants can trade these tokens without needing a central authority. This is possible because tokens use cryptography to validate these transactions. I provide a detailed description of the protocol behind Bitcoin in my *Economic Insights* article "Bitcoin vs. the Buck: Is Currency Competition a Good Idea?"

2 This is how Ricardo Lagos defines outside money in his article "Outside and Inside Money" in *The New Palgrave Dictionary of Economics*.

3 A bank note was a negotiable debt instrument issued by a private bank. It was a promise to pay a certain amount of gold on demand to whoever presented the bank note for redemption at the issuing bank. This redemption option was exercised infrequently, so bank notes remained in circulation for a considerable period. For more on bank notes and the banks that issued them, see my *Economic Insights* article "The Free-Banking Era: A Lesson for Today?"

4 Anna Schwartz and Milton Friedman provide a rigorous analysis of the evolution of the U.S. monetary system in *A Monetary History of the United States, 1867–1960*.

5 Illiquid assets usually earn a higher yield than liquid assets, but they cannot be easily sold before maturity. Even if the bank finds a buyer for its illiquid assets, the latter will usually agree to purchase them only at a large discount.

6 Bank runs can also occur when bank deposits are backed by assets that fluctuate in value. Because the value of a bank's assets is likely to decline if aggregate economic output declines, a bank may suffer a run simply because the economy is struggling. (Gary Gorton and, subsequently, Franklin Allen and Douglas Gale developed theories of financial intermediation that formalize the view that financial crises can be the result of severe economic downturns, as opposed to a random event in which depositors withdraw from the banking system because they believe other depositors will do the same.) Although here the cause is different, the result is the same: the destruction of inside money and the ensuing credit contraction in the economy.

7 Michael Bordo provides a statistical analysis of the main properties of the gold standard in the U.S. and the UK. His key finding is that the gold standard provides remarkable long-run price stability compared to other monetary arrangements.

8 American economist Gary Gorton documents the real effects of all U.S. panics during this period, with the most severe crises occurring in 1873, 1893, 1896, and 1907.

9 Although the banks pledge their illiquid assets to receive a temporary loan during a banking crisis, the value of their assets is certainly lower than the loan amounts.

10 However, the short-term solution to bank fragility came from another branch of the Federal government: It was the Federal Deposit Insurance Corporation (FDIC) that prevented further widespread commercial bank failures in the U.S. But if the federal government were to insure deposits, it needed to guarantee banking stability by regulating and supervising commercial banks and other related financial institutions. So the FDIC required commercial banks to pay a premium proportional to the value of deposits issued. The proceeds from premium payments formed a fund that could be used to guarantee the deposits of any insolvent bank. In a systemic crisis, many banks could become insolvent at the same time, and the guarantee fund could not be sufficient to make good on the deposits of all insolvent banks. Consequently, banks were regulated to ensure that the value of their assets was, under most scenarios, sufficient to pay depositors. Otherwise, the FDIC would become insolvent.

11 For instance, Gary Gorton and Andrew Metrick argue that repurchase agreement contracts (or repos) were the inside moneys that played a central role in the collapse of aggregate liquidity during the 2008 Global Financial Crisis.

12 Minneapolis Fed economist Warren Weber developed this idea in his article "A Bitcoin Standard: Lessons From the Gold Standard."

13 Gaetano Antinolfi, Elisabeth Huybens, and Todd Keister show that a central bank can provide an elastic currency by running a discount window, which allows for adjustments in the money supply to smooth out fluctuations in short-term interest rates and to prevent a liquidity crisis in the banking system. Their theoretical analysis demonstrates that an elastic supply of outside money is a stabilizing force in the monetary system, effectively ensuring its future existence. In other words, by providing a stable store of value to households and firms, an elastic currency is likely to increase its adoption and prevail as a viable monetary system.

14 The idea of programming the path of the supply of government currency as a way of achieving a stable monetary framework was proposed by Milton Friedman. Although his idea was widely acknowledged in the academic community, his critics doubted its feasibility.

15 Three other problems will likely prevent Bitcoin from playing a major role in the broader monetary system. First, it is extremely costly and time-consuming to update the public ledger. Indeed, the environmental costs associated with the mining of Bitcoin are not negligible. Second, the blockchain technology is vulnerable to hacker attacks. And third, there is a stigma associated with Bitcoin because some people use it to trade in banned goods (such as narcotics) and evade taxes.

16 Source: CoinGecko's web site: https://www.coingecko.com.

17 The web site is currently at URL https://tether.to/en/transparency.

18 Gary Gorton and Jeffery Zhang have pointed out the similarities between stablecoins and antebellum banks in their recent article "Taming Wildcat Banking."

19 Arthur Rolnick and Warren Weber have argued that fluctuations in asset values accounted for the bulk of banking failures during the Free Banking (pre-1863) Era in the U.S.

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The Pros and Cons of Housing Market Investors

Are investors bad for the housing market? And if so, how should policymakers address this problem?

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

Housing is of utmost importance to the economy at both the micro and macroeconomic scales. On the micro scale, the typical American household's largest asset is their home, and the majority of properties are lived in by their owners. (That is, they are "owner occupied," and their owners are "owner-occupants.") On the macro scale, housing market fluctuations can wreak havoc on the nation's financial stability. Housing's importance at both scales is highlighted by two recent episodes: the boom and bust leading up to the Great Recession and, later, the pandemic runup in housing prices. Both episodes affected almost everyone–and both raised concerns among policymakers about housing market investors' (HMIs') increasing presence in this market. Houses are intended to shelter people, and some worry that physically absent, financially motivated owners may harm the homes' occupants, by either extracting excessive rents or destabilizing markets.

So, should policymakers restrict HMIs? For example, should policymakers impose a transaction tax that discourages the trading of properties? Or should they police investors through the mortgage market by making it harder for them to borrow money to buy a house they don't intend to live in?

First, we need to find out whether HMIs are good or bad for the housing market. In reality, there are few bright-line distinctions between "good" and "bad" HMIs. In many cases, being a "good" or "bad" investor depends on the investor's particular actions rather than their status as a nonoccupant (that is, one who does not live in the property they own). Although there are legitimate concerns about certain investors

Who or What Is an HMI?

The academic literature and trade press use varying definitions and categorizations of "housing market investors." In this article, I define an HMI as someone who owns a property for its financial return and not for their own use. This definition differentiates an HMI from an owner-occupant and also ignores vacation homes (which are not regularly occupied but are held for the use of the owner). In some cases, the HMI's property will be rented out, making the HMI a landlord, and the financial return is a cash flow of rental payments from the home's occupant. In other cases, the HMI's property will be held vacant, possibly while undergoing renovation, with the HMI intending to resell the property for a capital gain. Under the broad heading of "HMIs," different motives, strategies, and behaviors lead to different implications for market stability and welfare.

Being a "good" or "bad" investor depends on the investor's particular action rather than their status as someone who does not live in the property they own.

speculating on homes, and thereby exacerbating cycles and driving out owner-occupants, there are also many ways HMIs can improve welfare. For example, HMIs may provide liquidity in a downturn; improve matching efficiency between buyers and sellers by "market-making"; and return idle, foreclosed homes to the market in the form of rental properties.

Some HMIs Destabilize

Some HMIs have speculative motives: They buy homes exclusively for the purpose of gaining from their resale, not for renting to other occupants (and not for themselves to live in).[1] An owner-occupant may be tied to a home because of its fit for their household composition or because of their neighborhood attachment. But HMIs, being driven by financial motives, are more likely to react to short-term changes in the price of a home. This means that their reactions to even slight changes in the housing market can amplify price movements. If they believe housing prices are about to increase, the market may be flooded by speculative buyers, intensifying price growth and hurting affordability. But if they believe prices are about to decrease, speculative owners may rapidly sell their properties, cratering prices and undermining the wealth of owner-occupants.

There is empirical evidence that speculator HMIs are active in housing booms. (Later in this article, I discuss whether such HMIs cause housing booms.) Using housing transaction and listing data for the U.S. in the 2000s, economists Anthony DeFusco and Charles Nathanson of Northwestern University and Eric Zwick of the University of Chicago show that buyers who do not expect to own their properties for long–and especially if they do not intend to live in their properties–are more active during housing booms.[2] They find that speculators were most active in housing markets in which cycles were especially volatile, such as Phoenix and Las Vegas (Figure 1). Many of these buyers bought late in the cycle, listing properties for sale after the transaction volume and prices had begun to decline.

Further empirical evidence suggests that many of these speculative investors are novices. Duke University economists Patrick Bayer, Christopher Geissler, and James Roberts and I show that new, inexperienced investors often enter the market during price booms.[3] Some can earn high gross profits if they accurately predict price increases, but some are left with properties purchased at the peak. In separate research, Bayer, Roberts, and I show that new investors are more likely to enter the market if they see other investors active in their own residential neighborhoods.[4] These influenced investors tend to fare worse even than investors with comparably little experience.

But does activity by speculators cause the boom-bust cycle? DeFusco, Nathanson, and Zwick say "yes." They built a model of housing market dynamics featuring buyers with differing motives for purchasing and with different holding tenures, all with limited information about the fundamental demand for property in the market. Theoretically, if HMIs were highly sophisticated and well informed, they would accurately predict future prices. However, because the model's HMIs lack adequate information, they rely on recent price trends to predict future prices. Thus, if prices have recently increased, HMIs predict that prices will continue to rise throughout the time they expect to own their property. That can lead to destabilization, with HMIs buying while prices are increasing, irrespective of what the market is signaling about a property's true value. Some HMIs may thus end up holding on to properties well past their market peak, which exacerbates volatility if HMIs then decide to sell their properties all at once. And that is precisely what DeFusco, Nathanson, and Zwick find had happened in many real-world U.S. housing markets during the housing boom and bust surrounding the Great Financial Crisis.

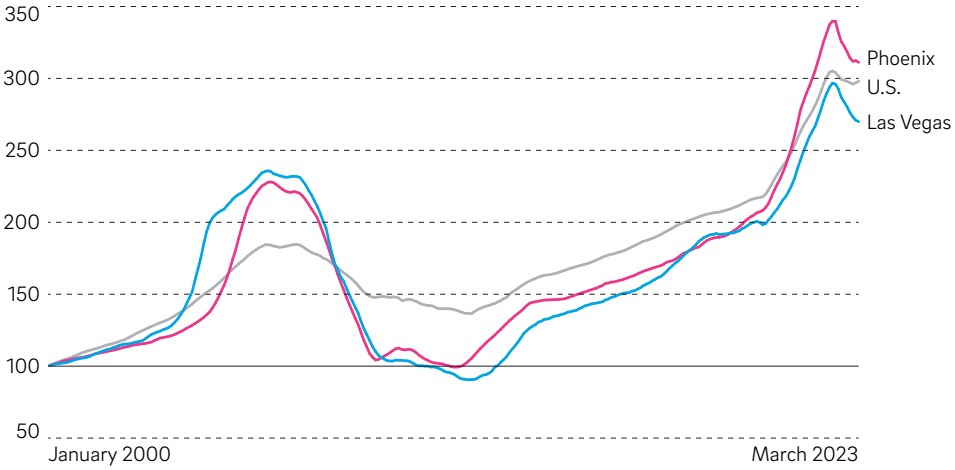
Based on these findings, I conclude that if we want to develop a theory of how investors destabilize housing markets, we need to consider information quality and investor sophistication in addition to HMIs' financial motivations.[5] A model of the economy in which everyone acts rationally does not exhibit the same boom-bust dynamics, even when HMIs are present. Limited information and extrapolation–that is, the use of the recent past to predict the future–are important features of the housing market. And they are made

FIGURE 1

Speculators Were Most Active in Volatile Markets

Phoenix and Las Vegas were particularly volatile.

Housing price index, 2000=100



Source: S&P/Case-Shiller Home Price Index.

By 2010, new construction had halted as prices collapsed in Las Vegas. TREKANDSHOOT/ISTOCK

Phoenix's growth also slowed as prices slumped, but then later resumed. PHOTOVS/ISTOCK

even more relevant by the presence of so many investors who are market novices.[6]

These theoretical results are corroborated by empirical research that isolates causality thanks to a statistical technique called instrumental variables. Because it is not clear what comes first, price increases or investor entry, researchers use variation in instrumental variables, or factors that exist outside a local housing market but have an indirect effect on it, to predict the market entry of various types of investors. For example, researchers have used economic shocks in distant locations to predict out-of-town buyers;[7] the prevalence of vacation properties in a market's distant history to predict second-home buying;[8] and state-level variation in capital gains taxes to predict the entry of speculative HMIs.[9] In each case, the results indicate that investor activity exacerbated local price cycles.

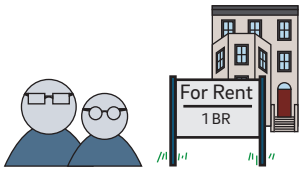
Some HMIs Stabilize

Just because all HMIs have financial motives for buying properties does not mean that they all destabilize the housing market. Yes, speculators tend to "chase" trends in the market, amplifying market volatility and leaving them overexposed when the market inevitably crashes. But other HMIs are neither speculators nor novices.

Some HMIs, for example, are landlords, who earn returns by renting their properties rather than from capital gains, and so are likely less vulnerable to the price fluctuations that speculators watch so closely. Recent research has found that landlords became more active in purchasing during the market downturn following the Great Financial Crisis, stabilizing prices by setting a floor for demand.[10]

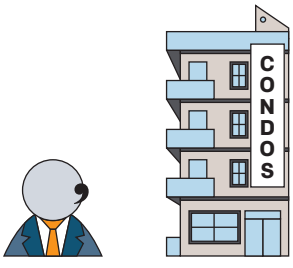
Other HMIs earn a capital gain not by speculating but rather by functioning as a market-making "dealer": They buy distressed properties from eager sellers and return the homes to market relatively quickly. As Bayer, Geissler, Roberts, and I note, speculators buy infrequently and tend to hold their properties longer (often for one to two years) before reselling them. Middlemen, however, frequently buy properties at a discount and quickly resell them (usually in less than a year, and often in just a few months). These investors are "middlemen" because they

The welfare implications of an investor's activity thus depend on the type, behavior, and strategy of the investor.



Landlords

Middlemen



Speculators

create a market where none previously existed. The middleman makes a profit not by selling when the market is "hot," but rather by buying from a property owner so eager to sell, they are willing to accept a price cut.

Both landlords and middlemen tend to stabilize housing markets. Notably, the activities of these more experienced, higher-volume HMIs are countercyclical: They buy in periods of lower demand. This is in accord with their apparent strategy, which is to buy properties when the sales price is declining, not during exuberant hot markets. In doing so, they provide a counterweight to fluctuating demand for housing and protect home prices from intense market swings.

HMIs' Effects on Welfare

Some HMIs benefit noninvestors, while others harm them.

For example, Bayer, Geissler, Roberts, and I, as well as, separately, economist Philippe Bracke of the UK Financial Conduct Authority, find that investors pay less than the expected market value for the properties they acquire.[11] This suggests that, upon resale, investors may be making a profit that might have otherwise been a surplus for buyers and sellers who live in these homes.[12] Moreover, recent work indicates that HMIs make housing less affordable by disproportionately increasing prices of the cheaper properties that function as "starter homes" for first-time homebuyers.[13]

On the other hand, intermediaries can improve the matching efficiency in the market. In this scenario, a purchase discount is evidence that the HMI is buying from an urgent seller. Unlike the seller, this more patient HMI can wait for a buyer willing to spend more for the home. This would improve the match quality—and the seller would make more money from the transaction—while the buyer would be able to buy the home they want at a price that reflects the reality of the local housing market.

In addition to matching efficiency, certain HMIs can affect welfare through the capacity utilization of housing. An occupied house is delivering housing services. But if a house is lying vacant—either because it is held up in a foreclosure proceeding or because a speculative owner is trying to time the market—it is a wasted resource, and no one is benefitting from the property's housing service. If HMIs buy foreclosed homes held idle by financial institutions and return the properties to market, they help deliver housing services to (new) occupants.

Thus, the welfare implications of an HMI's activity depend on the type, behavior, and strategy of the HMI. My work with Bayer, Geissler, and Roberts indicates that speculators likely harm societal welfare. Even aside from the possible destabilizing effects of their activity, the loss of property utilization to speculation is probably significant. Middlemen, unlike speculators, likely have a neutral to a positive effect on welfare, because the properties they purchase are not vacant for long and because they help match those properties with buyers. Moreover, property "flippers" often make physical improvements to their properties, restoring viable housing stock in housing markets suffering from a lack of investment. In short, more people use and benefit from properties when HMIs purchase distressed properties and return them to market. In areas where investors are more active, there are fewer vacant properties, and properties spend less time in foreclosure.[14]

How Policy Could Address HMIs

The complex nature of HMIs creates challenges for policy design. As we have seen, HMIs do not necessarily destabilize the housing market, and some HMI activity may actually make the market work better for everyone. Admittedly, it is unambiguously bad when speculators leave homes idle. But a restriction on HMIs could discourage market-making, liquidity-providing, and demand-stabilizing investors. And besides, restricting all housing transactions may burden owner-occupants more than HMIs. So, rather than limiting all HMI buying, policymakers may want to target the socially less-desirable HMI activities. But it is challenging to design such a precise policy.

One proposed policy is a Tobin tax, which levies a "round trip" transfer tax on the prices paid at purchase and sale.[15] Originally suggested for currency trades,

the policy is simple and clear, and it discourages quick and frequent flipping of properties. But it also taxes "good" transactions among owner-occupants, landlords, and middlemen. This is where it matters that housing is a real consumption good, not just a financial instrument.

Hence, transfer taxes like the Tobin tax may have perverse effects, as found by economists Lu Han of the University of Wisconsin at Madison and L. Rachel Ngai and Kevin Sheedy of the London School of Economics, who studied Toronto's Land Transfer Tax (LTT). By comparing transactions in the City of Toronto to transactions in the greater Toronto area, they found that the LTT reduced the percentage of homes occupied by their owners and increased the number of landlords. The authors reason that because the LTT discouraged frequent house trading, households with a shorter expected tenure in their homes opted to rent instead of buy and sell.[16] This also leads to an overall decline in liquidity, with households moving less frequently and homes for sale spending more time on the market. Overall, the distortions of this transfer tax have led to substantial welfare losses, especially for owner-occupants.

A transfer tax could be designed to target specific investors, but doing so requires a way to define the investor before they buy the property. Take, for example, the Taiwanese housing market, which for several years levied a housing transfer tax based on how long the owner owned the property. Under this graduated tax regime, the tax, which was paid by the seller at the point of sale, declined after one year of property ownership and then dropped to zero at two years. Investors responded predictably: They held homes for two years and then sold them all at once, avoiding the tax altogether.[17]

There are alternative taxes. Like transfer taxes, capital gains taxes discourage speculation. By basing a capital gains tax on the length of the holding period, policymakers could avoid taxing (most) owner-occupants. (The sharp graduation of taxes in the Taiwanese market remains a cautionary tale.) However, capital gains taxes also tax property dealers and thus limit their market-making function. This is relevant to middlemen because they tend to buy at a discount and earn their returns from the individual property's rapid capital gain, not from marketwide appreciation. Moreover, HMIs often invest in their properties during the holding period, and a capital gains tax would have to deduct the cost of these physical improvements. Otherwise, the tax would discourage property owners from improving their properties. Accounting for all revenues and deductions would effectively turn each instance of a property flip into something more like a business tax return, meaning that the application of this tax instrument would be very complicated in practice.

To target the underutilization of housing, local governments could use property taxes rather than transactions taxes. This would discourage the holding (but not the trading) of properties. Moreover, property taxes are well established in most American communities, and it is politically and practically easier to use a preexisting tool rather than introduce a new one. (Some communities already apply a lower tax rate to properties owned by their occupants, often through a "homestead exemption.") However, there are practical challenges here, too. Disparate property taxes would have to avoid taxing landlords. Otherwise, landlords would likely pass the tax on to renters. To avoid taxing owner-occupants and landlords, the property tax would have to be on a vacant house the current owner never lived in—a condition that may be difficult to enforce.

Policymakers could instead focus on how investors finance their purchases. For example, a policy could target the price an HMI pays for a mortgage. This already occurs to some extent. Homeownership enjoys tax benefits, including the mortgage interest deduction, which benefits owners who use their properties themselves.[18] In the mortgage market, private lenders compensate for the increased risk of default by charging owners who don't live in their properties a higher interest rate.

Policymakers could expand this spread. They could even have different spreads for rented properties, vacant properties, and properties that are being renovated. An extreme policy would ban any financing of investment properties.

Rather than limiting all investor buying, policymakers may want to target the socially less-desirable activities of housing market investors.

Speculative investors have driven a boom in condominium construction in Toronto. BENEDEK/ISTOCK

Policies that target how investors finance their purchases may seem like an oblique instrument compared with, say, transfer taxes. However, implicitly "taxing" HMIs' activity through the financing channel has several attractive features. First, it taxes the more financially destabilizing investor. When loans are cheap and easy to acquire, investors can more easily speculate with borrowed money. Increasing the cost of holding a property (though not necessarily the cost of acquiring it) would counteract this tendency. Second, it taxes the speculator HMI more than the middleman. The dollar cost of a mortgage tax would increase while the property is being held, discouraging idle property holding. Also, the cost is thus proportional to the purchase price. Because experienced middlemen tend to buy at a steeper discount, they can reduce their exposure to this policy. Third, although the total mortgage tax increases with each month the property is held, it is unrelated to the eventual sales price. This would discourage speculators from holding out for a higher sales price, reducing the length of time that properties remain vacant and smoothing the boom-bust dynamics characterized by DeFusco, Nathanson, and Zwick.

However, there are challenges to implementing such a proposal. Unlike a simple transfer tax, no level of government directly controls mortgage rates. Any mortgage tax would have to be enforced through financial policy, perhaps through the Federal Housing Finance Administration's oversight of government-sponsored enterprises (such as Fannie Mae). Also, unlike a transfer tax, which can be controlled by municipalities, an effective mortgage tax would have to be implemented at the federal level, making it harder to tailor the tax to local market conditions. It also may be harder to enact, because a federal policy would require political support from a wide constituency. Furthermore, even in the private mortgage market as it stands now, occupancy misreporting is already rampant: To avoid the nonoccupant mortgage price, many HMIs (falsely) declare on their mortgage applications that they intend to live in the property, secure in the knowledge that no one will follow up on their claim.[19] Without stricter enforcement of existing rules, an additional mortgage tax on HMIs would presumably exacerbate the problem of misreporting. Finally, a policy would have to target the specific behavior of the "bad" investor without giving the investor a way to avoid the tax. Currently, there is scant literature about how investors use and interact with the financial system, making this a welcome area for further research.

A policy would have to target the specific behaviour of the "bad" investor without giving the investor a way to avoid the tax.

A problem inherent in any of the above proposals is how to identify which homebuyers are HMIs. As evidenced by occupancy misreporting, many buyers are unlikely to state their intentions up front, to their financial detriment, unless forced to do so. It would be costly to verify whether a property is occupied by the owner, rented to another occupant, or left vacant. Besides, an investor's objectives may change while they own a property. For example, an HMI may intend to speculate on the home at the time of purchase but ultimately rent it to tenants. Finally, the composition of the types of investors that participate in the market can vary in unforeseeable ways across time and business cycles. Much of the recent literature on housing investors has shown that the post-Great Recession HMI is more likely an institution than an individual. These institutions probably have deeper pockets and greater financial sophistication, though perhaps inferior knowledge of the local housing market. No one could have foreseen this development before the Great Recession.

Hence, the policies discussed in this article target types of investors by policing behaviors consistent with the type. This is why we need to understand and document the behaviors of HMIs. Specifically, we need to identify behaviors that destabilize the housing market or damage societal welfare and that might respond to policy. Policy will be more successful and easier to implement if it focuses on specific behaviors and does not lump all investors together.

Notes

1 Gao, Sockin, and Xiong (2020) say that such HMIs are a "nonfundamental source of demand."

2 DeFusco, Nathanson, and Zwick (2022).

3 Bayer, Geissler, Mangum, and Roberts (2020).

4 Bayer, Mangum, and Roberts (2021).

5 See Scheinkman and Xiong (2003).

6 See Glaeser and Nathanson (2017).

7 See Chinco and Mayer (2016).

8 See Garcia (2022).

9 See Gao, Sockin, and Xiong (2020).

10 See Mills, Malloy, and Zarutskie (2019) and Lambie-Hanson, Li, and Slonkosky (2022).

11 Bayer, Geissler, Mangum, and Roberts (2020) and Bracke (2021).

12 This does not imply that the total surplus—the size of the pie—of a transfer from seller to buyer is reduced, only that the intermediary took some of the pie. Note that a buyer can earn a surplus by purchasing for a price less than their innate value of the property.

13 See Garriga, Gete, and Tsouderou (forthcoming).

14 See Lambie-Hanson, Li, and Slonkosky (2022).

15 Most jurisdictions in the U.S. have some form of a tax on deed transfers. At issue is whether such taxes discourage investor behavior and thus can be used as a policy instrument to affect investor participation in the market. Moreover, transfer taxes can be disproportionately levied on investors. For example, Ontario, Canada, imposes a Non-Resident Speculation Tax on properties purchased by foreign buyers.

16 Han, Ngai, and Sheedy (2022).

17 See Chi, LaPointe, and Lin (2022).

18 The mortgage interest deduction extends to second homes (as in, vacation properties) but not the investor-owned properties that are the focus of this article. The maximum deduction at the tax-return level is $750,000, meaning that the sum of the first and second home mortgage interest payments count as a single deduction.

19 See Griffin and Maturana (2016) and Elul, Payne, and Tilson (2023).

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Photo: Mumemories/iStock

Regional Spotlight

State Business Cycles vs. COVID

Our state business cycle dating algorithm was no match for COVID-19.

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The views expressed in this article are not necessarily those of the Federal Reserve. The authors thank Ryan Kobler for converting our original state business cycle dating algorithm into useful computer code.

The COVID-19 pandemic disrupted lives, livelihoods, and economies–abruptly and severely. This was true for the U.S. economy and for all 50 states.

The pandemic also affected key processes for gathering economic data and for assessing economic trends. Our state coincident indexes and our state business cycle algorithm were no exception.

In 2015, we developed an algorithm that uses our state coincident indexes to determine the peaks and troughs for each state's business cycle.[1] Regional economists value this consistent delineation of state business cycles as a starting point for their own research.

However, the pandemic introduced two key problems.

First, our state coincident indexes rely heavily on data from the Bureau of Labor Statistics (BLS). As the pandemic began to disrupt the economy in March 2020, the abrupt, severe economic changes presented numerous challenges to the BLS in maintaining its production of consistent, reliable monthly estimates of state unemployment rates and payroll jobs. The resulting

idiosyncrasies in the official BLS statistics directly influenced our state coincident indexes, leading our algorithm to frequently assign a state's peak as March 2020, rather than February.[2]

In addition, we designed our algorithm with a set of simple, objective criteria intended to reflect the subjective decision-making process of the Business Cycle Dating Committee (BCDC) of the National Bureau of Economic Research (NBER). Those criteria included a minimum duration of four months to qualify as a new phase of a business cycle. However, in July 2021, the BCDC broke with convention: Although it noted that the pandemic-driven contraction was uncharacteristic of other recessions, the BCDC affirmed that the severe pandemic contraction would be considered a recession with a peak in February 2020 and a trough in April 2020—despite being a mere two months long. The BCDC's decision forced us to reexamine our algorithm's criteria.[3]

In this article, we briefly review the general intent of state business cycle dating, including the development of our 2015 algorithm. We also explore the atypical aspects of the BCDC's recession determination during the pandemic, and we document how our algorithm performs in relation to the pandemic.

Next, we justify our decision to break from our own convention and treat the pandemic downturn as a recession. In the process, we delineate the duration of each state's unique pandemic recession. However, we conclude that we don't need to change our original algorithm—barring future pandemics.

Understanding Business Cycles

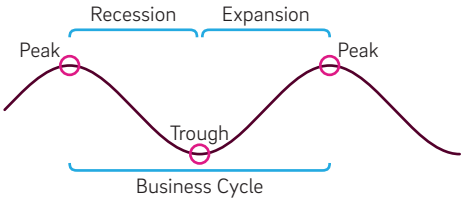
To understand why the pandemic disrupted business cycle dating, we must first understand business cycles.

Economists often characterize fluctuations in economic activity as alternating periods of expansion and contraction (or recession).[4] For well over 60 years, economists have usually deferred to the NBER's dating of the U.S. business cycle.[5] In 1978, the NBER formed its BCDC to determine the peaks and troughs in economic activity. According to the NBER, "a recession is a period between a peak and a trough, and an expansion is a period between a trough and a peak" (Figure 1).

FIGURE 1

Economists Characterize Fluctuations in Economic Activity as Alternating Periods of Expansion and Contraction (or Recession)

The National Bureau of Economic Research is the acknowledged expert for identifying peaks and troughs for the U.S. economy.



In determining a recession, the BCDC does not follow a fixed formula, but rather forms judgments. "The NBER's traditional definition of a recession is that it is a significant decline in economic activity that is spread across the economy and that lasts more than a few months."

In its determinations, the BCDC focuses on a monthly chronology, considers a range of monthly economic indicators, and accounts for both the duration between turning points and the depth of a downturn.

However, there is no committee (let alone 50 committees) to determine individual state business cycles, so, many regional economists use our state coincident indexes to identify state-level business cycles.[6]

We designed our state coincident indexes to model the underlying growth of a state's economy using an assortment of available data. We use three monthly variables (nonfarm payroll employment, average hours worked in manufacturing, and the unemployment rate) plus one quarterly variable (real wages and salaries plus proprietors' income) to reveal an underlying (or hidden) monthly variable that represents a state's economic growth.[7] This is a suitable proxy for the "range of monthly measures of aggregate real economic activity published by federal statistical agencies," which are used by the BCDC to date the national business cycle.[8]

However, an individual state's coincident index is inherently more volatile than the U.S. coincident index, because the underlying state data are more volatile than the U.S. data and the U.S. coincident index smooths out variation among the states. This makes it hard for researchers to determine each state's peaks and troughs.

In 2015, we developed an algorithm that uses our coincident indexes to determine business cycle dates for all 50 states.[9] First, we calibrated our coincident index for the U.S. economy against the five U.S. recessions since 1979 (as determined by the NBER). This allowed us to establish relatively simple, straightforward criteria that we could apply to the state indexes.

These criteria included a minimum duration and a minimum intensity for the periods determined to be recessions and expansions between the demarcated peaks and troughs. This calibration enables us to supplant the BCDC's subjective decision-making process with an objective algorithm.

Without the minimum-duration and minimum-intensity criteria, we would find a much higher frequency of recessions in many states. Greater volatility is one reason. However, a state may also experience significant job losses in the aftermath of a hurricane, a labor strike, or a corporate merger accompanied by layoffs. Generally, the negative effects from such an event do not persist for more than a month or two. Moreover, such shocks are typically limited to only a few states, if not just one. Although individuals and families impacted by such shocks experience significant economic hardship, economists tend to differentiate these short-lived, idiosyncratic events from recessions.[10]

*See **Determining State Peaks and Troughs**.*

However, significant economic shocks are often the trigger for national economic recessions. So, what should we make of the COVID-19 pandemic, which caused employment in most states and the nation to plummet for just two months (or less) before recovering?

An Atypical Recession

The two-month pandemic recession was not a typical recession.

In a November 2021 op-ed for the *New York Times*, Austan

Goolsbee, now serving as president of the Federal Reserve Bank of Chicago, noted that the pandemic was not a recession in the normal sense, although it was an economic disaster for some.[11] "Past business cycles look nothing like what the United States has gone through in the pandemic," Goolsbee wrote, "so [economic forecasters] are [looking in] the wrong place to find lessons for where things are going now." The path of recovery depends more on "how quickly we can control the spread of the virus than it is about recession fundamentals."

The NBER had already acknowledged this difference and broke two conventions in doing so.

On June 8, 2020, the BCDC determined that U.S. economic activity had reached a peak in February 2020 and that a recession had begun, bringing a sudden end to the longest expansion (at 128 months) since at least 1854.[12] "The unprecedented magnitude of the decline in employment and production, and its broad reach across the entire economy," the BCDC announced, "warrants the designation of this episode as a recession, even if it turns out to be briefer than earlier contractions."

Declaring the peak after observing only three more months of data was an unusually fast determination and a break from convention (Figure 2). The BCDC typically waits for one or two years of data revisions before dating a peak or trough, but the sheer size of the decline afforded confidence that the decline would not be revised away.

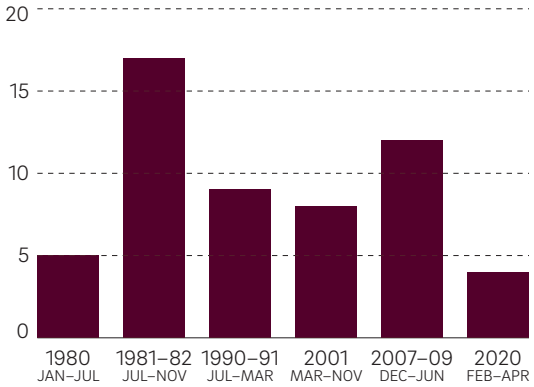
On July 19, 2021, the BCDC announced that U.S. economic activity had reached its trough in April 2020, affirming that this was (at two months) "the shortest U.S. recession on record."[13] The BCDC reiterated that a recession (usually) involves "a decline in economic activity that lasts more than a few months," but in a second break from convention it chose to declare this two-month contraction an exception because of the severity and the reach of the decline (Figure 3).

In this case, the BCDC noted "that the pandemic and the public health response have resulted in a downturn with different characteristics and dynamics than prior recessions."

FIGURE 2

The NBER Was Unusually Quick to Identify the COVID Recession

Number of months from the beginning of a recession to the NBER's announcement that a recession had occurred, 1978–2023



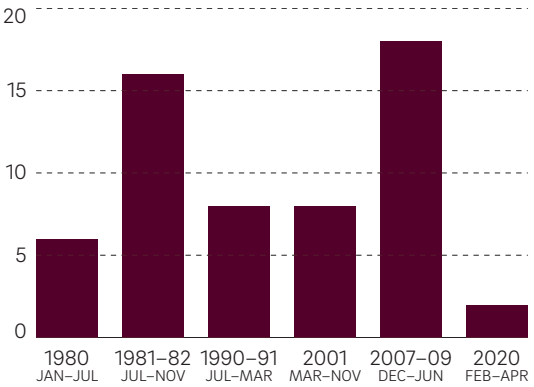
Source: National Bureau of Economic Research.

FIGURE 3

Recessions Usually Last Several Months

But the COVID recession was unusually short.

Duration of a recession in months, 1978–2023



Source: National Bureau of Economic Research.

Our Algorithm During COVID

With or without new criteria, our algorithm fails to adequately capture state-level recessions during the pandemic period. When we use our original criteria with our latest re-estimated coincident indexes, our algorithm identifies a recession in only 13 states (Figure 4).[14] The problem is the duration of the decline, not its depth.

The onset of the pandemic triggered a sudden and severe decline in payroll jobs and a concomitant rise of state unemployment rates to extreme levels in all 50 states. In turn, extreme declines in our state coincident indexes easily surpassed the threshold for a recession in all states and in the nation.

To understand just how extreme these declines were, let's examine the deepest one-month decline for each of the 50 states during the pandemic and during the Great Recession. During the Great Recession, these numbers range from −0.3 percent (in Georgia) to −3.3 (in West Virginia), but during the pandemic they range from −3.8 percent (in Arkansas) to −52.4 (in Michigan). The average decline for all 50 states during the pandemic was −22.0 percent (Figure 5).

The common thread during COVID was April, which saw the severest decline in every state's coincident index except Wyoming, where the index fell most steeply in May.[15]

However, the worst of the pandemic was very brief. The downturn lasted no more than three months in 37 states and the nation (exactly two months in 14 states and the nation; just one month in 12 states) (Figure 6).

Moreover, most of the 13 states where the downturn was long enough to qualify as a recession did so only because they happened to have experienced a few months of modest decline immediately before and/or after the onset of the pandemic (Figure 7). Only West Virginia, Wyoming, and (just barely) New Jersey exhibited the depth and duration of a typical recession prior to February, when the pandemic began to influence the economy.

West Virginia and Wyoming—the nation's largest coal-producing states—were still coping with downturns in the coal industry

when the pandemic hit. As for New Jersey, its recession might have ended in October 2019–a short, shallow recession like the ones in Louisiana and Maine in mid-2019.

When we change the algorithm's criteria to allow for a recession of only two months, we identify 38 states and the nation as in recession, but we still miss 12 states (Figure 8).

However, if we allow a two-month downturn to qualify as a recession, then we identify dozens of additional state-level recessions (and expansions) from 1979 through 2019. Most of the additional recessions would simply be representative of the greater volatility in state economic data, especially among smaller state economies.

Although a few additional recessions might result from identifiable, state-level idiosyncratic events, such as a hurricane or labor strike, economists would not categorize most of these events as a trigger for a new business cycle.

Researchers can allow for a two-month recession or stick with the minimum four-month standard, but neither option is ideal.

Discretion and Convention

Like the NBER, we decided to break with convention.

For general research purposes, we feel that the pandemic is best treated as a severe negative shock, like a labor strike or hurricane, rather than as another turn of the business cycle.

Moreover, the subsequent recovery had little in common with a typical expansion. Rather, the economy appeared to do as well as possible in the face of ongoing attenuated negative shocks from the pandemic–that is, the shocks were much smaller than before but still a constraint on the full resumption of activity.

However, for specific questions, a researcher may prefer to call the pandemic downturn a recession. As there are no "right" answers, we've made the following decision regarding how we date each state's business cycle.

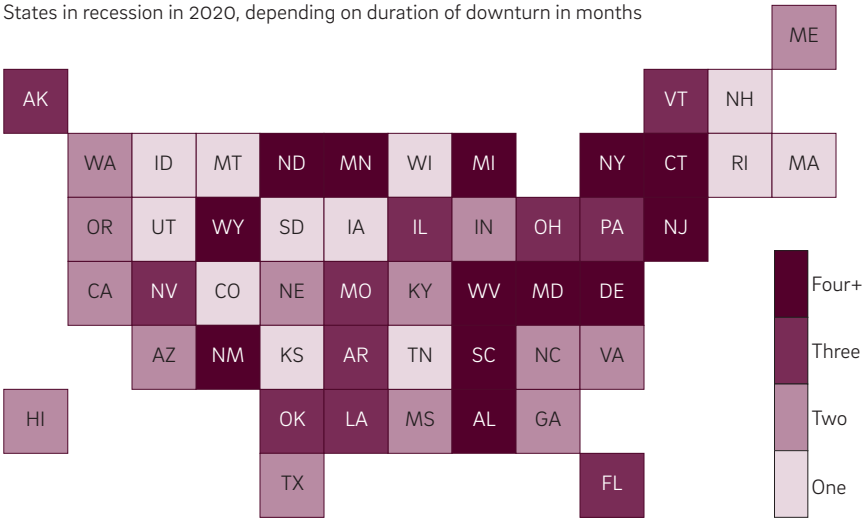
In the spreadsheet available on the State Coincident Indexes webpage–provided as a tool for researchers–we identify the peaks and troughs for all 50 states using our traditional criteria across the entire time frame, except for the negative months adjacent to March 2020. Regardless of whether an individual state's pandemic contraction lasted for one month or several months, we indicate a recession in all 50 states. However, we distinguish the 13 states for which our algorithm would have identified a recession, and further highlight the three states in which a recession was already underway.[16]

Ultimately, each researcher must use their own discretion in how they treat a given state's pandemic-related recession.

FIGURE 6

If We Allow for a Briefer Recession, We Identify More States in Recession

States in recession in 2020, depending on duration of downturn in months



Source: State Coincident Indexes, Federal Reserve Bank of Philadelphia.

FIGURE 4

According to Our Algorithm, a COVID Recession Occurred in Only 13 States

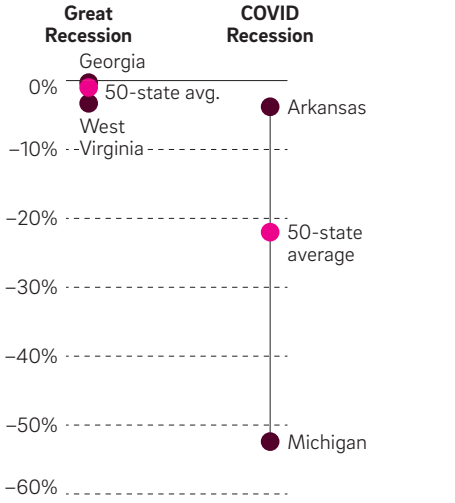
States in recession during COVID, 2020

Source: State Coincident Indexes, Federal Reserve Bank of Philadelphia.

FIGURE 5

COVID's One-Month Declines Dwarfed the Great Recession's Declines

Range of the deepest one-month economic declines for states during the Great Recession (2007–2009) and the COVID recession (2020)

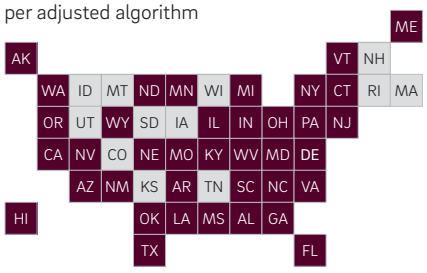


Source: State Coincident Indexes, Federal Reserve Bank of Philadelphia.

FIGURE 8

When We Allow for a Two-Month Recession, 38 States Were in Recession

States in recession in 2020, per adjusted algorithm

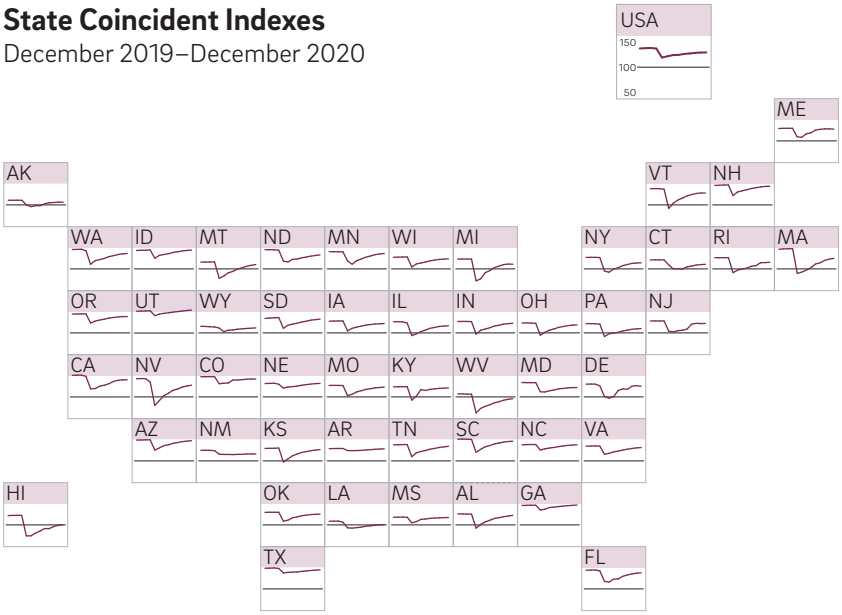


Source: State Coincident Indexes, Federal Reserve Bank of Philadelphia.

FIGURE 7

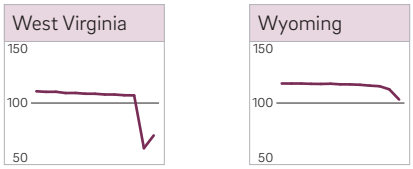
State Coincident Indexes

December 2019–December 2020

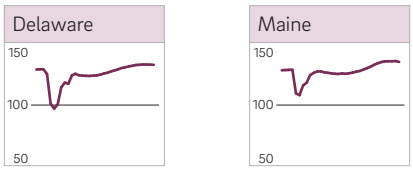


Source: State Coincident Indexes, Federal Reserve Bank of Philadelphia.

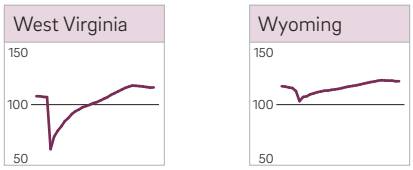
At Least Two States Were Already in Recession
May 2019–May 2020



Two Relapsed Before Full Recovery
Dec 2019–Sep 2022



Two Fell into Recession After Full Recovery
Dec 2019–Sep 2022



Resuming Our Algorithm

Although we reinstituted our algorithm after we had identified each state's pandemic recession, we recommend that researchers continue to use discretion.

In the wake of the severe pandemic contraction, the recoveries in two states failed to attain a new, higher peak before lapsing into another recession. The economies in Delaware and Maine had partially recovered by November 2020, establishing a local peak, before experiencing a mild relapse starting in December 2020. Delaware's recession lasted four months through March 2021; the duration in Maine was five months, ending in April 2021. In light of the ongoing pandemic, one might characterize these two recessions as a resurgence of the pandemic shock. The path of COVID-19 cases in Maine seems to support this interpretation; Delaware may require further explanation.[17]

By September 2022, the coincident indexes for all 50 states had recovered and risen above their prepandemic levels. However, our algorithm identified two states that fell back into a recession after attaining a new peak: our two coal-dependent states.

The West Virginia economy attained a new peak in March 2022, followed by a recession that appears to have ended in August. Likewise, Wyoming's economy peaked in April 2022, followed by an August 2022 trough.

In addition, the Iowa, Kansas, and Vermont economies appear to have peaked in April or May. The subsequent declines in their coincident indexes have been deep and long enough to constitute a recession. However, their declines continued through September 2022. We recommend caution until the BLS revises the initial data underlying the indexes and we have re-estimated our coincident indexes with that new data.[18]

Conclusion

COVID-19 was bad for the economy and challenging for economic analysis. Although the NBER called the resulting downturn a recession, it had to break with convention to do so. We agree with the NBER that this was a contraction. And it was certainly costly in lives and money. But a typical business cycle? No.

When applied to the pandemic period, our algorithm identified only 13 states as being in recession. Just two or three of those states would have been in a recession were it not for the pandemic. To reflect the reality of the atypical pandemic downturn, we, like the NBER, broke from convention and suspended our algorithm for the pandemic-induced contraction.

However, researchers can decide what information in our spreadsheet is appropriate for their own work–whether to treat these deep but brief one- or two-month contractions as recessions followed by relatively quick recoveries, or as a series of shocks that attenuated over time.

We agree with Goolsbee. We shouldn't treat what happened in 2020 like just another recession, which means we should be cautious when drawing comparisons between the pandemic period and past recessions and recoveries. A corollary is that we should not expect future business cycles to behave like the pandemic's contraction and recovery.

Now that all 50 states have resumed a more conventional economic path, there is no compelling reason to alter our algorithm for future state business cycle dating. However, we reserve the right to once again exercise discretion if another pandemic occurs.

From now on, we will annually publish our latest state business cycle dates for all 50 states. This research tool will enable researchers to explain and interpret a state's business cycle as they see fit.[19]

Determining State Peaks and Troughs

We start by identifying all peaks and troughs with the general understanding that the period following a peak through the subsequent trough is a recession, while the period following a trough through the subsequent peak is an expansion. But we use two additional criteria to qualify a period as a recession or expansion: duration and intensity. More specifically, a recession or expansion must extend for at least four months, and the absolute value of the sum of the period's monthly changes must equal or exceed the variance for that state's coincident index. (We define the variance as the average of the absolute value of the monthly percent changes [calculated as a log difference] in a state's coincident index.)[20]

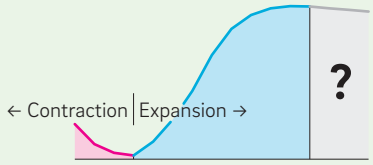
Thus, we identify a recession (after a peak) if the sum of at least four consecutive monthly changes is negative and if the absolute value of the sum equals or exceeds the variance for that state's coincident index. If the decline following a peak is too short or too shallow, then that period fails to constitute a recession (and that peak is discarded). Instead, the period becomes an extension of the ongoing expansion, which will end after a subsequent peak followed by a qualifiable recession (Figure 9).

And we identify an expansion (after a trough) if the sum of at least four consecutive monthly changes is positive and if the sum equals or exceeds the variance for that state's coincident index. If the increase following a trough is too short or too shallow, then that period fails to constitute an expansion (and that trough is discarded). Instead, the period becomes an extension of the ongoing recession, which will end after a subsequent trough followed by a qualifiable expansion.

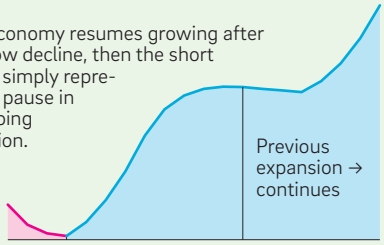
FIGURE 9

A Shallow Decline in Our Index Does Not Always Denote a Recession

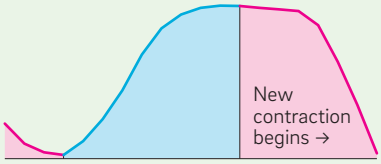
Brief, shallow swings in the data present a challenge: Whether a shallow decline becomes a recession is determined by the economic path that follows.



If the economy resumes growing after a shallow decline, then the short decline simply represents a pause in an ongoing expansion.



If the economy's decline deepens after a shallow decline, then the initial short decline becomes part of a new contraction.



Notes

1 See Flora (2016). Our algorithm relies on our state coincident indicators. For details on technical changes to the state coincident index model since 2016, see Changes to Methodology: State Coincident Indexes at https://www.philadelphiafed.org/-/media/frbp/assets/surveys-and-data/coincident/methodology.pdf.

2 See added explanations in our State Coincident Indexes releases, March 2020 through January 2022—especially May 2022. For technical changes by the BLS, see "SAE Methods Overview" and "LAUS Methods Overview."

3 See NBER (2020).

4 See the Congressional Research Service (2023) for a useful primer on business cycles.

5 The NBER began publishing business cycle dates in 1929. The U.S. Department of Commerce began to reference the NBER's business cycle peaks and troughs in 1961; the U.S. government does not produce an alternative. For more information, see NBER (2022).

6 See Owyang, et al. (2005).

7 Our coincident indexes are retrended to reflect the long-term growth rate of each state's gross state product. See the Federal Reserve Bank of Philadelphia's State Coincident Indexes page.

8 See NBER (2022).

9 See Flora (2016).

10 Hurricane Katrina, which made landfall in Louisiana in late August 2005, is a notable exception. Our algorithm flags a deep, four-month recession in Louisiana, concentrated

in September. There's also a sharp decline in neighboring Mississippi's coincident index, but that decline is limited to just September.

11 See Goolsbee (2021).

12 See NBER (2020).

13 See NBER (2021).

14 We revised our state coincident indexes in late March, after the BLS released its annual benchmark revisions of key state data and we had time to re-estimate each state's model. As we did in the prior two years, we excluded the extreme, pandemic data from after December 2019 during our re-estimation. We made a similar decision in applying our algorithm: When estimating the variance for each state, we excluded data from after December 2019.

15 Although the coincident index fell somewhat in March across most states, it continued its steady growth path in 14 states.

16 Because the data underlying our state coincident indexes are subject to annual revisions, the state business cycle results can change, so future state business cycle dates will vary from the results accompanying this article.

17 Maine's relative isolation in the northeast corner of the U.S. helped delay the state's first significant wave of infections until the winter of 2020–2021. As of May 15, 2023, Maine had the third-lowest all-time incidence of cases among all 50 states and the fourth-highest percentage of fully vaccinated residents, and it was tied with Massachusetts for the second-highest rate of seniors boosted with the bivalent vaccine (*New York Times*, accessed May 25, 2023, last updated May 15, 2023).

18 Although we have data through the end of 2022 and into 2023, September 2022 is the most recent month to have passed through the BLS's annual benchmark revision process. Subsequent months are subject to additional significant revisions. Like the NBER, we choose to wait until the data has been revised (at least once) before assigning business cycle peaks and troughs.

19 We re-estimate and update our coincident indexes each spring following the BLS's release of annual benchmark revisions of payroll employment and unemployment rates. Our annual state business cycle dating results will follow soon after.

20 A state-specific variance measure is used to acknowledge that a state's business cycle may have a smaller or greater amplitude than the nation's cycle. We excluded months following December 2019 to avoid the extreme values of the pandemic period.

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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.

The Changing Polarization of Party Ideologies: The Role of Sorting

U.S. congressional roll-call voting records show that as polarization of the two parties along the economic dimension changes, polarization along the social/cultural dimension tends to change in the opposite direction. A model of party competition within a two-dimensional ideology space is developed in which party platforms are determined by voters who compose the party. It is shown that if distribution of voter preferences is radially symmetric, polarization of party ideologies along the two dimensions are inversely related, as observed. The model gives a remarkably good quantitative account of the historically observed movements in polarization along the two dimensions.

WP 23-07. Satyajit Chatterjee, Federal Reserve Bank of Philadelphia Research Department; Burcu Eyigungor, Federal Reserve Bank of Philadelphia Research Department.

Lockdowns and Innovation: Evidence from the 1918 Flu Pandemic

Does social distancing harm innovation? We estimate the effect of nonpharmaceutical interventions (NPIs) — policies that restrict interactions in an attempt to slow the spread of disease — on local invention. We construct a panel of issued patents and NPIs adopted by 50 large U.S. cities during the 1918 flu pandemic. Difference-in-differences estimates show that cities adopting longer NPIs did not experience a decline in patenting during the pandemic relative to short-NPI cities and recorded higher patenting afterward. Rather than reducing local invention by restricting localized knowledge spillovers, NPIs adopted during the pandemic may have preserved other inventive factors.

WP 20-46 Revised. Enrico Berkes, The Ohio State University; Olivier Deschênes, University of California, Santa Barbara, IZA, and NBER; Ruben Gaetani, University of Toronto; Jeffrey Lin, Federal Reserve Bank of Philadelphia Research Department; Christopher Severen, Federal Reserve Bank of Philadelphia Research Department.

Model Averaging Prediction for Possibly Nonstationary Autoregressions

This paper considers the problem of model averaging (MA) predictions for the integrated autoregressive processes of infinite order (AR(1)), which accommodates many stationary and nonstationary models in practice. We adopt the MA approach to forecast future observations and obtain the uniformly asymptotic expression for the mean squared prediction error (MSPE) of the averaging predictor. The MSPE can be decomposed into three components: nonstationary integration order, model complexity, and goodness-of-fit. The decomposition justifies that the advantage of MA comes from the diverse model intersections and provides the separation conditions under which the MA can attain strictly lower MSPE over model selection (MS). Regarding the predictive risk reduction by MA, it can be shown that the magnitude of MA improvement has the same order as the oracle minimum risk of MS under algebraic-decay case, while the magnitude is negligible under exponential-decay case. To pick the best choice of weights, we propose Shibata model averaging (SMA) criterion and show that, even without the integration order information, the selected weights by minimizing SMA and its variants including AIC-type and Mallow's MA criteria are asymptotically optimal in the sense that: (i) The probability of a criteria minimizer with positive weights on models of dimension less than the integration order is negligible almost surely; (ii) The averaging predictor formed by the selected weights will ultimately achieve the lowest possible MSPE.

WP 23-08. Tzu-Chi (Simon) Lin, Supervision, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department.

Monetary Policy with Racial Inequality

I develop a heterogeneous-agent New-Keynesian model featuring racial inequality in income and wealth, and study interactions between racial inequality and monetary policy. Black and Hispanic workers gain more from accommodative monetary policy than White workers mainly due to higher labor market risks. Their gains are larger also because a larger proportion of them are hand-to-mouth, while wealthy White workers gain more from asset price appreciation. Monetary and fiscal policies are substitutes in providing insurance against cyclical labor market risks. Racial minorities gain even more from an accommodative monetary policy in the absence of income-dependent fiscal transfers.

WP 23-09. Makoto Nakajima, Federal Reserve Bank of Philadelphia Research Department.

A Structural Approach to Combining External and DSGE Model Forecasts

This note shows that combining external forecasts such as the Survey of Professional Forecasters can significantly increase DSGE forecast accuracy while preserving the interpretability in terms of structural shocks. Applied to pseudo real-time from the second quarter of 1997 onward, the canonical Smets and Wouters (2007) model has significantly smaller forecast errors when giving a high weight to the SPF forecasts. Incorporating the SPF forecast gives a larger role to risk premium shocks during the global financial crisis. A model with financial frictions favors a larger weight on the DSGE model forecast.

WP 23-10. Thorsten Drautzburg, Federal Reserve Bank of Philadelphia Research Department.

Market-Making with Search and Information Frictions

We develop a dynamic model of trading through market-makers that incorporates two canonical sources of illiquidity: trading (or search) frictions, which imply that investors can rebalance their portfolio only with a delay, and information frictions, which imply that market-makers face some degree of adverse selection. We use this model to study the effects of various technological innovations and regulatory initiatives that have reduced trading frictions in over-the-counter markets. Our main result is that reducing trading frictions can lead to less liquidity, as measured by bid-ask spreads. The key insight is that more frequent trading makes investors' behavior less dependent on asset quality. As a result, dealers learn about asset quality more slowly and set wider bid-ask spreads to compensate for this increase in uncertainty. We also show that widening bid-ask spreads do not necessarily correspond to a decline in trading volume or welfare.

WP 18-20 Revised. Benjamin Lester, Federal Reserve Bank of Philadelphia Research Department; Ali Shourideh, Carnegie Mellon University; Venky Venkateswaran, NYU Stern School of Business and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar; Ariel Zetlin-Jones, Carnegie Mellon University and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar.

Market Concentration in Fintech

This paper discusses concentration in consumer credit markets with a focus on fintech lenders and residential mortgages. We present evidence that shows that concentration among fintech lenders is significantly higher than that for bank lenders and other nonbank lenders. The data also show that the overall concentration in mortgage lending has declined between 2011 and 2019, driven mostly by a reduction in concentration among bank lenders. We present a simple model to show that changes in lender financial technology (interpreted as improvements in quality of loan services) explain more than 50 percent of the increase in fintech market shares and 43 percent of the increase in fintech concentration. This change in concentration in the fintech industry may have important implications for regulatory policy and financial stability.

WP 23-11. Dean Corbae, University of Wisconsin–Madison, NBER, and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar; Pablo D'Erasmo, Federal Reserve Bank of Philadelphia Research Department; Kuan Liu, Sam M. Walton College of Business, University of Arkansas.

Micro- and Macroeconomic Impacts of a Place-Based Industrial Policy

We investigate the impact of a set of place-based subsidies introduced in Turkey in 2012. Using firm-level balance-sheet data along with data on the domestic production network, we first assess the policy's direct and indirect impacts. We find an increase in economic activity in industry-province pairs that were the focus of the subsidy program, and positive spillovers to the suppliers and customers of subsidized firms. With the aid of a dynamic multiregion, multi-industry general equilibrium model, we then assess the program's impacts. Based on the calibrated model, we find that, in the long run, the subsidy program is modestly successful in reducing inequality between the relatively underdeveloped and more prosperous portions of the country. These modest longer-term effects are due to the ability of households to migrate in response to the subsidy program and to input-output linkages that traverse subsidy regions within Turkey.

WP 23-12. Enghin Atalay, Federal Reserve Bank of Philadelphia Research Department; Ali Hortaçsu, University of Chicago; Mustafa Runyun, Boston College; Chad Syverson, University of Chicago; Mehmet Fatih Ulu, Koç University.

Partisanship and Fiscal Policy in Economic Unions: Evidence from U.S. States

Partisanship of state governors affects the efficacy of U.S. federal fiscal policy. Using close election data, we find partisan differences in the marginal propensity to spend federal intergovernmental transfers: Republican governors spend less than Democratic governors. Correspondingly, Republican-led states have lower debt, (delayed) lower taxes, and initially lower economic activity. A New Keynesian model of partisan states in a monetary union implies sizable aggregate effects: The intergovernmental transfer impact multiplier rises by 0.58 if Republican governors spend like Democratic governors, but due to delayed tax cuts, the long-run multiplier is higher with more Republican governors, generating an intertemporal policy trade-off.

WP 20-20 Revised. Gerald Carlino, Federal Reserve Bank of Philadelphia Research Department Emeritus Economist; Thorsten Drautzburg, Federal Reserve Bank of Philadelphia Research Department; Robert Inman, The Wharton School of the University of Pennsylvania and NBER; Nicholas Zarra, New York University Stern School of Business.

"Let Us Put Our Moneys Together": Minority-Owned Banks and Resilience to Crises

Results suggest that minority-owned banks improved economic resilience in their communities during the global financial crisis (GFC) and the COVID-19 crisis through increased small-business and household lending, but fewer benefits are found during other phases of the business cycle. Our results are robust and stand up to treatments of identification concerns, including propensity score matching (PSM) and instrumental variables (IV). Our results imply that if all U.S. banks behaved in a manner consistent with minority-owned banks through the GFC, at least 1.9 million more minority jobs would have been maintained and at least $50 billion more in credit would have been available to small businesses on an annual basis. These findings are consistent with predictions of the economic resilience literature but not those of the finance-growth nexus literature.

WP 23-13. Allen N. Berger, University of South Carolina; Maryann P. Feldman, Arizona State University; W. Scott Langford, Arizona State University; Raluca A. Roman, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department.

Data in Focus

Survey of Professional Forecasters and the Unemployment Rate

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

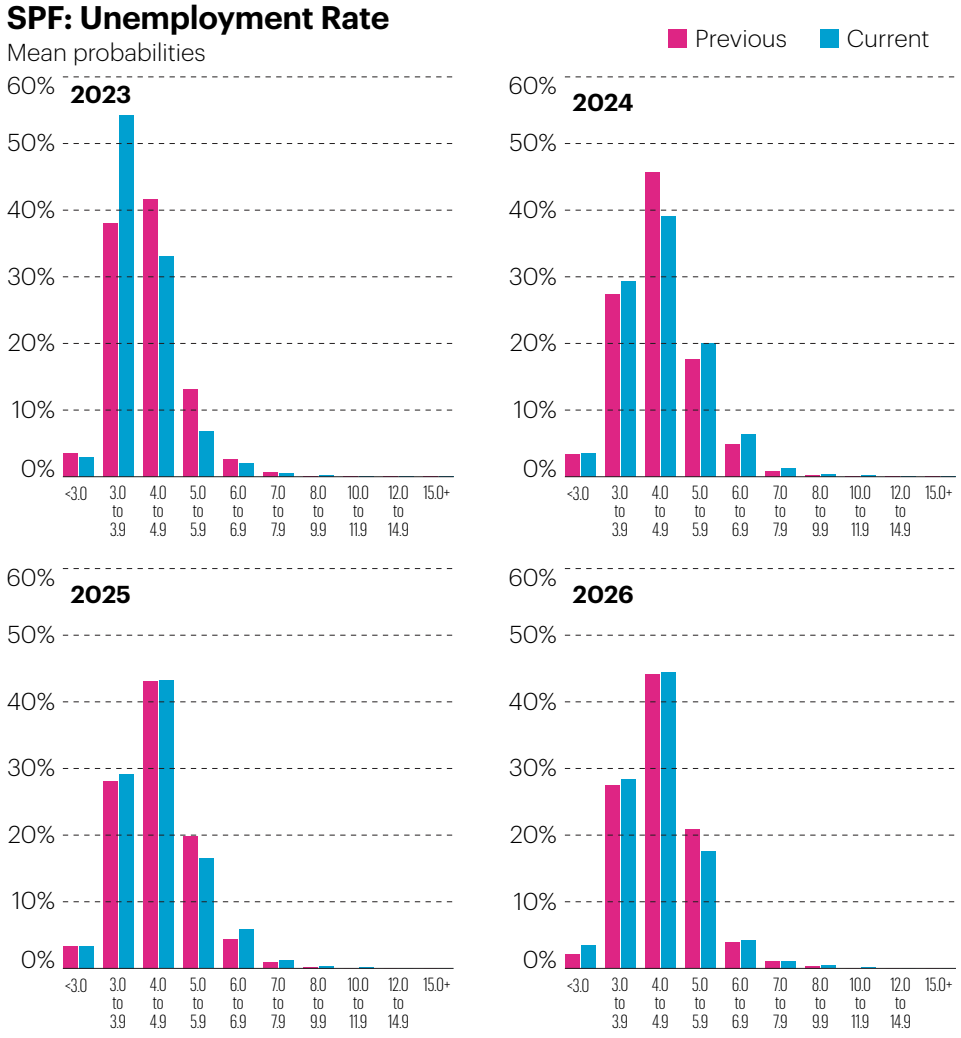
In the second-quarter 2022 issue of *Economic Insights*, we highlighted our Survey of Professional Forecasters (SPF), the oldest quarterly survey of macroeconomic forecasts in the U.S. As we wrote then, when the National Bureau of Economic Research (NBER) decided to discontinue the survey in 1990, the Philadelphia Fed adopted this orphan and added several forecasts for key variables.

In that issue, we focused on just one of these variables: real GDP growth. In this Data in Focus, we feature another variable, the unemployment rate. As with real GDP growth, we display the forecasts for the unemployment rate as mean probabilities for each of the next four years. For example, in the first-quarter 2023 survey, respondents predicted, on average, a 42 percent probability that the unemployment rate would be between 4.0 and 4.9 percent in 2023, but in the second-quarter 2023 survey that percentage dropped to 33 percent. Meanwhile, the predicted probability of an unemployment rate between 3.0 and 3.9 percent in 2023 increased from 38 to 54 percent.[1] This reflects rising expectations for lower unemployment.

As the U.S. navigates the economy's recovery from the unprecedented COVID pandemic, economists will likely use the SPF as the gold standard for their own forecasts and models. EI

SPF: Unemployment Rate

Mean probabilities



Source: Real-Time Data Research Center, Federal Reserve Bank of Philadelphia.

Notes

1 The Real-Time Data Research Center released the results of the first-quarter 2023 survey on February 10 and the results of the second-quarter 2023 survey on May 12. The Center is due to release the results of its third-quarter survey on August 11. All survey results appear on the Survey of Professional Forecasters webpage.

Learn More

Online: https://www.philadelphiafed.org/surveys-and-data/real-time-data-research/survey-of-professional-forecasters

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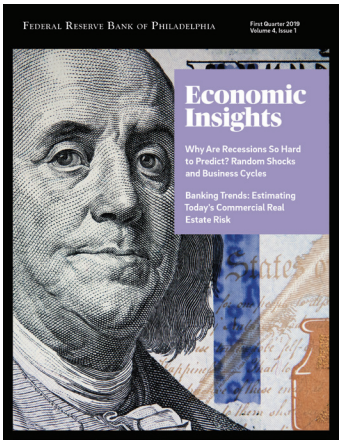

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