Photo: FG Trade/iStock

The Pandemic Mortgage Boom

We learn a lot about the mortgage market by understanding why it defied expectations during the pandemic.

Natalie Newton
Research Analyst
FEDERAL RESERVE BANK OF PHILADELPHIA

James Vickery
Senior Economic Advisor and Economist
FEDERAL RESERVE BANK OF PHILADELPHIA

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

The U.S. mortgage market experienced a surprising boom in 2020 and 2021, with new lending reaching an all-time high in excess of $4 trillion per year. The boom is particularly striking in light of the challenges the mortgage market faced as the COVID-19 pandemic took hold in the U.S. in March 2020. The emergence of the virus led to financial market disruptions and a short but deep recession, prompting concerns about a potential spike in mortgage defaults and foreclosures and the possible failure of mortgage lenders and servicers. Understanding the mortgage boom is important because mortgages are by far the largest component of household debt and because mortgage market conditions significantly affect the housing market, household spending, and financial stability.

In this article, we present facts about the pandemic mortgage boom and discuss the reasons why the mortgage market was able to prosper during a period of such economic uncertainty. We find that record-low interest rates, a relatively rapid economic recovery, and surging home prices all contributed in important ways to the lending boom. Underlying these outcomes, government policy actions, including expansionary monetary and fiscal policy and policies to stabilize mortgage intermediaries, played a significant role in supporting the mortgage and housing markets.

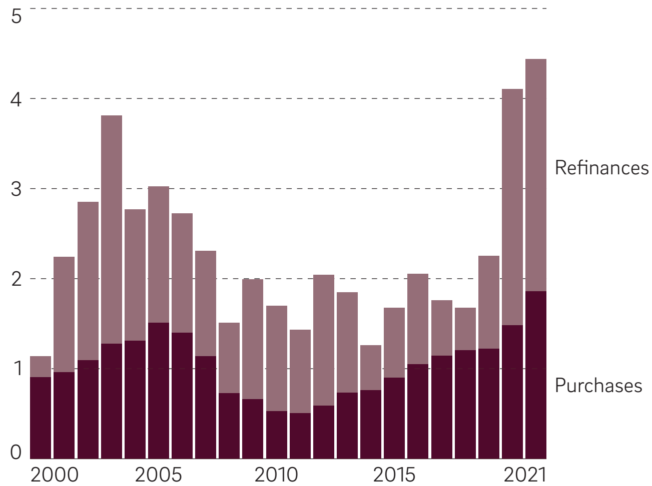
We also highlight some important limits of the boom. First, the mortgage industry faced significant capacity constraints as originators scrambled to expand lending in a challenging operating environment. As a result, only part of the decline in financial market yields was passed along to mortgage borrowers in the form of lower interest rates. (Yield in this context refers to the rate of return over the life of a fixed-income security such as a Treasury bond or mortgage-backed security.) In other words, although fixed mortgage rates fell to record lows below 3 percent in 2020 and 2021, rates could have been even lower if the credit supply had been more elastic.

Second, the low-rate environment did not benefit all mortgage borrowers equally. Mortgage rates did not fall as much for certain types of loans, such as those for large "jumbo" mortgages not eligible for government-backed credit guarantees. And Black, Latino, and Asian borrowers were less likely to refinance and thereby benefit from lower mortgage rates. This inequality in refinancing opportunities highlights the potential benefits of alternative mortgage contracts designed to allow mortgage rates to decline automatically along with market rates, sparing the borrower from needing to refinance.

FIGURE 1

Mortgage Lending Surged to Record Levels in 2020 and 2021

First-lien mortgage originations on single-family homes, purchase mortgages, and refinances, trillions of dollars, 2000–2021



Source: Mortgage Bankers Association via Haver Analytics.

FIGURE 2

The Lending Boom Was Linked to a Drop in Mortgage Rates

The same thing happened during the earlier refinancing wave of 2002–2003.

Benchmark market interest rate on 30-year fixed-rate conforming residential mortgages, 2000–2022

Source: Freddie Mac Primary Mortgage Market Survey.

The Boom in Context

Lenders originated $4.1 trillion in new mortgage loans in 2020—a new record, and much higher than nominal lending volume in any year since 2003 (Figure 1). The torrid pace of lending continued in 2021, with an even higher $4.4 trillion of originations.[1]

This surge in lending was closely connected to lower mortgage interest rates. The Freddie Mac benchmark 30-year fixed mortgage rate fell below 3 percent for the first time in July 2020 and remained at or close to its all-time low through the rest of 2020 and 2021 (Figure 2).[2]

A drop in mortgage rates boosts lending through two main channels. First, it incentivizes borrowers to refinance their existing mortgages at the new, lower market interest rates. Reflecting this incentive, refinancing more than doubled from 2019 to 2020, from $1.0 trillion to $2.6 trillion, accounting for the majority of the total rise in mortgage lending.[3] Second, lower interest rates increase homebuyers' purchasing power, likely providing a tailwind for the housing market, particularly as the economy started to show signs of recovery.[4] This was reflected in a smaller but still significant increase in the volume of "purchase mortgage" lending—that is, lending used to finance a home purchase.

Subsequently, the path of mortgage interest rates abruptly changed course in 2022—the benchmark 30-year fixed mortgage interest rate rose from 3.1 percent at the end of 2021 to 6.9 percent in October 2022, a level of rates not seen since 2002. Recent data suggest this sharp rise in borrowing costs has significantly curtailed mortgage lending activity, particularly for refinancing. Mortgage Bankers Association data indicate that applications for mortgage refinances in September 2022 were 84 percent lower than in the same month of 2021, while purchase applications were 30 percent lower. Similarly, total mortgage lending in the second quarter of 2022 was down by 42 percent relative to the second quarter of 2021. In short, it seems clear that the mortgage boom of 2020-2021 has now come to an end.

Initial Fears About the Mortgage Market

With the benefit of hindsight, 2020-2021 was a banner period for the mortgage market, but at the onset of the COVID-19 pandemic in March 2020 the mortgage outlook seemed highly uncertain, with the market apparently facing significant headwinds.

One concern was that the pandemic seemed to presage a challenging period for the housing market. Who would buy homes in such an uncertain environment? How would lenders conduct appraisals, inspections, and closings during a period of lockdowns and social distancing?

Financial markets were also extremely volatile in March 2020, making it difficult for mortgage lenders to manage risk. In particular, lenders faced large margin calls on "to-be-announced" (TBA) forward contracts, a type of financial derivative used by lenders to hedge the mortgages held in inventory while awaiting sale.[5] This means that lenders were forced to front up additional cash as security to their counterparties after the value of their forward positions declined. These margin calls resulted in liquidity outflows of up to $5 billion.[6]

The sharp economic downturn and spike in unemployment also raised the prospect of a surge in mortgage defaults and foreclosures similar to what was seen around the Great Recession in 2007-2009. Responding to the deteriorating economic situation, the federal government quickly stepped in to provide homeowner relief in the form of mortgage forbearance for borrowers facing financial difficulties, as part of the Coronavirus Aid, Relief, and Economic Security (CARES) Act signed into law on March 27, 2020.[7] By May, 4.7 million borrowers were in forbearance, amounting to 9 percent of all borrowers.[8] But while forbearance was a lifeline for many homeowners, it created problems for some of the financial institutions servicing their loans. Mortgage servicers are typically required, at least temporarily, to forward scheduled payments to investors and other parties even if the borrower is no longer making their mortgage payments. Forbearance was therefore a drain on the liquidity of these intermediaries.

There were particular concerns about the financial stability of nonbank mortgage companies, which today play a critical role in the mortgage market, accounting for well over half of mortgage lending as well as the majority of mortgage servicing. These firms are more exposed to liquidity risk than banks or credit unions because they rely on short-term loans (known as "warehouse lines of credit") from financial institutions rather than deposits, and because they do not have access to the Federal Reserve discount window or other liquidity backstops.[9] Reflecting the risks at the time, the rating agency Moody's switched its outlook for nonbank mortgage companies to negative at the start of April 2020, writing, "Our baseline scenario is that over the next several quarters non-bank mortgage firms will face ongoing liquidity stress, weaker profitability, as well as declines in capitalisation and asset quality."[10]

The ultimate concern was the possibility of a liquidity crunch leading to a wave of nonbank mortgage company failures, similar to what occurred just prior to the Great Recession.[11] Widespread nonbank financial distress could reduce the mortgage credit supply, with negative repercussions for the housing market and real economy. Such an event could also reduce the quality of mortgage servicing (for example, by increasing the frequency of errors or reducing servicers' capacity to work with borrowers to modify their loans), potentially resulting in excessive foreclosures or other adverse outcomes for borrowers in distress. In 2022, Darren Aiello found evidence of such effects among financially constrained mortgage servicers during and after the Great Recession.

*See **Securitization and the Mortgage Finance System.***

What Caused the Boom?

Ultimately, however, the mortgage market shook off these challenges and enjoyed a period of rapid lending growth as well as record profits for mortgage intermediaries. Figure 3 plots the quarterly evolution of lending during this period. Loan volumes grew consistently in the quarters leading up to the pandemic, reflecting falling interest rates and a solid housing market. Against this backdrop, the initial economic disruptions associated with COVID-19 are clearly apparent in the first quarter of 2020, which saw a sharp drop in lending for both purchase mortgages and refinances. But the market quickly recovered. Originations peaked in the fourth quarter of 2020 at almost $1.4 trillion, nearly double the level of the fourth quarter of the prior year. Although refinancing led the way, mortgage lending for home purchases also recovered strongly, and by the second half of 2020 it was running well above 2019 levels.

What accounts for this rapid recovery and the magnitude of the credit boom? Three key factors stand out.

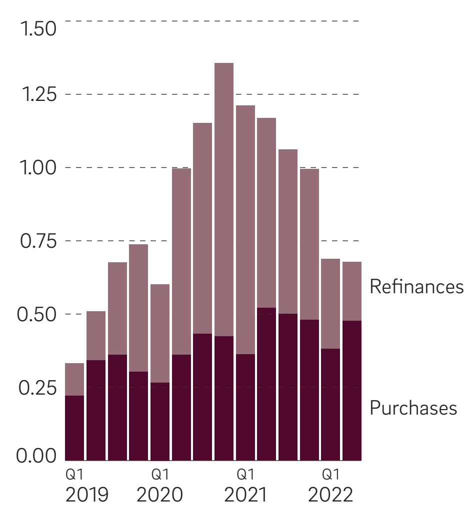
Government Policies

Expansionary fiscal policy and other federal government policy actions played a key role in stabilizing the mortgage market and the broader economy, particularly early in the pandemic. The CARES Act provided transfer payments to firms and to unemployed workers, supporting incomes and consumption. Mortgage forbearance prevented a wave of foreclosures that might have otherwise put downward pressure on home prices.[12] And actions by housing agencies helped support nonbank mortgage companies.

FIGURE 3

After a Drop in the First Quarter of 2020, Mortgage Lending Bounced Back Quickly

First-lien mortgages on single-family homes, trillions of dollars, quarterly, 2019–2022



Source: Mortgage Bankers Association via Haver Analytics.

For example, the government-sponsored enterprises Fannie Mae and Freddie Mac capped mortgage servicer advances for loans in forbearance, and Ginnie Mae created the Pass-Through Assistance Program (PTAP), a new liquidity facility for servicers.[13]

Monetary policy was also expansionary. The Federal Reserve reduced short-term interest rates to almost zero and implemented a significant new round of quantitative easing by purchasing large quantities of Treasuries and agency mortgage-backed securities (MBS). As a result, the Fed's MBS portfolio grew rapidly during the early months of the pandemic, from $1.37 trillion in March 2020 to $1.90 trillion by early July.[14]

Low Interest Rates

As a result of the Federal Reserve's actions and the overall economic environment, long-term interest rates in financial markets fell significantly over the course of 2020, and lenders consequently lowered their mortgage rates (Figure 4). Mortgage interest rates are typically closely tied to MBS yields in financial markets because most loans are packaged into securities and sold to investors.[15]

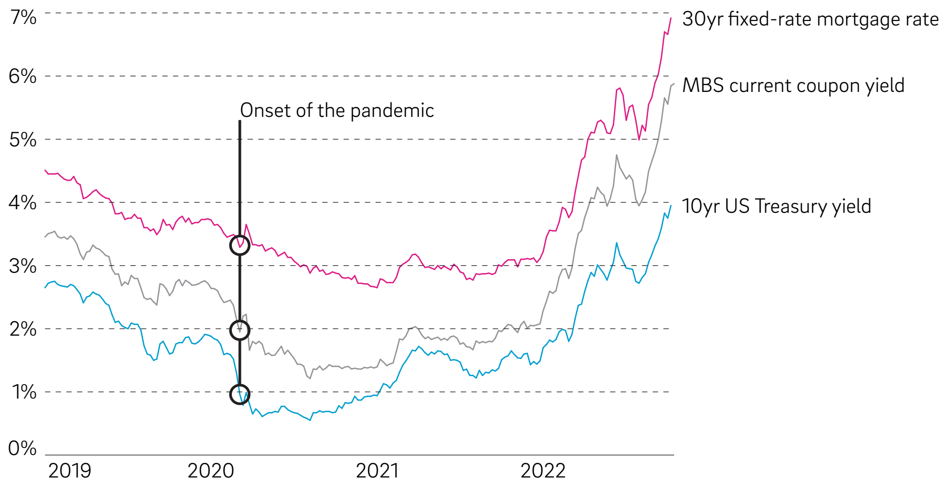
As discussed above, lower mortgage rates prompted a surge in mortgage refinancing activity. Refinancing was particularly strong for prime borrowers with high credit scores (Figure 5). The market was already primed for a period of elevated refinancing because rates had fallen significantly throughout 2019. But the further decline in rates in 2020 pushed refinancing to record levels, at least in nominal dollar terms.[16]

Aside from being a boon to households, the refinancing boom also provided significant support for nonbank mortgage companies through at least two channels. First, the volume of lending generated high fees and profits for mortgage lenders, strengthening their balance sheets. Second, refinancing provided a direct source of liquidity to mortgage companies because when a borrower refinances, the money used to pay off the original loan is held in trust by the mortgage servicer for around a month before it is forwarded to MBS investors. The surge in refinancing therefore provided a significant "float" of

FIGURE 4

Lower Mortgage Rates Reflected a Decline in Financial Market Yields

MBS current coupon yield, 10-year U.S. Treasury yield, and 30-year fixed mortgage rate paid by borrowers, 2019–2022



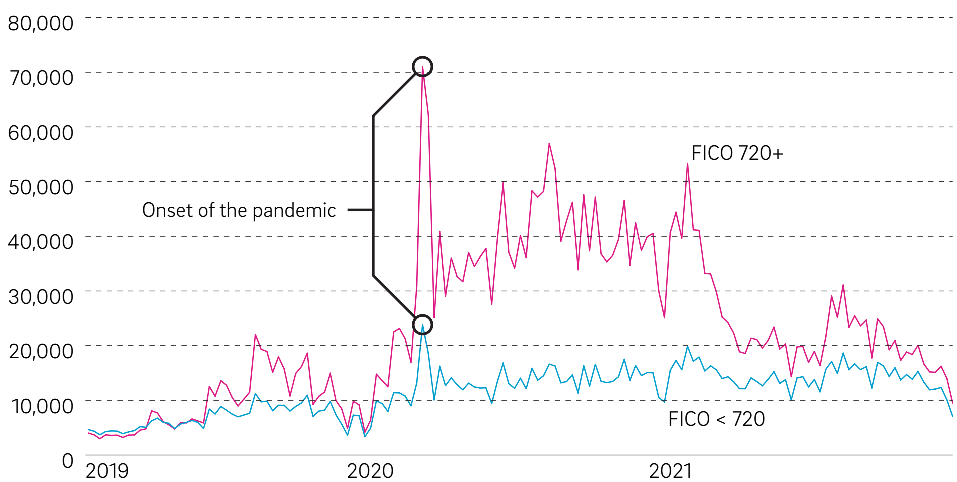
Sources: Freddie Mac Primary Mortgage Market Survey; Federal Reserve Board of Governors; Bloomberg.

Note: The MBS current coupon yield is a model-based estimate of yield-to-maturity on a synthetic to-be-announced forward contract trading at par. The difference between MBS yields earned by investors and mortgage rates paid by borrowers reflects the margin earned by the mortgage originator and other intermediaries.

FIGURE 5

Lower Rates Triggered a Surge in Refinancing Activity, Especially for Prime Borrowers

Weekly data on the number of mortgage refinance interest rate locks on the Optimal Blue platform, 2019–2021



Source: Optimal Blue.

Note: The Optimal Blue platform is used by more than 1,000 lenders and accounts for at least one-third of recent U.S. mortgage originations. Optimal Blue data are anonymized mortgage market/rates data that do not contain lender or customer identities or complete rate sheets. See Fuster et al. (2021) for more details.

liquidity to mortgage companies that offset liquidity outflows due to borrowers in forbearance not making their payments.[17]

Rapid Home Price Appreciation

Like the mortgage market, the housing market quickly recovered as the economy stabilized and the real estate industry adjusted to the pandemic-era operating environment. In fact, home prices surged, reaching a historic annualized growth rate of around 20 percent by early 2021 (Figure 6). Lower mortgage rates contributed to this boom in prices but were not the only factor. In particular, the increase in time spent at home and the shift to remote work significantly increased the demand for residential real estate. San Francisco Fed economist John Mondragon and University of California, San Diego, associate professor of economics Johannes Wieland estimate that the shift to remote work during the pandemic accounted for more than half of the increase in home prices in 2020-2021.[18] Higher residential housing demand during this period is also evident in a sharp increase in housing rents. For example, the CoreLogic Single-Family Rent Index grew at an annualized rate of 9 percent between March 2020 and October 2021.

A hot housing market typically increases the total volume of mortgage lending, by way of three channels. First, since homebuyers are likely to finance part of the higher purchase prices through debt, the average dollar size of each mortgage generally rises. Second, rising home prices make it easier for homeowners to qualify for refinancing, and also increase homeowners' ability to extract home equity through cash-out refinancing.[19] Such cash-out activity did indeed become more popular during the pandemic. Third, rapid home price growth is typically associated with a higher volume of housing transactions, increasing the number of new mortgages originated for the purpose of purchasing a home.

Regarding this third channel, home sales also quickly bounced back after dropping sharply at the start of the pandemic, with home sales exceeding prepandemic levels by mid-2020 (Figure 7). Sales of both new and existing homes rose, with new home sales buoyed by a boom in housing construction. This combination of robust home sales and higher home prices explains why the volume of purchase mortgages surged above prepandemic levels (as shown earlier in Figure 3).

Conversely, as mortgage rates have risen in 2022, the housing market boom has also subsided, reflected in a sharp drop in home price appreciation and a decline in the volume of home sales. This in turn has contributed to the slowdown in the volume of mortgage lending.

The Limits of the Boom

Although the 2020-21 mortgage boom was of historic proportions, a number of factors limited its scope and prevented all borrowers from fully enjoying its benefits.

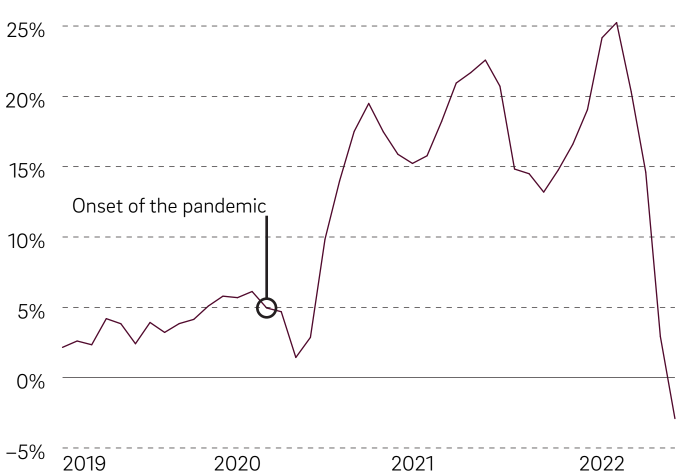
First, not all of the decline in financial market yields was passed through to mortgage borrowers. Although Treasury and MBS yields fell sharply in March and April 2020, mortgage rates declined only gradually. Furthermore, James Vickery, one of the authors of this article, working with Philadelphia Fed senior advisor and research fellow Lauren Lambie-Hanson, economist Andreas Fuster, and several other authors, estimates that the "primary-secondary" spread—the difference between mortgage rates and the relevant secondary-market MBS yield—increased by up to 100 basis points during the pandemic, reflecting a higher "gain-on-sale" earned by lenders.[20] In other words, although mortgage rates reached record lows, rates would have been even lower, by as much as 1 percentage point, if lower financial market yields had been fully passed through to borrowers.

Fuster, Lambie-Hanson, Vickery, et al. attribute this incomplete passthrough to the capacity constraints lenders faced. As interest rates fell, lenders experienced a dramatic increase in applications for mortgage refinances. Processing these applications and ramping up capacity

FIGURE 6

After a Pause, Home Prices Experienced a Historic Boom...

Annualized monthly percent growth in home prices, 2019–2022

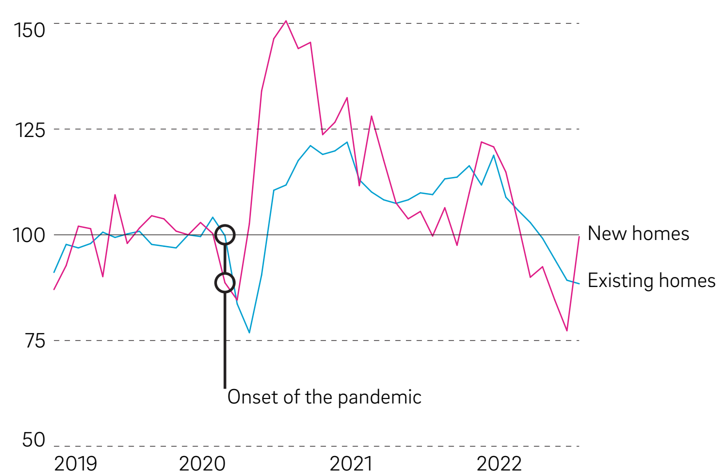


Source: Seasonally adjusted Case-Shiller U.S. National Home Price Index via Federal Reserve Bank of St. Louis/FRED.

FIGURE 7

...and Home Sales Also Quickly Rose Above Prepandemic Levels

Sales of new and existing single-family homes, seasonally adjusted, 2019–2022; indexed to 100 as of December 2019



Source: U.S. Census Bureau via Haver Analytics.

was particularly challenging due to the deteriorating economic situation (making it difficult to accurately confirm borrower employment and income), the unexpected shift to remote work, and the wave of forbearance requests from existing borrowers. In the words of one mortgage company CEO in March 2020, "Lending is in a bottleneck.... Most of our correspondent buyers and wholesale buyers are discouraging new loans. They are bloated with loans in process and cannot take on any more."[21] Capacity constraints are a typical feature of refinancing booms, but Fuster, Lambie-Hanson, Vickery, et al. find that operational frictions rendered the credit supply unusually inelastic in 2020–2021.[22]

Fuster, Lambie-Hanson, Vickery, et al. also find that interest rate passthrough was even lower outside of the prime conforming mortgage market. First, mortgage rates fell by a smaller amount for jumbo mortgages, which are ineligible for government-backed credit guarantees. This likely reflects the amplification of credit risk premia during the pandemic as well as the greater difficulty of securitizing mortgages outside of the government-backed agency market. Second, interest rates were relatively elevated for mortgages sold to (typically) lower-income borrowers in the Federal Housing Administration (FHA) market. These loans carry government insurance against default, but this insurance does not fully insulate lenders from risk.[23] FHA loans were also at greater risk of forbearance, creating liquidity risk for mortgage intermediaries.[24]

Aside from these differences in interest rate passthrough, Atlanta Fed economist Kristopher Gerardi, Boston Fed economist Paul S. Willen, and Lambie-Hanson also find evidence of disparities in the extent to which borrowers were able to take advantage of lower interest rates by refinancing. In particular, they find that Black, Latino, and Asian borrowers were significantly less likely to refinance, and therefore benefited less from the low-mortgage-rate environment. Their results demonstrate a general point: Borrowers often do not refinance when it seems to be in their financial interest to do so, because of either inattention, limited financial literacy, an inability to qualify for a new loan, or other factors.[25]

Conclusion

The 2020–2021 period provides a valuable case study that illustrates both the strengths and the limitations of the U.S. mortgage finance system. Overcoming a variety of challenges, the mortgage market intermediated a record volume of credit, thereby supporting the housing market and providing liquidity to consumers through lower mortgage rates. But capacity constraints and other frictions limited the passthrough of lower financial market yields to mortgage borrowers. Furthermore, minority borrowers did not benefit as much as other groups from the opportunity to refinance at a lower rate.

The experience of the pandemic highlights the potential benefits of alternative mortgage designs that allow rates on existing mortgages to fall automatically with market interest rates, particularly during periods of stress. The U.S. mortgage market is dominated by long-term fixed-rate mortgages (FRMs), which require the borrower to refinance if they want to benefit from lower market rates. One alternative to this kind of market features a larger role for adjustable-rate mortgages (ARMs), as is the case in the UK, Australia, and many continental European economies. An intermediate design proposed by Boston University associate professor of economics Adam Guren and his coauthors, and by Northwestern Kellogg professor of finance Janice Eberly and Stanford professor of finance Arvind Krishnamurthy, is an FRM that converts to an ARM during recessions. Guren and his coauthors find that such a design would produce significant welfare benefits during economic downturns. Another variation is the ratchet mortgage advocated by finance professor Andrew Kalotay, which allows for the contract interest rate to decline but never increase.[26]

Looking to the future, mortgage interest rates have risen very significantly in 2022, and mortgage lending has fallen sharply as a result. Higher interest rates, assuming they persist, will be a headwind for the housing market and presage a challenging period for the mortgage industry, which has grown in size and enjoyed record profits during the pandemic. Careful ongoing monitoring of the mortgage finance system seems warranted during this period of transition.

Securitization and the Mortgage Finance System

A mortgage begins with a borrower—someone buying a home or refinancing an existing mortgage—and a lender—typically either a commercial bank or a nonbank mortgage company. But this is not where the story ends, because in the U.S., mortgages are typically securitized rather than being retained on the lender's balance sheet.

Securitization involves packaging a pool of mortgages into a bond called a mortgage-backed security (MBS), which can then be sold to financial market investors, including banks, mutual funds, hedge funds, and life insurers. The Federal Reserve also holds a large volume of MBS as a result of its large-scale asset purchase programs. The most common form of mortgage securitization in the U.S. is "agency" securitization, in which an MBS carries a guarantee from Fannie Mae, Freddie Mac, or Ginnie Mae.[27]

Securitization creates a way for lenders to sell their mortgages shortly after origination, which means that the size of the lender's balance sheet need not limit how much lending they can do. This is particularly important for nonbank mortgage companies, which unlike banks cannot finance their mortgage lending through deposits. A liquid MBS market was a key factor in the rapid growth of nonbank mortgage lending over the past decade.[28]

Even after the mortgage is sold, the original lender may retain a relationship with the borrower by acting as the mortgage servicer. The servicer collects payments from the borrower and forwards them to investors, tax authorities, and other parties. The servicer also manages the loan if the borrower becomes unable to make their payments. (For example, the servicer may arrange a forbearance or loan modification—or, as a last resort, foreclose on the mortgage and seize the underlying property.) In return, the lender receives a periodic fee calculated as a fixed percentage of the loan balance. When a mortgage is securitized or sold, the servicing rights are sometimes retained by the original lender, but in other cases servicing is transferred along with the loan, or the servicing rights are sold to a third party.

As discussed in the main text of this article, the forbearance programs set in place at the start of the COVID pandemic resulted in liquidity outflows for mortgage servicers. This is because servicers must temporarily forward payments to MBS investors, home insurers, local governments, and other parties even if the borrower has paused their payments.[29] The servicer will be reimbursed for these payments eventually, but they may not be able to finance themselves in the interim if there is a spike in nonpayment.

The U.S. mortgage finance system is complex, and this brief primer omits many details by necessity. More information on securitization and the MBS market and references to further literature can be found in a recent article by Andreas Fuster, David O. Lucca, and James Vickery.[30]

Notes

1 Source: Mortgage Bankers Association. Trade publication Inside Mortgage Finance also reports a total of $4.1 trillion of first-lien originations for 2020 and an even higher volume of $4.8 trillion for 2021. We estimate that there were $4.0 trillion of first-lien mortgage originations in 2020 based on 2020 Home Mortgage Disclosure Act (HMDA) data.

2 Mortgage rates were in fact already trending downward in the 12-18 months prior to the pandemic, and more broadly have declined significantly over the past two decades from levels above 8 percent in the early 2000s. However, mortgage rates have reversed course sharply in 2022, as discussed below.

3 Similarly, the previous high watermark in terms of lending volume, in 2003, also featured a boom in mortgage refinancing due to a decline in mortgage interest rates.

4 For example, Glaeser, Gottlieb, and Gyourko (2012) estimate that a 1-percentage-point drop in interest rates is associated with an increase in home prices of about 7–8 percent.

5 Mortgage originators typically hold mortgages in a portfolio for a few weeks or months after origination before they are sold or securitized into mortgage-backed securities (MBS). This exposes the lender to risk because the mortgages might decline in value before the sale. To protect themselves, lenders sell mortgages forward—that is, they use the TBA market to enter into a contract to deliver mortgage pools at a fixed price a few months into the future, essentially locking in current prices. (See Vickery and Wright [2013] for a primer on the TBA market.) But to ensure that the lender does not default on this contractual obligation, the lender can be required to put up additional cash if the value of this forward position moves against it before the contract matures. This is what happened in mid-March 2020, when the Fed restarted quantitative easing and MBS yields declined sharply.

6 For more details, see Pence (forthcoming) and Nasiripour (2020).

7 The CARES Act required servicers to provide forbearance to borrowers who requested it, without any required proof of hardship. The act directly applied only to mortgages in the "agency" market, consisting of loans securitized through the agencies Fannie Mae, Freddie Mac, and Ginnie Mae. In practice, though, financial institutions made forbearance available quite widely, even to nonagency borrowers. See Cherry et al. (2021), An et al. (2021), Elul and Newton (2021), and Lee et al. (2022) for detailed discussions and analyses of the CARES Act mortgage forbearance program.

8 See Black Knight (2020).

9 For details, see Pence (forthcoming) and Kim et al. (2018).

10 Nauman et al. (2020).

11 As documented by Pence (forthcoming), concerns along these lines were widely held at the time and expressed by a range of parties, including industry practitioners, regulators, affordable-housing advocates, and members of Congress from both major parties.

12 Anenberg and Scharlemann (2021) find direct evidence that mortgage forbearance programs supported home prices in 2020.

13 For details, see Loewenstein (2021) and Pence (forthcoming).

14 The source for this data is the Federal Reserve Bank of New York.

15 See Fuster et al. (2017).

16 Although the nominal dollar amount of refinancing and total mortgage lending was higher in 2020 than in 2003 (the previous recordholder), 2003 is still higher in inflation-adjusted terms or scaled by the volume of mortgages outstanding.

17 See Pence (forthcoming) and Loewenstein (2021).

18 These authors use cross-city variation in remote-work exposure to isolate the effect of remote work from other drivers of home prices such as mortgage interest rates.

19 See Bhutta and Keys (2016).

20 See Fuster et al. (2021).

21 Larry Goldstone, president and CEO of mortgage company Aventur Partners, as quoted in Berry and Kline (2020).

22 This combination of high lending volumes and an increase in the profit per loan due to inelastic supply resulted in record profits for lenders. For example, the net income of Rocket Companies, the largest U.S. mortgage lender, increased almost tenfold in 2020 to $9.4 billion.

23 Two issues are at play here. First, FHA mortgage insurance claims often take a long time to be settled. This exposes the mortgage servicer to liquidity risk in the interim. Second, insurance claims do not cover all expenses incurred by the servicer in foreclosing or otherwise terminating the loan. Tozer (2019) estimates that servicers incur an uncompensated loss of about $10,000 per FHA claim. For more on the limits of this government insurance, see Pence (forthcoming), Tozer (2019), and Kim et al. (2018).

24 Lee et al. (2022).

25 Also see Keys, Pope, and Pope (2016).

26 See McAndrews (2015) for a policy-oriented discussion of mortgage contract design. These alternative designs are not a free lunch. If, for example, a mortgage has a ratchet feature so that the rate can decline but never increase, mortgage lenders and investors will take that into account when setting the other terms of the loan. Other things being equal, this would result in a higher initial mortgage rate. However, ARMs that allow the rate to go either up or down shift the risk to borrowers and will increase the borrower's interest costs when interest rates rise. Even so, Guren et al. (2021) find that alternative mortgage designs can improve overall welfare by increasing borrower cashflows when households are less wealthy and more liquidity constrained.

27 Ginnie Mae is a federal agency that guarantees the timely payment of principal and interest on MBS composed of federally insured or guaranteed loans, such as loans insured by the Federal Housing Administration. Fannie Mae and Freddie Mac are privately owned but government-sponsored enterprises that issue MBS with a credit guarantee to investors; this guarantee is widely perceived to be implicitly backed by the federal government. See Frame et al. (2015).

28 Research by Buchak et al. (2018) shows that nonbanks have a smaller market share of mortgage lending for mortgages that are relatively more difficult to securitize. However, nonbank mortgage lenders retain a significant market share of lending for mortgages that are ultimately not securitized. This is because nonbanks often act as correspondent lenders, originating and then selling mortgages as whole loans at prearranged prices to banks and other investors. However, because they rely on short-term wholesale funding, nonbank mortgage companies do not typically retain mortgages in their portfolios for long.

29 See Pence (forthcoming), Goodman et al. (2020), and Kim et al. (2018).

30 See Fuster et al. (2022).

References

Aiello, Darren J. "Financially Constrained Mortgage Servicers," *Journal of Financial Economics*, 144:2 (2022), pp. 590–610, https://doi.org/10.1016/j.jfineco.2021.09.026.

An, Xudong, Lawrence R. Cordell, Geng Liang, and Keyoung Lee. "Inequality in the Time of COVID-19: Evidence from Mortgage Delinquency and Forbearance," Federal Reserve Bank of Philadelphia Working Paper 21-09 (2021), https://doi.org/10.21799/frbp.wp.2021.09.

Anenberg, Elliot, and Tess Scharlemann. "The Effect of Mortgage Forbearance on House Prices During COVID-19," FEDS Notes. Washington: Board of Governors of the Federal Reserve System, March 19, 2021, https://doi.org/10.17016/2380-7172.2872.

Berry, Kate, and Allissa Kline. "Virus Scare Creates Perfect Storm for Mortgage Lenders," *American Banker*, March 19, 2020.

Bhutta, Neil, and Benjamin Keys. "Interest Rates and Equity Extraction During the Housing Boom," *American Economic Review*, 106:7 (2016), pp. 1742–1774, https://doi.org/10.1257/aer.20140040.

Black Knight. "4.7 Million Homeowners Now in Forbearance, but Pace Is Slowing Considerably," May 15, 2020.

Black Knight. "Black Knight Mortgage Monitor," technical report, March 2022.

Buchak, Greg, Gregor Matvos, Tomasz Piskorski, and Amit Seru. "The Limits of Shadow Banks," National Bureau of Economic Research Working Paper 25149 (2018).

Cherry, Susan, Erica Xuewei Jiang, Gregor Matvos, et al. "Government and Private Household Debt Relief During COVID-19," *Brookings Papers on Economic Activity* (2021), pp. 141–199.

Eberly, Janice, and Arvind Krishnamurthy. "Efficient Credit Policies in a Housing Debt Crisis," *Brookings Papers on Economic Activity* (2014), pp. 73–136.

Elul, Ronel, and Natalie Newton. "Helping Struggling Homeowners During Two Crises," Federal Reserve Bank of Philadelphia *Economic Insights*, (Fourth Quarter 2021), pp. 2–8, https://www.philadelphiafed.org/consumer-finance/mortgage-markets/helping-struggling-homeowners-during-two-crises.

Frame, W. Scott, Andreas Fuster, Joseph Tracy, and James Vickery. "The Rescue of Fannie Mae and Freddie Mac," *Journal of Economic Perspectives*, 29:2 (2015), pp. 25–52, https://doi.org/10.1257/jep.29.2.25.

Fuster, Andreas, Aurel Hizmo, James Vickery, et al. "How Resilient Is Mortgage Credit Supply? Evidence from the COVID-19 Pandemic," National Bureau of Economic Research Working Paper 28843 (2021), https://doi.org/10.3386/w28843.

Fuster, Andreas, Stephanie H. Lo, and Paul S. Willen. "The Time-Varying Price of Financial Intermediation in the Mortgage Market," National Bureau of Economic Research Working Paper 23706 (2017), https://doi.org/10.3386/w23706.

Fuster, Andreas, David O. Lucca, and James Vickery. "Mortgage-Backed Securities," Federal Reserve Bank of New York *Staff Report* 1001 (2022).

Gerardi, Kristopher S., Lauren Lambie-Hanson, and Paul S. Willen. "Racial Differences in Mortgage Refinancing, Distress, and Housing Wealth Accumulation During COVID-19," Federal Reserve Bank of Atlanta Policy Hub 2021-06 (2021).

Glaeser, Edward L., Joshua D. Gottlieb, and Joseph Gyourko. "Can Cheap Credit Explain the Housing Boom?" in Edward L. Glaeser and Todd Sinai, eds., *Housing and the Financial Crisis*. Chicago: University of Chicago Press, 2012, pp. 301–359.

Goodman, Laurie, Jim Parrott, Bob Ryan, and Mark M. Zandi. "The Mortgage Market Has Caught the Virus," Urban Institute Brief, May 2020.

Guren, Adam M., Arvind Krishnamurthy, and Timothy J. McQuade. "Mortgage Design in an Equilibrium Model of the Housing Market," *Journal of Finance*, 76:1 (2021), pp. 113–168, https://doi.org/10.1111/jofi.12963.

Kalotay, Andrew. "The Case for the Ratchet Mortgage," speech given at the Mortgage Contract Design: Implications for Housing, Monetary Policy, and Financial Stability Conference, Federal Reserve Bank of New York, New York, May 21, 2015.

Keys, Benjamin J., Devin G. Pope, and Jaren C. Pope. "Failure to Refinance," *Journal of Financial Economics*, 122:3 (2016), pp. 482–499, https://doi.org/10.1016/j.jfineco.2016.01.031.

Kim, You Suk, Steven M. Laufer, Karen Pence, et al. "Liquidity Crises in the Mortgage Market," *Brookings Papers on Economic Activity*, 49:1 (2018), pp. 347–428, http://doi.org/10.1353/eca.2018.0004.

Lee, Donghoon, You Suk Kim, Tess Scharlemann, and James Vickery. "Intermediation Frictions in Debt Relief: Evidence from CARES Act Forbearance," Federal Reserve Board of Governors Finance and Economics Discussion Series 2022-017 (2022).

Loewenstein, Lara. "Why Wasn't There a Nonbank Mortgage Servicer Liquidity Crisis?" Federal Reserve Bank of Cleveland *Economic Commentary* (2021).

McAndrews, Jamie. "Opening Remarks at the Mortgage Contract Design: Implications for Households, Monetary Policy, and Financial Stability Conference," speech given at the Mortgage Contract Design: Implications for Households, Monetary Policy, and Financial Stability Conference, Federal Reserve Bank of New York, New York, May 21, 2015.

Mondragon, John, and Johannes Wieland. "Housing Demand and Remote Work," National Bureau of Economic Research Working Paper 30041 (2022), https://doi.org/10.3386/w30041.

Nasiripour, Shahien. "Dirt-Cheap U.S. Mortgages Thwarted by $5 Billion in Margin Calls," *Bloomberg Law*, May 4, 2020.

Nauman, Billy, Robert Armstrong, and Laura Noonan. "U.S. Mortgage Lenders Face Liquidity Crunch," *Financial Times*, April 2, 2020.

Pence, Karen. "Liquidity in the Mortgage Market: How Does the COVID-19 Crisis Compare with the Global Financial Crisis?" *Real Estate Economics*, forthcoming, https://doi.org/10.1111/1540-6229.12389.

Tozer, Ted. "A Primer and Perspective on Ginnie Mae," Milken Institute Discussion Paper (2019).

Vickery, James, and Joshua Wright. "TBA Trading and Liquidity in the Agency MBS Market," Federal Reserve Bank of New York *Economic Policy Review*, 19:1 (2013), pp. 1–18, https://dx.doi.org/10.2139/ssrn.2324222.