Number 2022-11
August 16, 2022

Economic Commentary

Mortgage Borrowers’ Use of COVID-19 Forbearance Programs

Lara Loewenstein and Bezankeng Njinju

The guarantee of mortgage forbearance provided in the CARES Act is an unprecedented provision of flexibility for government-insured mortgage borrowers and has been successful thus far at limiting delinquencies during the COVID-19 pandemic. The terms of this forbearance are favorable to borrowers, and there is little required in terms of documentation of hardship, making requesting forbearance an attractive option even if borrowers are not facing hardship and do not need forbearance to remain current on a mortgage. Despite this, evidence indicates that so far CARES Act forbearance has largely been used by borrowers who did actually need it. The success of forbearance in providing households liquidity and in reducing mortgage delinquencies, and its many potential benefits relative to foreclosure in terms of aligning incentives among the borrower, lender, and neighboring homeowners, raises questions for how policymakers should approach mortgage policy during the next economic downturn and about how mortgage contracts are designed.

Introduction

At the end of March 2020, in response to the ongoing SARS-CoV-2 (COVID-19) pandemic, the United States Congress passed the Coronavirus Aid, Relief, and Economic Security (CARES) Act, which guarantees 12 months of forbearance to all borrowers of government-insured mortgages while the national declared state of emergency remained in effect. This specific extension of forbearance is easy to obtain, requiring only that borrowers verbally attest to hardship without having to provide supporting documentation, and has favorable terms in that no interest is charged on forborne balances.[1] The program has successfully limited mortgage defaults (Kim et al., 2021) and provided financial flexibility for homeowners, particularly during the early days of the pandemic when there was high unemployment and economic uncertainty.

The CARES Act is not the government’s first foray into mortgage forbearance. Forbearance has been offered to victims of natural disasters such as hurricanes. But forbearance has never been guaranteed on such a broad scale, with such little evidence of individual hardship,[2] or for such a long period of time. As of February 2022, the national emergency was extended past March 1, 2022, extending access to forbearance beyond two years for all borrowers of federally insured loans.

As a policy, forbearance has many potential benefits for lenders, borrowers, and the broader economy relative to alternatives. Borrowers often become delinquent because of temporary shocks such as unemployment, divorce, or health problems (Low, 2021). On an informal basis, borrowers may be able to miss a couple of mortgage payments before a lender initiates foreclosure; however, the borrower can generally “cure” the loan by repaying the missed payments in full, requiring the borrower to have access to a large amount of cash within a given timeframe. The borrower can also receive a loan modification, which might, for example, capitalize any missed payments into the loan balance. However, historically, modifications for residential mortgages have been rare, most likely because lenders fear that borrowers who do not truly need a modification will actively seek one out if modifications are more widely available (Adelino et al., 2013). By contrast, the forbearance provided by the CARES Act is guaranteed for 12 months

Lara Loewenstein is a research economist and Bezankeng Njinju is a former research analyst at the Federal Reserve Bank of Cleveland. The views authors express in *Economic Commentary* are theirs and not necessarily those of the Federal Reserve Bank of Cleveland or the Board of Governors of the Federal Reserve System.

Economic Commentary is published by the Research Department of the Federal Reserve Bank of Cleveland. *Economic Commentary* is also available on the Cleveland Fed’s website at www.clevelandfed.org/research. To receive an e-mail when a new *Economic Commentary* is posted, subscribe at www.clevelandfed.org/subscribe-EC.

ISSN 2163-3738 DOI 10.26509/frbc-ec-202211 FEDERAL RESERVE BANK *of* CLEVELAND

and allows for a variety of exit strategies that avoid having the borrower make up all their missed payments at once. A popular strategy for those who have exited forbearance thus far involves making the forborne payments due as a lump sum at loan maturity, when the borrower either refinances or sells her home, providing the borrower with the cash to pay off the balance.

Traditionally, after a borrower stops making payments, a lender eventually initiates foreclosure proceedings. However, foreclosure proceedings are costly to both the lender and the borrower. The lender must pay legal and administrative fees and abide by local legislation that may limit how and when the foreclosure can proceed. In the meantime, the borrower is aware that she is likely to lose her home and will either move, resulting in both personal and financial costs, or continue to reside in the property. In the former case, the house is vacant and without a clear owner to maintain it until the foreclosure is completed. In the latter case, the property is occupied, but the borrower has little incentive to maintain the property since she expects to lose it. Either scenario leads to potential depreciation of the collateral and potentially the value of neighboring houses (Frame, 2010). By contrast, in forbearance, the borrower maintains the ownership of the property. As a result, the borrower does not face any upheaval from having to move, the property remains occupied, and the occupant retains an interest in maintaining the property and its value.

One concern about forbearance programs is that people who do not necessarily need forbearance will take advantage of the program. As a consequence, the cost of the program will be higher than it would otherwise be. The forbearance provided to borrowers during the COVID-19 pandemic provides evidence of how borrowers have reacted to a widespread and well-publicized provision of mortgage modifications and therefore sheds light on moral hazard concerns. Forbearance could generate other consequences such as higher borrowing rates if, for example, the availability of forbearance encourages borrowers to seek higher loan balances and to raise overall risk. Such general equilibrium effects are worth exploring, but they are not the topic of this *Commentary*.

Research to date has shown that CARES Act forbearance has gone largely to those borrowers who needed it in order to stay in their homes, with relatively high uptake rates among low-income and racial and ethnic minority borrowers (Akana et al., 2021; Farrell et al., 2020; An et al., 2022; Cherry et al., 2021). In this *Commentary*, we provide additional evidence that most borrowers have not used forbearance in a strategic manner. That is, they have not sought out forbearance in a manner that maximizes the benefits while avoiding the costs (specifically, the inability to refinance). This is consistent with borrowers' using forbearance for its intended purpose: as a means of remaining current on a mortgage. This experience with forbearance raises questions about how policymakers should approach mortgage payment relief during periods of economic turmoil and how mortgage contracts should be designed.

How Borrowers Could Have Used Forbearance Strategically

Our goal is to ascertain whether there is evidence that borrowers who were not facing hardship because of the pandemic requested forbearance. The data we use do not offer direct observations of whether a borrower was affected by the COVID-19 pandemic, and they likewise do not provide information on employment status or income. However, if borrowers who were not facing hardship were requesting forbearance, then there should be evidence that they were doing so in a way to minimize the costs of forbearance while maximizing the benefits in ways that borrowers who truly need forbearance would have less flexibility to do. More specifically, when a borrower is in forbearance, she is unable to refinance her loan, and purchasing a new home can be more difficult for her than for those similarly qualified borrowers who are not in forbearance since she has to concurrently negotiate her exit from forbearance. Using these two facts along with the length limits placed on forbearance, we identify three observable ways in which borrowers may have used forbearance strategically, that is, uncoupled from an immediate need.[3] While what follows is not an exhaustive list of ways in which borrowers could have used forbearance to their advantage, these ways are directly observable in our data.[4]

First, borrowers buying a new home may wait until after their home purchase to request forbearance. This may be especially true for borrowers who are purchasing a first home as they are often more financially constrained. If borrowers were strategic in their use of forbearance, we would expect the probability of forbearance to be relatively higher for borrowers in the months soon after a home purchase. Second, borrowers may have requested forbearance after they refinanced their mortgage loans. One of the main downsides of being in forbearance is the inability to refinance, but if borrowers waited until after they refinanced to request forbearance, they would have locked in their lower interest rate and still reaped the rewards of forbearance. Third, borrowers could stay in forbearance for the maximum allowed time. In general, servicers provide borrowers with a three- or six-month forbearance, with an optional extension if requested by the borrower. The CARES Act stipulated that borrowers were allowed up to 12 months of forbearance. However, borrowers of federally backed mortgages that entered forbearance before a given date were able to extend their forbearance up to a total of 18 months.

We look at each of these three different ways in which borrowers could have strategically used mandated forbearance to their advantage. For the first, we compare rates of entry into forbearance for federally backed purchase mortgages[5] by first-time and repeat homebuyers. For the second, we look at forbearance entry rates of recently refinanced mortgages. For the third, we look at the rate at which borrowers in forbearance exited forbearance. If borrowers had been attempting to max out their allowed forbearance, we would expect to see an increase in forbearance exits at the maximum allowed forbearance period.

Data

We focus on loans in Ginnie Mae securities. Ginnie Mae is a government agency that insures the timely payments to investors in Ginnie Mae mortgage-backed securities. The mortgages in these securities have mortgage insurance provided by other government agencies, including the Federal Housing Administration (FHA), which provides mortgage insurance on loans to low-income borrowers and is a popular program among first-time homebuyers.

While the CARES Act guaranteed forbearance to borrowers of government-insured loans, which includes all loans in Ginnie Mae securities and those in Fannie Mae and Freddie Mac securities, we focus on loans in Ginnie Mae securities for three reasons. First, Ginnie Mae mortgage borrowers are more financially vulnerable than borrowers of Freddie Mac or Fannie Mae loans. Second, borrowers who use the FHA (Federal Housing Administration) or VA (Veterans Affairs) programs are aware at loan origination that their loan has a government guarantee and that they are therefore eligible for forbearance. By contrast, a borrower is usually unaware if her loan is sold into a Fannie or Freddie security since lenders make that decision after the loan is originated. Third, we have data on when borrowers entered and exited forbearance for the universe of Ginnie Mae mortgage loans.

We use loan-level data from eMBS. This is a comprehensive database of agency mortgage-backed securities (MBS), including MBS backed by Ginnie Mae. Beginning in June 2020, the Ginnie Mae data also include information on forbearance, and this information identifies exactly when a borrower entered forbearance relative to the origination date of her mortgage. While this information starts in June 2020, it includes forbearance entry dates prior to that time. The Ginnie Mae data also include a flag indicating whether a borrower is a first-time homebuyer.

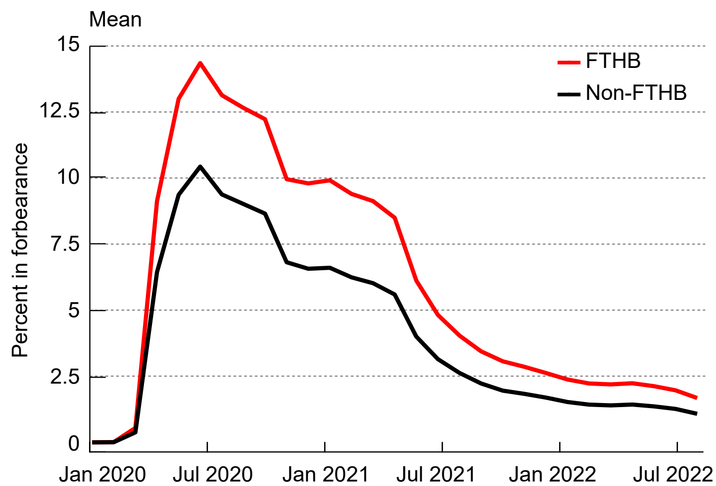
Strategic Use of Forbearance by Homebuyers Was Limited

We look to see whether there is evidence of each of the strategic uses of forbearance that we have identified.

The likelihood of entering forbearance after home purchase

To see how likely it is that a homebuyer who recently purchased a home enters forbearance, we look at purchase mortgages originated before and after the CARES Act was passed and calculate the probability that those loans enter forbearance. For example, for purchase mortgages originated in January 2020, we take the number of loans entering forbearance in a given month divided by the number of these loans outstanding at the beginning of that month. This gives us a measure of the probability that a purchase loan originated in January 2020 subsequently entered forbearance in that month. This rate is often referred to as a "hazard rate." We then perform a similar calculation for loans originated in other months. If borrowers had been using their access to forbearance strategically, we would expect that borrowers who purchased a home after March 2020, when the forbearance policy was put into place, would have relatively high rates of entry into forbearance.

Figure 1: FHA Forbearance Rates for First-Time Homebuyers and Non-First-Time Homebuyers



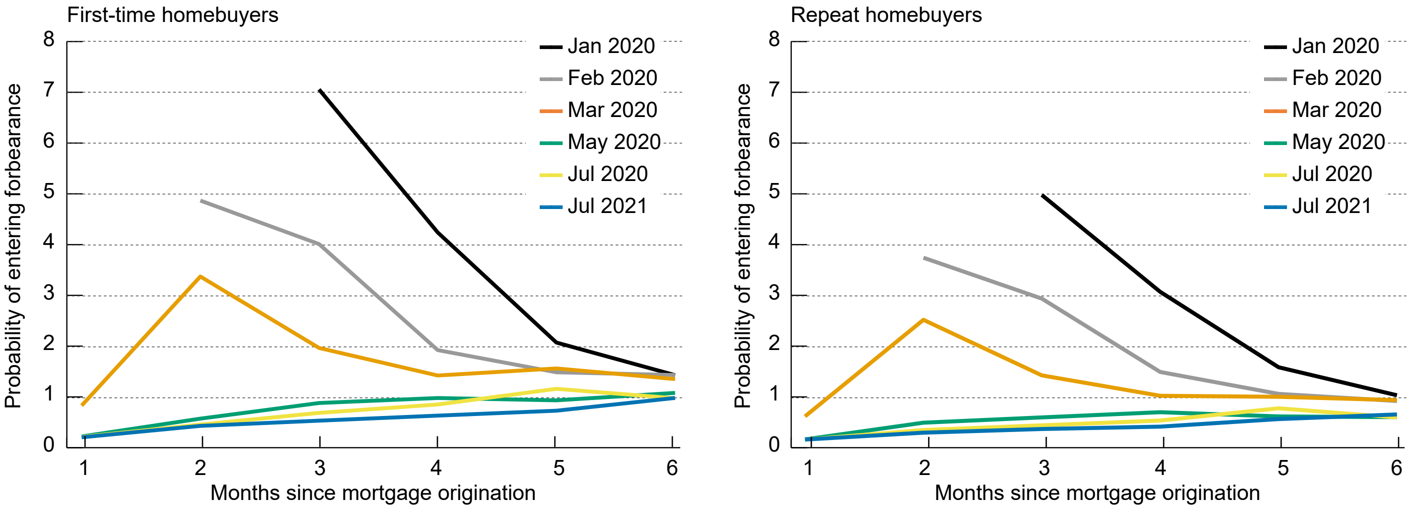
Source: eMBS

Note: Percent of mortgages in forbearance. First-time homebuyers defined using the flag provided by eMBS that is available starting in 2012. Sample is limited to loans originated in 2012 or later.

Since first-time homebuyers have, on average, fewer assets than repeat homebuyers, and therefore may be relatively more tempted to apply for forbearance, we conduct this analysis separately for first-time homebuyers and repeat homebuyers. This separation is motivated by the higher overall forbearance rate for first-time homebuyers (at least among borrowers of Ginnie Mae loans), as depicted in Figure 1.

The results of this analysis are in Figure 2. The top-left panel is for first-time homebuyers, and the top-right panel is for repeat homebuyers. Each line depicts the probability of entering forbearance for loans originated in a given month for each month relative to mortgage origination.

Figure 2: Probability of Entering Forbearance by Origination Month



Source: eMBS

Note: Values are the percent of mortgages entering forbearance in a given month starting in April 2020. Each line represents a cohort of mortgages originated in a given month, and values are plotted against the number of months since origination.

The black line for either first-time or repeat homebuyers is the probability that a purchase loan that was originated in January 2020 entered forbearance. For these loans, the line does not start until April 2020, when these loans would have first been legally eligible for the forbearance guaranteed by the CARES Act. The probability of entering forbearance for these loans was highest in April 2020 and fell quickly thereafter. So while borrowers were quick to enter forbearance when it was first offered, their propensity to enter forbearance then quickly declined. We see similar patterns for loans originated in February and March 2020. There is an initial spike in the likelihood of entering forbearance after the CARES Act is passed and then a drop. The peak forbearance period for loans originated in March 2020 is actually in May 2020, but this is likely because the first mortgage payment is generally due at least a month after the loan is originated.

By contrast, mortgages originated well-after the CARES Act was put into place are relatively unlikely to enter forbearance. For these loans, the probability of entering forbearance remains below 1 percent right after the loans are originated and remains low six months later. This is true for both first-time homebuyers and repeat buyers. This situation indicates that borrowers were not purchasing homes with the intent of entering forbearance after the loan was originated. Instead, forbearance uptake was higher for borrowers who were already in their homes, and they likely requested forbearance because they faced or anticipated facing a liquidity shock. While it is possible that these borrowers were delaying asking for forbearance until a later date, forbearance was only guaranteed while the state of emergency was in effect. Since the state of emergency could be revoked at any time, there was little incentive to delay entering forbearance.

It is also worth comparing the loans originated in May 2020 and those originated in either July 2020 or July 2021. It takes time to purchase a home and apply for a mortgage. It is very likely that borrowers who had their purchase loans originated in May 2020, had already started the process of the home purchase prior to the passage of the CARES Act. Therefore, if borrowers had been acting strategically, we may have expected that borrowers who started the home purchase process after they were aware that forbearance was available would have been more likely to enter forbearance, but we see no evidence to support this kind of behavior.

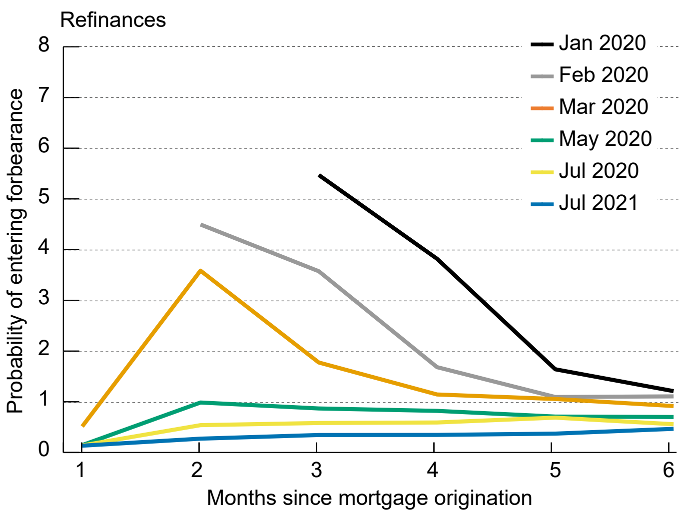
The likelihood of entering forbearance after a refinance

Since borrowers in forbearance are not eligible to refinance, borrowers could have waited to request forbearance until after they refinanced. This would have allowed them to delay making mortgage payments while locking in a low long-term mortgage rate.

We perform a similar analysis with refinances to that which we conducted with new purchase mortgages and look at the probability of entering forbearance by loan age across different vintages of refinance originations. The results are in Figure 3. Similar to new home purchases, we see high rates of forbearance uptake right after the CARES Act was passed. But there is no evidence that borrowers who refinanced after the CARES Act was in place (when the availability of forbearance was well-publicized) were entering forbearance at higher rates. In fact, loans that were originated in July 2020 and 2021 were less likely to enter forbearance than other vintages.

It is worth noting that many loans in Ginnie Mae securities are eligible for streamline refinances, which are rate refinances that do not require a new home appraisal or new income verification. Therefore, it is not that people who were less likely to need forbearance were the only ones who were eligible to refinance. Borrowers would have been able to refinance even if they had lost their jobs or were otherwise facing a hardship.

Figure 3: Probability of Entering Forbearance by Origination Month for Refinances



Source: eMBS

Note: Values are the percent of mortgages entering forbearance in a given month starting in April 2020. Each line represents a cohort of mortgages originated in a given month, and values are plotted against the number of months since origination.

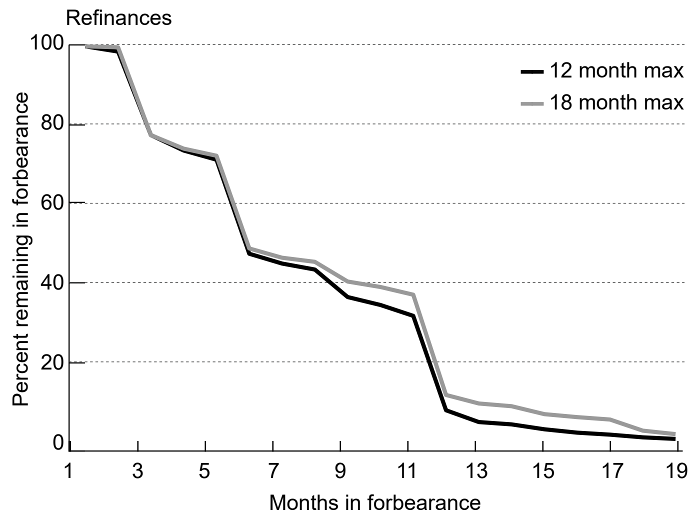
The likelihood of maximizing the forbearance period

The third way in which borrowers might have observably taken advantage of available forbearance is to use the maximum time allowable in forbearance. To look at whether borrowers were attempting to maximize their allotted time in forbearance, we calculate the share of mortgages that remains in forbearance after a given number of months. If a significant number of borrowers are attempting to maximize their forbearance, then the share of mortgages in forbearance should remain high, with a big drop when borrowers reach their maximum allowed period. The CARES Act initially guaranteed borrowers 12 months of forbearance. This was later extended to 18 months for borrowers already in forbearance plans as of June 30, 2020.

The results appear in Figure 4, which shows that of the borrowers who entered forbearance, 20 percent of them had exited by their third month. Only half of the mortgages that entered forbearance were still in forbearance six months later. Mortgage servicers often reached out to borrowers every three months to remain in contact about their forbearance policy, a practice which is consistent with borrower behavior.

A substantial fraction of borrowers did remain in forbearance for 12 months. About 40 percent of borrowers remained in forbearance until their eleventh month, after which there is a sharp decline in those remaining in forbearance; however, this decline also appears for borrowers who are eligible for 18 months of forbearance. So while almost 40 percent of borrowers effectively maxed out their 12 months of forbearance, there is little evidence that borrowers were anxious to continue their forbearance policy.

Figure 4: Share of Borrowers Remaining in Forbearance by Month After the Start of Forbearance



Source: eMBS

Note: The share remaining is calculated as the cumulative product of the probability of remaining in forbearance. The probability of remaining in forbearance is the share remaining in forbearance at the end of a month over the number in forbearance at the beginning of the month wherein the month is relative to the start of the forbearance. Ginnie Mae mortgages are eligible for up to 18 months of forbearance if a borrower had requested an initial forbearance plan by June 30, 2020. Borrowers who requested forbearance after June 30, 2020, are eligible for 12 months of forbearance.

Implications for Future Mortgage Payment Relief and Mortgage Contract Design

The lack of borrowers' strategic use of forbearance has implications for how policymakers address future economic shocks and potentially for how policymakers design mortgage contracts. Given the success of forbearance during the COVID-19 pandemic at keeping homeowners in their homes, reducing delinquencies, and providing homeowners with additional financial flexibility—especially when compared to the high default and foreclosure rates seen during the Great Recession—it is reasonable to consider how forbearance could be used during future periods of economic instability such as a recession or another pandemic. The main caveat when applying our recent experience with forbearance to other recessions is that house prices grew dramatically during the COVID-19 pandemic. During periods of falling house prices, a household may not default just because of short-term liquidity issues, but also because the mortgage balance is substantially higher than the house is worth on the current market. If house prices decline, households may request forbearance with the express intent of never resuming payments or in an attempt to get a modification that includes a substantial reduction in principal balance.

However, research has shown that the majority of borrowers with substantial negative equity in their homes do not default (Foote and Willen, 2018). Defaulting because of a *desire* to avoid payment, as opposed to an *inability*, is often called "strategic default." Concerns over strategic default drove some policy programs in the wake of the Great Recession that attempted to improve household equity positions by reducing the principal balance of a mortgage. But researchers have shown that these programs were much less successful at reducing defaults than those that targeted reduced mortgage payments because they did not solve the household's liquidity position (Scharlemann and Shore, 2016). A successful program to reduce delinquencies addresses a household's liquidity concerns, not necessarily its debt balance, and this is exactly what forbearance does. While the CARES Act forbearance guaranteed during the COVID-19 pandemic required little in terms of documentation of hardship, one can easily imagine ways of increasing the burden on households (such as verification of the receipt of unemployment benefits) to further limit the use of forbearance to those in need.

Our increased understanding of what drives mortgage default also indicates there may be a role for forbearance-type policies during normal economic times. Job losses, divorces, and deaths hit households idiosyncratically. The provision of forbearance could be provided ad hoc to households that are able to provide documentation of hardship, or this provision could be written into a mortgage document. One can think of many potential such contracts. For example, mortgages could come with an option for a short forbearance to be requested at the household's discretion. This option need not be free, but perhaps would result in a cost, such as interest charged on the forborne balances or a penalty paid at loan termination.

Conclusion

Policymakers' experience with forbearance during the COVID-19 pandemic and the knowledge they have gained since the Great Recession about how and why households default raises the question of how they might address mortgage policy going forward. More consistent use of forbearance, both during recessions and possibly to address idiosyncratic shocks to households, may prove to be a valuable approach. It has the potential to benefit all parties involved. Specifically, it allows the borrower and lender to avoid foreclosure, it keeps the home occupied, and it ensures that both the borrower and lender retain an interest in maintaining the home's value. While we certainly have more to learn about the costs to a more permanent provision of forbearance—such as how it would affect borrowing behavior and mortgage interest rates—what we have learned from the pandemic was that despite the ease with which homeowners were able to access forbearance, there was no broad uptake of forbearance by those who were not in need.

Endnotes

1. While a borrower is in forbearance, the mortgage servicer bears the cost because the servicer is required to front the missed payments to investors while temporarily not receiving any remuneration from the borrower. However, the servicer is required to do this for delinquent loans, as well, and those forwarded balances are eventually repaid by the government agency insuring the loan. In the longer run, mortgage investors bear some cost because the loans are often modified after exiting forbearance, a situation which lowers cash flows either because of the modification itself or because the mortgage is purchased out of the pool.
2. During natural disasters such as hurricanes, access to forbearance is limited to specific geographic areas affected.
3. The CARES Act is silent on whether a borrower could request forbearance more than once. However, given the general expectation in 2020 that the pandemic would be short lived, it did not make sense for borrowers to delay requesting forbearance. In fact, about 20 percent of borrowers who entered forbearance early in the pandemic continued making their payments.
4. There are many other ways borrowers could have used forbearance strategically that we cannot observe. The most obvious would be to request forbearance despite not facing an income loss. Or borrowers may have requested forbearance after quitting jobs as opposed to being laid off.
5. That is, mortgages used to purchase homes.

References

Adelino, Manuel, Kristopher Gerardi, and Paul S. Willen. 2013. "Why Don't Lenders Renegotiate More Home Mortgages? Redefaults, Self-Cures and Securitization." *Journal of Monetary Economics* 60 (7): 835–53. https://doi.org/10.1016/j.jmoneco.2013.08.002.

Akana, Tom, Lauren Lambie-Hanson, and James Vickery. 2021. "Recent Data on Mortgage Forbearance: Borrower Uptake and Understanding of Lender Accommodations." Consumer Finance Institute Research Briefs and Special Reports. Federal Reserve Bank of Philadelphia. https://fedinprint.org/item/p00001/93438.

Albuquerque, Bruno, and Alexandra Varadi. 2022. "Consumption Effects of Mortgage Payment Holidays: Evidence during the Covid-19 Pandemic." Working paper 2022–044. International Monetary Fund. https://doi.org/10.5089/9798400203107.001.

An, Xudong, Larry Cordell, Liang Geng, and Keyoung Lee. 2022. "Inequality in the Time of COVID-19: Evidence from Mortgage Delinquency and Forbearance." Working paper 21-09/R. Federal Reserve Bank of Philadelphia. https://www.philadelphiafed.org/consumer-finance/mortgage-markets/inequality-in-the-time-of-covid-19-evidence-from-mortgage-delinquency-and-forbearance.

Cherry, Susan F., Erica Xuewei Jiang, Gregor Matvos, Tomasz Piskorski, and Amit Seru. 2021. "Government and Private Household Debt Relief during Covid-19." Working paper 28357. National Bureau of Economic Research. https://doi.org/10.3386/w28357.

Eberly, Janice, and Arvind Krishnamurthy. 2014. "Efficient Credit Policies in a Housing Debt Crisis." *Brookings Papers on Economic Activity* 2014 (2): 73–136. https://doi.org/10.1353/eca.2014.0013.

Farrell, Diana, Fiona Greig, and Chen Zhao. 2020. "Did Mortgage Forbearance Reach the Right Homeowners? Income and Liquid Assets Trends for Homeowners during the COVID-19 Pandemic." JPMorgan Chase & Co Institute. https://doi.org/10.2139/ssrn.3742332.

Foote, Christopher L., Jeffrey C. Fuhrer, Eileen Mauskopf, and Paul Willen. 2009. "A Proposal to Help Distressed Homeowners: A Government Payment-Sharing Plan." *FRB of Boston Public Policy Brief* 09 (1). https://ideas.repec.org/a/fip/fedbpb/y2009n09-1.html.

Foote, Christopher L, and Paul S Willen. 2018. "Mortgage-Default Research and the Recent Foreclosure Crisis." *Annual Review of Financial Economics* 10: 59–100. https://doi.org/10.1146/annurev-financial-110217-022541.

Frame, W. Scott. 2010. "Estimating the Effect of Mortgage Foreclosures on Nearby Property Values: A Critical Review of the Literature." *Economic Review* 95. https://ideas.repec.org/a/fip/fedaer/y2010nv.95no.3.html.

Ganong, Peter, and Pascal J. Noel. 2020. "Why Do Borrowers Default on Mortgages? A New Method For Causal Attribution." Working Paper 27585. National Bureau of Economic Research. https://doi.org/10.3386/w27585.

Gerardi, Kristopher, Kyle F. Herkenhoff, Lee E. Ohanian, and Paul S. Willen. 2018. "Can't Pay or Won't Pay? Unemployment, Negative Equity, and Strategic Default." *The Review of Financial Studies* 31 (3): 1098–1131. https://doi.org/10.1093/rfs/hhx115.

Kim, You Suk, Donghoon Lee, Therese C. Scharlemann, and James I. Vickery. 2021. "Intermediation Frictions in Debt Relief: Evidence from CARES Act Forbearance." Finance and Economics Discussion Series 2022–017. Board of Governors of the Federal Reserve System. https://doi.org/10.17016/FEDS.2022.017.

Loewenstein, Lara. 2021. "Why Wasn't There a Nonbank Mortgage Servicer Liquidity Crisis?" *Economic Commentary* 2021-15. https://doi.org/10.26509/frbc-ec-202115.

Low, David. 2022. "What Triggers Mortgage Default? New Evidence from Linked Administrative and Survey Data." Working paper 2022–02. Consumer Financial Protection Bureau Office of Research. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4136704.

Scharlemann, Therese C., and Stephen H. Shore. 2016. "The Effect of Negative Equity on Mortgage Default: Evidence from HAMP's Principal Reduction Alternative." *The Review of Financial Studies* 29 (10): 2850–83. https://doi.org/10.1093/rfs/hhw034.