FHFA STAFF WORKING PAPER SERIES

NMDB
National Mortgage Database

Individual Borrower Motivations Surrounding Mortgage Forbearance Take-Up and Exit

Justin C. Contat
William M. Doerner
Michael J. Seiler
Scott Weiner

December 2024

Working Paper 24-11

FEDERAL HOUSING FINANCE AGENCY
Division of Research and Statistics
400 7th Street SW
Washington, DC 20219, USA

Please address correspondence to Michael Seiler (michael.seiler@fhfa.gov). Helpful feedback was provided by Billy Buchanan, Chuck Capone, Robert Dunsky, Adam Elaroussi, Austin Hawk, Darryl Hill, Alexandra Marr, Prasant Sar, and Jon Spader.

The latest paper can be found at https://www.fhfa.gov/research/papers/wp2411

Individual Borrower Motivations Surrounding Mortgage Forbearance Take-Up and Exit

Justin C. Contat, William M. Doerner, Michael J. Seiler, and Scott Weiner

FHFA Staff Working Paper 24-11

December 2024

Abstract

Borrower perceptions and beliefs about the future influence mortgage forbearance decisions. Using a proprietary dataset combining administrative mortgage records with borrower surveys, we find subjective expectations regarding forbearance uncertainty and financial knowledge help predict forbearance participation under the CARES Act alongside traditional underwriting variables. While precautionary motives seemingly drive decisions, a closer look reveals the importance of realized work and personal changes. Additionally, actual need and uncertainty about resolution options cause greater difficulty resuming payments when exiting forbearance. These findings highlight the benefits of using contemporaneous, subjective information during crises and emphasize the need for behavioral insights in policy design.

Keywords: behavioral · consumer finance · forbearance · mortgage · policy

JEL Classification: C35 · D10 · G01 · G18 · G28 · H12 · R20 · R30

Justin C. Contat
Federal Housing Finance Agency
Division of Research and Statistics
Office of Research and Analysis
400 7th Street SW
Washington, DC 20219, USA
justin.contat@fhfa.gov

William M. Doerner
Federal Housing Finance Agency
Division of Research and Statistics
Office of Research and Analysis
400 7th Street SW
Washington, DC 20219, USA
william.doerner@fhfa.gov

Michael J. Seiler
Federal Housing Finance Agency
Division of Research and Statistics
Office of Research and Analysis
400 7th Street SW
Washington, DC 20219, USA
michael.seiler@fhfa.gov, mjseiler@wm.edu

Scott Weiner
Federal Housing Finance Agency
Division of Research and Statistics
Office of Research and Analysis
400 7th Street SW
Washington, DC 20219, USA
scott.weiner@fhfa.gov

1 Introduction

The onset of the COVID-19 pandemic created unprecedented economic challenges, prompting Congress to pass the Coronavirus Aid, Relief, and Economic Security (CARES) Act in March 2020.[1] This legislation allowed borrowers with federally backed mortgages to request payment forbearance if they were experiencing a COVID-related financial hardship.[2] Though forbearance existed prior to COVID, the expanded eligibility and ease of enrollment in COVID forbearance meant the policy tool had a wider reach, providing immediate relief to many homeowners.[3] However, uncertainty regarding how the forbearance process works, ultimate resolutions, and the economic recovery led to different take-up and exit behavior across borrowers.

While existing research has identified broad borrower characteristics associated with forbearance, few studies examine the granular, behavioral drivers of enrollment and exit decisions. This paper fills that gap by merging administrative mortgage data from the National Mortgage Database (NMDB®) with individual borrower responses from the American Survey of Mortgage Borrowers (ASMB).[4] The novelty of our approach is due to the ASMB; this unique dataset allows us to explore how borrower beliefs—about forbearance terms, economic uncertainty, and personal financial prospects—shape forbearance decisions.

Supported by a behavioral theoretical model, we find that traditional underwriting characteristics at origination, such as credit scores or debt-to-income ratios, are by themselves

[1] For the actual law, see `https://www.congress.gov/116/plaws/publ136/PLAW-116publ136.pdf`.

[2] The CARES Act defines a federally backed mortgage loan as a single-family (1-4 families), residential real property loan either (1) insured by the Federal Housing Administration (FHA), (2) insured/guaranteed/made by the Department of Veterans Affairs (VA), (3) insured/guaranteed by the Department of Agriculture, or finally (4) purchased/securitized by the Federal Home Loan Mortgage Corporation (Freddie Mac) or the Federal National Mortgage Association (Fannie Mae). Additionally, loans insured and guaranteed under the National Housing Act and Housing and Community Act, respectively, were also deemed federally backed mortgages. The CARES Act directly applied to the majority of all outstanding mortgages across the United States. Importantly, private-label lenders tended to follow the federal guidelines, so the effective rate of CARES Act coverage is much higher.

[3] For example, borrowers can request forbearance when they experience natural disasters, income loss, or other life-disrupting events. See Fannie Mae/Freddie Mac Form 710 for other examples.

[4] The NMDB program is a joint research effort by the Federal Housing Finance Agency (FHFA) and the Consumer Financial Protection Bureau (CFPB). Questions on the ASMB vary from year to year. In the 2020 version, there are 92 questions, many with multiple parts, that collect a wide variety of data concerning beliefs about the future, personal economic situations, and much more, as it relates to mortgage forbearance and COVID-19.

insufficient predictors of forbearance participation.[5] Instead, we argue realized changes in economic circumstances, along with subjective expectations about needing help, morality about prioritizing one's self interests, financial literacy, and perceived economic uncertainty, are central to take-up and exit decisions.[6] Notably, 56% of survey participants enrolled with precautionary motives; that is, they enrolled in case of a future need, rather than due to a realized hardship. This highlights the potential strategic behavioral aspects of forbearance during the pandemic.[7]

Our results underscore the importance of integrating more current behavioral insights into policy design. By revealing how current circumstances, beliefs, and financial literacy affect borrower behavior, this study provides insights for improving debt relief programs to reduce uncertainty, such as tailoring mitigation options to borrower knowledge gaps and communicating clear repayment plans. While existing national surveys provide valuable data, their static nature or infrequent sampling limits timely insights. Policymakers and servicers may enhance predictions by incorporating targeted questions informed by our findings into outreach efforts aimed at borrowers contacting servicers for assistance.

This study examines how borrower beliefs and perceptions influenced mortgage forbearance decisions under the CARES Act. Using a unique, proprietary dataset combining administrative mortgage records at origination with contemporaneous borrower surveys, we find (contemporaneous) subjective expectations surrounding the implementation details of forbearance relief and economic uncertainty statistically outperform traditional underwriting variables (at origination) in predicting forbearance take-up and exit. Precautionary motives drive the majority of decisions, while repayment uncertainty delays exits. These findings highlight the potential benefits of behavioral insights for policy design, thereby creating

[5]This is an important point where our paper expands the household finance literature. Forbearance is not a new concept. Prior to the pandemic, it has been used during natural disaster relief and as a workout option with student loans. The literature has examined borrower behavior by pairing participation with administrative data (see del Valle, Scharlemann, and Shore, 2024) or tracking borrower characteristics through longitudinal surveys (like in Catherine and Yannelis, 2023). We take a different tack by introducing borrower beliefs and the accuracy of those perceptions as a way to gauge consumer decision-making.

[6]D'Acunto and Weber (2024) discuss at length the need to collect survey-based expectations data since actual consumer decision-making is based on beliefs, perceptions, cognitive limitations, and biases, as well as limited access to accurate information.

[7]Those who actually need the protection are able to anticipate changes in their personal and professional lives. Not all borrowers are able to self-identify the potential need to enter into a forbearance program. For such reasons, it would be ideal for policymakers to be able to promptly identify borrowers who are more likely to need assistance during times of economic turmoil.

more effective debt relief programs and enhancing systemic financial stability. Ultimately, a major aim of the paper is to stratify borrowers into meaningful groups, enabling more effective and equitable outreach during economic shocks. Absent an ability to survey borrowers during a crisis, a series of financial distress questions are already asked quarterly (of select borrowers of newly originated loans) on the National Survey of Mortgage Originations (NSMO).[8] Given that during a crisis, time is of the essence, having either servicers ask key current life challenge questions or relying on recent quarterly surveys of new borrowers may help identify distressed borrowers for forbearance plans. Our results show the importance of both more timely, contemporaneous information about borrowers and also the specific importance of borrower's expectations, beliefs, and financial knowledge.

This paper is organized as follows. Section 2 overviews how forbearance operated across the mortgage market and the related literature on mitigation strategies. Section 3 describes the unique dataset assembled from administrative records and survey responses, which enables a detailed analysis of borrower behavior. Section 4 presents empirical results on forbearance entry and exit, highlighting key patterns and drivers. Section 5 introduces a theoretical framework that integrates these findings and derives insights into why borrowers respond as they do under stress. Finally, Section 6 concludes with lessons learned and recommendations to improve the design and implementation of future crisis response programs.

2 Background and Literature Review

This section provides background information concerning the CARES Act, as well as the literature related to forbearance. We examine policy mechanisms implemented across the U.S. mortgage market to mitigate widespread financial distress and place our research within the broader context of borrower behavior and pandemic-related risk management.

2.1 Background

In the early days of the COVID-19 pandemic, the federal government prioritized measures to prevent widespread economic disruption. To support mortgage markets, borrowers with

[8]During the pandemic, not all sectors of the economy were impacted equally. For example, the retail service industry was particularly negatively affected. While NSMO does ask questions relating to borrower employment status, more specific questions might allow for a greater identification of those in need of forbearance programs allowing for targeted relief efforts.

federally backed loans[9]—constituting approximately 80% of the mortgage market—were permitted under the CARES Act to enter into forbearance[10] and suspend their mortgage payments.[11] Borrowers in forbearance would not accrue additional interest on outstanding balances during the pause, but the methods for repaying missed payments varied depending on the market segment, and industry guidance was mixed early on.[12] Borrowers could access forbearance by attesting to financial hardship related to the COVID pandemic to their servicer; no documentation was required, and missed payments during forbearance were not counted as delinquent by credit bureaus.[13] Interestingly, as others have documented, we also see evidence of borrowers entering forbearance and continuing to make payments, suggesting borrowers were using forbearance as a form of insurance rather than an immediate form of debt relief.

2.1.1 Enrolling to receive forbearance assistance

Figure 1 illustrates forbearance trends, showing the rapid take-up across all market segments in early 2020. Participation was particularly high among borrowers with FHA and GSE-backed loans, though the GSEs had the lowest share of their portfolios in forbearance. This swift adoption was driven by the deliberate design of the program, which prioritized simplicity and ease of access. Although initial guidance excluded borrowers who were already two or more months delinquent as of March 1, 2020, subsequent clarifications extended

[9]These loans included those purchased or securitized by Fannie Mae or Freddie Mac (the Government-Sponsored Enterprises or "GSEs"), along with those backed by the Federal Housing Administration (FHA), Department of Veterans Affairs (VA), or Department of Agriculture (USDA). See: `https://files.consumerfinance.gov/f/documents/cfpb_csbs_industry-forbearance-guide_2020-06.pdf`.

[10]Note that forbearance existed for prior to the COVID pandemic as an option for borrowers affected by a personal hardship or natural disaster to temporarily pause mortgage payments, and prevent servicers from starting foreclosure proceedings, while they worked to resolve their hardship. The novelty of COVID forbearance was the expanded eligibility for forbearance, and in some specific details of its implementation, including workout options available at the end of forbearance.

[11]Estimates suggest 70–80% of the mortgage market was federally-backed. The lower end of the range comes from a blog by the U.S. Government Accountability Office at `https://www.gao.gov/blog/cares-act-provides-relief-some-homeowners-during-coronavirus-outbreak` while the upper bound is provided in an online NMDB dashboard at `https://www.fhfa.gov/data/dashboard/nmdb-aggregate-statistics`.

[12]See `https://www.fhfaoig.gov/sites/default/files/OIG-2020-004.pdf` for more details. Communication was quite consistent across agencies that a lump-sum reinstatement would not be required upon exiting forbearance.

[13]Servicers are typically required to make Quality Right Party Contact (QRPC) with borrowers for forbearance related matters. For example, see Fannie Mae's Servicing Guide for more details at `https://servicing-guide.fanniemae.com/svc/d2-2/requirements-contacting-borrower`. The purpose of QRPC is largely to determine the nature of the distress to the borrower as well as the ability (and timing) to repay any missed payments. We believe the data contained in ASMB complements the usual hard and soft data servicers collect when communicating with borrowers.

eligibility to those experiencing pandemic-related hardship, regardless of prior delinquency.[14]

Initially, forbearance lasted up to 180 days (six months), with an additional 180 days available upon request. Borrowers enrolled in forbearance by February 2021 were eligible for two more three-month extensions, allowing a maximum of 18 months. Following the official end of the COVID-19 emergency in April 2023, October 2023 marked the last month for entry into COVID forbearance. Consequently, all COVID-related forbearance plans were set to conclude a year later.[15]

While in forbearance, borrowers were protected from penalties, foreclosure proceedings, and additional interest on unpaid balances. For those with escrow accounts, servicers continued to advance property tax and insurance payments, while borrowers without escrow accounts were expected to manage those payments themselves.[16] Importantly, borrowers in forbearance were reported to credit bureaus as "current" if they had not previously missed payments. Those who entered forbearance while delinquent were reported as delinquent, but the depth of their reported delinquency remained unchanged while in forbearance.[17]

2.1.2 Workout options for borrowers exiting forbearance

Repayment options for exiting forbearance differed by agency, and the immediate focus on facilitating enrollment left limited regulatory guidance regarding the resolution of missed payments. This lack of clarity led to instances where borrowers received inconsistent information from the industry. Subsequent amendments clarified that missed payments would not

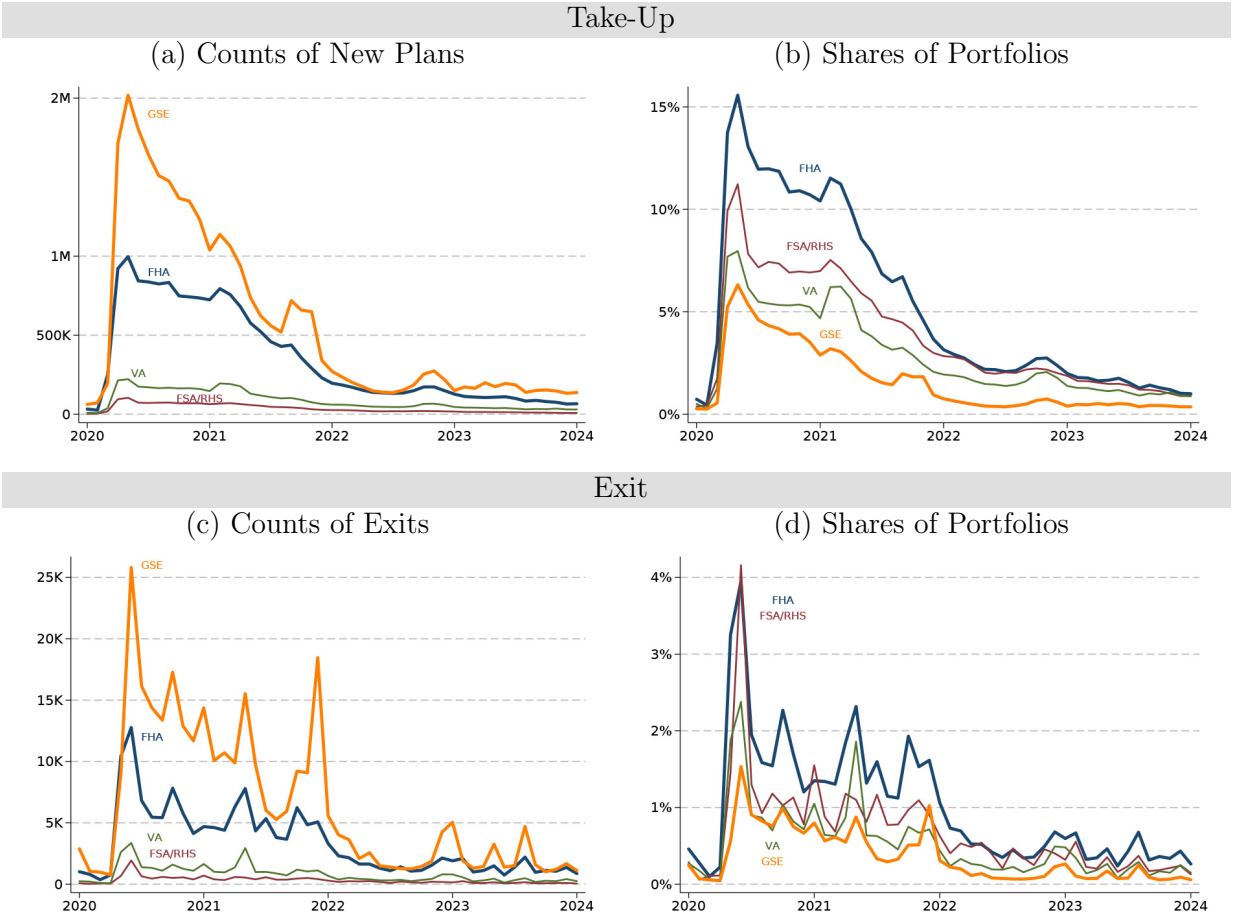
[14]For example, Freddie Mac initially excluded such borrowers from COVID forbearance but later amended servicer guidance at `https://guide.freddiemac.com/app/guide/bulletin/2020-4`. Fannie Mae provided a long list of guidance and amendments with its early 2020 lender letter at `https://singlefamily.fanniemae.com/media/22261/display`. Additional clarifications made it clear that, across the mortgage market, all borrowers experiencing a financial hardship would be eligible, as discussed for FHA, VA, and USDA loans at `https://www.rd.usda.gov/sites/default/files/Interagency_COVID19_Housing_Forbearance_FS_Lenders.pdf` and for all consumers at `https://files.consumerfinance.gov/f/documents/cfpb_csbs_consumers-forbearance-guide_2020-05.pdf`.

[15]Final deadlines for enrollment and expiration at mentioned for Fannie Mae at `https://singlefamily.fanniemae.com/media/33711/display`, for Freddie Mac at `https://guide.freddiemac.com/app/guide/bulletin/2023-17`, and for FHA at `https://www.hud.gov/sites/dfiles/OCHCO/documents/2023-08hsgml.pdf`.

[16]Details on escrow responsibilities are at `https://web.archive.org/web/20200804231839/https://www.consumerfinance.gov/coronavirus/mortgage-and-housing-assistance/after-you-receive-relief/` and additional guidance from Freddie Mac is at `https://sf.freddiemac.com/faqs/covid-19-servicing-forbearance-faq`.

[17]For details on credit reporting, see `https://files.consumerfinance.gov/f/documents/cfpb_csbs_consumers-forbearance-guide_2020-05.pdf`.

Figure 1: How Quick is Forbearance Take-up and Exit?



Note: Forbearance is identified with the National Mortgage Database (NMDB®) using a 5% representative sample of 14 million records (depicting over 275 million loan originations) that are outstanding from 1998 through 2023. Loans are kept if they are still active in January 2020. Counts are rescaled from NMDB in order to be nationally representative. Shares are computed for each major portfolio loan type (i.e., GSE, FHA, VA, FSA/RHS) weighted by loan count (not unpaid principal balance). Both use a monthly frequency.

be forgiven, and additional communications reassured borrowers that lump-sum repayment of the full balance would not be required.[18]

For loans owned by Fannie Mae or Freddie Mac, servicers were required to contact borrowers at least 30 days before their scheduled forbearance end to discuss repayment options. Workout options included a lump-sum repayment; a repayment plan, where arrearages would be repaid over 12 months in addition to regular payments; a payment deferral, in which missed payments would be added to the loan as a non-interest-bearing balance; or a loan modification, aimed at permanently reducing the borrower's monthly payments. Among these options, payment deferral was the most common resolution.[19]

Introduced in March 2020, with significant clarifications and refinements in May 2020, the payment deferral option allowed borrowers to defer up to 12 months of missed payments—or 18 months for those eligible for extended forbearance—until the loan's maturity or prepayment date.[20] These deferred amounts were structured as non-interest-bearing, non-amortizing "balloon" payments, preserving the loan's original term and interest rate. In contrast to a loan modification, because the monthly payment and maturity term remained unchanged, payment deferrals allowed the Enterprises to maintain payment schedules to investors without having to buy the loans out of securities, thus avoiding administrative and financial complications.

Early guidance indicated that payment deferrals would cover principal and interest (P&I), as well as taxes and insurance (T&I).[21] However, updates clarified borrowers would repay T&I separately over 12 to 60 months.[22] For borrowers unable to resume full payments post-forbearance, certain modifications were available. Servicers also had financial incentives to

[18]On April 27, 2020, concerns about lump-sum repayment were addressed at `https://www.fhfa.gov/news/news-release/no-lump-sum-required-at-the-end-of-forbearance-says-fhfas-calabria`.

[19]Industry guidance on COVID-19 forbearance and deferrals can be found at `https://guide.freddiemac.com/app/guide/bulletin/2021-6`, `https://guide.freddiemac.com/app/guide/bulletin/2020-15`, and `https://singlefamily.fanniemae.com/media/25121/display`. The process for a servicer and borrower to agree on a workout option depended on which option was selected. The process of completing a COVID payment deferral was designed to be simple: servicers had to provide borrowers with basic information about the terms, and in some cases simply making a full monthly P&I payment could be considered sufficient evidence of borrower accepting the deferral offer.

[20]Single-family servicers could follow the determination waterfall at `https://singlefamily.fanniemae.com/media/36561/display`. Additional guidance is available there for escrow payments.

[21]See `https://guide.freddiemac.com/app/guide/section/9206.15`.

[22]`https://guide.freddiemac.com/app/guide/bulletin/2021-35`.

complete a workout option, earning $500 for a repayment plan or deferral and $1,000 for a modification, capped at a total of $1,000 per loan.[23] If a servicer was unable to make contact with a borrower before the end of forbearance, they were expected to evaluate eligibility for a payment deferral within 15 days post-forbearance and extend an offer where applicable.

Workout options for FHA, VA, and USDA loans were broadly similar, but varied in implementation.[24] FHA offered a "Partial Claim" option, which was analogous to the GSEs' payment deferral.[25] FHA and VA also offered loan modifications for borrowers unable to resume making their original payments; however, modifications for FHA and VA loans require adjusting the loan to the prevailing interest rate. By mid-2022, this would have resulted in substantial increases to monthly payments for most borrowers, rendering such a modification impractical.[26] As another example, USDA loans could have missed payments added to the end of the loan by extending the loan term. The VA unexpectedly discontinued its partial claim (payment deferral) program in 2022, leaving fewer options for borrowers exiting forbearance to avoid foreclosure.[27]

2.1.3 Economic and behavioral impacts

Some industry participants expressed concerns about potential moral hazard, suggesting that borrowers might forbear their mortgage payments to conserve cash or pursue speculative investments with limited lender recourse. For example, Anderson, Harrison, and Seiler (2022) note that borrowers who forbear mortgage payments could do one of several things with the additional cash balance from forbearance. They could (1) store the cash as a precautionary need in case they get sick and/or lose their job, (2) consolidate other higher interest rate

[23]Details on servicer incentives are at `https://guide.freddiemac.com/app/guide/bulletin/2021-8`.

[24]Details on USDA and VA mitigation programs are at `https://www.rd.usda.gov/sites/default/files/Interagency_COVID19_Housing_Forbearance_FS_Borrowers.pdf` and `https://www.hud.gov/sites/dfiles/OCHCO/documents/2024-02hsgml.pdf`.

[25]Read more at `https://www.hud.gov/program_offices/housing/sfh/nsc/covid_19_loss_mit_options_homeowners`.

[26]As a result, FHA also introduced the COVID-19 Advance Loan Modification (ALM), to make more borrowers exiting forbearance eligible for payment reductions where needed.

[27]This received media coverage on NPR at `https://www.npr.org/2023/11/11/1211855956/veterans-va-loans-foreclosure-covid-forbearance`.

debt, such as on credit cards,[28] or (3) use the extra cash to invest in the risky stock market.[29]

Despite early concerns, the evidence suggests that most borrowers who entered forbearance did so out of genuine need. The typical forbearance period rangesd from 5 and 10 months, with exit behavior driven in waves by house price appreciation, expiring program terms, and opportunities to refinance at historically low interest rates. These departure trends are shown in the bottom panel of Figure 1. The majority of exits happened before mortgage rates rose precipitously in 2022.[30] Studies by Loewenstein and Njinju (2022) and Kim et al. (2024) support the view that forbearance primarily mitigated financial strain, enabling borrowers to cover essential expenses and stabilize housing markets. Overall, the CARES Act's intervention is widely regarded as a success, providing critical support to borrowers while preserving systemic stability (as noted in An et al. (2022), Cherry et al. (2021), Farrell, Greig, and Zhao (2020), Gerardi, Lambie-Hanson, and Willen (2022), and Pence (2022)).

2.2 Literature Review

Most studies of forbearance during COVID examine which groups or classifications of borrowers were more likely to enter into forbearance. Similar to much of this literature, our work focuses on the U.S. population.[31] Previous work finds that forbearance is positively associated with urban residency (Lambie-Hanson, Vickery, and Akana, 2021), employment in industries most affected by the pandemic such as hospitality and leisure (Lambie-Hanson,

[28]Note that payments to student loans were also frozen without the accumulation of interest during this period, so the consolidation of student loan debt is believed to be less of a concern.

[29]The idea behind this third option is to pursue what effectively amounts to a long call option in that if the investment in the stock market goes up in value, then the borrower repays the missed mortgage payments and keeps the profit. However, if the return to the stock market is negative, the borrower could default on the mortgage in the hopes the government would once again intervene to assist borrowers. One industry report finds that a limited number of borrowers took this idea a step further by using part of the forbearance proceeds to invest in the even riskier cryptocurrency market to leverage up potential returns. In the end, this behavior is isolated enough so as not to be a major economic concern.

[30]Typically, a borrower must be current on their mortgage for several months to be eligible to refinance. COVID forbearance changes this requirement somewhat, as borrowers could miss payments during forbearance while still being considered current from a credit reporting standpoint. Even in this case, however, they may not be immediately eligible for refinance after forbearance; for example, borrowers who receive a COVID-19 Payment Deferral have to subsequently remain current for three months before being eligible to refinance (see `https://guide.freddiemac.com/app/guide/bulletin/2020-17`). This paper does not focus on refinances, but future work could investigate whether there is a relationship between forbearance activity and refinance incentives.

[31]See Allen et al. (2022) for work on COVID-19 forbearance in Canada, who find nearly 80% of borrowers were unaware of the existence of forbearance.

Vickery, and Akana, 2021; Cherry et al., 2021), lower income borrowers[32] (Cherry et al., 2021; An et al., 2022), minority groups (Cherry et al., 2021; An et al., 2022; Gerardi, Lambie-Hanson, and Willen, 2022), borrowers with lower credit scores (Shi, 2022; Kim et al., 2024; McManus and Yannopoulos, 2021), and for borrowers with higher DTI and LTV ratios (McManus and Yannopoulos, 2021). In particular, An et al. (2022) find that while lower income and minority borrowers experience disproportionately negative impacts from the pandemic, targeted government programs help these groups more effectively than higher-income and white borrowers. Despite the initial results of these interventions, lower income and minority borrowers ultimately have higher delinquency and default rates after exiting forbearance. This underscores the importance of not only studying borrowers during forbearance but also monitoring their outcomes after exiting these programs.[33] Further thoughts are presented in Gordon et al. (2021).

2.2.1 Cash buffer and precautionary savings

Several studies show borrowers may have used forbearance as a cash buffer or precautionary means to avoid further financial trouble. Farrell, Greig, and Zhao (2020) analyze the CARES Act using private JP Morgan Chase account data and mortgage-level characteristics. They find that forbearance allows families in need to maintain sufficient cash balances during the pandemic. Approximately one-third of borrowers who take up forbearance remain current on their mortgage payments, implying many people enter forbearance as a precautionary action. This finding aligns with other studies, including Cherry et al. (2021), Kim et al. (2024), Lambie-Hanson, Vickery, and Akana (2021), and Farrell, Greig, and Zhao (2020). Consistent with An et al. (2022), Farrell, Greig, and Zhao (2020) find that some borrowers default without entering forbearance, likely due to a lack of awareness about the program. This missed opportunity highlights the need for better communication strategies to ensure eligible borrowers are informed about relief options.[34]

2.2.2 Labor market conditions and interest rates

Another strand of literature shows labor market conditions and low interest rates influence forbearance participation. Anenberg and Scharlemann (2021) document that despite a spike

[32]Gerardi, Lambie-Hanson, and Willen (2022) note that minority and lower-income borrowers are more likely to miss payments, but conditional on missing payments are equally as likely to enter into forbearance.

[33]Agarwal, Chomsisengphet, and Mielnicki (2008) find a 22% re-default rate on credit cards after exiting forbearance programs, supporting the need for extended program monitoring.

[34]The National Housing Resource Center surveyed housing counselors to learn about what they were encountering. The results are available online at `https://www.hsgcenter.org/wp-content/uploads/2020/07/Survey-results-Forbearance-and-Delinquency2.pdf`.

in the unemployment rate due to lockdowns, home prices increase substantially, not only in terms of price levels, but also when compared to rent prices on equivalent homes. Fuster et al. (2021) take a deep dive into how expected labor market frictions stemming from illness and lockdowns in the mortgage industry might have otherwise limited the supply of funds flowing into the mortgage market. Instead, this would-be inelastic supply curve flattens by more technology-savvy lenders who step in to fill the void, allowing home prices to continue to rise against conventional wisdom. As the forbearance program begins to transition from greater entry to exit flows, Fonseca and Liu (2024) and Batzer et al. (2024) discuss how the lock-in effect also contributes to higher home prices. Homeowners with mortgages at rates significantly below current market levels are reluctant to sell their homes, contributing to reduced inventory and higher home prices. These studies demonstrate the importance of borrower expectations as a key driver of housing market behavior.

2.2.3 Importance of subjective beliefs

Borrower beliefs and perceptions have also been shown to play an important role in financial decision-making. Lambie-Hanson, Vickery, and Akana (2021) analyze the CARES Act using survey data from the Federal Reserve Bank of Philadelphia's Consumer Finance Institute. Their high-level findings provide a foundation for our more detailed analysis, which links subjective beliefs to actual mortgage performance.[35] D'Acunto and Weber (2024) argue that consumer surveys are needed to examine decision-making because the beliefs and perceptions of borrowers will impact their choices, even when these beliefs are biased, limited in scope, or suffer from cognitive limitations. Collinson et al. (2024) use a combination of administrative and survey data to study emergency rental assistance in four metropolitan areas during the pandemic, but find limited effects on financial and housing stability. Building on these studies, we undertake an examination of forbearance for homeowners using survey-based beliefs and expectations about a myriad of future potential outcomes. We join that sample with actual mortgage performance data from NMDB, a national database of mortgage and credit report data representing all residential mortgages in the United States.[36] This approach allows us to examine how well borrowers understand their mortgages and the effects of this knowledge, or their perception of it, on forbearance decisions.

[35]Household consumer surveys have been useful for studying financial knowledge and decision-making. For example, poor financial literacy is associated with confusion and worse choices of credit products (Disney and Gathergood, 2013). Subjective measures of well-being and future perceptions can be used to study difficulties with short-term borrowing and access to credit Zinman (2010).

[36]Low (2023*a*) uses a similar data combining approach to disentangle negative equity and a liquidity shock when examining triggering events leading to mortgage default. Low (2023*b*) offers a more formal theory of these triggering events, but without survey-based data.

2.2.4 Forbearance exits literature

Our paper also expands the nascent literature on forbearance exits. In the context of Irish commercial loans, Bergant and Kockerols (2024) find that not only are borrowing firms strategic in the forbearance decision, but so too are banks. Specifically, banks are incentivized to grant forbearance, else the non-performing loan will decrease profits and adversely affect their capital ratios. While extending loan terms avoids short-term financial crises, it may lead to higher default rates in the long-term. Policymakers should be aware that while forbearance can stave off an impending financial crisis, tradeoffs should be considered carefully.

In the U.S. residential lending space, An et al. (2022) show that extending the loan term is a successful mechanism to lower mortgage payments and mitigate defaults in the short-term. In the longer-term, the results are less conclusive. Since their data stop in November 2021, during the on-going pandemic, one must be careful when drawing forbearance exit conclusions. For example, they find while Black borrowers are more likely to remain in forbearance, they are less likely to exit into delinquency when they did leave the program. In contrast, lower-income borrowers exhibit worse metrics on both accounts, suggesting the need to further study forbearance exits. Our study answers An et al. (2022)'s call for an extended and deeper examination of forbearance exits.

3 Assembling Data About Forbearance Outreach

Our data come from two main sources. The first is the National Mortgage Database (NMDB), a one-in-twenty nationally representative sample of closed-end, first-lien residential mortgages.[37] This database contains extensive details on loan characteristics at origination and about ongoing performance. Borrowers from the NMDB are selected and pooled with respondents to our second data source: the American Survey of Mortgage Borrowers (ASMB).[38] The ASMB, a periodic survey compiled through a joint effort by the Federal Housing Finance Agency (FHFA) and the Consumer Financial Protection Bureau (CFPB), is designed

[37] We use internal version 27.1 of NMDB and restrict our analysis to single-family housing.

[38] A somewhat closely related survey is the Census's Household Pulse Survey (`https://www.census.gov/data/experimental-data-products/household-pulse-survey.html`), which is comprised of individual-level data on demographics, income, health status, educational attainment, and many other variables. Though they do ask if the respondent was late on mortgage and also if they anticipate future difficulties, their focus is more on general well-being. In contrast, the focus of the ASMB is on the respondent's financial health during COVID, particularly as it relates to mortgages. More importantly, unlike Pulse, we are able to link ASMB data with mortgage origination and mortgage performance data.

to address pressing economic issues in each survey wave.[39] In 2020, the ASMB targeted forbearance take-up under the CARES Act. Our sample includes borrowers and loans from the 2020 ASMB survey, with forbearance participation tracked through March 2024.

The ASMB is distributed to a targeted sub-sample, ensuring the survey reaches borrowers most affected by the issue being studied. For example, the 2022 ASMB targets borrowers exiting forbearance under the CARES Act, while the 2023 ASMB focuses on flood risk and surveys homeowners in areas vulnerable to flooding.[40] The ASMB's design allows us to merge individualized survey responses with loan-level characteristics and credit reports, providing the possibility for a much richer analysis of individuals' behavior than studying aggregated survey results. This integration includes loan origination data, ongoing performance metrics, and other credit lines—an opportunity unavailable to most researchers outside the federal government and more comprehensive than what can be assembled even at major private financial institutions.

The 2020 ASMB sample consists of three strata from the NMDB: 6,000 borrowers with evidence of forbearance, 2,000 borrowers with mortgage delinquencies but no forbearance, and 2,000 borrowers with credit delinquencies (e.g., credit cards or auto loans) but no forbearance. To account for this sampling design, we follow Low (2023*a*) by weighting responses based on the proportion of borrowers in each of these categories. The survey was mailed out in October 2020, with responses following afterwards.[41] In an effort to ensure the ASMB survey respondent is properly matched to the borrower record in the NMDB, a series of loan-level questions are asked in addition to soliciting demographic descriptors. Respondents with incomplete and partial responses are removed from the sample. The final dataset includes 1,741 complete and verified borrower records across all 50 states plus Puerto Rico and Washington D.C., which is consistent with sample sizes in similar studies.[42] Among these, federally backed loans account for approximately 85.6% of the sample, while non-federally backed loans comprise the remaining 14.4%.

[39]The NMDB can also be linked to the National Survey of Mortgage Originations (NSMO), which focuses on borrowers who recently obtained mortgages. While useful for tracking responses across cohorts, the NSMO is not positioned to address evolving issues like forbearance or delinquency.

[40]Note that neither dataset is currently publicly available.

[41]The survey was conducted in a single wave with reminders to complete the survey sent to respondents in subsequent weeks. With our monthly time frequency, we assume respondents completed the survey in November 2020 since we do not observe the response date.

[42]See Anderson et al. (2023); Anderson et al. (2023); and Seiler (2014, 2015*a*,*b*, 2016, 2017, 2018).

Table 1: Variable Descriptions

Panel A: NMDB Variables	
Borrower Income	Annual income relied upon for underwriting at origination reported in Table 2 (thousands of dollars, nominal), while 2019 income from (ASMB) is used for estimations.
Credit Score	VantageScore 3.0 closest to, but not later than, origination date. A change in credit score from origination to survey date is also calculated and included in models.
Debt-to-Income	Debt-to-Income (DTI) ratio at origination, expressed as fraction and rounded to nearest hundredth place (Ex: 0.34).
First-Time Homebuyer	Equals 1 if meet conditions of first-time home buyer, and 0 otherwise.
Interest Rate	Original interest rate, expressed as percent rounded to nearest 1/8th of a percentage point (Ex: 4.125%).
Loan Type	Type of Loan, i.e. whether Conventional, Federal Housing Administration (FHA), Veterans Affairs (VA), Farm Service Agency (FSA), or Rural Housing Service (RHS).
Mark-to Market Loan-to-Value	Mark-to-Market Loan-to-Value (MTMLTV) ratio with value adjusted via a local house price index (HPI), expressed as percent rounded to nearest 0.25 of a percentage point (Ex: 12.25%). If in forbearance, equal to MTMLTV at time of entering forbearance, otherwise equal to the average MTMLTV over 2020Q1 to 2020Q3. HPI is constructed using annual county data that are mapped into quarterly data using movements in the respective state series.
Mortgage Current as of ASMB	Equals 1 if mortgage is current at time of survey (November 2020), and 0 otherwise.
Number of Borrowers	Number of borrowers on the mortgage at origination.
Purchase Loan	Equals 1 if mortgage is for purchase of a home, and 0 otherwise (i.e., if mortgage is a refinance).
Servicer Size	Categorical variable classifying servicer as small (<5K loans), medium (5K–30K loans), or large (>30K loans).
Term	Original term of mortgage (years).
Panel B: ASMB 2020 Questionnaire	
Actual Need	Equals 1 if borrower stated they had concerns or difficulties making payments, and 0 otherwise (q29).
Age When Surveyed	Stated age (years) indicated by survey respondent (q66).
Beliefs After Forbearance (FB)	Equals 1 if not clear on what would happen at the end of FB, and 0 otherwise. Defined for all observations. (=1 if q23b = 2 or q21e = 1, 0 else).
College Educated	College status of borrower. Equals 1 if respondent indicated college graduate or higher education, and 0 otherwise (q68).
Consumer Knowledge	Weighted Average of correct responses about loan characteristics (mortgage date, loan amount, monthly payment, interest rate, purchase price, prepayment penalty, adjustable or fixed rate, balloon payment and interest-only loan), where weights are percent that got question incorrect (q3-q6, q8, q13).
Current Pay Type	Categorical variable for form of employment borrower has (full-time self-employed, part-time self-employed, full-time not self-employed, part-time not self-employed, retired, unemployed, or not working for other reasons [student, homemaker, disabled]) (q74).
Dependents Under 18	Equals 1 if respondent has any dependents under 18 years old, and 0 otherwise (q76).
Desirability Beliefs	Indicates beliefs for neighborhood's desirability (-1 = less desirable, 0 = same, 1 = more desirable) (q19).
Financial Knowledge	If in forbearance (FB), sum of correct answers to initial FB period and current forbearance status as of November 2020 (q24, q25). If not in FB, equal to 0 if did not know about FB or its effect on credit scores, 1 if knew one of these facts, and 2 if knew both of these facts (q21a, q21g).
Full-Time	Equals 1 if the respondent indicated full-time, either self-employed or employed by another, and 0 otherwise (q74).
How Applied	Categorical variable for how borrower applied for FB (only defined if in FB; phone, online, mail/email) (q22).
In Forbearance (FB)	Equals 1 if borrower responded they were in forbearance as a result of COVID-19 at any point between and including January 2020 to November 2020, and 0 otherwise (q20).
Male	Sex of borrower. Equals 1 if respondent's sex is male, and 0 otherwise (q67).
Married	Equals 1 if respondent indicated they were married, and 0 otherwise (q64).
Morality	Equals 1 if borrower indicated strategic default is morally acceptable, and 0 otherwise (q92f).
Other Language	Equals 1 if language other than English is primarily spoken at home, and 0 otherwise (q79).
No Job (Non-Retired)	Equals 1 if respondent indicated they were either unemployed or not looking for work (student, homemaker, disabled) and not retired, and 0 otherwise (q74).
Personal Changes	Sum of 4 dummies, each equal to 1 if event happened (borrowed money, delayed major purchases, made smaller/delayed payments on other loans or credit cards, reduced other expenses) (q33).
Precautionary Motive	Equals 1 if borrower did not have immediate need for FB, and 0 otherwise. Defined for all observations (q20 and q21).
Primary Residence	Equals 1 if respondent indicated property securing mortgage is primary residence, and 0 otherwise (q16).
Rental Property	Equals 1 if respondent indicated property securing mortgage is either rental or investment property (q16).
Risk Preferences	Equals 1 if borrowers expressed any preference for risk taking, and 0 otherwise (q86 = 1, 2, or 3).
Self-Employed	Equals 1 if respondent indicated they were self-employed, whether part-time or full-time, and 0 otherwise (q74).
Self-Reported Knowledge Index	Sum of number of financial terms feel comfortable explaining (total of 9 questions, with 0 = not at all, 1 = somewhat, and 2 = very), i.e., self-reported knowledge (q91).
White	Race of borrower. Equals 1 if respondent identified as white, and 0 otherwise (q70).
Work Changes	Sum of 4 dummies, each equal to 1 if event happened (reduced hours, reduced pay, temporarily laid off, job loss) (q73).
Panel C: County-Level Controls	
COVID-19 Incidence	Average number of COVID cases per 100,000 people in property's county for November 2020, where the average rate is across case numbers of each day. Collected from Johns Hopkins University.
Unemployment	Average unemployment rate for property's county from 2016–2020, calculated by authors for each county as as the number of civilian unemployed divided by the labor force for that county. Collected from IPUMS (2020 American Community Survey, B84AE/B84AA).
Voted Democrat	Percent of voters who voted for Democratic candidate in property's county in 2020 U.S. Presidential election. Collected from Massachusetts Institute of Technology (MIT) Elections lab.

Note: Panel A's source is the National Mortgage Database (NMDB), a one-in-twenty nationally representative sample of closed-end, first-lien residential mortgages. Prior to merging with other panels, several filters are applied. Observations are dropped for credit scores (VantageScore) less than 500, DTI over 60%, and loan purposes other than purchase or refinance. Panel B's source is the American Survey of Mortgage Borrowers (ASMB), a periodic survey compiled through a joint effort by the Federal Housing Finance Agency and the Consumer Financial Protection Bureau. Associated question numbers from the survey are provided in parentheses (Ex: q23). Panel C includes COVID-19 Average Incidence Rate from COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, unemployment rate from IPUMS/NHGIS for the American Community Survey's Source Table B2305, and voting data from the Massachusetts Institute of Technology's Election Data and Science Lab.

Table 2: Selected Summary Statistics

Variable	Type	Count	Mean	S.D.	Min.	Max.
			Panel A: NMDB			
Borrower Income	dollars	1,412	85.77	60.56	12.00	623.00
Credit Score	unit	1,412	704.23	72.13	506.00	835.00
Debt-to-Income	share	1,412	0.37	0.10	0.08	0.57
First-Time Homebuyer	share	1,412	0.34	0.47	0.00	1.00
Interest	%	1,412	4.50	1.23	1.62	13.00
Mark-to-Market Loan to Value	share	1,412	57.68	20.98	2.00	151.00
Number of Borrowers	unit	1,412	1.47	0.51	1.00	4.00
Purchase Loan	share	1,412	0.72	0.45	0.00	1.00
Term	years	1,412	28.08	5.21	10.00	40.00
			Panel B: ASMB			
Actual Need	share	1,412	0.51	0.50	0.00	1.00
Age When Surveyed	years	1,412	50.06	12.82	21.00	86.00
Beliefs After Forbearance	share	1,412	0.29	0.45	0.00	1.00
College Educated	share	1,412	0.52	0.50	0.00	1.00
Consumer Knowledge	index	1,412	0.35	0.12	0.00	0.64
Desirability Beliefs	index	1,412	0.31	0.58	-1.00	1.00
Financial Knowledge	index	1,412	1.05	0.78	0.00	2.00
Full-Time	share	1,412	0.67	0.47	0.00	1.00
In Forbearance	share	1,412	0.45	0.50	0.00	1.00
Male	share	1,412	0.48	0.50	0.00	1.00
Married	share	1,412	0.65	0.48	0.00	1.00
Morality	share	1,412	0.06	0.24	0.00	1.00
No Job (Non-Retired)	share	1,412	0.12	0.33	0.00	1.00
Other Language	share	1,412	0.22	0.42	0.00	1.00
Personal Changes	share	1,412	1.31	1.58	0.00	4.00
Precautionary Motive	share	1,412	0.50	0.50	0.00	1.00
Primary Residence	share	1,412	0.94	0.25	0.00	1.00
Rental Property	share	1,412	0.03	0.18	0.00	1.00
Risk Preferences	share	1,412	0.59	0.49	0.00	1.00
Self-Employed	share	1,412	0.15	0.36	0.00	1.00
White	share	1,412	0.77	0.42	0.00	1.00
Work Changes	index	1,412	0.78	0.94	0.00	4.00
			Panel C: County-Level Controls			
COVID-19 Incidence	rate	1,409	3,283.05	1,385.42	330.40	10,315.15
Unemployment	%	1,412	6.00	2.00	2.00	26.00
Voted Democrat	%	1,380	52.00	16.00	10.00	92.00

Note: Table shows variables and summary statistics sorted alphabetically within source panels. The source is the National Mortgage Database (NMDB) for Panel A, the American Survey of Mortgage Borrowers (ASMB) for Panel B, and various other sources for Panel C as noted in Table 1. We report Borrower Income (income relied upon at origination) rather than 2019 income from ASMB in this table as 2019 income is not a continuous variable. Some variables were omitted for space but available upon request: How Applied, Conventional, FHA, and Changes in Credit Score, as well as Forbearance Length (for those borrowers/loans in forbearance). Variable type indicates units of measurement for variables if not immediately apparent for variables with easily recognizable units. Otherwise, a variable type of share indicates a dummy variable and a variable type of index indicates an index with the scale defined appropriately in Table 1.

To improve response rates, the ASMB offers borrowers the option to complete the survey online or by mail. In 2020, 58% of responses were collected online, while 42% were mailed. Response rates range from 20% to 25%.[43] Variable definitions and summary statistics for this study are presented in Tables 1 and Table 2, respectively. The tables segmented variables into three sources: NMDB, ASMB, and publicly available county-level control variables. In Panel A, the NMDB data used in the current study include: borrower income at origination, borrower's credit score at origination, change in borrower's credit score, debt-to-income ratio at origination, first-time homebuyer dummy, mortgage interest rate, conventional loan dummy, Federal Housing Administration (FHA) loan dummy, whether or not the borrower is current on their mortgage, mark-to-market loan-to-value ratio, number of borrowers on the mortgage, loan purchase dummy (as opposed to the loan being originated to refinance), servicer size and loan term to maturity at origination (in years).[44]

Panel B variables are collected from the ASMB, and while the full survey is available online, key variables are described here. Some variables are composite measures created from multiple ASMB questions. For example, Consumer Knowledge refers to a composite of nine questions that assess respondents' understanding of their mortgage terms. Five of these—mortgage origination month and year (Q3), loan amount at origination (Q4), total principal, interest, taxes and insurance (PITI) monthly payment (Q5), interest rate on the mortgage (Q6), and purchase price (Q13)—are continuous variables. The remaining four are dichotomous variables indicating whether a loan has a prepayment penalty (Q8a), adjustable interest rate (Q8c), balloon payment (Q8d), or is interest-only (Q8e). Since these first five questions are on a different scale, we calculate proximity of reported answers to correct values using NMDB data. Each borrower's responses are ranked by accuracy, with a higher score representing greater precision. Continuous variables are scaled between zero and one using relative rankings in order to align with the dichotomous variable scores.[45] The average scores

[43]The 2020 forbearance survey instrument is publicly available at `https://www.fhfa.gov/documents/asmb-questionnaire/2020`.

[44]As noted in Table 2, for space we omit summary statistics for How Applied, Conventional, FHA, and Change in Credit Score. The calculations are available upon request.

[45]This effectively converts continuous variables into percentile form by using the ranking of errors of each variable. We then combine these rescaled (between 0 and 1) variables forming a weighted average of continuous variables, where the scaling and weights vary across individual and variable to take into account the relative accuracy of both the individual and the group of borrowers as a whole.

across all nine variables is used to create the composite score, Consumer Knowledge.[46]

Past research demonstrates that financial knowledge strongly influences mortgage payment behavior.[47] While the ASMB does not administer formal financial knowledge tests, it does include self-assessments of nine mortgage-related concepts (Q91). Although stated preferences differ from revealed preferences, these self-reported measures provide a useful—if less precise—proxy for financial understanding. We combine this information to form our Self-Reported Knowledge Index.

The ASMB collects data on a borrower's willingness to take risks, realizing that opting into forbearance involves some perceived uncertainty. To include risk-taking behavior in subsequent regressions, we transform Q86 into a dummy variable, where a value of 1 indicates a willingness to take risks and 0 otherwise.[48] Building on existing literature on mortgage payment behavior, we hypothesize borrowers who believe their home values will go up in the coming years are more likely to continue making their mortgage payments. To capture this, the ASMB collects beliefs about future home price movement on a scale from 1 to 5, where 1 reflects the belief that neighborhood home prices will increase a lot while 5 indicates the expectation of a significant decrease over the next few years (Q18).

The ASMB includes several other variables relevant to borrower behavior. Concerns about making mortgage payments through a binary variable (Q29) and work-related disruptions are tracked (in Q73) by reduced hours, pay cuts, temporary layoff/furlough, or job loss. To distinguish between primary residences and investment properties—important in predicting payment behavior—there is a question on primary residence (Q16). The survey also collects data on borrowers' moral attitudes toward discontinuing mortgage payments when they can still afford them (Q92f). Standard demographic information is also collected about borrower

[46]Respondents could indicate "I don't know" for certain questions, which is treated as incorrect. If data are missing, we take the average score of the remaining variables. To account for the possibility that missing data for these nine questions might not be random, we assign a weight equal to one minus the correct answer percentage for all nine questions. Robustness checks confirm results are similar between weighted and unweighted scores, as well as replacing missing data instead of leaving the cells blank.

[47]As an example, van Ooijen and van Rooij (2016) measure financial and debt literacy to establish that homeowners with riskier loans are self-aware and feel comfortable with navigating economic turmoil. Borrowers with limited knowledge tend to use brokers who can provide counseling. Kuhnen and Melzer (2016) discuss how positive self-efficacy helps consumers avoid long-term financial distress.

[48]We do not combine this with other indices as risk aversion seems conceptually distinct from knowledge of mortgage characteristics. We select on a binary form due to concern of limited degrees of freedom.

age, marital status, education level, number of dependent children, sex, race, and whether a language other than English is spoken at home. Most importantly, the survey asks whether or not the borrower was ever in forbearance (Q20).

Panel C incorporates county-level control variables that are publicly available. Since the CARES Act and resulting forbearance program came about because of COVID-19, we include county-level infection rates and unemployment rates at the time of survey completion. These variables capture the local economic conditions that may have influenced borrowers' decisions to enter forbearance. Additionally, recognizing that local policies and public opinions had interesting national variations during the pandemic, we include the percentage of voters in the borrower's county who supported each political party in the 2020 presidential election, which was conducted during the ASMB survey period.

After cleaning the initial dataset for missing or incomplete responses, we retain 1,412 borrower records.[49] Of those, 44.5% reported entering forbearance in 2020, consistent with the ASMB's goal of targeting at-risk borrowers.[50] This number is higher than a random sample of federal loan borrowers, but recall the ASMB is specifically targeted to this population. Interestingly, 32.0% of respondents in forbearance do so as a precautionary measure, despite reporting no immediate financial hardship. This reflects the heightened uncertainty of the pandemic, a phenomenon explored further in Anderson, Harrison, and Seiler (2022).

Among borrowers who do not enter forbearance, 29.1% of respondents express worries or difficulties making mortgage payments. Reasons for not entering forbearance (respondents could select multiple reasons) include being unsure about a lump-sum payment at the end of forbearance (29.2%), thinking they do not need it (63.6%), not knowing about it (28.9%), uncertainty about how payments would be repaid (20.7%), believing they do not qualify (9.2%), and thinking it is not available for their loan (8.4%). Hesitations about credit score impacts (23.8%) and receipt of other forms of mortgage assistance (2.7%) are also mentioned. These findings highlight wide differences in borrower understanding and program communication, which are issues mentioned later.

[49]We keep borrowers with Debt-to-Income ratios below 57%, people who have credit score at origination above 500, and loans made for purchase or refinance purposes. For our entry results we also restrict attention to those loans with terms more than 10 months.

[50]The numbers in this section are based on borrower's self-reported measure of forbearance. In contrast, one could also define forbearance with NMDB. We discuss the differences later on in the paper.

4 Forbearance Estimation Results

This section starts by examining forbearance participation based on several approaches about how individuals decided to enroll. The analysis compares results using participation data from administrative records, survey responses, and a combination of both datasets, highlighting the benefits and shortcomings of each source. We also evaluate whether these exercises can help us understand how people exit the forbearance program. To ensure the effectiveness of temporary relief policies, it is essential that policymakers design programs with clear guidance on when to begin forbearance, how to transition out, and which pathways best address individual borrower circumstances.

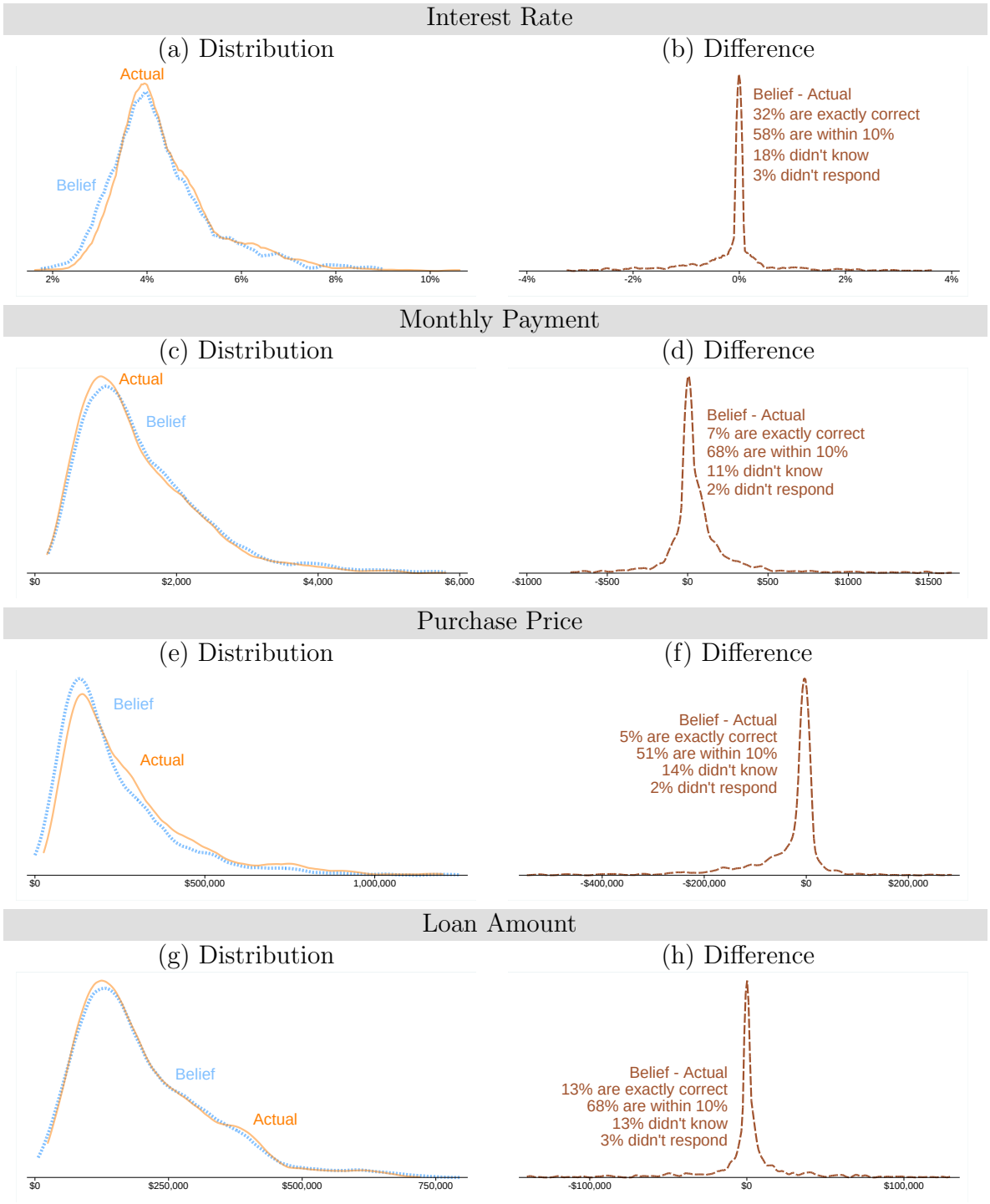
4.1 Loan Knowledge

Past studies have shown homeowners are surprisingly inaccurate when it comes to knowing various aspects of their home and mortgage characteristics.[51] As such, we begin with questions asking participants to share their mortgage interest rate, monthly principal, interest, taxes and insurance (PITI) payment, purchase price, and loan amount. Figure 2 reports that only 32% of borrowers know their exact interest rate. An additional 58% are correct within plus or minus 10% of this number, while a concerning 18% simply admitted they do not know it. Only 7% of borrowers precisely know their monthly principal, interest, taxes and insurance (PITI) payment, whereas another 68% are accurate within plus or minus 10%. This disparity is concerning given that these funds are deducted monthly from the borrower's bank account, although it is most likely done automatically. Only 5% of respondent borrowers recall their exact home's purchase price, and an additional 51% provide answers within 10% of the contract price. In terms of loan amount, only 13% report the precise answer. Similar to the other metrics, 68% of answers are within 10% of the true answer, 13% of borrowers simply do not know, and 3% more leave the question blank. A full distribution of responses is shown in Figure 2.

The remaining dichotomous Consumer Knowledge variables include whether or not the loan has a prepayment penalty, to which only 45.3% of respondents answer correctly, whether the mortgage interest rate is fixed or variable (82.8% correct), whether or not the loan has a balloon payment (78.4% correct), and whether or not the monthly mortgage payment contains both principal and interest or interest-only payments (42.4% correct).

[51] Seiler et al. (2012) show financial knowledge is important during strategic default decision-making.

Figure 2: Beliefs versus Actual Values: Are Borrowers Well Informed?



Note: Beliefs are recorded by the American Survey of Mortgage Borrowers (ASMB) and actual values are tracked in the National Mortgage Database (NMDB). All graphics are kernel densities using the Epanechnikov kernel function with optimized density window widths around each point. Vertical axes are omitted to avoid confusion with fractional or frequency interpretations. Minor filters are applied for illustrative purposes (e.g., trimming values above the 99th percentile or below the 1st percentile).

These low composite Consumer Knowledge results highlight the gap between a borrower's perceptions of their financial situation and their actual financial reality.[52] Since people make decisions based on their beliefs of the world around them, we collect not just accurate lending data as in NMDB, but also the inaccurate recollection of loan characteristics and borrower beliefs about the future as obtained through ASMB variables.[53]

4.2 Sorting into Forbearance

In answering our primary research question, "Who enters into forbearance?" (Q20), we discover that there is a huge disparity between what borrowers believe to be their forbearance status (ASMB) and what the NMDB reports as the borrower's forbearance status. For example, the ASMB indicates that 44.6% of respondent borrowers believe they are in forbearance, whereas the NMDB indicates the true answer is 66.5%.[54] When identifying discrepancies between beliefs about being in forbearance (ASMB) and actually being in forbearance (NMDB), we learn that while the CARES Act requires borrowers to actively indicate a desire to be placed into forbearance, some servicers may place borrowers into forbearance without their knowledge.[55] It is also plausible that, in part because the enrollment process is designed to be as simple as possible, some borrowers may not remember enrolling in forbearance, or may not have made the connection between that enrollment and the ASMB question.

Before learning of this practice, our supposition was that we need both actual mortgage data (NMDB) and borrower beliefs about their mortgage data and other idiosyncratic borrower information (ASMB) in order to properly model whether or not a borrower would enter into

[52] Although we take this disparity between loan characteristics and beliefs about those characteristics as given, future research could look further into this issue by providing theoretical and empirical determinants of the differences between reality and borrower beliefs.

[53] A potential concern is that the survey respondent is a co-borrower or member of a household who is not the primary source of mortgage knowledge. However, comparing the distributions of our three financial knowledge variables (Financial Knowledge, Consumer Knowledge, and Self-Reported Knowledge) for loans with exactly 1 borrower and more than 1 borrower, we do not find evidence of this. Specifically, for respondents of loans with only 1 borrower the mean (median) values of Financial Knowledge, Consumer Knowledge, and Self-Reported Knowledge are 1.017 (1), 0.347 (0.356), and 0.937 (0.889), respectively, while for respondents of loans with more than 1 borrower those respective values are 1.077 (1), 0.344 (0.353), and 0.966 (1). Further details are available upon request.

[54] Since the ASMB question asks if forbearance was ever used, we similarly calculate the percentage of borrowers who are in forbearance at any point between the start of the pandemic and the time of the survey using NMDB forbearance indicators to make the numbers comparable.

[55] In fact, there is an on-going class-action lawsuit against Wells Fargo where borrowers allege being placed into forbearance without their knowledge or consent. We do not find evidence of servicers of different sizes affecting forbearance entry rates differently. Specifically, with one minor exception, servicer size is not statistically significant in any models.

forbearance. But, after learning that borrowers are woefully incorrect about their forbearance status, we are convinced about the benefit of incorporating ASMB survey questions.

Borrower beliefs about their current position and future beliefs are paramount. With this in mind, we turn to Table 3 which seeks to answer the question, "Who took up forbearance?" The first of the three clusters of columns report results from a linear probability model using the NMDB identifier of who is in forbearance as the dependent variable. Column (1) models this dependent variable using only NMDB data, while column (2) uses only ASMB survey data, which reflects borrowers' current circumstances, beliefs about their future, and sometimes inaccurate beliefs about their present. Column (3) combines the NMDB and ASMB independent variables together and also adds three country-level control variables. To present the table in a more parsimonious and manageable size, we report the key variables of interest within the table itself, while summarizing the complete list of controls in the table's footnote.

When comparing columns (1) and (2), we see only three NMDB variables explain who will forbear relative to the seven significant ASMB variables. This is particularly interesting given the dependent variable in these three columns is borrower forbearance status based on administrative data. As such, it is striking that few administrative variables explain the result. Add to this the steady climb in adjusted-R^2 in column 3 and the need to consider variables such as actual need and work changes, and it becomes clear a combined NMDB and ASMB collective approach is beneficial. County-level control variables are not significant.

The second set of clustered columns (4)–(6), reflects the same analysis, but this time using the ASMB borrower self-reported forbearance status as the dependent variable instead of what is reported in the NMDB (Q20). The explanatory power of the estimation in column (6) is greater than in column (3), suggesting that borrowers may make decisions based more on their perceptions of reality, rather than based upon the reality reflected in administrative data. These contrasting results reveal how disparate the markers are between the two datasets. There is also a stark difference in overall model success in that the adjusted-R^2 when using NMDB explanatory variables is quite weak when compared to the survey-based ASMB variables, which reflect borrower perceptions about their current situation and their beliefs about the future (0.029 versus 0.463). Given the inconsistencies between columns (1)–(3) and (4)–(6), we estimate the results using a subset of the data where only borrowers

Table 3: Who Took Up Forbearance?

	Forbearance Identified in NMDB (Admin)			Forbearance Identified by ASMB (Survey)			Forbearance Matches NMDB and ASMB		
	Only NMDB	Only ASMB	Both + Controls	Only NMDB	Only ASMB	Both + Controls	Only NMDB	Only ASMB	Both + Controls
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Credit Score - Medium	**0.157*** **		**0.178*** **	0.0428		**0.0603** **	**0.155*** **		**0.125*** **
Credit Score - High	**0.269*** **		**0.333*** **	0.0106		**0.110*** **	**0.208** **		**0.221*** **
Debt-to-Income - Low	-0.0441		-0.0399	-0.103		**-0.102** **	-0.0873		**-0.0964***
Debt-to-Income - Medium	-0.0306		-0.0505	-0.0336		-0.0616	-0.0352		-0.0608
First-Time Homebuyer	0.0193		-0.00570	0.0000909		-0.0125	0.0227		-0.0277
Mark-to-Market Loan-to-Value - Low	-0.0832		-0.000104	-0.0516		-0.0404	-0.101		-0.102
Mark-to-Market Loan-to-Value - Medium	-0.139		-0.0528	-0.0315		-0.0212	-0.127		-0.108
Number of Borrowers	-0.0787*		-0.0586	-0.0387		-0.0294	-0.0743*		-0.0454
Actual Need		**0.154*** **	**0.209*** **		**0.315*** **	**0.342*** **		**0.301*** **	**0.336*** **
Beliefs After Forbearance		**0.0615** **	**0.0711** **		-0.0233	-0.0211		0.0206	0.0394
Consumer Knowledge		0.131	0.0192		0.142	0.110		0.181	0.102
Desirability Beliefs		**0.0572** **	**0.0427***		0.0418	0.0461		0.0448	0.0490
Financial Knowledge		**-0.142*** **	**-0.140*** **		**-0.313*** **	**-0.308*** **		**-0.311*** **	**-0.292*** **
Household Income - Medium		-0.0140	-0.0200		0.00941	0.00927		0.00321	-0.00751
Household Income - High		-0.00688	-0.0603		-0.0361	-0.0538		-0.0382	-0.0838
Morality		**-0.0927** **	**-0.0762***		0.0156	0.0372		-0.0219	-0.00798
Personal Changes		**-0.0350*** **	**-0.0295** **		**-0.0348** **	**-0.0384** **		**-0.0407** **	**-0.0434*** **
Rental Property		**0.271*** **	**0.193** **		0.156	0.138		**0.244***	0.174
Risk Preferences		0.0323	0.0108		0.0147	-0.00631		0.0143	-0.0194
Self-Reported Knowledge		0.00376	-0.000479		0.0144	0.0109		-0.0000338	-0.000432
Work Changes		**0.0848*** **	**0.0765*** **		**0.0662*** **	**0.0604*** **		**0.0850*** **	**0.0763*** **
Loan Characteristics	Yes		Yes	Yes		Yes	Yes		Yes
Servicer Size	Yes		Yes	Yes		Yes	Yes		Yes
Borrower Traits		Yes	Yes		Yes	Yes		Yes	Yes
Demographics		Yes	Yes		Yes	Yes		Yes	Yes
County-Level Controls			Yes			Yes			Yes
N	1412	1412	1377	1412	1412	1377	1034	1034	1009
RMSE	0.476	0.456	0.430	0.481	0.358	0.355	0.482	0.365	0.354
R2	0.116	0.179	0.294	0.057	0.473	0.498	0.103	0.478	0.532
adj-R2	0.089	0.163	0.256	0.029	0.463	0.471	0.066	0.464	0.496

Note: Table shows ordinary least squares estimation results from Model 1. Dependent variable is a binary variable equal to 1 in the borrower is in forbearance, where different definitions of forbearance are given by different groups of columns (1–3, 4–6, and 7–9). Estimated coefficients are reported for select variables along with statistical significant where *** is $p = 0.01$, ** is $p = 0.05$, and * is $p = 0.10$. Bold font reiterates a significant result at one of those three levels. Standard errors are clustered according to open year of the loan, but not shown since p-values are displayed. Several groups of variables are acknowledged as covariates and controls at the bottom of the table and estimates are not reported specifically, but they can be provided upon request. Probability weights account for sampling weights and non-adjustment response. The individual variables in each grouping include the following: loan characteristics are interest rate, loan type, mortgage current as of ASMB, purchase loan, term, how applied for FB and whether in FB when surveyed, primary residence, and rental property; servicer size are controls for whether a medium or large-sized servicer; borrower traits are college educated, current pay type, full-time employment, and self-employed; demographics are age when surveyed, dependents under 18, and white; and county-level controls include the COVID-19 incidence rate, unemployment rate, and share that voted Democrat. Medium and high borrower incomes are binary variables equal to 1 if borrower's 2019 income (from ASMB) is \$75k–175k and greater than \$175k, respectively, and 0 otherwise. Medium and High Credit score are binary variables equal to 1 if borrower credit scores at origination are 620–720 and greater than 720, respectively, and 0 otherwise. Low and medium debt-to-income are binary variables equal to 1 if borrower DTI at origination is less than 41 and between 41 and 50, respectively, and 0 otherwise. Low and Medium mark-to-market loan-to-value are binary variables equal to 1 if MTMLTV is less than 80 and between 80 and 90, respectively, and 0 otherwise. F-tests for joint significance were performed on set of ASMB controls in columns (3), (6), and (9) with the result being we can reject the hypothesis that all ASMB variable coefficients are zero with probability greater than 0.9999. F-statistics available upon request.

whose ASMB self-assessment of being in forbearance exactly matches the NMDB records of who is actually in forbearance. We exclude 34 observations where borrowers mistakenly believe they were in forbearance despite not being classified as such, and 344 observations where borrowers are unaware that they were, according to NMDB data, enrolled in forbearance. Sub-sample results are reported in columns (7)–(9).

Overall model explanatory power is much greater after mis-classified borrowers are removed. Notice the tremendous disparity in the predictive power of using only NMDB variables (column 7) versus only ASMB variables (column 8). This supports a position that ASMB topics would be important to capture when designing solutions to stem potential mortgage payment issues, like during a time of national crisis. While traditional NMDB variables are a good place to start, several additional ASMB variables could be important to know in identifying which borrowers are more likely to step forward and need forbearance assistance.[56] Useful variables for identifying borrowers in need include finding people who self-identify as needing it (beyond what can be gleaned from NMDB data), borrower's financial knowledge, those who have undergone personal life changes, and those who perceive future work changes might be on the horizon. None of these considerations are included in traditional mortgage borrower datasets, but they are clearly important to future decision-making. Stated actual need of borrowers contributes significantly to the likelihood of entering forbearance, increasing the probability of entering forbearance by approximately 30 percentage points.

In sum, the main takeaway from Table 3 is that the origination data found in NMDB by itself has little explanatory power, particularly when compared with the contemporaneous ASMB survey, though combining both substantially increases the explanatory power. The results suggest borrowers' experiences and beliefs about their financial situation are more important than standard data collected by lenders at origination. Given that economic circumstances can change over time, and that borrowers are sometimes uninformed or misinformed about their true financial picture, this result makes sense.

4.3 Forbearance as a Precautionary Strategy

Responding to global economic emergencies is challenging, as policymakers must anticipate not only how people may respond to external factors, but also the underlying reasons for their

[56]For all estimations in Tables 3–5 on the full set of controls (NMDB + ASMB + county-level controls), we perform F-tests that all ASMB variables are jointly statistically insignificant. In all estimations, we can reject the null hypotheses that all ASMB coefficients are 0 with probability 0.9998 or greater.

reactions. In other words, what drives people's behavior in responding to a crisis and efforts to mitigate it? As it relates to the CARES Act, Anderson, Harrison, and Seiler (2022) anticipated that one reason to forbear mortgage payments would be as a precautionary motive. Specifically, if people are currently unaffected, but are concerned they might later be affected, a reasonable course of action would be to file for forbearance now, particularly given that there is no penalty for forbearance under the CARES Act.[57]

With this line of reasoning in mind, we run a series of regressions similar to the prior table, except this time we ask the question, "Who took forbearance as a precautionary strategy?" Table 4 restricts the overall sample to the 701 borrowers who state they did not have an immediate need for forbearance, and then as before estimates a linear probability model with dependent variable equal to 1 if the borrower enters forbearance. As before, the first set of columns (1–3) reports the results when allowing the NMDB to define who is in forbearance, the second set of columns (4–6) shows results when borrowers believe they are in forbearance (ASMB), while the last three columns (7–9) use the sub-sample of borrowers whose beliefs about forbearance participation agree with those of NMDB. Consistent with Table 3, two immediate conclusions arise in Table 4. First, ASMB explanatory variables substantially improve models that otherwise only contain NMDB borrower data. Second, models which employ either the NMDB or ASMB definition of being in forbearance are inferior to a model where borrowers are correctly classified as being in forbearance or not. While this makes logical sense, Table 4 demonstrates this necessity.

Focusing on variables that advance our understanding of who pursued a precautionary motive, column (9) shows borrowers who are more likely to take up forbearance are people with a higher MTMLTV, single borrowers, those who stated they had actual need of financial assistance, less financially knowledgeable borrowers, and those who could foresee future work-life changes. In summary, administrative data at origination and externally available

[57]Not only is there no negative mark on the borrower's credit report, but there would also be no accrual of interest during the forbearance period if a borrower stops making payments. To the extent the borrower continues to make payments, forbearance would not convert those amounts into pure principal curtailments; the loan would continue to amortize on the same schedule. During COVID-19, some people describe such self-imposed liquidity restrictions as preserving a long call option. However, if debt-constrained households are the ones who voluntarily refuse debt forbearance, the intent of public policy could be thwarted, as pointed out by Vihriälä (2023). Besides running counter to the intended stimulus, an event that enhances liquidity constraints could set the stage for potential mortgage default, especially if the borrower becomes closer to having negative equity or experiences an unexpected increase in monthly expenses (like receiving an early property tax bill as described by Anderson and Dokko, 2016).

Table 4: Who Took Forbearance as a Precautionary Strategy?

	Forbearance Identified in NMDB (Admin)			Forbearance Identified by ASMB (Survey)			Forbearance Matches NMDB and ASMB		
	Only NMDB	Only ASMB	Both + Controls	Only NMDB	Only ASMB	Both + Controls	Only NMDB	Only ASMB	Both + Controls
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Credit Score - Medium	0.0532		0.0445	0.0216		0.0296	0.0811		0.0943
Credit Score - High	0.184		**0.186***	-0.00101		0.0381	0.121		0.119
Debt-to-Income - Low	-0.0105		-0.0382	0.00430		-0.0299	-0.00755		-0.0221
Debt-to-Income - Medium	0.00362		-0.0365	0.0474		-0.00637	0.0516		0.0120
First-Time Homebuyer	0.00567		0.00460	-0.00677		0.0163	0.00524		-0.0205
Mark-to-Market Loan-to-Value - Low	-0.0632		-0.0459	0.0739		0.0104	-0.0271		**-0.192****
Mark-to-Market Loan-to-Value - Medium	-0.0985		-0.0489	0.0979		0.0761	-0.0263		-0.111
Number of Borrowers	**-0.112*****		-0.0729	**-0.0867****		**-0.0797****	**-0.125*****		**-0.104****
Actual Need		-0.00875	0.0786		**0.240*****	**0.281*****		**0.203*****	**0.255*****
Beliefs After Forbearance		0.0410	0.0434		-0.0482	**-0.0777***		0.0216	0.0137
Consumer Knowledge		-0.174	-0.130		-0.155	-0.184		-0.203	-0.205
Desirability Beliefs		0.0187	-0.00628		0.0151	0.0124		0.0266	0.0102
Financial Knowledge		**-0.170*****	**-0.167*****		**-0.321*****	**-0.321*****		**-0.339*****	**-0.332*****
Household Income - Medium		0.0576	0.0669		0.0662	**0.0767****		**0.0962****	**0.0923****
Household Income - High		0.00186	-0.00569		-0.0230	-0.0152		-0.00402	-0.0159
Morality		**-0.163****	**-0.126***		0.0390	0.0393		-0.00703	-0.00870
Personal Changes		-0.00233	-0.00654		**-0.0493****	**-0.0607*****		-0.0378	**-0.0519****
Rental Property		0.194	0.162		0.0539	**0.138****		0.0917	**0.166***
Risk Preferences		**0.0898****	**0.0884***		0.0128	0.0126		0.0105	0.0102
Self-Reported Knowledge		-0.0377	-0.0329		0.0408	0.0531		0.0169	0.0330
Work Changes		**0.102*****	**0.0889*****		**0.0641****	**0.0563****		**0.0899*****	**0.0845*****
Origination Year Fixed Effects	Yes		Yes	Yes		Yes	Yes		Yes
Loan Characteristics	Yes		Yes	Yes		Yes	Yes		Yes
Servicer Size	Yes		Yes	Yes		Yes	Yes		Yes
Borrower Traits		Yes	Yes		Yes	Yes		Yes	Yes
Demographics		Yes	Yes		Yes	Yes		Yes	Yes
County-Level Controls			Yes			Yes			Yes
N	699	699	683	699	699	683	452	452	442
RMSE	0.472	0.458	0.433	0.425	0.322	0.316	0.447	0.330	0.318
R^2	0.158	0.196	0.325	0.092	0.469	0.517	0.160	0.533	0.606
adj-R^2	0.111	0.163	0.251	0.041	0.448	0.465	0.087	0.503	0.536

Note: Table shows ordinary least squares estimation results from Model 2. Dependent variable is a binary variable equal to 1 in the borrower is in forbearance conditional on stating a precautionary motive in ASMB (q20 and q21), where different definitions of forbearance are given by different groups of columns (1–3, 4–6, and 7–9). Estimated coefficients are reported for select variables along with statistical significant where *** is $p = 0.01$, ** is $p = 0.05$, and * is $p = 0.10$. Bold font reiterates a significant result at one of those three levels. Standard errors are clustered by open year, but not shown since p-values are displayed. Sample size differs from other tables because conditional filters only select on borrowers who have a precautionary need and have term length over 10. Several groups of variables are acknowledged as covariates and controls at the bottom of the table and estimates are not reported specifically, but they can be provided upon request. Probability weights account for sampling weights and non-adjustment response. The individual variables in each grouping include the following: loan characteristics are interest rate, loan type, mortgage current as of ASMB, purchase loan, term, how applied for FB and whether in FB when surveyed, primary residence, and rental property; servicer size are controls for whether a medium or large-sized servicer; borrower traits are college educated, current pay type, full-time employment, and self-employed; demographics are age when surveyed, dependents under 18, and white; and county-level controls include the COVID-19 incidence rate, unemployment rate, and share that voted Democrat. Medium and high borrower incomes are binary variables equal to 1 if borrower's 2019 income (from ASMB) is \$75k–175k and greater than \$175k, respectively, and 0 otherwise. Medium and High Credit score are binary variables equal to 1 if borrower credit scores at origination are 620–720 and greater than 720, respectively, and 0 otherwise. Low and medium debt-to-income are binary variables equal to 1 if borrower DTI at origination is less than 41 and between 41 and 50, respectively, and 0 otherwise. Low and Medium mark-to-market loan-to-value are binary variables equal to 1 if MTMLTV is less than 80 and between 80 and 90, respectively, and 0 otherwise. F-tests for joint significance were performed on set of ASMB controls in columns (3), (6), and (9) with the result being we can reject the hypothesis that all ASMB variable coefficients are zero with probability greater than 0.9999. F-statistics available upon request.

measures provide limited insight into how and why borrowers might respond. In contrast, contemporaneous survey questions that capture borrowers' beliefs about the present and their future expectations appear to be key drivers of real-time borrower decision-making.

4.4 Needing Forbearance Despite Only a Precautionary Motive

Table 5 takes a subset of the prior table and asks the question, "For those who took forbearance as a precautionary measure, who ended up needing it?" The dependent variable is a binary indicating who states they had an actual need for forbearance (Q29), but conditional on only those borrowers who take forbearance as a precautionary motive (Q20B). Borrowers with personal changes and their beliefs about future work changes are the primary drivers of identifying who takes up forbearance as a precautionary motive, and then ends up needing it. Focusing on the last three columns (4-6), as in previous tables, the ASMB variables add the most explanatory power to the model, with the NMDB being far less important. In fact, none of the NMDB variables are statistically significant in the final model at the five-percent level or better. Moreover, the additional external, publicly available county-level control variables fail to add value to the model. What is most important to take away from this third model is not so much what explains the result, but the behavior of people who take forbearance as a precautionary need ($N = 201$) and then end up actually needing it ($N = 112$ or 55.2%).[58] This study is agnostic about whether it is acceptable or desirable that so many borrowers take up forbearance without actually needing it. Our purpose is to document the finding and highlight that it may be an unintended consequence due to a low barrier to forbearance entry. Others might argue that forbearance served as a no-cost insurance policy to borrowers. If true, all borrowers would have entered forbearance, not just the small fraction who did or the even smaller fraction who initiated it.[59]

4.5 Forbearance Exit Results

To study the determinants of different forbearance exit outcomes that have an increasing degree of severity, we use an ordered logit approach along with the usual three data sources. For each borrower i we observe the outcome variable y_i, which indicates whether after forbearance the borrower made no payments, partial payments, or full payments (relative to

[58] Although in other insurance market this may be seen as a very large number of claims relative to policies, the COVID-19 shock had unprecedented size, surprise, and uncertainty of what might happen next.

[59] Another future program consideration is the ability to refinance, especially if interest rates are very low.

Table 5: Who Had A Precautionary Motive For Forbearance And Ended Up Needing It?

	Forbearance Identified by ASMB Responses			Forbearance Matches ASMB Responses and NMDB Data		
	Only NMDB	Only ASMB	Both + Controls	Only NMDB	Only ASMB	Both + Controls
	(1)	(2)	(3)	(4)	(5)	(6)
Credit Score - Medium	0.103		0.136	0.143		0.199
Credit Score - High	-0.233		-0.0603	-0.148		0.0659
Debt-to-Income - Low	0.0934		0.102	0.0969		0.0753
Debt-to-Income - Medium	0.00806		0.105	0.0254		0.0863
First-Time Homebuyer	-0.000331		0.0331	-0.0409		-0.0755
Mark-to-Market Loan-to-Value - Low	-0.0951		**0.259***	-0.150		**0.235***
Mark-to-Market Loan-to-Value - Medium	**-0.246***		0.132	**-0.252***		0.148
Number of Borrowers	-0.0614		0.109	-0.0613		**0.131***
Beliefs After Forbearance		0.0517	0.0519		-0.000119	0.00336
Consumer Knowledge		0.0312	0.0207		-0.0252	-0.106
Desirability Beliefs		-0.0225	-0.00419		-0.00238	0.0263
Financial Knowledge		0.0879	0.0754		**0.123****	**0.113***
Household Income - Medium		-0.0729	-0.0484		-0.0984	-0.0661
Household Income - High		-0.0242	0.00241		-0.0685	-0.0357
Morality		0.0442	0.0721		0.0925	**0.177***
Personal Changes		**0.250*****	**0.233*****		**0.258*****	**0.248*****
Rental Property		**-0.259***	-0.260		**-0.284***	-0.233
Risk Preferences		0.0411	0.0361		0.105	0.0737
Self-Reported Knowledge		0.00822	0.0237		0.00632	0.0213
Work Changes		**0.0402*****	**0.0531****		**0.0376****	0.0348
Origination Year Fixed Effects	Yes		Yes	Yes		Yes
Loan Characteristics	Yes		Yes	Yes		Yes
Servicer Size	Yes		Yes	Yes		Yes
Borrower Traits		Yes	Yes		Yes	Yes
Demographics		Yes	Yes		Yes	Yes
County-Level Controls			Yes			Yes
N	201	201	195	193	193	188
$RMSE$	0.440	0.296	0.295	0.445	0.281	0.277
R^2	0.343	0.694	0.763	0.333	0.727	0.796
adj-R^2	0.213	0.642	0.644	0.195	0.679	0.688

Note: Table shows ordinary least squares estimation results from Model 3. Dependent variable is a binary variable if the borrower indicated an actual need for forbearance, conditional on the borrower entering forbearance for precautionary reasons (q20). Estimated coefficients are reported for select variables along with statistical significant where *** is $p = 0.01$, ** is $p = 0.05$, and * is $p = 0.10$. Bold font reiterates a significant result at one of those three levels. Standard errors are clustered by open year, but not shown since p-values are displayed. Sample size differs from other tables because conditional filters only select on borrowers who have a precautionary motive and need it. The panel of equations for FB Identified in NMDB is included in other tables, but not here because both the precautionary motive and actual need for forbearance are only defined in ASMB (survey) and not NMDB (admin) data. Several groups of variables are acknowledged as covariates and controls at the bottom of the table and estimates are not reported specifically, but they can be provided upon request. Probability weights account for sampling weights and non-adjustment response. The individual variables in each grouping include the following: loan characteristics are interest rate, loan type, mortgage current as of ASMB, purchase loan, term, how applied for FB and whether in FB when surveyed, primary residence, and rental property; servicer size are controls for whether a medium or large-sized servicer; borrower traits are college educated, current pay type, full-time employment, and self-employed; demographics are age when surveyed, dependents under 18, and white; and county-level controls include the COVID-19 incidence rate, unemployment rate, and share that voted Democrat. Medium and high borrower incomes are binary variables equal to 1 if borrower's 2019 income (from ASMB) is \$75k–175k and greater than \$175k, respectively, and 0 otherwise. Medium and High Credit score are binary variables equal to 1 if borrower credit scores at origination are 620–720 and greater than 720, respectively, and 0 otherwise. Low and medium debt-to-income are binary variables equal to 1 if borrower DTI at origination is less than 41 and between 41 and 50, respectively, and 0 otherwise. Low and Medium mark-to-market loan-to-value are binary variables equal to 1 if MTMLTV is less than 80 and between 80 and 90, respectively, and 0 otherwise. F-tests for joint significance were performed on set of ASMB controls in columns (3) and (6) with the result being we can reject the hypothesis that all ASMB variable coefficients are zero with probability greater than 0.9999. F-statistics available upon request.

pre-forbearance monthly payments):[60]

$$y_i = \begin{cases} 0 & \text{if no payment after end FB} \\ 1 & \text{if no partial payment after end FB} \\ 2 & \text{if full payment after end FB} \end{cases} \tag{1}$$

The groupings are rough indications that help us sort progressively on cash flow outcomes.[61] The exact level of payment is a latent amount that incorporates underlying distress that ultimately determines the observed outcome. We can write the latent variable in a standard form of $Y_i^* = \beta x_{it} + \alpha_t + u_{it}$ where the error term has a standard logistic, not the classical normal, distribution.. Finally, the observed outcome and latent variable are related through the usual data generating process for ordered logit estimations:

$$Y_i = \begin{cases} 0 & \text{if } Y_i^* < \kappa_1 \\ 1 & \text{if } \kappa_1 < Y_i^* < \kappa_2 \\ 2 & \text{if } Y_i^* > \kappa_2 \end{cases} \tag{2}$$

where κ_1 and κ_2 are threshold cutoff points to be estimated along with the β and α. If the error u is distributed via the logit function $F(\cdot)$, then we can form the probabilities of each outcome and calculate marginal effects:[62]

$$Pr(Y_i = 0) = F(\kappa_1 - \beta x_{it} + \alpha_t) \tag{3}$$

$$Pr(Y_i = 1) = F(\kappa_2 - \beta x_{it} + \alpha_t) - F(\kappa_1 - \beta x_{it} + \alpha_t) \tag{4}$$

$$Pr(Y_i = 2) = 1 - F(\kappa_2 - \beta x_{it} + \alpha_t) \tag{5}$$

Table 6 shows the results for the forbearance exit estimations. Each panel corresponds to a data source, and within each panel, three models are specified. The first column [labeled as (1), (4), and (7)] uses only NMDB variables, the second column [(2), (5), and (8)] has only

[60] We use the payment two months after the forbearance period ends (to allow for a potential month transitional delay) compared to the payment two months prior to starting the program (to guard against any reporting issues which could trigger forbearance).

[61] Usually, we would not discard available information. However, for future improvements, we want to recreate what might have been possible to model with limited information. Could we have predicted exits with any degree of accuracy had this exercise been conducted while designing the COVID-19 forbearance outreach? With those caveats, we focus on generalizable outcome statements rather than precise measures.

[62] For an econometric reference, see Wooldridge (2010).

Table 6: What Determines Forbearance Exits?

	Forbearance Identified in NMDB (Admin)			Forbearance Identified in ASMB (Survey)			Forbearance Matches NMDB and ASMB		
	Only NMDB	Only ASMB	Both + Controls	Only NMDB	Only ASMB	Both + Controls	Only NMDB	Only ASMB	Both + Controls
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Credit Score - Medium	0.211		0.292	0.172		0.377	0.0683		0.292
Credit Score - High	**0.982*** **		**0.766** **	**0.771*** **		**0.878** **	**0.643** **		**0.766** **
Debt-to-Income - Low	0.107		-0.0411	0.0119		-0.00525	-0.0113		-0.0411
Debt-to-Income - Medium	0.125		0.241	0.165		0.248	0.175		0.241
First-Time Homebuyer	0.0927		0.109	-0.00629		0.197	-0.0324		0.109
Mark-to-Market Loan-to-Value - Low	**0.765** **		0.544	0.224		0.487	0.265		0.544
Mark-to-Market Loan-to-Value - Medium	**1.258*** **		**0.964***	**0.682** **		0.868	**0.735** **		**0.964***
Number of Borrowers	**0.232***		0.0921	0.175		0.0567	0.228		0.0921
Actual Need		**-0.665*** **	**-0.607*** **		**-0.673*** **	**-0.595*** **		**-0.665*** **	**-0.607*** **
Beliefs After Forbearance		-0.173	**-0.277***		-0.150	-0.253		-0.173	**-0.277***
Consumer Knowledge		**1.213***	1.309		1.156	1.193		**1.213***	1.309
Desirability Beliefs		-0.0780	-0.0901		-0.0906	-0.114		-0.0780	-0.0901
Financial Knowledge		0.103	0.163		0.143	0.172		0.103	0.163
Household Income - Medium		**0.430** **	0.301		**0.426** **	**0.354***		**0.430** **	0.301
Household Income - High		0.173	-0.166		0.180	-0.116		0.173	-0.166
Morality		**-0.702*** **	**-0.839** **		**-0.688*** **	**-0.862*** **		**-0.702*** **	**-0.839** **
Personal Changes		-0.0591	0.00385		-0.0690	0.00276		-0.0591	0.00385
Rental Property		0.130	-0.335		0.109	-0.241		0.130	-0.335
Risk Preferences		0.144	-0.000138		0.152	-0.0100		0.144	-0.000138
Self-Reported Knowledge		**-0.320***	**-0.364***		**-0.318***	**-0.353***		**-0.320***	**-0.364***
Work Changes		-0.0751	-0.0790		-0.0590	-0.0607		-0.0751	-0.0790
Forbearance Length	**-0.0285*** **	**-0.0170***	-0.0105	-0.0104	**-0.0180***	-0.0115	-0.00911	**-0.0170***	-0.0105
Origination Year Fixed Effects	Yes		Yes	Yes		Yes	Yes		Yes
Loan Characteristics	Yes		Yes	Yes		Yes	Yes		Yes
Servicer Size	Yes		Yes	Yes		Yes	Yes		Yes
Borrower Traits		Yes	Yes		Yes	Yes		Yes	Yes
Demographics		Yes	Yes		Yes	Yes		Yes	Yes
County-Level Controls			Yes			Yes			Yes
Cutoff 1	**-11.07*** **	**-2.602*** **	**-13.06*** **	**-11.12*** **	**-2.657*** **	**-12.75*** **	**-12.29*** **	**-2.602*** **	**-13.06*** **
Cutoff 2	**-9.826*** **	**-1.381** **	**-11.70*** **	**-9.884*** **	**-1.436*** **	**-11.39*** **	**-11.05*** **	**-1.381** **	**-11.70*** **
N	920	581	566	587	587	572	581	581	566
Pseudo-R2	0.0585	0.0489	0.106	0.0557	0.0487	0.105	0.0571	0.0489	0.106

Note: Table shows ordered logit estimation results for borrower exit rather than entry using the same variables as in prior tables. The dependent variable is equal to 0 if no payments were made (no payments), equal to 1 if positive payments less than or equal to 98% of pre-COVID mortgage payments were made (partial payments), and equal to 2 if more than 98% of pre-COVID mortgage payment were made (full payments). Estimated coefficients are reported for select variables along with statistical significant where *** is $p = 0.01$, ** is $p = 0.05$, and * is $p = 0.10$. Bold font reiterates a significant result at one of those three levels. Standard errors are clustered by open year, but not shown since p-values are displayed. Probability weights are not used in this table, unlike previous forbearance entry tables, due to the ordered logit specification. Several groups of variables are acknowledged as covariates and controls at the bottom of the table and estimates are not reported specifically, but they can be provided upon request. The individual variables in each grouping include the following: loan characteristics are interest rate, loan type, mortgage current as of ASMB, purchase loan, term, how applied for FB and whether in FB when surveyed, primary residence, and rental property; servicer size are controls for whether a medium or large-sized servicer; borrower traits are college educated, current pay type, full-time employment, and self-employed; demographics are age when surveyed, dependents under 18, and white; and county-level controls include the COVID-19 incidence rate, unemployment rate, and share that voted Democrat. As with the forbearance entry models, F-tests were used for joint statistical significance on the group of ASMB controls in the full set of estimations in columns (3), (6), and (9). All reject the null hypothesis of zero coefficients for ASMB variables with probability greater than 0.9999. F-statistics available upon request.

ASMB variables, and the third column [(3), (6), and (9)] combines variables from both datasets. The ordered logit approach is appropriate because the dependent exit variable has an ordinal scale capturing the discrete outcomes of forbearance exit behavior where a value of 0 means no payments are made two months after exiting, a value of 1 for partial payments that are more than 0 but less than 98% of the pre-COVID monthly payment amount, and a value of 2 for full payment if payments exceed 98% of the pre-COVID monthly mortgage payment amount.[63] Model fit statistics (Pseudo-R^2) indicate the combined models (third column in each panel) consistently provide the best explanatory power.

Key determinants emerge across the models, offering insights into borrowers' repayment propensities. In all three data sources, "Actual Need", "Morality", and "Self-Reported Knowledge" have estimated coefficients that are statistically significant and negative. Borrowers who share they have a real financial need for assistance are more likely to not make any payments, or only partial ones, after their forbearance ends. The morality result indicates that when borrowers believe strategic default is morally acceptable, they are more likely not to make full payment. Across certain specifications, staying in forbearance longer indicates, in the future, not being able to pay the same pre-COVID mortgage payment. Oddly, this is also the case for people who have self-reported a high degree of knowledge of financial terms. Focusing on positive coefficient estimates, a high degree of consumer knowledge, medium level of income, high credit score, and a low or medium mark-to-market loan-to-value ratio are all indicators of being more likely to resume full payment after exiting the assistance program, although these effects are not statistically significant. Under different circumstances, researchers might find people who possess those characteristics are more likely to have financial stability or access to resources (e.g., savings, wealth, or stable employment) that facilitate repayment.

Near the bottom of the table, the estimated cutoff points, "Cutoff 1" and "Cutoff 2", represent the thresholds for transitioning between levels of restored payment behavior. In the only NMDB models, the relatively high value (in absolute terms) of "Cutoff 1" suggests that

[63]We recognize that the dependent variable is measured crudely due to the bucketing approach. However, this choice is deliberate, aiming to reflect the type of information which might have been prioritized when considering options in March 2020. At the time, discussions centered around generalized outcomes. In practice, property values rose significantly, along with taxes and insurance costs, creating further uncertainty about how forborne amounts would be addressed. As a result, the classification has facile and practical interpretations: borrowers are either not back on track, making partial payments, or making something akin to full payments—even if "full" could be less than the updated scheduled amount due to higher escrow costs.

borrowers need substantial improvements in their financial circumstances or clarity about repayment options to move from no payment to partial payment. Conversely, the lower value (again in absolute) of "Cutoff 2" implies that once borrowers begin making partial payments, the return to full repayment is less daunting (despite being a very large range), perhaps reflecting they regain financial stability or confidence. For those interested, the ordered logit results can reconstruct latent values by plugging in the cutoffs (refer to Cutoff 1 as C_1 and Cutoff 2 as C_2) and coefficient magnitudes into several steps for the latent thresholds and probabilities via proportional odds. The threshold interpretation for no payment is $Y_i = 0$ if $Y_i^* \leq C_1$, for partial payment is $Y_i = 1$ if $C_1 \leq Y_i^* \leq C_2$, and for full payment is $Y_i = 2$ if $Y_i^* \geq C_2$. For a probabilistic interpretation, let $M = \sum_{a=1}^{A} \beta_a X_a$ be the summation of each estimated coefficient multiplied by its observed or expected value for all A covariates. The probability for no payment is $P(\text{no payment}) = P(Y = 0) = \frac{1}{1+\exp(M-C_1)}$, for partial payment is $P(\text{partial payment}) = P(Y = 1) = \frac{1}{1+\exp(M-C_2)} - \frac{1}{1+\exp(M-C_1)}$, and for full payment is the remaining probabilistic fraction or $P(\text{full payment}) = P(Y = 2) = 1 - P(\text{partial payment}) - P(\text{no payment}) = 1 - \frac{1}{1+\exp(M-C_2)}$. What does all of this effectively mean? Consider the case of the "Only NMDB" sample in the first equation of each panel. Having extremely large negative cutoff numbers will require M to be much larger and negative to offset the summation and produce a small exponential evaluation. If M is not sufficiently large and negative, the exponential expression will be quite large and, in the probability limit, drive the fraction to zero. With larger cutoff values, it is more difficult to generate a positive probability on the likelihood of no payment with the estimated coefficients. If we restrict ourselves to only using administrative data, it appears that everybody will only make some partial or full payment. This finding is not terribly surprising because mortgages would not have been underwritten if future payment cash flows appeared risky.

In contrast, the much smaller cutoffs on the ASMB sample provide a reasonable opportunity to calculate different positive probabilities. Comparing the coefficient magnitudes, there is greater relative balancing in the second column of each panel than in the first column and when both are combined, the administrative data is largely driven by a single covariate (high credit score). In hindsight, it seems easy to conclude this should happen since administrative variables are a weak tool for gauging distant decisions because the data miss current conditions or beliefs about what may happen. Likewise, it may not seem revolutionary to find that a higher chance of not getting back on track can be predicted by conditions which have a chance of making it less psychologically desirable (moral convictions) or more financially

difficult (actual needs) to return to their prior mortgage payment. But, such information was not fully available at the time of the CARES Act and decisions had to be made quickly (i.e., there was no option to send out a wave of surveys, wait several months or even several weeks for responses, perform analysis, and then decide on support options).

These findings reinforce the importance of understanding both financial and behavioral dimensions when analyzing post-forbearance repayment outcomes. The integration of administrative data with survey-based measures of beliefs and expectations enhances the predictive power of the exit models, suggesting that, in the future, servicers should aim to provide borrowers with consistent information about program expectations, repayment plan terms, mitigation options, and other targeted support to overcome financial barriers to repayment.[64]

Next, we develop a theoretical framework to formally work through these findings. The model offers a structured lens to interpret the observed empirical patterns in forbearance. By incorporating behavioral and financial mechanisms, the model generates insights into the role of borrower heterogeneity and how program choices can steer participation trajectories.

5 A Theoretical Model of Forbearance

To gain deeper insights into the decision-making process behind forbearance, we develop a two-period model where borrowers have private information about both their financial distress and their beliefs about how forbearance will be resolved. The model captures the dynamic nature of financial distress, incorporating both precautionary and non-precautionary motives. A key focus is the role of heterogeneous entry costs for borrowers seeking access to forbearance. Without entry barriers or a lack of program awareness, it becomes challenging to explain why more financially distressed borrowers do not utilize forbearance options.

The model has several simplifying assumptions. First, once a borrower enters forbearance, the servicer is assumed to correctly assess the borrower's level of financial distress and assign appropriate forbearance exit outcomes. This abstracts away from incentive compatibility concerns, such as strategic behavior by borrowers misrepresenting their level of distress.[65]

[64] As with the forbearance entry models, F-tests are used for joint statistical significance on the group of ASMB controls in the full set of estimations. All reject the null hypothesis of zero coefficients for ASMB variables with probability greater than 0.9999.

[65] Our interest lies in understanding how borrower distress and beliefs influence behavior, rather than potential strategic interactions between borrowers and servicers.

Table 7: Distress and Forbearance Outcomes

Assigned Distress Level	Type of Distress	Forbearance Outcome	Non-Forbearance Outcome
0	No Distress	Reinstatement	Loan Stays Current
1	Temporary Distress	Payment Deferral	Payment Deferral
2	Minor Permanent Distress	Loan Modification	Loan Mod
3	Major Permanent Distress	Lose Home Later	Lose Home Sooner

Note: The assigned distress level is D_2 if $D_2 > 0$ or $D_1 = D_2 = 0$. If $D_1 > 0$ and $D_2 = 0$, we assume the servicer assigns lump-sum payment (Reinstatement) as the forbearance outcome.

Second, we ignore discounting future payoffs, effectively assuming no time value of money.[66] Third, we assume that the servicer is able to contact the borrower, and places distressed borrowers into forbearance after consultation.[67] Thus, in our model,the decision for distressed borrowers to enter forbearance hinges on whether they *proactively* contact the servicer.[68] Not contacting the servicer has implications for payoffs. Borrowers experiencing distress in the first period automatically begin the second period in forbearance, regardless of whether they initially "chose" to enter forbearance. Finally, we assume that only non-distressed borrowers in forbearance are eligible to exit; distressed borrowers must remain in forbearance.

The timing of the game is as follows. At the start of the first period, borrowers learn their belief type (uninformed, informed, optimistic, pessimistic), forbearance entry costs, and initial financial distress level (D_1). Borrowers choose whether to enter forbearance. Financially distressed borrowers who opt not to enter forbearance are automatically placed into it by their servicer. At the start of the second period, borrowers learn their new distress level (D_2) and make new forbearance decisions. Borrowers in forbearance who remain financially distressed must stay enrolled, while those without financial distress may choose to exit. Borrowers not in forbearance choose whether to enter. The game ends with payoffs being realized. The extensive form of the game, conditional on each D_1, are shown with two panels in Figure 3.

At each time t, a borrower experiences a level of financial distress $D_t \in \{0, 1, 2, 3\}$, where

[66]This is reasonable (and only has a minor economic impact) given the brief initial six-month forbearance period, the prevailing low-interest-rate environment, and that individuals often experience money illusion.

[67]The purpose of forbearance is to suspend payments, giving the servicer sufficient time to assess the degree of financial distress and best course of action. This enables even borrowers facing substantial hardship to benefit from forbearance while options are evaluated.

[68]For non-distressed borrowers, the decision to enter or exit forbearance has the usual interpretation.

larger values of D_t indicate more distress (e.g., larger income shocks).[69] A borrower is considered distressed in period t if $D_t > 0$ and not distressed if $D_t = 0$.

Table 7 lists the forbearance exit outcomes and labels correspond to each distress level. The servicer assigns the forbearance outcome based on the borrower's final period distress level (D_2) unless the borrower transitions form being initially distressed to not distressed (i.e., $D_1 > 0$ and $D_2 = 0$). In such cases, we assume the borrower makes a lump-sum payment.[70] Initial distress (D_1) is given exogenously while final distress (D_2) is determined by a Markov process, where $m_{i,j}$ indicates the distress transition probability from $D_1 = i$ to $D_2 = j$.[71]

Borrowers differ in their beliefs about the expected outcomes at the end of forbearance. We categorize them into four types: unaware (U), informed (I), pessimistic (P), and optimistic (O). We assume borrowers' beliefs and levels of financial distress are independent. Unaware borrowers do not initially know that forbearance is an option. However, if they are placed into forbearance, they learn of its existence and gain a full understanding of the forbearance exit process after consulting with the servicer. Aware borrowers, in contrast, have preexisting beliefs about forbearance outcomes, which may be accurate or inaccurate. Informed borrowers hold correct beliefs about the process, while misinformed borrowers have incorrect beliefs about what will happen at the end of forbearance. Rather than considering all possible misinformed beliefs, we focus on two key types likely to influence empirical analysis. Optimistic borrowers believe all arrears will be forgiven, whereas pessimistic borrowers believe all arrears will be due immediately as a lump-sum payment at the end of forbearance.

To voluntarily enter forbearance for the first time, borrowers must pay entry costs $\kappa \geq 0$, which represent the combined behavioral and transaction costs associated with contacting the

[69] Different levels of financial distress are needed to justify the use of various forbearance outcomes. In practice, another option exists called a "Repayment Plan" where the borrower makes up arrears by temporarily increasing monthly payments for a fixed period. However, we exclude this option because it was infrequent in our dataset. Additionally, the "Lose Home" outcome could correspond to either a short sale, deed in lieu, or foreclosure. For ease, we abstract from distinctions among these events and treat them equally as the borrower's worst outcome.

[70] If $D_1 > 0$ and $D_2 = 0$, the borrower is assigned to reinstatement if they can make a lump-sum payment or assigned to a payment deferral if they cannot. Our assumption that previously distressed borrowers exiting forbearance make lump-sum payments does not affect equilibrium behavior, as this benefit only impacts payoffs at the point of exiting forbearance. Adding this benefit only slightly shifts the thresholds at which entering forbearance becomes optimal.

[71] Transition probabilities satisfy $m_{i,j} \geq 0$ and $\sum_{j=0}^{3} m_{ij} = 1$.

servicer and enrolling in forbearance.[72] We assume κ follows a distribution F, independent of borrowers' beliefs and levels of financial distress. If a borrower remains in forbearance during the second period, they pay reduced entry costs $\delta\kappa$, where $0 < \delta < 1$. For borrowers placed in forbearance by their servicer (referred to as servicer-initiated forbearance), the entry cost is $\mu\kappa$. We assume $0 < \delta < \mu \leq 1$, meaning that reentry costs are smaller than servicer-initiated entry costs, but both are lower than the costs of voluntarily entering forbearance.

Forbearance decisions provide borrowers with particular benefits. Let $h(D)$ denote an increasing function that represents the per-period flow benefit of being in forbearance, driven by consumption smoothing. Higher levels of financial distress (e.g., greater income loss) result in increased smoothing.[73] This setup implies that forbearance exit outcomes are determined according to Table 7 and that the benefits $h(\cdot)$ inherently reflect these outcomes. If a borrower is not distressed but remains enrolled in forbearance, they earns an additional per-period flow benefit $B \geq 0$, representing the ability to use deferred payments for savings or investment purposes. Conversely, if the borrower is distressed, no financial benefits are assumed, as their income is used on essential living expenses. To improve readability, we typically write h_i instead of $h(i)$. We omit costs associated with not choosing forbearance, such as potential damage to credit history, for two reasons. First, our data cover the period immediately after enactment of the CARES Act, which prohibited such costs.[74] Second, including these costs is equivalent to reducing the benefits, offering no additional insights.

Our model incorporates several other regularity assumptions. First, we assume that $h_0 + B$ is sufficiently small such that $h_0 + B < \frac{h_1}{1-\mu}$. This condition would hold, for example, if the investment opportunities and consumption smoothing benefits for borrowers under no financial duress are relatively minor. Second, we assume δ is small enough to satisfy $\frac{h_3}{1-\mu} \leq \frac{h_0+B}{\delta}$. This condition would hold if the paperwork and psychological costs of remaining in forbearance are minimal for borrowers already enrolled. Together, these assumptions imply an ordering of second period payoffs in the model: $h_0 + B \leq \frac{h_1}{1-\mu} \leq \cdots \leq \frac{h_3}{1-\mu} \leq \frac{h_0+B}{\delta}$. Finally, we assume that $\mu < \frac{m_{00}(1-\delta)}{1-m_{00}}$. This simplifies the ordering of parameter regions and

[72] These costs, κ, encompass the borrower's time, completing paperwork, potential stigma associated with forbearance, and other factors. Even though the CARES Act minimized enrollment costs, borrowers may have faced delays, such as long phone wait times, or other incidental expenses.

[73] We abstract away from explicit inter-temporal decisions on consumption, savings, and mortgage payments. Instead, we use the derived benefits of consumption smoothing in response to income shocks as our starting point.

[74] See Section 4021 of the CARES Act for details.

is reasonable, as it would hold if servicer-initiated forbearance is not prohibitively costly for borrowers or if the likelihood of remaining out of financial distress, once already not distressed, is sufficiently high.

For each belief type, we summarize the borrower's equilibrium behavior across both periods in the propositions below. The model is solved using backwards induction, with detailed proofs, derivations, and explanations provided in the appendix. In the second period, borrowers may already be in forbearance, face varying levels of financial distress, and hold differing beliefs. We begin by analyzing the behavior of unaware borrowers, summarizing their actions across both periods. Afterward, we proceed to describe the equilibrium behavior for borrowers of all other belief types. Throughout, we consider initially non-distressed and initially distressed borrowers separately to highlight the potential for precautionary motives.

5.1 Unaware Borrowers

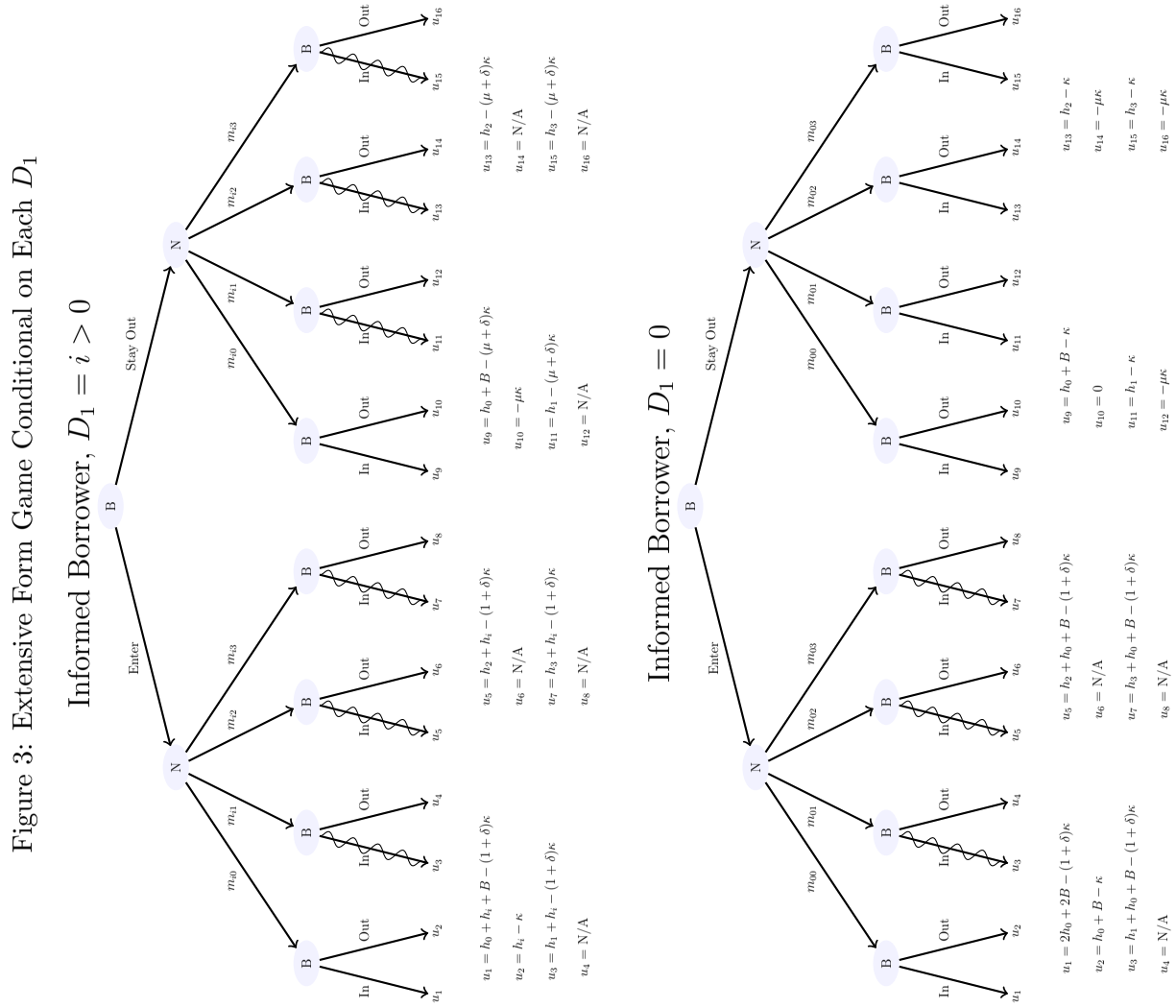
Uninformed borrowers offer a straightforward explanation for why some borrowers may not utilize forbearance programs: they are unaware that forbearance is an option. The only way an uninformed borrower becomes aware of forbearance is if they experience financial distress, are contacted by the servicer, and are subsequently placed into the program. Once placed into forbearance, an uninformed borrower will exit only if they are no longer distressed and their reentry costs ($\delta\kappa$) are small relative to the benefits of remaining in forbearance (h_0+B). Proposition 1 below characterizes equilibrium behavior for unaware borrowers.

Proposition 1. *Suppose the borrower is unaware. In the first period, the borrower does not voluntarily choose forbearance (by definition), but is placed into forbearance by the servicer at the end if $D_1 > 0$. In the second period, if the borrower is already in forbearance, they remain there unless $D_2 = 0$ and $\kappa \geq \frac{h_0+B}{\delta}$. If the borrower is not in forbearance at the start of the second period, they do not choose to enter forbearance voluntarily but will be placed into it by the servicer if $D_2 > 0$.*

5.2 Informed Borrowers

To distinguish between the roles of precautionary savings and need, we analyze equilibrium behavior separately for initially distressed ($D_1 > 0$) and initially non-distressed ($D_1 = 0$) informed borrowers. It is important to note that in the latter case, the borrower's behavior is driven solely by precautionary measures.

Figure 3: Extensive Form Game Conditional on Each D_1



5.2.1 Initially distressed borrowers: $D_1 > 0$

Proposition 2 describes the equilibrium behavior of informed borrowers who are initially distressed. Figure 3 illustrates the extensive form tree for each D_1, with the top part reflecting $D_1 = i > 0$. Notably, the borrower always begins in forbearance in the second period. If the borrower is able to exit forbearance, they will choose to do so only if the reentry costs are prohibitively high or if benefits of remaining in forbearance are too small. In the first period, anticipating this behavior, borrowers will only enter forbearance if their entry costs are smaller than a scaled version of the first period benefits of forbearance, where the scaling factor increases with the fraction of servicer-initiated entry costs. In summary, distressed borrowers may choose to avoid forbearance if their entry costs are sufficiently high.

Proposition 2. *Suppose the borrower is informed and $D_1 = i > 0$.*

- ***Second period behavior**: The borrower begins the second period in forbearance and remains in forbearance unless $D_2 = 0$ and $\kappa > \frac{h_0+B}{\delta}$.*
- ***First period behavior**: The borrower enters forbearance if $\kappa \leq \frac{h_i}{1-\mu}$.*

Proof. See Appendix. □

Before moving to the next section, we highlight some comparative statics in the corollary below. The simplicity and results of this case arise from the borrower beginning the second period in forbearance, regardless of their behavior in the first period.

Corollary 1. *Suppose the borrower is initially distressed with $D_1 = i$. Changing the conditional probabilities $(m_{i0}, m_{i1}, m_{i2}, m_{i3})$ has no effect on equilibrium behavior. Increasing h_i makes forbearance more likely to be chosen initially, but does not affect behavior in the second period. On the other hand, increasing h_0 makes forbearance more likely in the second period, but has no effect in the first period. Finally, increasing any other benefits h_k, $k \notin \{0, i\}$, does not influence equilibrium behavior.*

5.2.2 Initially non-distressed borrowers: $D_1 = 0$

If the informed borrower is not initially distressed, the equilibrium becomes more complicated due to the number of possible cases that must be considered. Figure 3 illustrates the decision tree for the borrower in the bottom panel, corresponding to $D_1 = 0$. Our approach is to first partition the set of possible κ into six distinct "cases", each representing different second

Table 8: Cases for Entry Cost Parameter κ, Informed $D_1 = 0$ Borrowers

Case Number m	Definition	Cutoff $\widehat{\kappa}_m$: Enter First Period if $\kappa < \widehat{\kappa}$
1	$\kappa < h_0 + B$	$\frac{h_0+B}{\delta}$
2	$h_0 + B < \kappa < \frac{h_1}{1-\mu}$	$\frac{(h_0+B)(1+m_{00})}{\delta+m_{00}}$
3	$\frac{h_1}{1-\mu} < \kappa < \frac{h_2}{1-\mu}$	$\frac{(h_0+B)(1+m_{00})+m_{01}(h_1)}{\delta+m_{00}+(1-\mu)m_{01}}$
4	$\frac{h_2}{1-\mu} < \kappa < \frac{h_3}{1-\mu}$	$\frac{(h_0+B)(1+m_{00})+\sum_{i=1}^{2} m_{0i}(h_i)}{\delta+m_{00}+(1-\mu)\sum_{i=1}^{2} m_{0i}}$
5	$\frac{h_3}{1-\mu} < \kappa < \frac{h_0+B}{\delta}$	$\frac{(h_0+B)(1+m_{00})+\sum_{i=1}^{3} m_{0i}(h_i)}{\delta+m_{00}+(1-\mu)\sum_{i=1}^{3} m_{0i}}$
6	$\frac{h_0+B}{\delta} < \kappa$	$\frac{h_0+B+\sum_{i=1}^{3} m_{0i}(h_i)}{1-(\mu-\delta)\sum_{i=1}^{3} m_{0i}}$

Note: This table describes first period forbearance decisions and their corresponding cases for non-distressed, informed borrowers. Specifically, it partitions the set of κ into six cases, taking the exogenous parameters $\{B, \{h_i\}_{i=0}^{3}, \{m_{ij}\}_{i,j=0,1,2,3}, \mu, \delta\}$ as given. For each case m, a borrower in case m chooses forbearance in the first period if $\kappa < \widehat{\kappa}_m$.

period behavior. We solve for equilibrium behavior within each case, as listed in Table 8, which partition the parameter space into intervals with respect to κ. Within each case, borrowers follow a cutoff rule: they choose forbearance if κ is below the cutoff specific to that case. Importantly, equilibrium behavior within each case depends crucially on the exogenous parameter values of the model, making comparative statics complex and cumbersome.

Next, we fully characterize equilibrium behavior across all cases by partitioning the parameter space into six "regions" and solving for behavior in each case.[75] The key idea is that within each parameter region, equilibrium behavior is uniquely defined, which makes comparative statics easier to interpret. Table 9 lists and defines the parameter regions. Proposition 3 below characterizes equilibrium behavior in both periods for each borrower type and κ.

Proposition 3. *Suppose the borrower is informed and $D_1 = 0$. Partition the possible values of κ into the six cases given in Table 8, where each case m has a distinct cutoff $\widehat{\kappa}_m$.*

- ***Second period behavior**: Behavior depends on κ, the initial forbearance decision, and the model parameters.*
  - *If the borrower initially chooses forbearance, they will remain in forbearance if either $D_2 > 0$, or $D_2 = 0$ and $\kappa \leq \frac{h_0+B}{\delta}$.*

[75] We label these regions with letters (e.g., Region A, Region B, ..., Region F) to avoid confusion with the previously mentioned cost κ "cases".

Table 9: Parameter Regions for First Period Behavior, Informed $D_1 = 0$ Borrowers

Parameter Region	Definition
A	$0 < a(1) + \underline{b}(1) - c$
B	$a(1) + \underline{b}(1) - c < 0 < a(2) + \overline{b}(1) - c$
C	$a(2) + \overline{b}(1) - c < 0 < a(2) + \underline{b}(2) - c$
D	$a(2) + \underline{b}(2) - c < 0 < a(3) + \overline{b}(2) - c$
E	$a(3) + \overline{b}(2) - c < 0 < a(3) + \underline{b}(3) - c$
F	$a(3) + \underline{b}(3) - c < 0$

Note: Let $a(i) = \frac{(h_i)(\delta+m_{00})}{1-\mu}$, $\underline{b}(i) = \sum_{k=1}^{i} m_{0i}(h_i - h_k)$, $\overline{b}(i) = \sum_{k=1}^{i} m_{0i}(h_{i+1} - h_k)$, and $c = (1 + m_{00})(h_0 + B)$, where $\overline{b}(i) > \underline{b}(i) > \overline{b}(i-1) > \underline{b}(i-1)$. This partitions the parameter space $(\delta, \mu, \{h_i\}_{i=0}^{3}, \{m_{0i}\}_{i=0}^{3}, B)$ into six distinct regions.

  - *If the borrower does not choose forbearance and $D_2 = 0$, they will enter forbearance in the second period if $\kappa \leq h_0 + B$. If $D_2 = i > 0$, they will enter forbearance if $\kappa \leq \frac{h_i}{1-\mu}$.*

- ***First period behavior**: If a borrower's κ falls within case m, they will choose forbearance in the initial period if $\kappa < \widehat{\kappa}_m$. In particular, for any given parameter values, borrowers in case 1 will choose forbearance, while borrowers in case 6 will not. Borrowers in the intermediate cases may choose forbearance, depending on parameter values.*

Proof. See Appendix. □

While Proposition 3 provides the cutoff rules, interpreting these rules is challenging due to the potential variations in parameter configurations. For instance, increasing a particular h_i can change both the case to which a given κ belongs and the corresponding cutoff $\widehat{\kappa}$. Additionally, the relationship between the different cutoffs is not straightforward. The next proposition characterizes equilibrium behavior by the model parameters. Specifically, it partitions the parameter space into regions A–F, as defined in Table 9, and demonstrates that forbearance decisions, both across and within cases, are determined within each parameter region.

Proposition 4, specifically Table 10, summarizes equilibrium behavior for each case and region pair. To avoid confusion, we refer to the decision to choose forbearance as "entering" and the decision not to choose forbearance as "exiting". Monotonicity is immediately evident across

Table 10: First Period Forbearance Entry Decisions, Informed $D_1 = 0$ Borrowers

Region	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
A	all enter	some enter	all don't enter	all don't enter	all don't enter	all don't enter
B	all enter	all enter	some enter	all don't enter	all don't enter	all don't enter
C	all enter	all enter	all enter	all don't enter	all don't enter	all don't enter
D	all enter	all enter	all enter	some enter	all don't enter	all don't enter
E	all enter	all enter	all enter	all enter	all don't enter	all don't enter
F	all enter	all enter	all enter	all enter	some enter	all don't enter

Note: This table describes equilibrium behavior by parameter region and entry costs κ (case #). "All enter" means that all types (i.e., values of κ) within the case choose forbearance in equilibrium. "Some enter" means that only the lowest types in the case, specifically those below the cutoff given in Proposition 3, will choose to enter forbearance while other types above the cutoff will not choose forbearance. "All don't enter" means that all types within the case do not choose forbearance in the initial period.

both cases and regions. Specifically, a higher likelihood of forbearance is associated with lower cases (i.e., smaller values of κ) and higher regions (i.e., those later in the alphabet).

Proposition 4. *Assume that $\mu < \frac{m_{00}(1-\delta)}{1-m_{00}}$. First period behavior is summarized in Table 10. The terms used in the able are as follows: "all enter" means that all types (i.e., values of κ) within the case choose forbearance in equilibrium, "some enter" means that only the lowest types within the case, specifically those below the cutoff value provided in Table 8, choose to enter forbearance, while types above the cutoff do not, and "all don't enter" means that no types within the case choose forbearance in the initial period.*

Proof. See Appendix. □

To conclude this section, we present several comparative statics in the corollary below. It is important to note that changes in the parameters affect the parameter regions. For example, an increase in h_1 shifts the boundaries of the regions, specifically altering the terms $a(i), \underline{b}(i)$, and $\overline{b}(i)$, which define these regions.

Corollary 2. *Suppose the borrower is informed and $D_2 = 0$. Increasing h_i makes forbearance weakly more likely in the first and second periods for $i = 0, 1, 2, 3$. Forbearance is strictly more likely in all cases, except when the borrower is already in forbearance in the second period and $D_2 = i$.*

5.3 Optimistic and Pessimistic Borrowers

We now consider two types of borrowers who have incorrect beliefs about what will happen when forbearance ends. Optimistic borrowers believe that all arrears will be forgiven,

while pessimistic borrowers believe that a lump-sum payment will be required upon exiting forbearance. Optimistic borrowers expect an additional financial benefit from being in forbearance, beyond the usual consumption smoothing benefits $h(\cdot)$. Thus, we can think about optimistic borrowers as having a new benefit function $\overline{h}(D) > h(D)$, for all D. In contrast, pessimistic borrowers expect fewer benefits, and we model them as having benefits $\underline{h}(D) < h(D)$, for all D.

All the previous results for informed buyers apply, with only a change in notation. The differences in behavior across belief types can be interpreted as a comparative static on the perceived benefits of forbearance. The following proposition summarizes the differences in behavior between optimistic and pessimistic borrowers.

Proposition 5. *If the borrower is optimistic, with benefits $\overline{h}(D)$, then the borrower is more likely to enter forbearance for any given κ. Conversely, if the borrower is pessimistic, with benefits $\underline{h}(D)$, then the borrower is less likely to enter forbearance for a given κ.*

Proof. This follows immediately from previous propositions. Let $\widehat{\kappa}_m$ represent the cutoff for case m. Then, $\widehat{\kappa}_m$ is increasing in m, meaning that forbearance becomes more likely within a given case because more borrowers with lower values of κ now choose forbearance. Additionally, $\widehat{\kappa}_m$ is non-decreasing in h_i for all $i = 0, 1, 2, 3$, which further increases the likelihood of forbearance. Increasing h_i places the borrower either in the same or the next lower case, resulting in a lower $\widehat{\kappa}_m$ and making it more likely forbearance will be chosen, as shown by the monotonicity in Table 10. □

5.4 Discussion

We now compare and contrast the equilibria of the previous cases to develop intuition and predictions. Before delving into a broader discussion of forbearance determinants, we highlight two key tensions from our model that help explain forbearance decisions: the trade-off between immediate need versus precautionary motives, and the role of belief types, which reflects differences in the perceived benefits of forbearance.

Precautionary motives or not To better understand the importance of precautionary motives, we compare the behavior of distressed and non-distressed borrowers in the first period. Distressed borrowers focus solely on their current level of distress when considering forbearance. They weigh the immediate benefits of forbearance (h_i) against the net entry cost

$((1-\mu)\kappa)$, which incorporates the savings from servicer-initiated forbearance. In contrast, non-distressed borrowers' decisions account not only for their current situation but also future scenarios where forbearance may or may not be desirable. Like distressed borrowers, non-distressed borrowers factor in the reduced future forbearance costs from servicer-initiated forbearance ($\mu\kappa$). However, they also consider additional elements of the model, such as the reentry cost parameter (δ) and other relevant parameters, making their decision process more complex.

As an example, suppose we are in Case 3, where $\frac{h_1}{1-\mu} < \kappa < \frac{h_2}{1-\mu}$. A distressed borrower enters forbearance in the first period if $D_1 = 2$ or $D_1 = 3$, but not if $D_1 = 1$. In contrast, a non-distressed borrower's decision to enter depends crucially on the parameter region in the model, as shown in Table 10. For non-distressed borrowers, the precautionary motive is influenced by a broader set of parameters. This includes all benefits $\{h_i\}_{i=0,1,2,3}$, all transition probabilities $\{m_{ij}\}_{i,j=0,1,2,3}$, the financial benefit B, and the savings from reentry costs δ. In general, there is an incentive for precautionary forbearance if the expected benefits from consumption smoothing are large enough. This aligns with our results in Table 3, where forbearance is more likely to be chosen by borrowers who experienced work changes (e.g., reduced hours, reduced pay, job loss) or who self-reported an actual need. We would expect to see the largest consumption smoothing benefits among individuals who experienced income loss.

Importance of belief types Different belief types influence forbearance decisions in our model. Holding the level of distress constant, the more benefits a borrower expects to receive, the more likely they are to enter into forbearance. Conversely, if the borrower is pessimistic and expects to face lump-sum repayment upon exiting, regardless of their future financial distress, they will be less likely to choose forbearance than if they have correct beliefs.

Our results highlight the importance of financial education and the need for borrowers to form accurate expectations about how forbearance will be resolved when making decisions. Our data suggest that different borrower belief types do indeed exist. Among borrowers in forbearance at the time of the survey, about 14% are still unsure about forbearance outcomes, 21% believe all arrears would be due as a lump-sum payment, 40% expect a payment deferral, 17% anticipate a loan modification or repayment plan, and 8% do not expect any deferred or reduced payments. Of those borrowers not in forbearance, 29% cite concerns about lump-

sum payments as a reason for not choosing forbearance, while 21% of borrowers mention uncertainty about how arrears would be paid.

Determinants of forbearance In summary, our model generates several predictions about which borrowers are likely to use forbearance and the reasons behind their decisions. First, as previously noted, the level of distress plays a critical role in the likelihood of using forbearance, which aligns with our empirical results. For a fixed entry cost κ, borrowers with higher levels of distress—those with greater benefits from using forbearance—are more likely to opt for it. In the case of non-distressed borrowers, precautionary motives become more complex but generally imply that forbearance is more likely when the benefits of using it in the future are sufficiently large. Second, borrower beliefs about how arrears will be handled also matters. The more favorable a borrower perceives the resolution of forbearance will be, the more likely they are to choose it. Additionally, beliefs about future levels of distress are decisive when considering precautionary motives.

Looking at raw data, 59% of borrowers chose forbearance if reported being very or somewhat likely to lose their home because they cannot afford payments. In contrast, among borrowers who are not concerned, 57% do not choose forbearance. Furthermore, with borrowers who believe either their housing or non-housing expenses will significantly increase in the next 12 months, only 47% chose forbearance. While these numbers are not directly comparable to our model (since some borrowers may have already been in forbearance), they suggest a potential link between stated future need and forbearance choices, warranting further investigation. Finally, while difficult to measure empirically, psychological and paperwork costs are important deterrents to forbearance uptake. Though quantifying those costs is beyond the scope of this paper, future research could explore this aspect further.

These theoretical insights, alongside the earlier empirical findings, emphasize that program design influences borrower participation in outreach programs, such as mortgage forbearance during the pandemic. The results point to critical opportunities for supporting borrowers by reducing informational barriers and simplifying procedures. In the next section, we synthesize these findings and offer recommendations for improving future program designs.

6 Conclusion

This study highlights the pivotal role that borrowers' beliefs, perceptions, and realized hardships play in mortgage forbearance decisions, offering insights for addressing future crises. The findings reveal that relying solely on traditional underwriting metrics collected at origination is inadequate for predicting take-up and exit behavior during periods of systemic uncertainty. The ease of access of COVID-19 forbearance was well-suited to the circumstances, in which the goal was for as many people as possible to have access to relief. In the future, however, unless policymakers are constrained by resources, time, or outreach of relief programs, our results suggest focusing on sorting via borrowers' reported economic hardships, perspectives, and expectations. Tailored program designs that address gaps in financial understanding and clarify workout options could enhance outcomes while maintaining safety and soundness during times of economic distress.

Our research advances the literature on financial decision-making under pressure by combining administrative mortgage origination data with borrower survey responses to deliver a unique analysis of individual forbearance behavior across the U.S. mortgage market. The study underscores the importance of borrowers' subjective factors—such as expectations about repayment, financial knowledge, and precautionary motives—in influencing their forbearance decisions. These findings expand the understanding of borrower responses during crises, adapting a behavioral economic theoretical model with insights about decision-making processes.

For financial institutions, these findings represent potential ways to improve borrower support, particularly in times of instability. Servicers could supplement their existing borrower outreach with targeted, perceptual-based questions to better identify needs and behavioral considerations not present in the current process. This could guide both entry and exit decisions for relief programs. The information could be integrated in real-time to update administrative data systems with key borrower insights which may help enable immediate and personalized assistance while servicers are triaging individual distress situations. For policymakers, conveying greater clarity relating to forbearance entry and exit pathways could help with future crises. When circumstances allow, more procedural certainty and transparency could better direct relief efforts to those who truly need it.

References

Agarwal, Sumit, Souphala Chomsisengphet, and Lawrence Mielnicki. 2008. "Do Forbearance Plans Help Mitigate Credit Card Losses?" *Journal of Family and Economic Issues*, 29(2): 191–201.

Allen, Jason, Robert Clark, Shaoteng Li, and Nicolas Vincent. 2022. "Debt-Relief Programs and Money Left on the Table: Evidence from Canada's Response to COVID-19." *Canadian Journal of Economics/Revue canadienne d'économique*, 55: 9–53.

Anderson, Jackson T., David M. Harrison, and Michael J. Seiler. 2022. "Reducing Strategic Forbearance Under the CARES Act: An Experimental Approach Utilizing Recourse Attestation." *The Journal of Real Estate Finance and Economics*, 65(2): 230–260.

Anderson, Jackson T., David M. Harrison, Kimberly F. Luchtenberg, and Michael J. Seiler. 2023. "Legal Versus Psychological Contracts: When Does a Mortgage Default Settlement Contract Become a Contract?" *The Journal of Real Estate Finance and Economics*, 67(2): 191–217.

Anderson, Nathan B. and Jane K. Dokko. 2016. "Liquidity Problems and Early Payment Default Among Subprime Mortgages." *The Review of Economics and Statistics*, 98(5): 897–912.

Anenberg, Elliot and Tess Scharlemann. 2021. "The Effect of Mortgage Forbearance on House Prices During COVID-19." Board of Governors of the Federal Reserve System FEDS Notes.

An, Xudong (Sean), Larry Cordell, Liang Geng, and Keyoung Lee. 2022. "Inequality in the Time of COVID-19: Evidence from Mortgage Delinquency and Forbearance." Federal Reserve Bank of Philadelphia Working Paper 21-09/R.

Batzer, Ross M., Jonah R. Coste, William M. Doerner, and Michael J. Seiler. 2024. "The Lock-In Effect of Rising Mortgage Rate." Federal Housing Finance Agency Working Paper 24-03.

Bergant, Katharina and Thore Kockerols. 2024. "Forbearance Patterns in the Post-Crisis Period: Stories from Microdata." SSRN Working Paper 3701130.

Catherine, Sylvain and Constantine Yannelis. 2023. "The Distributional Effects of Student Loan Forgiveness." *Journal of Financial Economics*, 147(2): 297–316.

Cherry, Susan F., Erica Xuewei Jiang, Gregor Matvos, Tomasz Piskorski, and Amit Seru. 2021. "Government and Private Household Debt Relief During COVID-19." *Brookings Papers on Economic Activity*, Fall: 141–199.

Collinson, Robert, Anthony A. DeFusco, John Eric Humphries, Benjamin J. Keys, David C. Phillips, Vincent Reina, Patrick S. Turner, and Winnie van Dijk. 2024. "The Effects of Emergency Rental Assistance During the Pandemic: Evidence from Four Cities." National Bureau of Economic Research Working Paper Series 32463.

del Valle, Alejandro, Therese Scharlemann, and Stephen Shore. 2024. "Household Financial Decision-Making After Natural Disasters: Evidence from Hurricane Harvey." *Journal of Financial and Quantitative Analysis*, 59(5): 2459–2485.

Disney, Richard and John Gathergood. 2013. "Financial Literacy and Consumer Credit Portfolios." *Journal of Banking & Finance*, 37(7): 2246–2254.

D'Acunto, Francesco and Michael Weber. 2024. "Why Survey-Based Subjective Expectations are Meaningful and Important." *Annual Review of Economics*, 16: 329–357.

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 Research Paper.

Fonseca, Julia and Lu Liu. 2024. "Mortgage Lock-In, Mobility, and Labor Reallocation." *Journal of Finance*, 79(6): 3729–3772.

Fuster, Andreas, Aurel Hizmo, Lauren Lambie-Hanson, James Vickery, and Paul Willen. 2021. "How Resilient is Mortgage Credit Supply? Evidence from the COVID-19 Pandemic." National Bureau of Economic Research Working Paper Series 28843.

Gerardi, Kristopher, Lauren Lambie-Hanson, and Paul Willen. 2022. "Lessons Learned from Mortgage Borrower Policies and Outcomes During the COVID-19 Pandemic." Federal Reserve Bank of Atlanta Policy Hub 2022-9.

Gordon, Julia, David Sanchez, Lindsay Augustine, Diane Cipollone, Debby Goldberg, and Lisa Rice. 2021. "Protecting Homeownership from the Impact of COVID-19." National Association of REALTORS Report.

Kim, You Suk, Donghoon Lee, Tess Scharlemann, and James Vickery. 2024. "Intermediation Frictions in Debt Relief: Evidence from CARES Act Forbearance." *Journal of Financial Economics*, 158: 103873.

Kuhnen, Camelia M. and Brian T. Melzer. 2016. "Noncognitive Abilities and Financial Delinquency: The Role of Self-Efficacy in Avoiding Financial Distress." *The Journal of Finance*, 73(6): 2837–2869.

Lambie-Hanson, Lauren, James Vickery, and Tom Akana. 2021. "Recent Data on Mortgage Forbearance: Borrower Uptake and Understanding of Lender Accommodations." Federal Reserve Bank of Philadelphia Consumer Finance Institute Research Brief.

Loewenstein, Lara and Bezankeng Njinju. 2022. "Mortgage Borrowers' Use of COVID-19 Forbearance Programs." Federal Reserve Bank of Cleveland Economic Commentary 2022-11.

Low, David. 2023*a*. "An Empirically-Disciplined Theory of Mortgage Default." Consumer Financial Protection Bureau Office of Research Working Paper Series 2021-01.

Low, David. 2023*b*. "What Triggers Mortgage Default? New Evidence from Linked Administrative and Survey Data." *The Review of Economics and Statistics*, 1–26. Forthcoming.

McManus, Douglas and Elias Yannopoulos. 2021. "COVID-19 Mortgage Forbearances: Drivers and Payment Behavior." *Journal of Structured Finance*, 27(2): 13–25.

Pence, Karen. 2022. "Liquidity in the Mortgage Market: How Does the COVID-19 Crisis Compare with the Global Financial Crisis?" *Real Estate Economics*, 50(6): 1405–1424.

Seiler, Michael J. 2014. "The Effect of Perceived Lender Characteristics and Market Conditions on Strategic Mortgage Defaults." *Journal of Real Estate Finance and Economics*, 48(2): 256–270.

Seiler, Michael J. 2015*a*. "Do as I Say, Not as I Do: The Role of Advice Versus Actions in the Decision to Strategically Default." *Journal of Real Estate Research*, 37(2): 191–215.

Seiler, Michael J. 2015*b*. "The Role of Informational Uncertainty in the Decision to Strategically Default." *Journal of Housing Economics*, 27(March): 49–59.

Seiler, Michael J. 2016. "The Perceived Moral Reprehensibility of Strategic Mortgage Default." *Journal of Housing Economics*, 32(June): 18–28.

Seiler, Michael J. 2017. "Do Liquidated Damages Clauses Affect Strategic Mortgage Default Morality? A Test of the Disjunctive Thesis." *Real Estate Economics*, 45(1): 204–230.

Seiler, Michael J. 2018. "Asymmetric Dominance and Its Impact on Mortgage Default Deficiency Collection Efforts." *Real Estate Economics*, 46(4): 971–990.

Seiler, Michael J., Vicky L. Seiler, Mark A. Lane, and David M. Harrison. 2012. "Fear, Shame, and Guilt: Economic and Behavioral Motivations for Strategic Default." *Real Estate Economics*, 40(S1): 199–233.

Shi, Lan. 2022. "Heterogeneity in the Effect of COVID-19 Mortgage Forbearance: Evidence from Large Bank Servicers." *Cityscape*, 24(3): 21–60.

van Ooijen, Raun and Maarten C.J. van Rooij. 2016. "Mortgage Risks, Debt Literacy and Financial Advice." *Journal of Banking & Finance*, 72: 201–217.

Vihriälä, Erkki. 2023. "Self-Imposed Liquidity Constraints via Voluntary Debt Repayment." *Journal of Financial Economics*, 150(2): 103708.

Wooldridge, Jeffrey Marc. 2010. *Econometric Analysis of Cross Section and Panel Data.* Cambridge, Massachusetts:The MIT Press.

Zinman, Jonathan. 2010. "Restricting Consumer Credit Access: Household Survey Evidence on Effects Around the Oregon Rate Cap." *Journal of Banking & Finance*, 34(3): 546–556.

Appendix

Proof of Proposition 1

Proof. Suppose the borrower is unaware of forbearance. If $D_1 = 0$, meaning the borrower is not in distress, they do not enter forbearance initially. In this case, the borrower has no decisions to make in the second period, regardless of D_2. If the borrower later enters forbearance (i.e., $D_2 > 0$), they remains in it; otherwise, they stay out of the program.

If $D_1 > 0$, the unaware borrower is placed into forbearance by the servicer. In this case, if $D_2 > 0$, the borrower remains in forbearance with no decisions to make. However, if $D_2 = 0$, the borrower can choose either to remain in forbearance or exit. If the borrower exits, their expected total payoff is $-\mu\kappa + 0$. If they remain in forbearance, their total payoff (across both periods) is $-\mu\kappa + h_0 + B - \delta\kappa$. Therefore, the borrower will choose to exit if $\kappa \geq \frac{h_0+B}{\delta}$ which happens with probability $1 - F(\frac{h_0+B}{\delta})$. □

Proof of Proposition 2

Proof. Figure 3 illustrates the game for this case, with curly lines indicating mandatory decisions (i.e., the borrower must remain in forbearance). We solve this extensive form game using backwards induction.

Suppose the borrower is initially financially distressed. Regardless of their first period behavior, the borrower starts off period 2 in forbearance. If $D_2 > 0$, the borrower must remain in forbearance, and payoffs reflect the consumption smoothing benefits and damage to credit history. If $D_2 = 0$, however, the borrower can choose to remain in or exit forbearance, and may receive other financial benefits. If the borrower is able and willing to leave forbearance, they make a lump-sum payment of past arrears, resulting in no additional financial benefits.[76] Regardless of the first period choice, the borrower remains in forbearance in the second period if $\kappa \leq \frac{h(0)+B}{\delta}$.

Returning to the first period, m_{Dk} represents the transition probability to $D_2 = k \in$

[76] As previously mentioned, allowing for a payment deferral only slightly changes the cutoffs for which forbearance is optimal.

$\{0, 1, 2, 3\}$ given $D_1 = D$. If the borrower initially enters forbearance their payoff is

$$m_{D0} \max\{h(D_1) + h(0) + B - (1+\delta)\kappa, h(D_1) - \kappa\} + \sum_{k=1}^{3} m_{Dk}[h(D_1) + h(k) - (1+\delta)\kappa]. \tag{6}$$

In contrast, if the borrower chooses not to proactively contact the servicer, the servicer will later contact the borrower and place them into forbearance, resulting in payoffs of

$$m_{D0} \max\{h(0) + B - C(D_1) - (\mu+\delta)\kappa, -C(D_1) - \mu\kappa\} + \sum_{k=1}^{3} [m_{Dk}(h(k) - C(D_1) - (\mu+\delta)\kappa]. \tag{7}$$

Regardless of whether $\kappa \leq \frac{h(0)+B}{\delta}$ holds (i.e., whether the first or second term in both maximum operators is larger), forbearance is initially optimal if $\sum_{k=0}^{3}(h(D_1)+C(D_1)-(1-\mu)\kappa \geq 0$. Using the fact that probabilities sum to 1 and rearranging, we obtain the desired result. □

Proof of Proposition 3

Proof. If the borrower initially chooses forbearance and later becomes distressed ($D_2 > 0$), thye must remain in forbearance. However, if the borrower remains not distressed, they must decide whether to enter forbearance. If forbearance is chosen, payoffs are $2h(0)+2B-(1+\delta)\kappa$, while if forbearance is not chosen, payoffs are $h(0) + B - \kappa$. Thus, the borrower chooses to enter forbearance if $\kappa \leq \frac{h(0)+B}{\delta}$.

If the borrower initially does not choose forbearance, they start the second period not in forbearance. If the borrower remains not distressed, forbearance leads to payoffs of $h(0) + B - \kappa$, while not choosing forbearance leads to payoffs of 0. Therefore, the borrower chooses forbearance if $\kappa \leq h(0) + B$.

Now, if the borrower is distressed, entering forbearance provides both benefits and the avoidance of costs. Specifically, when distress is $D_2 > 0$, if forbearance is chosen, payoffs are $h(D_2) - \kappa$ while if forbearance is not chosen, payoffs are $-C(D_2) - \mu\kappa$. Therefore, with distress level $D_2 > 0$, forbearance is chosen if $\kappa \leq \frac{h(D_2)+C(D_2)}{1-\mu}$. Borrowers experiencing vary-

ing levels of distress have different cutoff values for κ, with more distress corresponding to higher thresholds and greater likelihoods of entering forbearance. In other words, increased distress makes forbearance more likely.

Moving back to the first period, we can write expected payoffs from entering forbearance. If the borrower initially enters forbearance, they receive payoffs of

$$\begin{aligned} & m_{00}(\max\{2h(0) + 2B - (1+\delta)\kappa, h(0) + B - \kappa\}) \\ + & \sum_{k=1}^{3} m_{0k}(h(k) + h(0) + B - (1+\delta)\kappa). \end{aligned} \tag{8}$$

In contrast, if the borrower does not initially chose forbearance, they get

$$\begin{aligned} & m_{00}(\max\{h(0) + B - \kappa, 0\}) \\ + & \sum_{k=1}^{3} m_{0k}(\max\{h(D_2) - \kappa, -C(D_2) - \mu\kappa\}). \end{aligned} \tag{9}$$

The derivations from this point are straightforward but tedious, as several cases must be considered. The diagram at the bottom of Figure 3 illustrates the timing and payoffs used in these expected value calculations.

Case 1, $\kappa < h_0 + B$: Here the borrower always chooses forbearance in the second period. If they enter initially, they expect to receive

$$\begin{aligned} Entry_1 &= m_{00}(2h_0 + 2B - (1+\delta)\kappa) + \sum_{i=1}^{3} m_{0i}(h_i + h_0 + B - (1+\delta)\kappa) \\ &= (h_0 + B)(1 + m_{00}) - (1+\delta)\kappa + \sum_{i=1}^{3} m_{0i}h_i. \end{aligned} \tag{10}$$

In contrast, if they do not enter initially, they expect to get

$$\begin{aligned} Exit_1 &= m_{00}(h_0 + b - \kappa) + \sum_{i=1}^{3} m_{0i}(h_i - \kappa) \\ &= m_{00}(h_0 + b) + \sum_{i=1}^{3} m_{0i}h_i - \kappa. \end{aligned} \tag{11}$$

Entry thus leads to better payoffs when $Entry_1 > Exit_1$ as shown with

$$\begin{aligned}(h_0 + B)(1 + m_{00}) - (1 + \delta)\kappa + \sum_{i=1}^{3} m_{0i}h_i &> m_{00}(h_0 + b) + \sum_{i=1}^{3} m_{0i}h_i - \kappa \\ h_0 + B - \delta\kappa &> 0 \\ \kappa &< \frac{h_0 + B}{\delta} \end{aligned} \tag{12}$$

which holds since $\kappa < h_0 + B < \frac{h_0+B}{\delta}$, where the first inequality follows from the definition of the case and the second follows from $\delta < 1$. Thus, for all κ in Case 1, there is entry in the first period.

Case 2, $h_0 + B < \kappa < \frac{h_1+c_1}{1-\mu}$: Now the borrower always chooses forbearance in the second period if it is chosen in first period. If forbearance is not chosen initially, the borrower chooses it in the second period, provided there is some level of distress (i.e., $D_2 > 0$). As with Case 1, if the borrower enters, they get $Enter_2 = (h_0 + B)(1 + m_{00}) - (1 + \delta)\kappa + \sum_{i=1}^{3} m_{0i}h_i$. If the borrower exits, they expect to receive

$$\begin{aligned} Exit_2 &= m_{00}(0) + \sum_{i=1}^{3} m_{0i}(h_i - \kappa) \\ &= \sum_{i=1}^{3} m_{0i}h_i - \kappa \sum_{i=1}^{3} m_{0i} \\ &= \sum_{i=1}^{3} m_{0i}h_i - \kappa(1 - m_{00}). \end{aligned} \tag{13}$$

Thus, we have $Entry_2 > Exit_2$ when

$$\begin{aligned}(h_0 + B)(1 + m_{00}) - (1 + \delta)\kappa + \sum_{i=1}^{3} m_{0i}h_i &> \sum_{i=1}^{3} m_{0i}h_i - \kappa(1 - m_{00}) \\ (h_0 + B)(1 + m_{00}) - (\delta + m_{00})\kappa &> 0 \\ \kappa &< \frac{(h_0 + B)(1 + m_{00})}{\delta + m_{00}}. \end{aligned} \tag{14}$$

For κ in the interval characterized by Case 2, participation occurs depending upon the size of the term $\frac{1+m_{00}}{\delta+m_{00}} > 1$. The larger this multiplier term, the more likely forbearance is taken up.

Case 3, $\frac{h_1+c_1}{1-\mu} < \kappa < \frac{h_2+c_2}{1-\mu}$: Behavior and payoffs are the same if entry is initially chosen (i.e., the borrower enters forbearance). Thus, the payoffs if the borrower enters are $Entry_3 = (h_0 + B)(1 + m_{00}) - (1 + \delta)\kappa + \sum_{i=1}^{3} m_{0i}h_i$. However, the borrower only enters forbearance if distress is moderate, specifically if $D_2 > 1$. The borrower's payoffs if forbearance is not chosen initially are

$$\begin{aligned} Exit_3 &= m_{00}(0) + m_{01}(-C_1 - \mu\kappa) + \sum_{i=2}^{3} m_{0i}(h_i - \kappa) \\ &= -m_{01}C_1 - (m_{01}\mu + \sum_{i=2}^{3} m_{0i})\kappa + \sum_{i=1}^{3} m_{0i}h_i - m_{01}h_i \\ &= -m_{01}(h_1 + C_1) - (m_{01}\mu + \sum_{i=2}^{3} m_{0i})\kappa + \sum_{i=1}^{3} m_{0i}h_i \end{aligned} \tag{15}$$

which makes entry an optimal choice if

$$\begin{aligned} &(h_0 + B)(1 + m_{00}) - (1 + \delta)\kappa + \sum_{i=1}^{3} m_{0i}h_i > -m_{01}(h_1 + C_1) - (m_{01}\mu + \sum_{i=2}^{3} m_{0i})\kappa + \sum_{i=1}^{3} m_{0i}h_i \\ &(h_0 + B)(1 + m_{00}) + m_{01}(h_1 + C_1) - (1 + \delta - m_{01}\mu - \sum_{i=2}^{3} m_{0i})\kappa > 0 \\ &\kappa < \frac{(h_0 + B)(1 + m_{00}) + m_{01}(h_1 + C_1)}{1 + \delta - m_{01}\mu - \sum_{i=2}^{3} m_{0i}} = \frac{(h_0 + B)(1 + m_{00}) + m_{01}(h_1 + C_1)}{\delta + m_{00} + (1 - \mu)m_{01}} \end{aligned} \tag{16}$$

and, as in the previous case, this holds depending upon the model parameters.

Case 4, $\frac{h_2+c_2}{1-\mu} < \kappa < \frac{h_3+c_3}{1-\mu}$: Payoffs and behavior after entering forbearance remain the same as before, leading to $Entry_4 = (h_0 + B)(1 + m_{00}) - (1 + \delta)\kappa + \sum_{i=1}^{3} m_{0i}h_i$. However, if forbearance is not chosen initially, the borrower picks forbearance in the second period only if distress is extreme, i.e., if $D_2 = 3$. The payoffs from not initially entering forbearance are given by

$$\begin{aligned} Exit_4 &= m_{00}(0) + \sum_{i=1}^{2} m_{0i}(-C_i - \mu\kappa) + m_{03}(h_3 - \kappa) \\ &= -\sum_{i=1}^{2} m_{0i}(h_i + C_i) - (\sum_{i=1}^{2} m_{0i}\mu + m_{03})\kappa + \sum_{i=1}^{3} m_{0i}h_i \end{aligned} \tag{17}$$

and entry is an optimal choice in the first period if

$$(h_0+B)(1+m_{00})-(1+\delta)\kappa+\sum_{i=1}^{3}m_{0i}h_i>-\sum_{i=1}^{2}m_{0i}(h_i+C_i)-(\sum_{i=1}^{2}m_{0i}\mu+m_{03})\kappa+\sum_{i=1}^{3}m_{0i}h_i$$

$$(h_0+B)(1+m_{00})+\sum_{i=1}^{2}m_{0i}(h_i+C_i)-(1+\delta-\sum_{i=1}^{2}m_{0i}\mu-m_{03})\kappa>0$$

$$\kappa<\frac{(h_0+B)(1+m_{00})+\sum_{i=1}^{2}m_{0i}(h_i+C_i)}{1+\delta-\sum_{i=1}^{2}m_{0i}\mu-m_{03}}=\frac{(h_0+B)(1+m_{00})+\sum_{i=1}^{2}m_{0i}(h_i+C_i)}{\delta+m_{00}+(1-\mu)\sum_{i=1}^{2}m_{0i}}. \tag{18}$$

Case 5, $\frac{h_3+c_3}{1-\mu}<\kappa<\frac{h_0+B}{\delta}$: The payoffs and behavior conditional on choosing forbearance in the first period are the same, so that $Entry_5=(h_0+B)(1+m_{00})-(1+\delta)\kappa+\sum_{i=1}^{3}m_{0i}h_i$. However, if forbearance is not chosen initially, the borrower never takes it up in the second period. This leads to exit payoffs of

$$Exit_5=m_{00}(0)+\sum_{i=1}^{3}m_{0i}(-C_i-\mu\kappa)=-\sum_{i=1}^{3}m_{0i}C_i-\mu(1-m_{00})\kappa \tag{19}$$

which means entry in the first period is optimal if

$$(h_0+B)(1+m_{00})-(1+\delta)\kappa+\sum_{i=1}^{3}m_{0i}h_i>-\sum_{i=1}^{3}m_{0i}C_i-\mu(1-m_{00})\kappa$$

$$(h_0+B)(1+m_{00})+\sum_{i=1}^{3}m_{0i}(h_i+C_i)-(1+\delta-\mu(1-m_{00}))\kappa>0$$

$$\kappa<\frac{(h_0+B)(1+m_{00})+\sum_{i=1}^{3}m_{0i}(h_i+C_i)}{1+\delta-\mu(1-m_{00})}=\frac{(h_0+B)(1+m_{00})+\sum_{i=1}^{3}m_{0i}(h_i+C_i)}{\delta+m_{00}+(1-\mu)\sum_{i=1}^{3}m_{0i}}. \tag{20}$$

Case 6, $\frac{h_0+B}{\delta}<\kappa$: In this final case, κ is sufficiently large to discourage the selection of forbearance in the second period, regardless of the decision made in the first period.

As a result, the entry payoffs are now

$$\begin{aligned} Entry_6 &= m_{00}(h_0 + B - \kappa) + \sum_{i=1}^{3} m_{0i}(h_0 + h_i + B - (1+\delta)\kappa) \\ &= h_0 + B - \kappa + \sum_{i=1}^{3} m_{0i}(h_i - \delta\kappa) \\ &= h_0 + B + \sum_{i=1}^{3} m_{0i}h_i - (1 + \delta \sum_{i=1}^{3} m_{0i})\kappa. \end{aligned} \tag{21}$$

Not choosing forbearance leads to payoffs of $Exit_6 = -\sum_{i=1}^{3} m_{0i}C_i - \mu(1 - m_{00})\kappa$. Thus, in the initial period, entry is optimal if

$$\begin{aligned} & h_0 + B + \sum_{i=1}^{3} m_{0i}h_i - (1 + \delta \sum_{i=1}^{3} m_{0i})\kappa > -\sum_{i=1}^{3} m_{0i}C_i - \mu(1 - m_{00})\kappa \\ & h_0 + B + \sum_{i=1}^{3} m_{0i}(h_i + C_i) - \kappa(1 + \delta \sum_{i=1}^{3} m_{0i} - \mu(1 - m_{00})) > 0 \\ & \kappa < \frac{h_0 + B + \sum_{i=1}^{3} m_{0i}(h_i + C_i)}{1 + \delta \sum_{i=1}^{3} m_{0i} - \mu(1 - m_{00})} \\ & = \frac{h_0 + B + \sum_{i=1}^{3} m_{0i}(h_i + C_i)}{1 + \delta \sum_{i=1}^{3} m_{0i} - \mu(1 - m_{00})} \\ & = \frac{h_0 + B + \sum_{i=1}^{3} m_{0i}(h_i + C_i)}{1 - (\mu - \delta)(1 - m_{00})} \\ & = \frac{h_0 + B + \sum_{i=1}^{3} m_{0i}(h_i + C_i)}{1 - (\mu - \delta)\sum_{i=1}^{3} m_{0i}}. \end{aligned} \tag{22}$$

□

Proof of Proposition 4

Recall that Proposition 3 fully characterizes equilibrium behavior for cases 1 and 6. For any parameter region, borrowers in case 1 always choose forbearance, while borrowers in case 6 never choose forbearance. We now characterize behavior for cases 2 to 5. For each of these cases, we first determine the new inequalities under which borrowers in each case would either all prefer to choose forbearance or not participate.

Case 2 : Recall that this case is characterized by $h_0 + B < \kappa < \frac{h_1}{1-\mu}$, with the cutoff $\widehat{\kappa}_2 = \frac{(1+m_{00})(h_0+B)}{\delta+m_{00}}$. If $\frac{h_1}{1-\mu} < \widehat{\kappa}_2$, then all types in case 2 choose forbearance. In other words, if the largest type in the case is below the cutoff $\widehat{\kappa}_2$, then all other (smaller) types in the case are also below this cutoff. This happens if

$$\begin{aligned}
&\frac{h_1}{1-\mu} < \frac{(1+m_{00})(h_0+B)}{\delta+m_{00}} \\
&\frac{h_1}{1-\mu} - \frac{(1+m_{00})(h_0+B)}{\delta+m_{00}} < 0 \\
&\frac{h_1}{1-\mu}(\delta+m_{00}) - (1+m_{00})(h_0+B) < 0 \\
&\frac{h_1}{1-\mu}(\delta+m_{00}) + \sum_{i=1}^{1} m_{0i}(h_1-h_i) - (1+m_{00})(h_0+B) < 0. \qquad (23)
\end{aligned}$$

Similarly, all types in case 2 will prefer not to choose forbearance if $\widehat{\kappa}_2 < h_0 + B$. Plugging $\widehat{\kappa}_2$ into this inequality, we see that it is false, since $\delta < 1$. In other words, it is impossible for all types in case 2 to find it optimal not to choose forbearance.

Case 3 : Recall that case 3 is defined as $\frac{h_1}{1-\mu} < \kappa < \frac{h_2}{1-\mu}$, with the cutoff $\widehat{\kappa}_3 = \frac{(h_0+B)(1+m_{00})+\sum_{i=1}^{1} m_{0i}h_i}{\delta+m_{00}+(1-\mu)\sum_{i=1}^{1} m_{0i}}$. Repeating the same steps as in case 2, all types in case 3 choose forbearance if $\frac{h_2}{1-\mu} < \widehat{\kappa}_3$. This happens if

$$\begin{aligned}
&\frac{h_2}{1-\mu} < \frac{(h_0+B)(1+m_{00})+\sum_{i=1}^{1} m_{0i}h_i}{\delta+m_{00}+(1-\mu)\sum_{i=1}^{1} m_{0i}} \\
&h_2(\delta+m_{00}+(1-\mu)\sum_{i=1}^{1} m_{0i}) < \left[(h_0+B)(1+m_{00}) + \sum_{i=1}^{1} m_{0i}h_i\right](1-\mu) \\
&\frac{h_2}{1-\mu}(\delta+m_{00}) + h_2\sum_{i=1}^{1} m_{0i} < (h_0+B)(1+m_{00}) + \sum_{i=1}^{1} m_{0i}h_i \\
&\frac{h_2}{1-\mu}(\delta+m_{00}) + \sum_{i=1}^{1} m_{0i}(h_2-h_i) - (h_0+B)(1+m_{00}) < 0. \qquad (24)
\end{aligned}$$

Likewise all types in case 3 do not choose forbearance if $\frac{h_1}{1-\mu} > \widehat{\kappa}_3$. This happens if

$$\begin{aligned}
&\frac{h_1}{1-\mu} > \frac{(h_0+B)(1+m_{00}) + \sum_{i=1}^{1} m_{0i}h_i}{\delta + m_{00} + (1-\mu)\sum_{i=1}^{1} m_{0i}} \\
&\frac{h_1}{1-\mu}(\delta + m_{00} + (1-\mu)\sum_{i=1}^{1} m_{0i}) > (h_0+B)(1+m_{00}) + \sum_{i=1}^{1} m_{0i}h_i \\
&\frac{h_1}{1-\mu}(\delta + m_{00}) + \sum_{i=1}^{1} m_{0i}(h_1 - h_i) - (h_0+B)(1+m_{00}) > 0. \qquad (25)
\end{aligned}$$

Note that, apart from the opposite sign, this is the same inequality as in case 2.

Case 4 : Recall that case 4 is defined as $\frac{h_2}{1-\mu} < \kappa < \frac{h_3}{1-\mu}$, with the cutoff $\widehat{\kappa}_4 = \frac{(h_0+B)(1+m_{00})+\sum_{i=1}^{2} m_{0i}h_i}{\delta+m_{00}+(1-\mu)\sum_{i=1}^{2} m_{0i}}$. Repeating the same steps as in the previous cases, all types in case 4 choose forbearance if $\frac{h_3}{1-\mu} < \widehat{\kappa}_4$. This happens if

$$\begin{aligned}
&\frac{h_3}{1-\mu} < \frac{(h_0+B)(1+m_{00}) + \sum_{i=1}^{2} m_{0i}h_i}{\delta + m_{00} + (1-\mu)\sum_{i=1}^{2} m_{0i}} \\
&\frac{h_3}{1-\mu}(\delta + m_{00}) + \sum_{i=1}^{2} m_{0i}(h_3 - h_i) - (h_0+B)(1+m_{00}) < 0. \qquad (26)
\end{aligned}$$

Similarly, all types in case 4 do not choose forbearance if $\frac{h_2}{1-\mu} > \widehat{\kappa}_4$, which happens if

$$\begin{aligned}
&\frac{h_2}{1-\mu} > \frac{(h_0+B)(1+m_{00}) + \sum_{i=1}^{2} m_{0i}h_i}{\delta + m_{00} + (1-\mu)\sum_{i=1}^{2} m_{0i}} \\
&\frac{h_2}{1-\mu}(\delta + m_{00}) + \sum_{i=1}^{2} m_{0i}(h_2 - h_i) - (h_0+B)(1+m_{00}) > 0. \qquad (27)
\end{aligned}$$

Case 5 : This case is defined as $\frac{h_3}{1-\mu} < \kappa < \frac{h_0+B}{\delta}$, with the cutoff $\widehat{\kappa}_5 = \frac{(h_0+B)(1+m_{00})+\sum_{i=1}^{3} m_{0i}h_i}{\delta+m_{00}+(1-\mu)\sum_{i=1}^{3} m_{0i}}$. Repeating the same steps as in the previous cases, all types in case 5 choose forbearance

if $\frac{h_0+B}{\delta} < \widehat{\kappa}_5$. This happens if

$$\begin{aligned}
&\frac{h_0+B}{\delta} < \frac{(h_0+B)(1+m_{00}) + \sum_{i=1}^{3} m_{0i}h_i}{\delta + m_{00} + (1-\mu)\sum_{i=1}^{3} m_{0i}} \\
&\frac{h_0+B}{\delta}(\delta + m_{00} + (1-\mu)\sum_{i=1}^{3} m_{0i}) < (h_0+B)(1+m_{00}) + \sum_{i=1}^{3} m_{0i}h_i \\
&\frac{h_0+B}{\delta}(\delta + m_{00} + (1-\mu)(1-m_{00}) - \delta(1+m_{00})) < \sum_{i=1}^{3} m_{0i}h_i \\
&\frac{h_0+B}{\delta}(1-\mu+(\mu-\delta)m_{00}) < \sum_{i=1}^{3} m_{0i}h_i \\
&\frac{h_0+B}{\delta}(m_{00} + \sum_{i=1}^{3} m_{0i} - \mu + (\mu-\delta)m_{00}) < \sum_{i=1}^{3} m_{0i}h_i \\
&\sum_{i=1}^{3} m_{0i}(\frac{h_0+B}{\delta} - h_i) + \frac{h_0+B}{\delta}((\mu-\delta+1)m_{00} - \mu) < 0. \qquad (28)
\end{aligned}$$

Since the first term is positive, in order for this inequality to be satisfied, the second term would need to be negative. In other words, if the second term is always positive, then the inequality can never hold, making it impossible for all borrowers in case 5 to choose forbearance. One can verify that the second term is positive if $\mu < \frac{m_{00}(1-\delta)}{1-m_{00}}$, which is precisely the assumption we made earlier. Lastly, all types in case 5 do not choose forbearance if $\frac{h_3}{1-\mu} > \widehat{\kappa}_5$, which happens if

$$\begin{aligned}
&\frac{h_3}{1-\mu} > \frac{(h_0+B)(1+m_{00}) + \sum_{i=1}^{3} m_{0i}h_i}{\delta + m_{00} + (1-\mu)\sum_{i=1}^{3} m_{0i}} \\
&\frac{h_3}{1-\mu}(\delta + m_{00}) + \sum_{i=1}^{3} m_{0i}(h_3 - h_i) - (h_0+B)(1+m_{00}) > 0. \qquad (29)
\end{aligned}$$

Now, putting all of this together, we see that the left-hand side of all these inequalities has a common form. Let $a(i) = \frac{(h_i)(\delta+m_{00})}{1-\mu}$, $\underline{b}(i) = \sum_{k=1}^{i} m_{0i}(h_i - h_k)$, $\overline{b}(i) = \sum_{k=1}^{i} m_{0i}(h_{i+1} - h_k)$, and $c = (1+m_{00})(h_0+B)$. Importantly, note that $a(i) > a(i-1)$ and $\overline{b}(i) > \underline{b}(i) > \overline{b}(i-1) > \underline{b}(i-1)$, which allows us to order the parameter spaces. To see this, note c is common to all inequalities, so we can ignore it when comparing the left-hand side of each inequality. All inequalities have 0 on the right-hand side, though not always with the same sign. We can then order the

left-hand sides of each inequality using these five thresholds to be

$$a(1) + \underline{b}(1) < a(2) + \overline{b}(1) < a(2) + \underline{b}(2) < a(3) + \overline{b}(2) < a(3) + \underline{b}(3). \tag{30}$$

We now can define the parameter regions by deciding where to place 0. For example, Region A is written as

$$0 < a(1) + \underline{b}(1) < a(2) + \overline{b}(1) < a(2) + \underline{b}(2) < a(3) + \overline{b}(2) < a(3) + \underline{b}(3), \tag{31}$$

Region B is defined by

$$a(1) + \underline{b}(1) < 0 < a(2) + \overline{b}(1) < a(2) + \underline{b}(2) < a(3) + \overline{b}(2)a(3) + \underline{b}(3), \tag{32}$$

and so forth. Table 9 provides the definitions of each region in terms of these bounds.

Using these parameter regions, we can characterize behavior for all cases simultaneously. Suppose we are in region A. For borrowers in case 2, it is not the case that all borrowers in this region prefer to choose forbearance. Since we have shown that it is impossible for all borrowers to prefer not choosing forbearance, it follows that some borrowers—specifically, those with lower κ types below the cutoff $\widehat{\kappa}_2$—will choose forbearance, while the other higher κ types will not. For borrowers in case 3, we observe that all types find it optimal to not choose forbearance. The monotonicity of the region boundaries implies that borrowers in cases 4 and 5 also prefer not to choose forbearance.

Suppose we are in Region B. We immediately find that all borrowers in case 2 choose forbearance. For case 3 borrowers, both inequalities (i.e., all choosing forbearance and all not choosing forbearance) are not satisfied, implying that some types choose forbearance while others do not. In particular, borrowers with lower κ values, below the cutoff $\widehat{\kappa}_3$, choose forbearance, while those above do not. For borrowers in cases 4 and 5, we again see that all types prefer not to choose forbearance. Repeating this process, we can complete Table 10 for all remaining parameter regions.

Proof of Corollary 2

Proof. **Second period behavior** Suppose forbearance is chosen initially. If $D_2 = 0$ (which occurs with probability m_{00}), the borrower chooses forbearance if $\kappa \leq \frac{h_0+B}{\delta}$. Increasing h_0

raises the cutoff, inducing more types to take-up forbearance. However, increasing h_i for $i > 0$ has no effect on behavior. If $D_2 > 0$, forbearance is mandatory and increasing h_i for any i does not influence the outcome. Instead, suppose that forbearance was not initially chosen. Increasing h_i raises the cutoff if $D_2 = i$, making forbearance more likely in that case. Increasing h_j (where $j \neq i$) has no effect on second period behavior if $D_2 = i$.

First period behavior Returning to the first period, payoffs from entering are written as

$$Enter : h_0 + B - \kappa + m_{00}(\max\{h_0 + B - \delta\kappa, 0\}) + \sum_{i=1}^{3} m_{0i}(h_i - \delta\kappa). \tag{33}$$

Similarly, not choosing forbearance initially results in payoffs of

$$Exit : m_{00} \max\{h_0 + B - \kappa, 0\} + \sum_{i=1}^{3} m_{0i} \max\{h_i - \kappa, -\mu\kappa\}. \tag{34}$$

We can see that increasing h_0 raises the payoffs from entering compared to exiting, making forbearance more likely to be chosen, all else equal.

In contrast, suppose we increase h_i for $i > 0$. Increasing h_i by ϵ means that entering yields higher payoffs of $m_{0i}\epsilon$. Changes in exit require evaluating a couple of scenarios:

1. If $h_i - \kappa > -\mu\kappa$, exit payoffs increase by $m_{0i}\epsilon$, making forbearance equally attractive before and after the change in h_i.

2. If $h_i - \kappa < -\mu\kappa$, we consider two options:

   (a) If $h_i - \kappa < -\mu\kappa$ and $h_i + \epsilon - \kappa < -\mu\kappa$, exit payoffs remain unchanged when h_i increases, making forbearance more likely to be chosen initially. (i..e, $\Delta Entry = m_{0i}\epsilon > 0$ and $\Delta Exit = 0$.)

   (b) If $h_i - \kappa < -\mu\kappa$ and $h_i + \epsilon - \kappa > -\mu\kappa$, exit payoffs increase by $m_{0i}(h_i + \epsilon - \kappa + \mu\kappa) = m_{0i}(\epsilon + h_i - (1 - \mu)\kappa) < m_{0i}\epsilon$, leaving higher exit payoffs but still making entry (weakly) more likely, all else equal.

□