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Working Paper 24-02

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Abstract

Homeownership is often expressed as a simple static number. Most reports or studies are unable to track a homeowner over time and they cannot follow a person after a home is sold to see what happens next. We craft new and dynamic statistics based on first-time homebuyers (FTHBs) using a nationally representative panel. FTHBs tend to remain homeowners through time. Additionally, we follow them through the mortgage market to describe their experiences with subsequent mortgages, including other purchase mortgages and refinances. We provide statistics about three measures of homeownership “sustainability”: current homeownership, time until first exit from homeownership, and cumulative time since first purchase that individuals have remained owners. Across all three measures, we see that most homebuyers remain homeowners and the persistence has increased over time across all homeowner demographics, regions of the country, and mortgage lending submarkets.

Keywords: NMDB · homeownership · mortgage · first-time homebuyer

JEL Classification: R21 · G21 · C80 · D10

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¹The paper was completed while Robert Avery was Project Director at the Federal Housing Finance Agency (FHFA).

1. Introduction

What happens to first-time homebuyers (FTHBs) over the long run after they purchase a home? This study investigates the journey of first-time homebuyers, focusing on their tenure as mortgaged homeowners, including their refinancing activities and transitions to new properties. Utilizing a unique, new, comprehensive FTHB panel, this research provides a novel perspective on homeownership sustainability. Crafted from the National Mortgage Database (NMDB), this panel tracks a nationally representative sample of FTHBs from the time they initially acquire a mortgage, starting with originations in 2003, and offers deep insights into the patterns and persistence of homeownership. The richness of information in the NMDB, combined with the ability to track individual borrowers long term, is a substantial contribution to existing data on mortgages and homeownership. Specifically, most previous literature is based on longitudinal household surveys or credit bureau data; the former are usually small samples, suffer from survey attrition, and include only incomplete information about finances; the latter often do not include much information on borrower demographics; our NMDB dataset comprises a large sample size and includes both credit bureau data as well as extensive demographic information.

This analysis centers on the concept of “sustainability” in homeownership, meaning its persistence over time. Although homeowners may voluntarily transition back to renting, a number of subsidies are in place to expand access to homeownership and assist homeowners with remaining in place. Notably, over this period most FTHBs have sustained homeownership well beyond their initial purchase, actively managing mortgages for significant periods, with many still holding active mortgages as of March 2023. The persistence of homeownership has increased, especially in cohorts following the Great Recession.

This paper compares different ways to measure sustainability and proceeds as follows: the next section provides background on existing studies on tenure duration and exit from homeownership. Section 3 describes the unique information on borrowers and mortgages in the NMDB and the methodology for linking borrowers across mortgages. Summary tables present the distribution of FTHB cohorts entering over the past two decades. Section 4 illustrates the various metrics to gauge homeownership sustainability. Section 5 compares different multivariate regression techniques for each metric. Section 6 concludes with a discussion of these findings and their implications.

2. Background

There is an extensive literature on the costs and benefits of homeownership, including financial, social, and physical effects for both individuals and their neighborhoods (Dietz and Haurin 2003; Herbert and Belsky 2008). Although the housing crisis glaringly exposed some of the risks of ownership, studies since the Great Recession reconfirm many of the benefits (Goodman and Mayer 2018; Riley, Ru, and Feng 2013). However, the benefits of homeownership are often mediated through the stability of tenure (Aaronson 2000; Lindblad and Quercia 2015; Aarland and Reid 2019; Acolin 2022). For example, household wealth increases with years of ownership (Di, Belsky, and Liu 2007; Turner and Luea 2009; Herbert, McCue, and Sanchez-Moyano 2013; Killewald and Bryan 2016; Wainer and Zabel 2020). Tenure duration is a function of both entry to and exit from homeownership. Exits may arise through foreclosure, but many are voluntary. Lee and Tracy (2023) analyze FHA-insured mortgages and find that, although the share that default has declined since the Great Recession, the share of first-time homebuyers that return to renting has remained around 20 percent for each cohort between 2007 and 2016.

Previous research documents demographic differences in homeownership even among households with similar financial characteristics (Linneman and Wachter 1989; Calem, Firestone, and Wachter 2010; Barakova, Calem, and Wachter 2014; Park 2023). These differences are also found in rates of entry into homeownership (Boehm and Schlottmann 2004; Anderson, Han, and Hisnanick 2021; Dey and Brown 2022).

The existing literature is mixed on how exit rates and tenure duration vary by demographics. Some studies find certain homeowners are more likely to exit, compounding the effect of lower entry rates (Haurin and Rosenthal 2004, 2005). Kermani and Wong (2024) find demographic differences in financial returns to homeownership are driven by higher rates of distressed sales among certain groups and “equalizing rates of first-time home purchase over the life cycle has virtually no impact because the gap in returns nullifies the benefit of purchasing a home at an earlier age” (p. 3). But, other research finds demographics are not significant predictors of homeownership exit, either controlling or not controlling for other risk factors (Boehm and Schlottmann 2004; Ren 2020; Anderson, Han, and Hisnanick 2021; Gerardi, Willen, and Zhang 2023). Some of the discrepancy may be explained by differences in study period: Turner and Smith (2009) and Sharp and Hall (2014) find gaps in homeownership exits increased over time going into the Great Recession.

More recently, studies have shown certain homeowners are less likely to refinance when optimal, leading to higher cumulative housing costs over their homeownership tenure (Keys, Pope, and Pope 2016; Lambie-Hanson and Reid 2018; Gerardi, Willen, and Zhang 2023). Lowering housing costs through refinancing can reduce the likelihood of default and improve chances of remaining a homeowner (Zhu et al. 2015; Tracy and Wright 2016; Abel and Fuster 2021; Aarland and Reid 2023). Consequently, homeownership sustainability is not equivalent to a borrower remaining in the original mortgage used to purchase their first house. At the same time, prepayment can lead to understating the risk of homeownership ((Aragon et al. 2010; Caplin, Cororaton, and Tracy 2015)). A borrower who refinances and then defaults results in a 50 percent default rate but one-for-one failure to sustain homeownership.

Most of these studies on homeownership duration use household surveys to follow individuals over time, but suffer from small sample sizes, survey attrition, and incomplete information on financial characteristics. The next section describes the NMDB and methodology used to link borrowers across mortgages, yielding a more comprehensive picture of the demographics and financial characteristics associated with homeownership sustainability.

3. Description of the NMDB and the Borrower Panel

Data for this study are drawn from the NMDB, a data set managed by the Federal Housing Finance Agency (FHFA). The core data in the NMDB represent a statistically valid 1-in-20 random sample of all closed-end, first-lien mortgages reported in the files of Experian, one of the three national credit bureaus. When the NMDB program began, an initial sample was drawn from all mortgage files outstanding at any point from January 1998 through June 2012. Since then, the sample has been updated quarterly with mortgages newly reported to Experian.²

The NMDB serves as a rich resource, amalgamating demographic, administrative, and credit bureau data, and thus providing a multifaceted view into housing and mortgage markets. For example, Park and Miller (2023) use the NMDB to examine the effect of student debt on mortgage performance. Li, Low, and Ricks (2022) describe mortgage delinquency and forbearance during the COVID-19 pandemic. Karamon, Liu, and McManus (2022) leverage the contemporaneous credit score information in the NMDB to examine whether FTHBs subsequently experience financial stress. Linking borrowers in the NMDB across mortgages further enables analysis of other long-term outcomes. Park (2025) compares determinants of mortgage delinquency with those of homeownership exit (see Section 4.2). Liu (2024)

²For a detailed description of the NMDB, see Avery et al. (2022).

measures the longevity of homeownership (see Section 4.3).

The NMDB was originally constructed as a loan-based database. Most research to date using the NMDB data has utilized this version of the database.³ From its inception, however, it was envisioned that the NMDB would have both loan-based and borrower panel versions. In principle, because each borrower must be associated with at least one mortgage and the NMDB is a representative sample of mortgages, deriving a borrower panel data set from the loan-based frame should be feasible. However, the process is complicated by borrowers having multiple mortgages and many loans having multiple associated borrowers. For example, the universe of all borrowers associated with any NMDB loan would generate a data set in which borrowers had a range of probabilities of inclusion (the probability of inclusion would be 1-in-20 for a borrower with only one loan, but about 1-in-4.5 for a borrower with five mortgages). Further, these probabilities would be dynamic and change over time as borrowers take out new mortgages.

For a multitude of reasons, the current study sought to have a representative “self-weighted” sample of borrowers in which each sample member had the same probability of inclusion and where that probability was static and did not change over time. This was accomplished in two phases. The initial phase used the collective group of borrowers associated with the initial NMDB sample (loans outstanding at any point from 1998 to June 2012). For each of these borrowers, information was available on each of their loans that met the NMDB sampling criteria, whether included in the NMDB sample or not. The sample selection rule was that if their most recently opened mortgage as of June 2012 had been selected to be an NMDB sample loan then the borrower was selected for the panel; otherwise, the borrower was not selected. Because each borrower can have only one “most recently opened mortgage”, regardless of how many other mortgages they have, and the likelihood of this loan being selected for the NMDB is 1-in-20, then the resulting sample satisfies the criteria of being a representative sample of borrowers with at least one active mortgage from 1998 to June 2012.

The second phase focused on borrowers and loans added to the NMDB after 2012. Each quarter, eligibility was restricted to those borrowers with no mortgages reported to the credit bureau before that quarter (and who thus were not eligible for earlier inclusion in the panel).⁴

³An earlier version of this borrower panel data limited to originations starting in 2012 was used by Liu (2024) to examine homeownership longevity.

⁴Credit bureau records are purged between 7 and 10 years after a loan is closed, so it is possible some that some individuals may seem like they have no previous mortgage because their records have been purged.

Further, the borrower’s first mortgage (the one with the earliest opening date) had to be selected for the NMDB. If so, the borrower was selected for the panel. Again, this meets the criteria of being self-weighted with a 1-in-20 selection probability.

Both the loan-based NMDB version and the borrower panel version of the NMDB (the panel) are representative 1-in-20 samples. They differ, however, in the characteristics of their second and higher moments. Each NMDB loan is selected independently, but that is not the case for the panel. For example, if a recent first-time homebuying couple takes out a mortgage loan, they will either both be selected for the panel or neither will be. For many kinds of analysis, this will reduce the “power” of the data set. However, it is not likely to be a significant issue given the number of observations.

This study is the first to utilize the borrower panel version of the NMDB – referred to in this paper as the “NMDB borrower panel” – starting from 2003. For every borrower in the panel, the data set contains detailed information on every mortgage loan active at any point from 2003 to the present and reported to the credit bureau. This includes not only NMDB sample loans but all other mortgages.⁵ The loan data include origination and performance information for each mortgage drawn from credit bureau files. A virtue of the NMDB panel is that tracking a person is based on these credit bureau data, rather a panel based on survey information, which relies upon respondents continuing to voluntarily provide information.

Although extensive, these files do not contain information on some key mortgage features, such as the loan’s purpose (home purchase or refinance), borrower income, or property location. For about 70 percent of the NMDB first-lien mortgages it was possible to obtain this information through high-quality matches to administrative file records maintained by Fannie Mae, Freddie Mac, the Federal Housing Administration, the U.S. Department of Veterans Affairs, the Rural Housing Service, and the Federal Home Loan Banks.⁶ Additional fuzzy logic matching to other public and proprietary data sources – including deed record filings, Home Mortgage Disclosure Act (HMDA) filings, and commercially available servicing

To correct for this possibility, a five-year-old archive is drawn periodically for the NMDB to identify purged mortgages.

⁵Thus for a borrower in the panel, we see all of his or her mortgages. We do not necessarily see all loans from a co-borrower: for instance, if person A is in the panel after her solo first mortgage then takes out another mortgage with person B (who is not in the panel), we see all loans for person A but not for B.

⁶Data merging was conducted behind a protected firewall at the credit bureau, using detailed information about the borrowers including name, social security number and address, to facilitate high quality matching (the matching variables are used only for this purpose and are not contained in the dataset delivered to FHFA, which is anonymized). Match rates are very high, approaching 100 percent, see Avery et al. (2022) for details.

databases – provided information on many of the remaining 30 percent of the NMDB loans. Variable values for the small percentage of loans that could not be matched to any of those sources (including most second-liens) were imputed using a variety of methods (see Avery et al. (2022) for details) .

The NMDB borrower panel also contains extensive demographic information (age, sex, income, residency, *etc.*), and credit information (quarterly scores and summary metrics of non-mortgage credit) for each sample member. Most of these data were drawn from credit bureau files, with data on income and demographics obtained from matches to administrative and HMDA data.

The current study utilizes a subset of the NMDB borrower panel. The data set is first restricted to borrowers who obtained their first mortgage anytime between 2003 and 2022.⁷ This first mortgage must be a closed-end, first-lien purchase loan for an owner-occupied property in the United States.⁸ Every borrower on the original mortgage must be a first-time homebuyer (FTHB), defined as an individual who has no previous mortgage tradeline in their credit histories in the past seven years.⁹ Observations with more than two borrowers on the original mortgage are excluded.¹⁰ The result is a panel of more than 2 million FTHBs over the past 20 years.¹¹ Buyers are grouped by cohort, defined by the year of origination of their first purchase mortgage. The analysis is conducted at the level of individual, because changes in household composition add considerable complexity to household-level analyses. Although two borrowers may purchase their first home together, they could subsequently proceed through different sequences of mortgages and homeownership. In this sense, this analysis focuses on the experience of individual first-time homeowners rather than the population of mortgages.¹²

⁷One could theoretically go back as far as 1998 but the very early data are sparser and require more imputation than the rest of the sample. The restriction is made in order to ensure our results are robust. Specifically, for this paper, we must be sure that we are capturing FTHBs, which means we need to check for previous loans. 2003 is the earliest year we could be sure we catch the vast majority of earlier loans.

⁸The analysis excludes US territories.

⁹This is a more restrictive definition than the one commonly used in public policy, which typically defines first-time homebuyers as having not owned a home in the previous three years.

¹⁰FTHBs with more than two borrowers constitute less than 1 percent of the sample.

¹¹Appendix A compares the weighted sum of original loan amounts from the NMDB borrower panel to the dollar volume of securities issuance backed by FTHB mortgages and finds the two series to be similar in size.

¹²Consequently, many mortgages will be associated with more than one observation in this data set. For example, about half of FTHBs start as couples and because of the design of the NMDB panel sampling process both parties are likely to end up as part of the panel. For the analysis both individuals are treated as separate observations.

Table 1 shows that the number of FTHBs declined between 2003 and 2011 before rising again. The median age of FTHBs at the time of purchase has remained relatively constant, at about 30 years. The male share of FTHBs has increased from 53 percent in 2003 to 59 percent in the first quarter of 2023. In keeping with overall demographic changes, the non-Hispanic White share of FTHBs has fallen from 74 percent most recently in 2009 to a low of 60 percent in 2021 and 2022, while the shares for other groups have increased, especially since the Great Recession. The Black share peaked at 10 percent in 2006 before declining but has nearly recovered. The Asian share doubled from 5 percent in 2006 to 10 percent in 2022. The Hispanic share increased from 11 percent in 2013 to 18 percent in 2020-2022.¹³

Where FTHBs enter the market has shifted over the last decade. Table 2 shows the share of FTHBs by Census region.¹⁴ The South accounts for the largest and growing share of FTHBs, rising from 35 percent to 40 percent since 2010. Meanwhile, purchasing in the West fell from 26 percent to 20 percent. How FTHBs finance their mortgage has also changed. Less than half of FTHBs in 2005 used a mortgage insured by the federal government or a conventional (that is, not government-insured) loan acquired by one of the government-sponsored enterprises (GSEs).¹⁵ Two years later, more than half were purchased by one of the GSEs. Then between 2008 and 2012, more than half of FTHBs used a loan insured by the federal government to purchase their first home. The share of FTHBs using a conventional mortgage (both GSE-acquired and other) has increased over the last decade, but the government-insured share remains above its level before the Great Recession.

However, FTHBs often have more than just their original mortgage over the course of their homeownership tenure. Figure 1A shows that about four out of five FTHBs in 2003 and 2004 subsequently took out another owner-occupied, first-lien mortgage of some kind after their original mortgage in the past 20 years. The homeownership experiences of these borrowers would be censored at the time of prepayment in most analyses of mortgage performance, but

¹³Approximately 18 percent of the sample has some demographic characteristic imputed by the FHFA, which is why the Other category is relatively small. The imputed share is highest among the most recent cohorts.

¹⁴The four US Census regions are: 1) Northeast (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont); 2) Midwest (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin); 3) South (Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia); and 4) West (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming).

¹⁵Government-insured mortgages include those guaranteed by a federal agency such as the Federal Housing Administration, US Department of Veterans Affairs, or Rural Housing Service. Government-sponsored enterprises include Fannie Mae, Freddie Mac, and the Federal Home Loan Banks.

can be appended to the original mortgage in our borrower panel. On the other hand, more than half of FTHBs since 2004 only have one purchase mortgage origination in their credit history (Figure 1B), indicating they only ever bought one house. In addition, most FTHBs who entered the market since 2012 have never refinanced (Figure 1C), despite record-low mortgage interest rates during the COVID-19 pandemic.¹⁶

The average cumulative number of mortgages obtained over time by each cohort varies by borrower demographics, location, and original mortgage submarket. Figure 2A shows that Asian FTHBs tend to take out the highest number of mortgages, on average, followed by White borrowers, while Black and Hispanic borrowers have the fewest. FTHBs whose initial home purchase was in the West tend to subsequently have more mortgages than homebuyers starting in other regions (Figure 2B). FTHBs who originally use GSE-acquired conventional mortgages tend to subsequently have more mortgages than FTHBs who use other conventional mortgage channels, such as private-label mortgage-backed securities and bank portfolio lending (Figure 2C). However, sustainability is not measured by the number of mortgages but by how long a borrower is a homeowner.

¹⁶Many borrowers exercise their prepayment option in a suboptimal manner. See, for example, Keys, Pope, and Pope (2016) and Johnson, Meier, and Toubia (2018).

Table 1: NMDB FTHB Borrower Panel Demographics by Cohort

Year of First Purchase	Sample Borrowers	Original Mortgages	Median Age	Demographics (%)						
				Male	Female	White	Black	Asian	Hispanic	Other
2003	154,287	122,167	31	53	47	74	7	5	12	1
2004	142,053	113,890	31	54	46	71	8	6	14	1
2005	134,071	107,376	30	54	46	70	9	6	14	1
2006	120,208	95,305	30	55	45	68	10	5	15	1
2007	101,434	78,858	30	55	45	72	9	6	12	1
2008	83,173	62,377	29	55	45	73	8	6	11	1
2009	86,680	65,698	29	55	45	74	7	7	12	1
2010	66,279	51,062	29	56	44	71	7	7	13	2
2011	59,104	45,188	29	56	44	72	7	7	13	2
2012	66,697	51,027	30	57	43	73	6	7	12	2
2013	72,417	55,276	30	58	42	73	6	8	11	2
2014	71,586	54,511	30	58	42	72	6	8	12	2
2015	82,769	62,580	30	58	42	71	6	7	13	2
2016	92,909	70,714	30	58	42	69	7	8	14	2
2017	98,092	74,309	30	58	42	68	8	8	14	2
2018	105,152	79,302	31	57	43	66	8	8	16	2
2019	111,935	84,269	31	58	42	64	9	7	17	2
2020	121,356	92,493	31	57	43	64	9	7	18	3
2021	132,944	101,314	32	57	43	60	9	9	18	3
2022	107,165	80,425	32	58	42	60	9	10	18	3

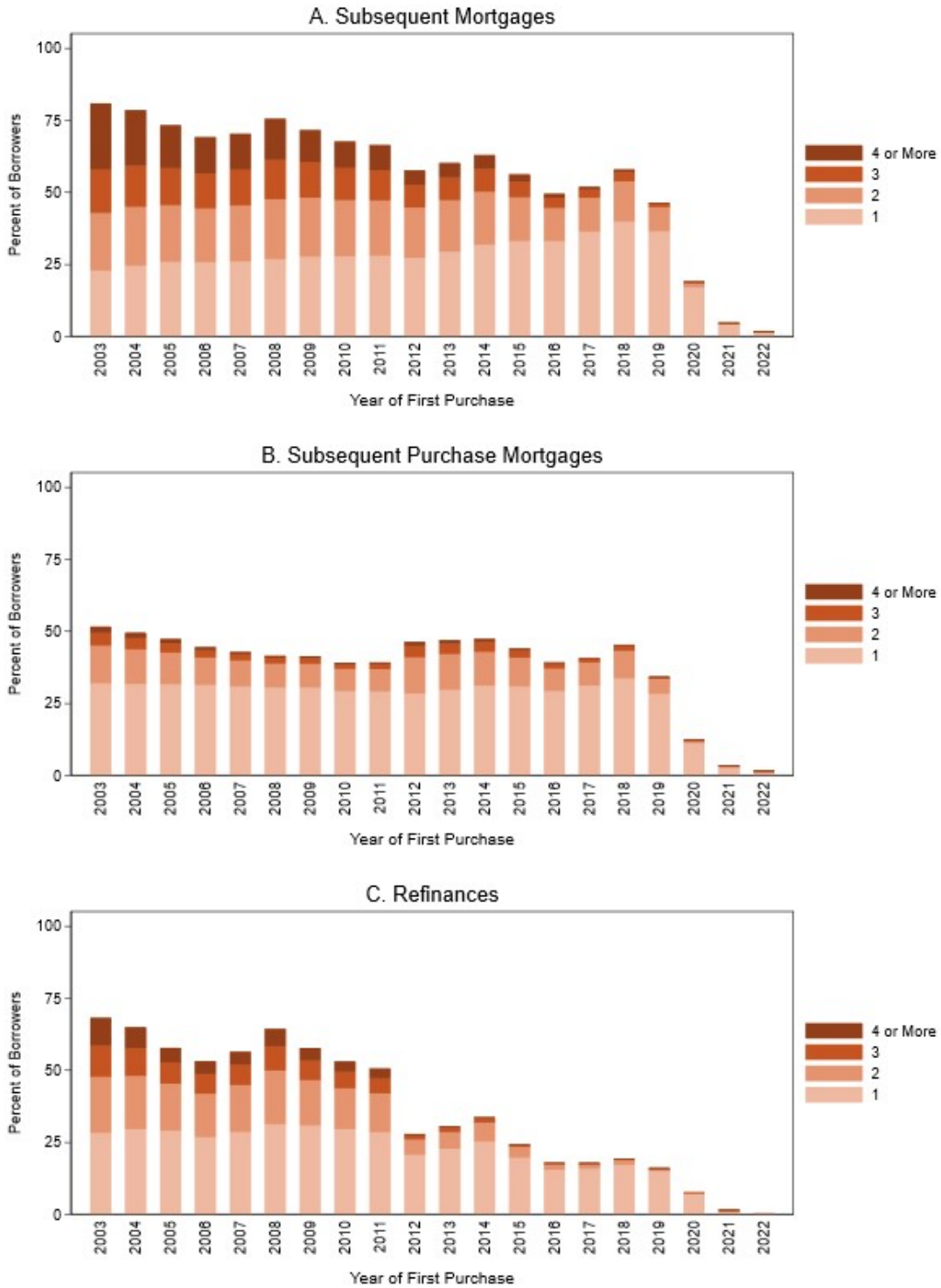
Note: Percents indicate shares of borrowers within a cohort defined by year of first purchase.

Table 2: NMDB FTHB Borrower Panel Region and Mortgage Submarket by Cohort

Year of First Purchase	Region (%)				Mortgage Submarket (%)		
	Northeast	Midwest	South	West	Government Insured	GSE-Acquired Conventional	Other Conventional
2003	16	24	36	24	24	42	34
2004	16	23	37	24	19	35	45
2005	16	23	38	23	15	34	51
2006	16	23	40	21	16	38	46
2007	17	23	40	20	19	53	28
2008	16	23	38	23	50	33	17
2009	17	22	35	26	65	25	10
2010	17	21	35	26	65	24	11
2011	16	22	36	26	62	26	12
2012	17	23	36	25	57	32	11
2013	17	23	36	23	48	39	12
2014	16	23	38	23	46	41	13
2015	16	23	38	23	49	39	13
2016	16	23	38	23	48	40	13
2017	16	22	38	23	45	42	14
2018	16	22	39	23	41	43	16
2019	15	22	40	23	41	42	16
2020	15	21	41	23	40	46	13
2021	17	21	40	22	36	49	15
2022	18	22	40	20	35	45	20

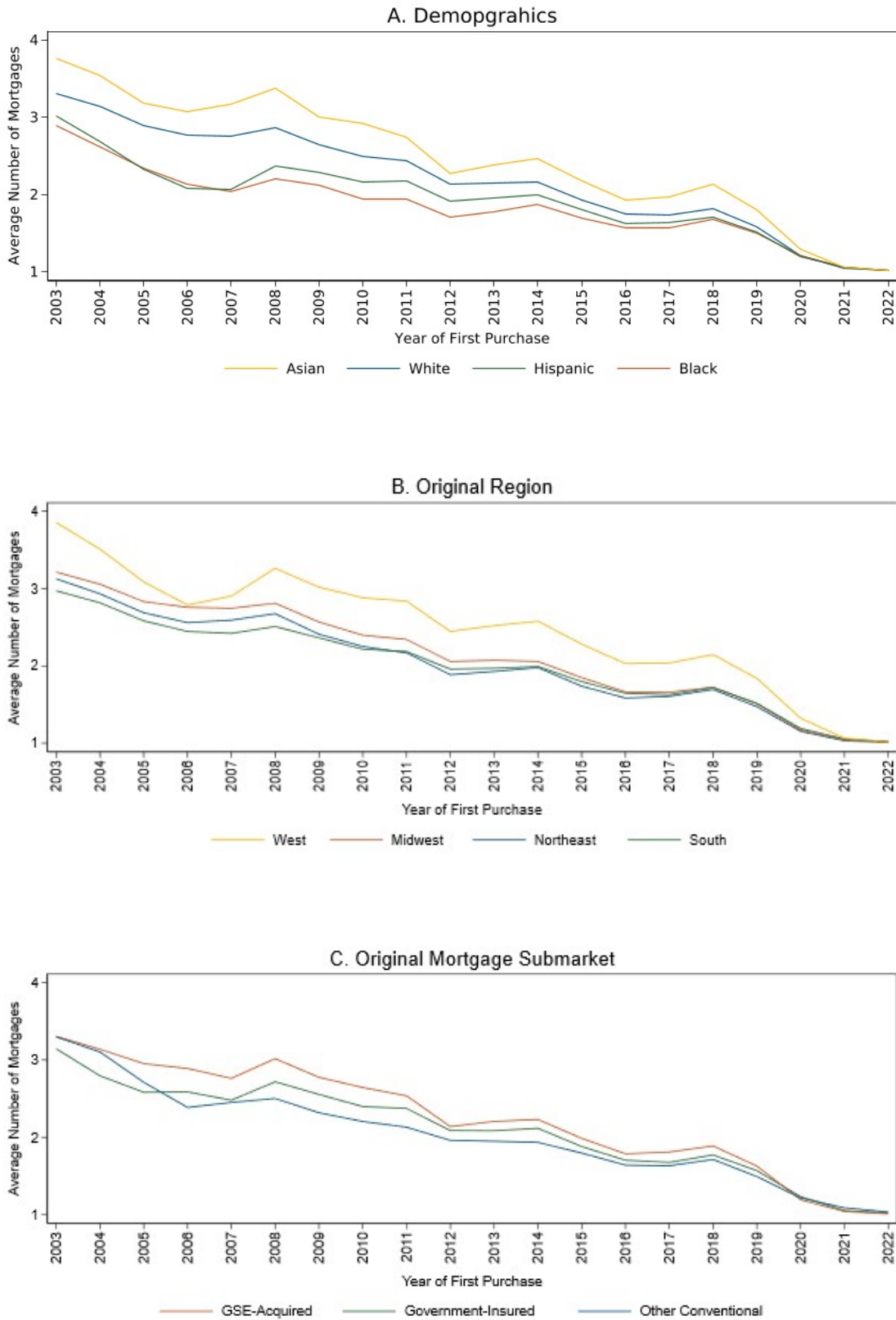
Note: Percents indicate shares of borrowers within a cohort defined by year of first purchase. Regions and submarkets refer to an individual's first mortgage.

Figure 1: Distribution of Number of Subsequent Mortgages by Cohort¹⁷



¹⁷The remainder in Panel A are borrowers still on their original mortgage.

Figure 2: Average Number of Mortgages per Borrowers by Cohort



4. Measuring Sustainable Homeownership

Homeownership sustainability can be measured along several dimensions. This section presents three potential measures of homeownership sustainability that utilize the unique information available in the NMDB borrower panel. The first considers how many FTHBs are currently homeowners. The second investigates how long FTHBs were homeowners without any substantive gaps in tenure. The third measures the cumulative share of time since first-time home purchase that FTHBs have been homeowners, inclusive of multiple spells of homeownership with gaps in between. More recent cohorts have had less seasoning, meaning time in which to have exited homeownership, and consequently often score higher in terms of sustainability. Therefore, comparisons within a cohort are most valid.

An important limitation of the data as currently constructed is that homeownership is defined as having an active owner-occupied, first-lien mortgage. Borrowers who prepay their mortgage to own their home without debt or who only have a home equity line of credit are not observable. However, Appendix B compares the age distributions at the time of first purchase and homeownership exit (see Section 4.2) in the NMDB borrower panel with the share of homeowners who own free and clear by age as reported in the American Community Survey and finds that mortgage payoff likely explains only a small share of observed exits.

4.1 Current Mortgage Status

Similar to Lee and Tracy (2023), the first measure of homeownership sustainability asks, “Where are they now?” This study identifies five mutually exclusive states with respect to mortgaged homeownership:

1. **Original mortgage:** The original mortgage is still active (even if other mortgages have opened since origination)
2. **Likely Refinanced¹⁸:** The original mortgage has closed but an owner-occupied refinance mortgage in the same Census tract is active.
3. **Any other mortgage:** Any other owner-occupied mortgage – that is not in the prior two categories – is active
4. **No mortgage (never delinquent):** There is no active owner-occupied mortgage and no record of prior serious delinquency (that is, 90 or more days late).

¹⁸By this definition, someone will be considered “refinanced” if he or she buys a different house in the same Census tract. We will not characterize this as a move since we assume any new loan within the same tract is a refinance. Fortunately, that scenario should not be common.

5. **No mortgage (any delinquency):** There is no active owner-occupied mortgage, but there is a record of prior serious delinquency.¹⁹

Due to the mortgage market tumult during the COVID-19 pandemic, this study describes the mortgage status as of December 2019 as well as March 2023, the most recent period for which data were available at the time of this analysis.

Most FTHBs over the last two decades are still homeowners. Figure 3 shows that about 60 percent of FTHBs who entered the market between 2003 and 2006 still have a mortgage. On average, nearly 40 percent of FTHBs who entered between 2003 and 2019 were still on their original mortgage before the pandemic (Figure 3A), but that share fell to 19 percent by March 2023 among the same set of borrowers (Figure 3B). The share of borrowers who had refinanced their original mortgage increased slightly, while the share with any other mortgage increased from 25 percent to more than 37 percent. The share of FTHBs with no mortgage (never delinquent) increased from 17 percent to 23 percent while the share with no mortgage (any delinquency) remained at 7%.

Demographic differences in current homeownership status are particularly notable for cohorts that entered before the Great Recession. Figure 4A shows that Black and Hispanic FTHBs who entered between 2003 and 2007 have the lowest shares with any active mortgage (the sum of first three status categories) as of March 2023. Across all years, buyers purchasing their first home in the Northeast tend to be more likely to still have an active mortgage, while buyers in the South tend to be less likely (Figure 4B). FTHBs using government-insured or GSE-acquired conventional mortgages are more likely to still have an active mortgage than homebuyers who entered the market through other conventional mortgage market channels (Figure 4C).²⁰

¹⁹Note that under the Coronavirus Aid, Relief, and Economic Security (CARES) Act of 2020, borrowers in forbearance or other pandemic-related relief were typically reported to credit bureaus as being current on their mortgage.

²⁰Borrowers may change geographic regions and mortgage submarkets over the course of their homeownership tenure. It is important to be aware that regions and submarkets exhibit different patterns, but why they do so is beyond the scope of this paper.

Figure 3: Mortgage Status Pre-Pandemic and Most Recent by Cohort

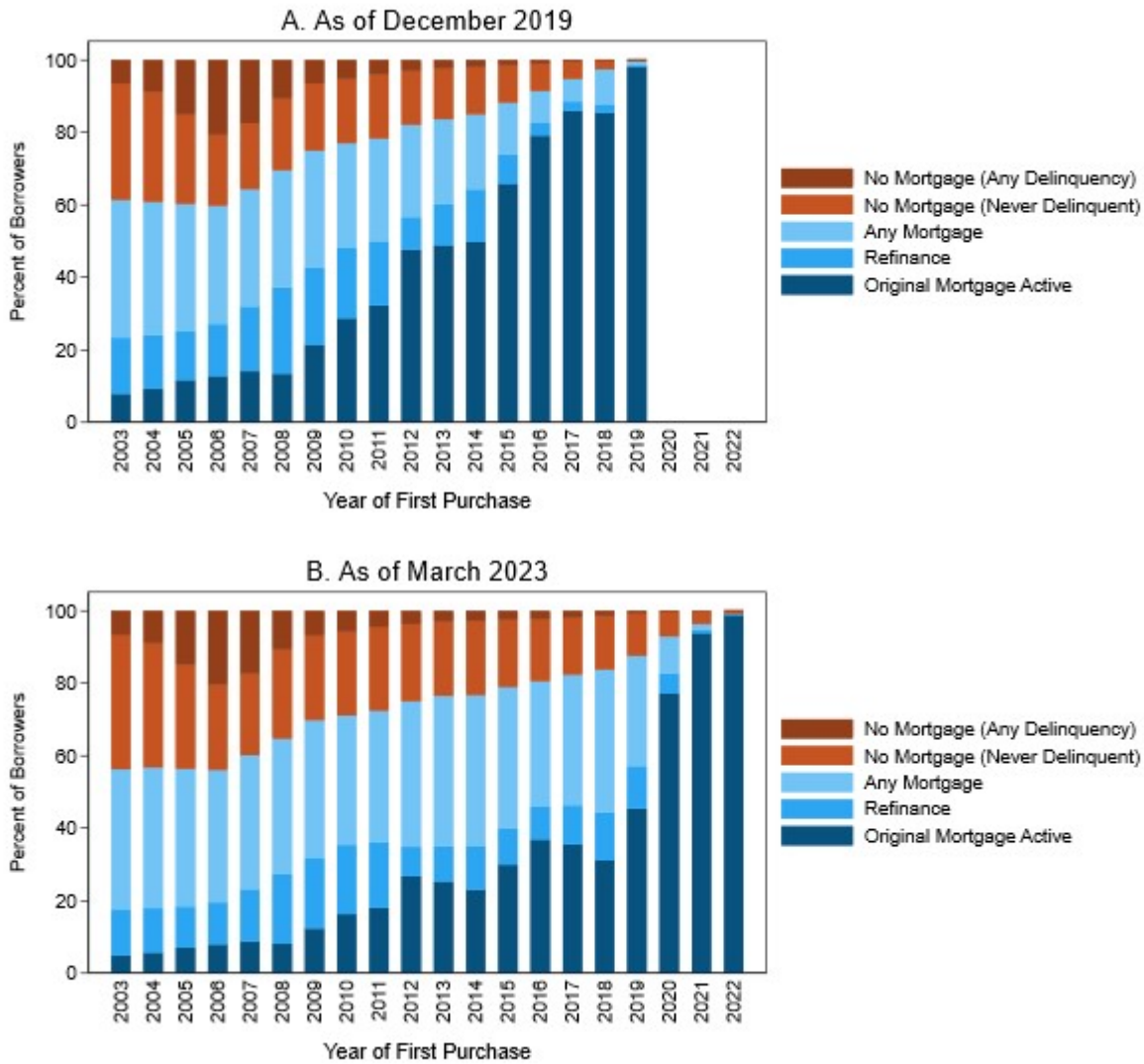
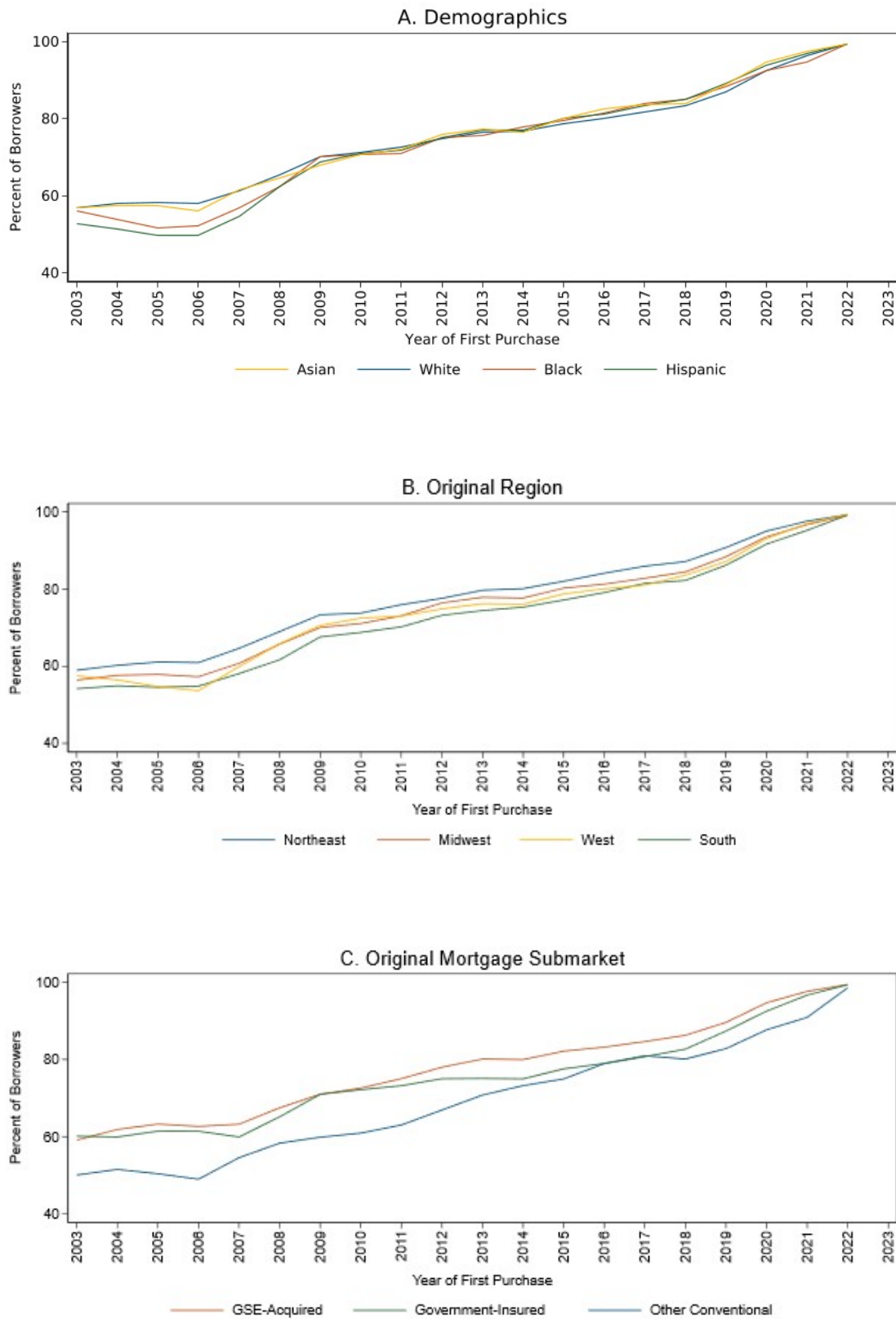


Figure 4: Share with Any Active Owner-Occupied Mortgage in March 2023 by Cohort



4.2 Homeownership Exit

The second approach to homeownership sustainability follows previous research (Boehm and Schlottmann 2004; Reid 2004; Haurin and Rosenthal 2005; Sharp and Hall 2014; Ren 2020) and measures how long a buyer is able to remain a homeowner before exiting. Homeowners often have short gaps between mortgages while refinancing or selling one house before buying another. But longer gaps suggest that an individual is no longer a homeowner. This study defines an exit from homeownership as the start of a consecutive period of 24 months without an active owner-occupied mortgage.²¹ The share of borrowers who remain mortgaged homeowners as a function of time since first purchase forms a survival curve, which can be compared across cohorts (Figure 5A).²²

Overall, nearly 30 percent of FTHBs in the borrower panel exited mortgaged homeownership at some point, meaning they had a gap of at least 24 months without an active owner-occupied mortgage even if they subsequently returned to homeownership. In general, about 3.8 percent of homebuyers leave mortgaged homeownership each year, 15 percent exit within 5 years, and about one-third within 10 years. The exit rate was highest for the 2006 cohort but has improved since then.

The survival rates are slightly higher for Asian and White FTHBs compared to Black and Hispanic FTHBs (Figure 5B). For example, more than 17 percent of Hispanic FTHBs exit homeownership after 5 years on average, compared to 14 percent of Asian FTHBs. Survival rates are highest for FTHBs in the Northeast and lowest in the West (Figure 5C). There is also a substantial difference by market type: 12 percent of FTHBs using GSE-acquired mortgages and 14 percent using government-insured mortgages left mortgaged homeownership within 5 years, compared to 22 percent of buyers using other conventional mortgages (Figure 5D). This higher exit rate is partly explained by the concentration of non-GSE conventional mortgages among cohorts before the Great Recession. To disentangle these factors, Section 5 models the likelihood of exiting homeownership as a function of time since first purchase conditional on sustaining homeownership until that point using a Cox proportional hazards model.

The NMDB borrower panel also allows us to observe FTHBs who exited mortgaged home-

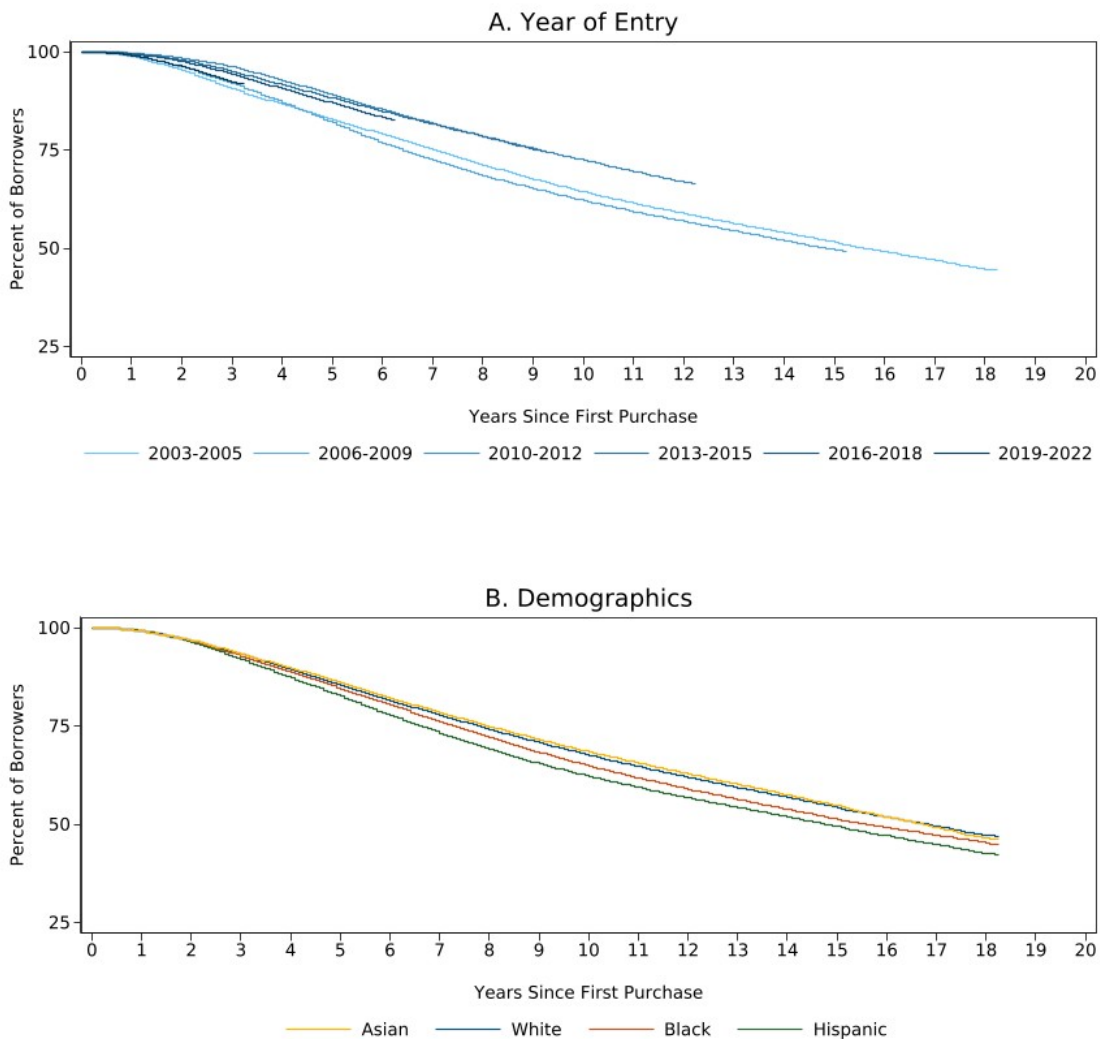
²¹FTHBs entering after 2020 are excluded from this analysis because they cannot have exited homeownership yet, by definition.

²²The survival curve is computed by the Kaplan-Meier estimator, defined as $S(t) = \prod_{t_i < t} \left(1 - \frac{d_i}{n_i}\right)$, where d_i is the number of borrowers who exited homeownership at time t_i and n_i is the number of borrowers who had remained homeowners (neither exited nor censored) up to that time.

ownership and subsequently re-entered by obtaining a new owner-occupied mortgage. By our definition, this cannot occur for at least 24 months after exit. Among borrowers who left homeownership before 2021, 30 percent had subsequently re-entered by March 2023. About 5.5 percent of former homeowners re-enter mortgaged homeownership each year, and 18 percent have returned within 5 years. FTHBs who left mortgaged homeownership in 2007 had the lowest rate of re-entry, with rates increasing among subsequent cohorts (Figure 6A).

Figure 6B shows that, in addition to having lower exit rates, Asian and White FTHBs who exit homeownership have higher re-entry rates than Hispanic and Black former owners. About 20 percent of Asian and White FTHBs who exited homeownership re-enter within 5 years, compared to about 12 percent of Black former owners.

Figure 5: Homeownership Non-parametric Survival Curve



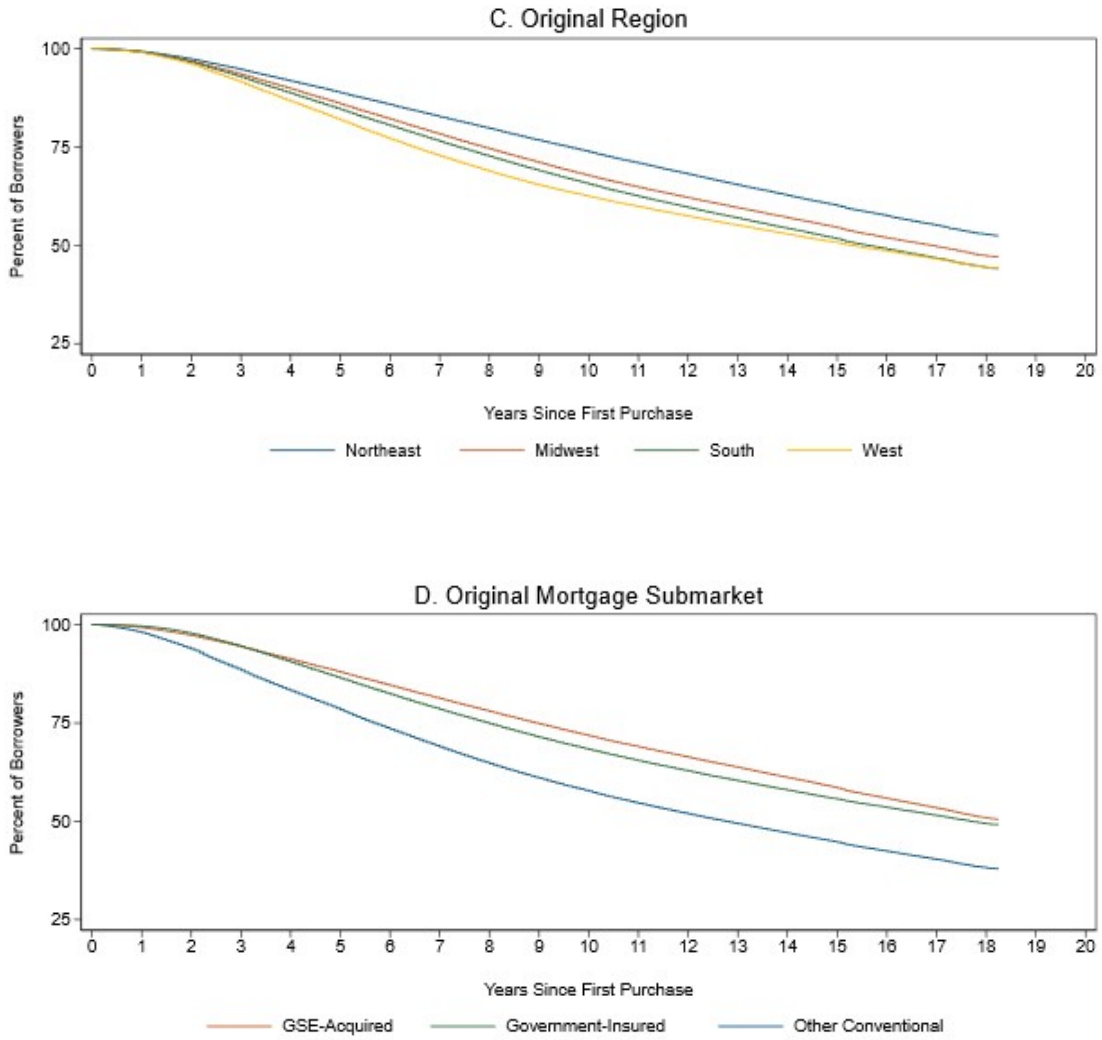
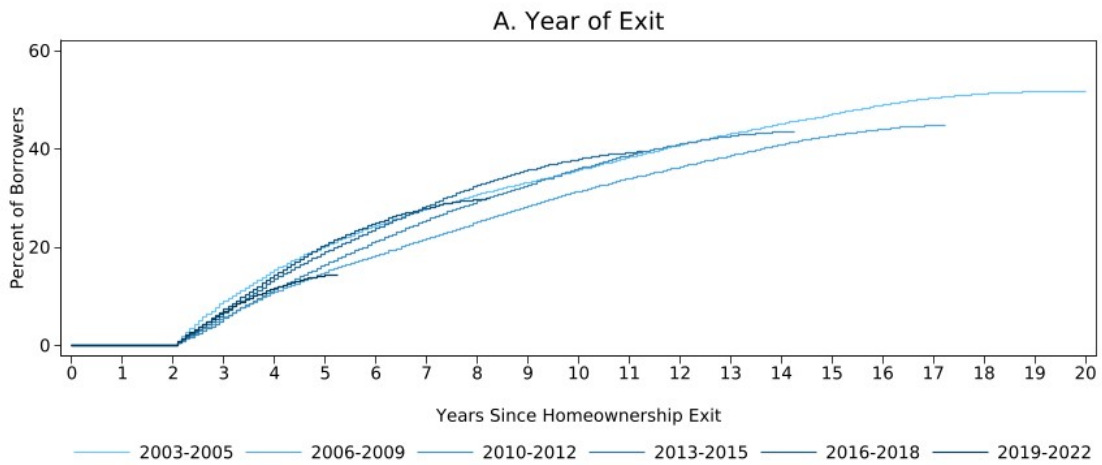
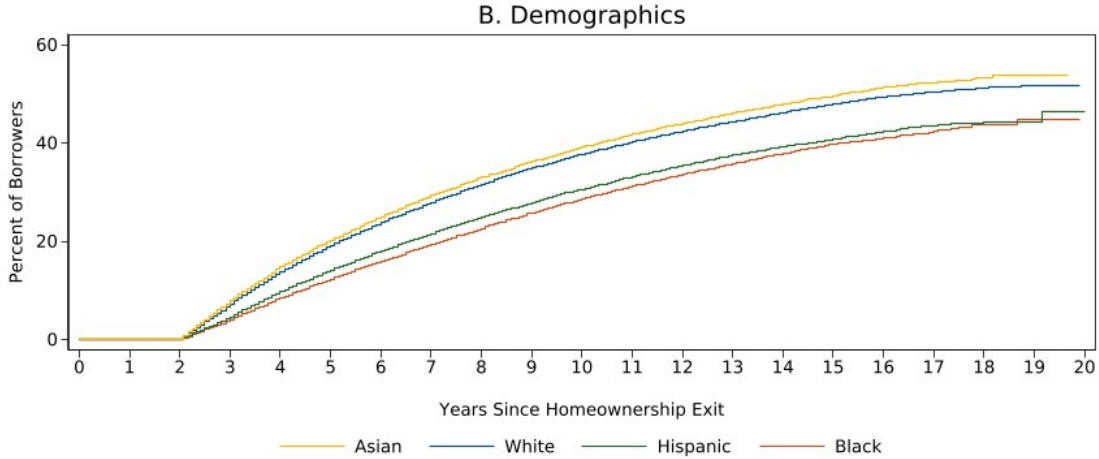


Figure 6: Homeownership Re-entry Curve





4.3 Homeownership Longevity

The third approach measures cumulatively how much of the time FTHBs have been mortgagors following their first entry. Longevity is defined as the share of months since first purchase that the borrower has had an active owner-occupied mortgage, even if months are not consecutive. Gaps in active mortgage status of less than 3 months are assumed to be continuous homeownership and coded as having an active mortgage. Borrowers who are more likely to leave homeownership and less likely to return will have lower overall longevity.

Figure 7A shows the longevity for all borrowers by cohort. Overall, the average FTHB in the NMDB borrower panel has had an active mortgage for 86 percent of the months since first purchase. This measure of longevity is lowest for the 2006 cohort, at about 72 percent, and higher for more recent cohorts, which have had less seasoning.

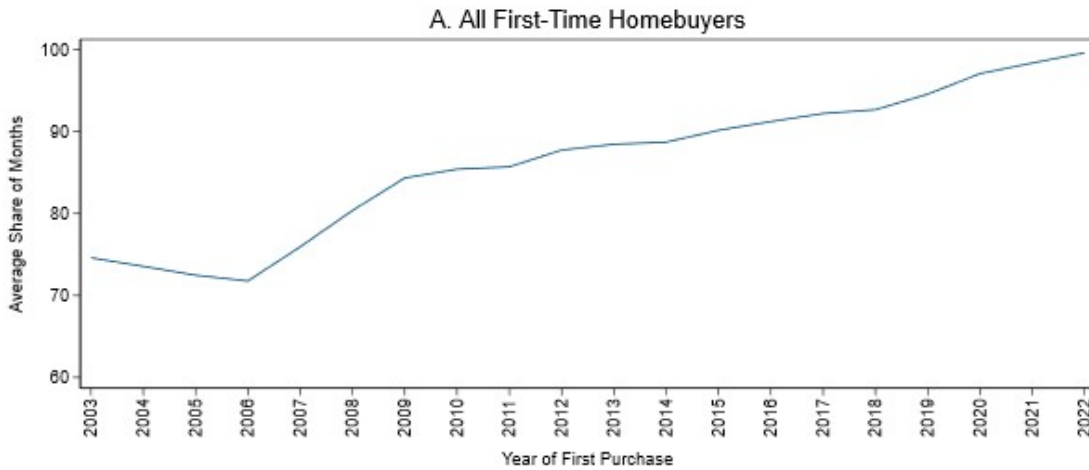
Before the 2008 cohort, Hispanic FTHBs had the lowest average share of months with an active owner-occupied mortgage (Figure 7B). The 2006 Hispanic cohort has the lowest longevity rate at 64 percent, compared to 74 percent for White borrowers. Since then, the longevity differences between demographic groups have narrowed to 1-2 percentage points. FTHBs purchasing in the Northeast typically have the highest longevity rates across cohorts (Figure 7C). FTHBs in the West have the lowest longevity before the 2008 cohort. For example, the 2006 cohort in the West has the lowest longevity at 66 percent, compared to the same cohort in the Northeast at 78 percent.

Liu (2024) shows that, while there are only small differences in homeownership longevity between minority and non-Hispanic White borrowers, there are divergent paths in how these

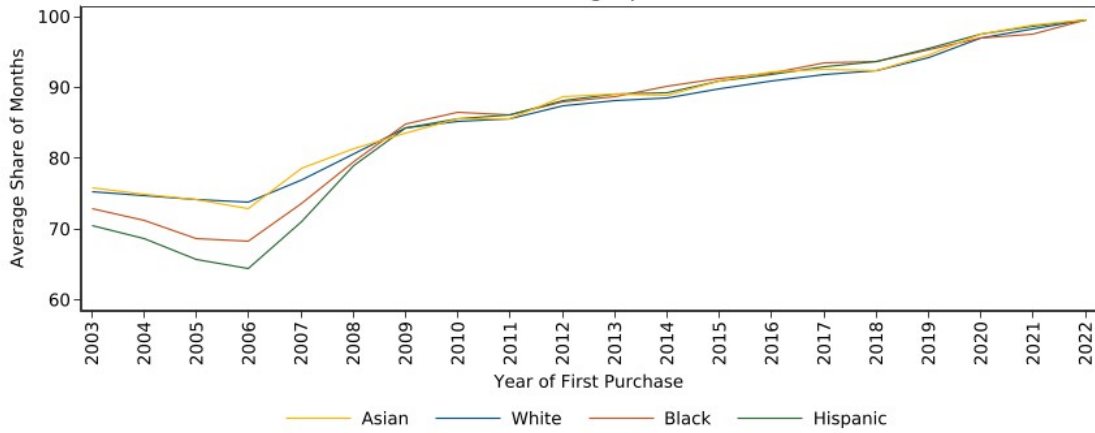
longevity levels are achieved. On average Black borrowers have an unconditionally higher delinquency rate, Black borrowers spend no less time with an active mortgage than White first-time borrowers; although Black borrowers have a higher probability of deeper delinquency, they are more likely to cure or transition back to less delinquent states than to terminate their homeownership. A duration analysis shows that Black and Hispanic borrowers are less likely to leave their first home even for those who eventually exit with deeper delinquency. But once they leave, they are less likely to return to homeownership.

FTHBs with their original mortgage financed through the GSEs have the highest longevity across all cohorts (Figure 7D). FTHBs using other conventional mortgages have the lowest longevity. The gap between GSE and other conventional FTHBs is about 13 percentage points for the 2006 cohort, equivalent to 2 years out of the 17-year time window (from 2006 to 2023:Q1). The following section models the longevity rate as a function of borrower demographics, loan type, and year of first purchase and compares the results to other measures of homeownership sustainability.

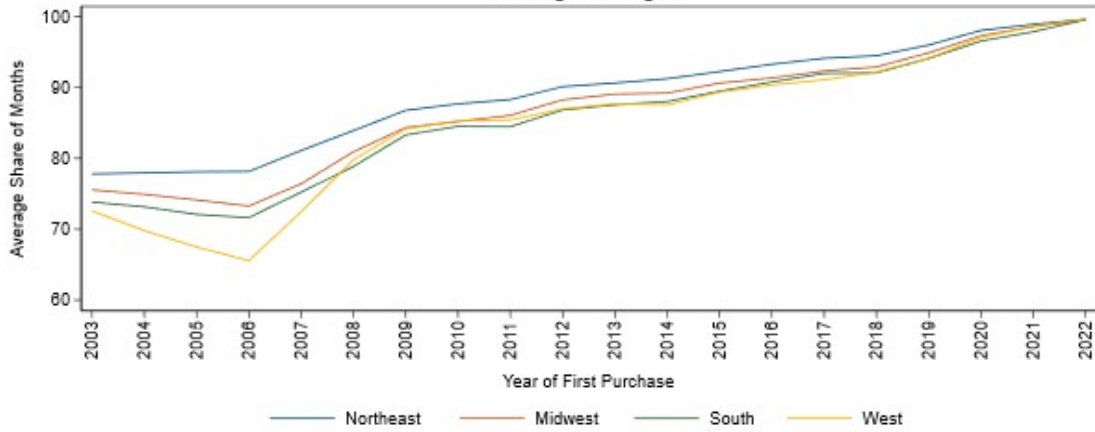
Figure 7: Share of Months with Active Owner-Occupied Mortgage by Cohort



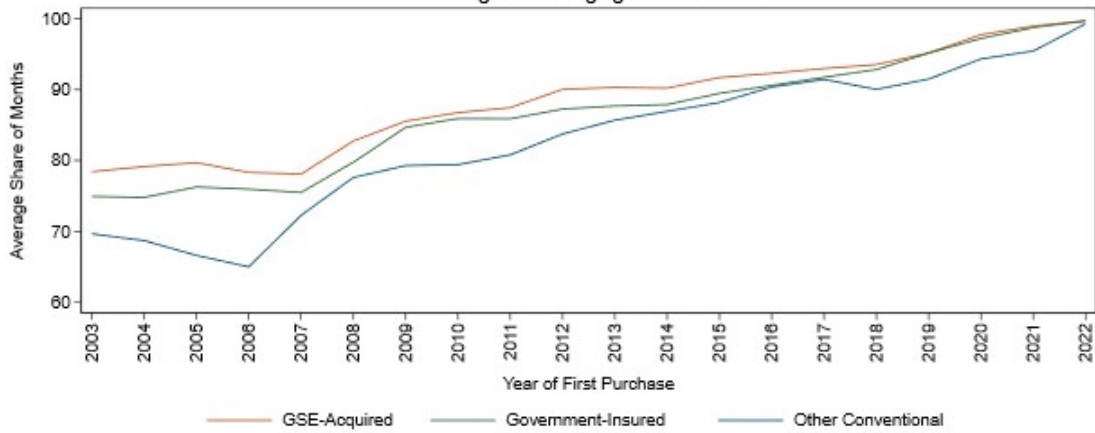
B. Demographics



C. Original Region



D. Original Mortgage Submarket



5. Model Comparison

We estimate each metric of homeownership sustainability as a function of borrower demographics, state and year fixed effects, year of first purchase, and loan type using multivariate regression models that allow interpretation of effects conditional on other covariates. However, the model form is specific to each metric. We model whether a borrower still has a mortgage as of Q1 2023 using binomial logistic regression. We estimate the exit hazard (*i.e.*, probability of exit in a given period conditional on survival up to that period) using a Cox proportional hazard model, but – to be consistent in direction with the other two models – the coefficients are multiplied by -1 to reflect the probability of sustaining homeownership rather than exiting. Since most borrowers (62%), particularly among more recent cohorts, had a mortgage for all observable months, we model the longevity rate using a Tobit model to accommodate right-censoring. In each model, errors are clustered by the original loan number to account for co-borrowers having correlated, but not necessarily identical, mortgage sequences and outcomes.

Several patterns are consistent across all metrics of homeownership sustainability. Older and female FTHBs are associated with a lower likelihood of sustaining homeownership in every model. Hispanic FTHBs are also associated with a lower likelihood in two of the three models. On the other hand, Black FTHBs are associated with a higher likelihood of sustaining homeownership in every model. The coefficients correspond to nearly 8 percent higher odds of still currently having a mortgage compared to a non-Hispanic White FTHB, 1.6 percent lower likelihood of exiting homeownership in a given period, and 2 percentage point increase in cumulative share of months with a mortgage since first purchase, equivalent to roughly an additional month of homeownership for every 4 years since becoming a homeowner.

The year indicator coefficients capture the effect of both seasoning and changes in sustainability across cohorts for the logistic (not shown) and Tobit models, but reflect only changes in sustainability in the Cox model. In general, sustainability has increased since the 2006 cohort of FTHBs, although the Cox model also reports declines in the 2018 and 2019 cohorts, which may reflect turmoil from the COVID-19 pandemic.

FTHBs entering homeownership using a government-insured mortgage or conventional mortgage acquired by a GSE exhibit higher sustainability than FTHBs entering using other conventional mortgages. Some of these differences may be explained by differences in underwriting standards and the borrower and mortgage characteristics associated with each loan

type. Liu (2024) and Park (2025) further explore the effects of these risk factors on longevity and homeownership exit, respectively.

Table 3: Sustainability Model Comparison

	Current Status Logistic	Survival [†] Cox	Longevity Tobit
Age	-0.024*** (0.0002)	-0.006*** (0.0002)	-0.002*** (0.0001)
Female	-0.171*** (0.0031)	-0.107*** (0.0024)	-0.033*** (0.0007)
Black	0.075*** (0.0071)	0.016** (0.0058)	0.022*** (0.0017)
Hispanic	-0.036*** (0.0059)	-0.071*** (0.0048)	0.002 (0.0014)
Asian	0.009 (0.0080)	0.010 (0.0067)	0.009*** (0.0018)
Other	0.101*** (0.0147)	0.028* (0.0124)	0.020*** (0.0033)
GSE Conventional	0.451*** (0.0051)	0.406*** (0.0039)	0.141*** (0.0012)
Government-Insured	0.312*** (0.0055)	0.260*** (0.0044)	0.095*** (0.0013)
AIC	2,004,090	14,310,451	2,066,361
Pseudo R2	0.128	0.003	0.205
χ^2	146,925	36,086	318,679

Note: All models include year of first purchase as well as state and year fixed effects. Clustered standard errors shown in parenthesis. Statistically significant at the ***0.001, **0.010, and *0.050 level. †Reported coefficients reflect the estimated exit hazard multiplied by -1 .

6. Summary

This paper tracks FTHBs across mortgages as they refinance and move into new homes, focusing on how long a borrower remains a homeowner. By utilizing a unique nationwide borrower panel, homeownership sustainability can be measured in new ways, and disaggregated by borrower demographics, region, and mortgage submarket. This is done by following homeowners across mortgages on the same or even different properties. We are able to improve on existing work because our novel dataset offers both a richer set of demographic and financial variables than have generally been available elsewhere and provides a large

representative sample of individuals who can be reliably tracked over a long period of time spanning multiple homes and mortgages.

Most homebuyers have remained homeowners, and the persistence of homeownership has increased, especially since the Great Recession. But even among cohorts between 2003 and 2007, the median FTHB sustained homeownership for 15 years, averaged an active mortgage for 74 percent of the time overall, and 57 percent still had a mortgage as of March 2023. These sustainability measures have all improved in recent cohorts.

Measuring homeownership sustainability is a significant contribution to our understanding of homeownership persistence. While this study sheds light on the dynamics of homeownership, several fundamental normative questions remain unanswered concerning the optimal homeownership rate, and the factors influencing the initiation and cessation of homeownership. Future research could explore these aspects while leveraging the NMDB's rich empirical data with borrower-specific controls to better understand what drives people to have persistent or repeated cycles of homeownership. Additionally, insights into the experiences of repeat homeowners and the impact of household formation and dissolution on homeownership would be valuable. Other statistics might also be useful for quantifying sustainable homeownership that have yet to be introduced but are now possible with housing and mortgage databases.

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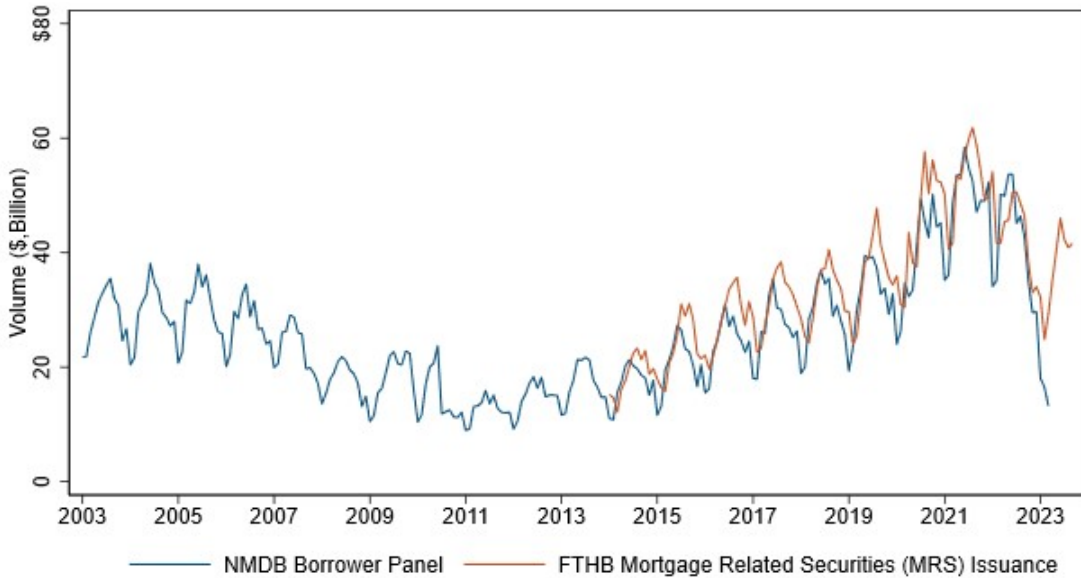
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A FTHB Volume Comparison

The most commonly used definition of first-time homebuyer (FTHB) is a person who has not owned a home in the prior three years (for example, see 12 CFR 1290.1). The National Mortgage Database (NMDB) uses a more restrictive definition that requires the person to have no previous mortgage tradeline in their credit history. Despite the difference, the volume of FTHB mortgage originations in the borrower panel is comparable to that reported in mortgage-related securities (MRS) issuance data for Fannie Mae, Freddie Mac, and Ginnie Mae. The two monthly series have a 0.91 correlation between 2014 and 2022. On average, the weighted NMDB volume²³ is about 9 percent lower than the MRS series. This percentage is consistent with that reported by Lee and Tracy (2018), who find a similar discrepancy from the three-year lookback.

Figure 8: Monthly FTHB Mortgage Volume



B Mortgage Entry and Payoff Appendix

A weakness in the measure of homeownership sustainability used in this paper is that both the entry and exit from homeownership are identified in the NMDB borrower panel by the absence of an active owner-occupied mortgage. This excludes individuals who enter homeownership without a mortgage (*e.g.*, through inheritance) and those who exit by paying

²³The NMDB is based on a 5 percent sample, so reported loan amounts are weighted by a factor of 20. Note that the comparison is at the loan level, while the analysis in the rest of this paper is at the borrower level.

off their mortgage and owning their home without debt. Figure 9 shows that the person-level share of homeowners without a mortgage (“free and clear”) reported in the American Community Survey²⁴ does not begin to rise meaningfully until after 50 years of age. If non-mortgaged ownership were determined solely by mortgage payoffs, one would expect to see an upward sloping pattern since mortgage payoff is a positive function of the age of the mortgage, which is correlated with the age of the borrower.

Figure 10 shows the age distribution of FTHBs at the time of first purchase. Overall, the median age of a FHTB is approximately 30 years old (see Table 1). FTHBs who subsequently exit homeownership (that is, have a gap in mortgaged homeownership of at least 24-months; see Section 4.2) skew slightly older than all FTHBs, but have the same median age at first purchase. Figure 10 also shows the age distribution at the time of observed homeownership exit. The median age at homeownership exit is 37. The share of homeowners who own their home free and clear actually declines slightly between ages 30 and 37.

Since most borrowers in our sample are below 50, figure 9 implies that the distortion in our sample due to homeowners paying off their mortgages is likely small. Otherwise, we would see a rising share of non-mortgaged homeowners earlier in the lifecycle (and figure 9 would display a positive slope between ages 20 and 40). The level masks flows into and out of mortgaged homeownership. But, it does suggest that homeowners paying off their mortgages likely explains a small share of homeownership exits in our sample.

On the other hand, the relatively large percentage of homeowners without a mortgage at any age does suggest that our sample design does miss a sizable portion of individuals who enter homeownership without a mortgage, particularly those who enter at a young age.

²⁴Based on a custom 0.2 percent sample of the 2003 through 2021 surveys obtained through IPUMS USA, University of Minnesota.

Figure 9: Non-Mortgaged Share of Homeowners

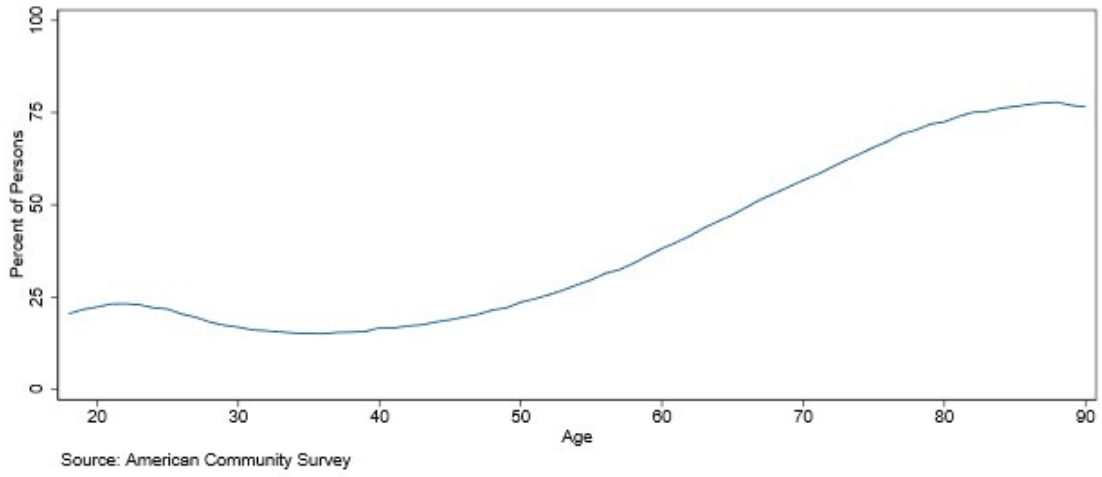


Figure 10: Age Distribution

