2017

Annual Housing Activities Report

March 14, 2018

Submitted to Congress and the Federal Housing Finance Agency under section 307(f) of the Federal Home Loan Mortgage Corporation Act (12 U.S.C. §1456(f)) and FHFA regulations (12 C.F.R. §1282.63)

Freddie Mac
We make home possible®

Having adequate, affordable housing generates long-lasting benefits for families, communities, and the economy overall.

Yet finding such a home is a challenge for tens of millions of households across the country. One-third of U.S. households are cost burdened; that is, they pay more than 30 percent of their income on housing. Among lower-income households, that percentage is far greater. That leaves less to spend on other needs — such as food, education, and healthcare. For many families, slow income growth, rising interest rates, and rising rents and home prices have made homes less affordable in recent years. Compounding the challenges: limited construction and preservation of homes that are affordable at lower incomes, to people just starting out on their own, and to first-time homebuyers.

Working together with our customers and the industry, the Federal Home Loan Mortgage Corporation (Freddie Mac) makes housing more accessible and affordable for homebuyers, homeowners, and renters nationwide. We have helped make home possible nearly 77 million times over the last 47 years. More than ever, we are committed to delivering our unmatched expertise, creativity and leadership to help transform the U.S. housing finance system and make housing affordable to more families.

REQUIRED INFORMATION

Our Mission, Our Commitment

Every day, Freddie Mac makes home possible. Our commitment to affordable, adequate housing is central to who we are. Our continuous support — in all economic conditions and for communities across the entire country — distinguishes us from private funding sources.

Since being chartered by Congress in 1970 to operate in the U.S. secondary mortgage market, we have fulfilled our mission to keep mortgage money flowing, support the stability of the housing market, and promote housing affordability by buying loans that meet our standards from approved lenders. With the money that lenders receive in return, they can make loans to other qualified borrowers. In securitizing pools of mortgages and selling the securities to investors, we shift a significant portion of the credit risk associated with the loans we own to private investors — away from taxpayers. Our securitization model also allows us to reduce our borrowers' cost of capital.

Our commitment extends beyond our charter mission to what we call our community mission, which starts with our affordable housing goals and contributions to national affordable housing funds, and continues with our added efforts to stabilize communities, prevent foreclosures, responsibly expand credit and educate consumers. In the coming years, Freddie Mac will expand our focus on tackling the nation's most persistent housing challenges through the Duty to Serve program. We welcome the opportunity to lead the industry in developing innovative solutions that will benefit the nation for generations to come.

Supporting Homebuyers, Homeowners, and Renters Nationwide

Freddie Mac enables homeownership through our Single-Family Business and rental housing through our Multifamily Business.

Single-Family Business

Our Single-Family business supports responsible, sustainable homeownership. We work with lenders of all sizes — national, regional, and community lenders and credit unions — to buy conventional, conforming mortgage loans for one- to four-unit homes — including condominiums and manufactured homes — up to a certain dollar amount set by our regulator. As part of our mission, we are committed to creating homeownership opportunities for people hoping to buy a home for the first time, earning low and moderate incomes, and living in underserved markets.

Because lenders know they can sell loans to us, they are more willing to make long-term, fixed-rate loans, which make mortgage payments more affordable to more households. When a homeowner faces financial difficulties, we work with the lender to help the borrower avoid foreclosure, where possible, or exit homeownership as smoothly as possible.

Multifamily Business

Working with a network of specialized lenders, Freddie Mac Multifamily provides funding for loans on properties ranging from five units to hundreds of units across multiple buildings. We support all types of multifamily properties nationwide, including conventional, seniors, student, and subsidized housing as well as smaller properties and manufactured housing communities.

The vast majority of the apartments we finance each year are affordable to low- or moderate-income renters. We help keep financing affordable for many properties that otherwise would have difficulty securing funding, including those that are aging, in need of capital improvements, and in smaller communities. Multifamily borrowers mainly are commercial entities, such as property developers, and the properties are considered businesses. Our in-house teams closely monitor loan and property quality throughout the life of each loan.

A Better Freddie Mac, Building a Better Housing Finance System

As an industry leader, Freddie Mac constantly works to develop new and better ways to help lenders expand affordable lending and access to credit for qualified borrowers as well as to attract private capital from investors, while minimizing taxpayer risk. We've become a better company, and we're building a better housing finance system.

Let's look at some of the advances that our **Single-Family** Business made in 2017.

$344 billion to the **single-family market**

Helped **1.5 million families** buy and refinance homes

Created **312,000 first-time homebuyers** — a 10-year high

Enabled **390,000 low- and very low-income families** to become homeowners

- We're reimagining the mortgage experience, based on better technology. Our innovative Loan Advisor Suite® helps lenders give mortgages to more qualified homebuyers faster, more efficiently, and at lower cost. For example, we now allow automated assessment of a homebuyer with a thin credit file or no credit scores but with verifiable payment references, such as a history of timely payments for an apartment, car insurance, and utilities. This especially benefits younger and minority homebuyers.
- Our Home Possible® product suite makes homeownership possible for qualified first-time as well as low- and moderate-income homebuyers with down payments as low as 3 percent. Since being introduced in 2015, Home Possible Advantage® has gained real traction. And HFA Advantage® helps a growing number of state and local housing finance authorities fulfill their missions to increase affordable homeownership.
  - To build awareness of our low down payment products, resources and tools and to equip housing professionals to use them to promote responsible homeownership, Freddie Mac participated in more than 350 events in 2017 to educate customers, real estate professionals, housing counselors, housing finance agencies and borrowers.
  - Last year, 84 percent of Home Possible Advantage loans and 88 percent of HFA Advantage loans helped families buy their first homes.
- We opened our 14th Borrower Help Center in rural McComb, Mississippi. Our nationwide network of Borrower Help Centers helps prepare families to buy and responsibly maintain homes. Our Borrower Help Centers and other partners provided one-on-one pre-purchase counseling to about 35,000 people, homebuyer education to more than 38,000 people and financial-capability education to more than 194,000 people.
- Our credit risk transfer (CRT) program is now fully integrated into our business model and has changed the way we fund the residential mortgage market. Ninety-eight percent of targeted loans were included in CRT reference pools in 2017. We also launched two new CRT offerings: STACR Securitized Participation Interests℠ and Freddie Mac Deep MI CRT.

Now let's turn to our **Multifamily** Business, which had a record year in 2017.

$73 billion to the **multifamily market**

Funded **408,000+ eligible apartment units** that were affordable to low-income families

Increased **affordable housing preservation** by **70%** year-over-year

Boosted support for **small balance loan properties** by **76%** year-over-year

Our innovative products, underwriting, and world-class securities helped bring financing to almost every corner of the multifamily market, preserve much-needed affordable housing, and transfer the majority of risk away from taxpayers.

- For the third year straight, Freddie Mac was the nation's rental housing finance leader. We provided a record $73 billion, funding more rental housing units than ever — 820,000 — including more than 408,000 eligible units that were affordable to low-income families.
- Our Small Balance Loan program provided $7.8 billion in funding in 2017, a significant portion of which went toward properties with five to 50 units. These smaller properties are major sources of housing for families earning low and moderate incomes.

- Making properties "greener" helps lower operating costs for buildings, keep utility costs low and protects the environment. Our funding for energy- and water-saving improvements jumped nearly 500 percent in 2017.
- Through our innovative securities, we transfer the credit risk of about 90 percent of our loan purchase volume away from taxpayers — to private investors. We extended our credit risk transfer capabilities in 2017 with several new transaction types. For example:
  - Our ML Certificates leverage flagship K-Series and our M-Series securitization programs to efficiently securitize tax-exempt loans and related supplemental taxable loans. They help reduce borrowers' cost of capital, which in turn helps keep rents low.
  - Our KT Certificates are backed by multifamily mortgage loans that are awaiting sale into our K-Series securitizations. They help minimize our credit risk in the interim between when we acquire the loans and when they are sold into K-Series securitizations.

The Affordable Housing Goals

FHFA establishes annual housing goals for mortgages purchased by Freddie Mac, as required by the Federal Housing Enterprises Financial Safety and Soundness Act of 1992 and as amended by the Housing and Economic Recovery Act of 2008. The goals help gauge how well Freddie Mac fulfills our public purposes, which include "an affirmative obligation to facilitate the financing of affordable housing for low- and moderate-income families in a manner consistent with their overall public purposes, while maintaining a strong financial condition and a reasonable economic return."[1] According to Freddie Mac's Charter, one of our purposes is to "provide ongoing assistance to the secondary market for residential mortgages (including activities relating to mortgages on housing for low- and moderate-income families involving a reasonable economic return that may be less than the return earned on other activities)…."[2]

FHFA's final rule establishing the 2015-2017 housing goals was published in September 2015.[3] The housing goals included separate categories for both single-family and multifamily mortgages on housing that is affordable to low- and very low-income families. Among other things, the final rule established updated benchmark levels for each of the single-family and multifamily housing goals and subgoals, and set a new subgoal for small multifamily properties (5-50 units) affordable to low-income families.

FHFA determined in December 2017 that **Freddie Mac achieved all five Single-Family and all three Multifamily affordable housing goals for 2016**.[4] Based on preliminary information, **we believe that we met all five Single-Family goals and all three Multifamily goals for 2017**. FHFA will make a final determination on Freddie Mac's 2017 performance when market data is released in October 2018.

Single-family housing goals for 2017:

- *Low-income home purchase goal* – At least 24 percent of home purchase mortgages on single-family, owner-occupied properties with borrowers with incomes no greater than 80 percent of area median income (AMI)
- *Very low-income home purchase goal* – At least 6 percent of home purchase mortgages on single-family, owner-occupied properties with borrowers with incomes no greater than 50 percent of AMI
- *Low-income areas home purchase subgoal* – At least 14 percent of home purchase mortgages on single-family, owner-occupied properties with borrowers with census tract incomes no greater than 80 percent of AMI, or borrowers with income no greater than 100 percent of AMI who live in census tracts with a minority population of 30 percent or more and a tract median income of less than 100 percent of AMI

1 12 U.S.C. §4501(7)

2 Id. at §1451(b)(3)

3 See 80 Fed. Reg. 53392 (Sept. 3, 2015), codified at 12 CFR part 1282.

4 https://www.fhfa.gov/PolicyProgramsResearch/Programs/AffordableHousing/Documents/Fred_M_Goals/12-18-17_FRE-2016-Hsg-Goals-Final-Determination-Letter.pdf

- *Low-income areas home purchase goal* – At least 18 percent of home purchase mortgages on single-family, owner-occupied properties with borrowers who meet the criteria under the low-income area home purchase subgoal described above, as well as home purchase mortgages to families with incomes no greater than 100 percent of AMI who live in a federally declared disaster area
- *Low-income refinancing goal* – At least 21 percent of refinancing mortgages on single-family, owner-occupied properties with borrowers with incomes no greater than 80 percent of AMI

Multifamily housing goals for 2017:

- *Low-income goal* – At least 300,000 units affordable to families with incomes no greater than 80 percent of AMI in multifamily rental properties
- *Very low-income subgoal* – At least 60,000 units affordable to families with incomes no greater than 50 percent of AMI in multifamily rental properties
- *Low-income subgoal for small multifamily rental properties (5-50 units)* – At least 10,000 units affordable to families with incomes no greater than 80 percent of AMI

The remainder of this report describes in detail our achievements toward the 2017 housing goals that FHFA established for Freddie Mac.[5]

5 The statistical and financial information included in this report and in the tables referenced in this report may not be comparable to information provided in Freddie Mac's public disclosure documents, including Monthly Volume Summaries and reports filed with the U.S. Securities and Exchange Commission, as the statistical and financial information included in this report and in the tables has been compiled and aggregated in accordance with specific regulatory guidelines. The information presented in the exhibits (and described in the related discussion) is derived from certain tables included in Freddie Mac's 2017 Annual Mortgage Report (2017 AMR). The 2017 AMR is being delivered to FHFA with this report.

Introduction

Pursuant to section 307(f) of the Federal Home Loan Mortgage Corporation Act, as amended, 12 U.S.C. § 1456(f), Freddie Mac must submit annually to the Committee on Banking, Housing, and Urban Affairs of the Senate, the Committee on Financial Services of the House of Representatives and the Federal Housing Finance Agency (FHFA) a report on its activities under subpart B of part 2 of subtitle A of the Federal Housing Enterprises Financial Safety and Soundness Act of 1992, as amended, 12 U.S.C. §§ 4561 et seq.

The following constitutes Freddie Mac's 2017 Annual Housing Activities Report to Congress and FHFA under section 307(f) and FHFA regulations at 12 C.F.R. 1282.63.[6]

A. Information Required Under § 307(f)(2)(A)

§ 307(f)(2)(A) requires that this report include, in aggregate form and by appropriate category, statements of the dollar volume and number of mortgages on owner-occupied and rental properties purchased which relate to each of the annual housing goals established under such subpart.

In 2017, Freddie Mac purchased more than 1.3 million mortgages on single-family owner-occupied properties, and more than 6,000 mortgages on multifamily properties.[7]

Exhibit A-1 summarizes our performance for the single-family affordable housing goals, listing for each affordable housing goal the regulatory benchmark, our performance against the benchmark in 2017, the dollar volume of goal-qualifying mortgages that Freddie Mac purchased in 2017, and the number of goal-qualifying mortgages.

EXHIBIT A-1:

Freddie Mac's 2017 Single-Family Affordable Housing Goals Performance

	2017 Benchmark	2017 Market	2017 Performance	Volume ($Millions)	Owner-Occupied Mortgages Financed
Low-Income Purchase Goal	24%	To be determined by FHFA	23.19%	$25,224	165,554
Very Low-Income Purchase Goal	6%	To be determined by FHFA	5.72%	$4,523	40,848
Low-Income Areas Purchase Goal	18%	To be determined by FHFA	20.86%	$28,843	148,932
Low-Income Areas Subgoal	14%	To be determined by FHFA	16.41%	$23,666	117,150
Low-Income Refinance Goal	21%	To be determined by FHFA	24.80%	$21,068	143,472

Note: Figures calculated by Freddie Mac. Final figures will be calculated and published by FHFA.

6 The statistical and financial information included in this Report and in the tables referenced in this Report may not be comparable to information provided in Freddie Mac's public disclosure documents, including Monthly Volume Summaries and reports filed with the U.S. Securities and Exchange Commission, as the statistical and financial information included in this report and in the tables has been compiled and aggregated in accordance with specific regulatory guidelines. The information presented in the exhibits (and described in the related discussion) is derived from certain tables included in Freddie Mac's 2017 Annual Mortgage Report (2017 AMR). The 2017 AMR is being delivered to FHFA with this report.

7 The vast majority of these single-family and multifamily mortgages funded "eligible housing units" for purposes of the housing goals, and thus was used as the basis for calculating our performance under the housing goals.

Pursuant to FHFA regulations,[8] Freddie Mac may achieve a single-family housing goal or subgoal by meeting or exceeding either the FHFA benchmark or the share of qualifying loans originated by the market, as calculated from Home Mortgage Disclosure Act (HMDA) data.

The 2017 HMDA data is not expected to be released until the fall of 2018. At that time FHFA will have all the necessary information to make a final determination of our 2017 Single-Family Affordable Housing Goals performance.

In 2017, Freddie Mac also financed 7,653 low-income rental units in single-family 2-4 unit properties in which an owner-occupant resides in one unit.

Exhibit A-2 summarizes our performance for the multifamily affordable housing goals, listing for the multifamily goal and subgoals, the regulatory targets, our performance against the targets in 2017, and the dollar volume of goal-qualifying units that Freddie Mac financed in 2017. Our official performance will be determined by FHFA.

EXHIBIT A-2:
Freddie Mac's 2017 Multifamily Affordable Housing Goals Performance

	2017 Benchmark (Units)	2017 Performance (Units)	Volume ($Millions)
Low-Income Goal	300,000	408,096	$30,558
Very Low-Income Subgoal	60,000	92,274	$6,228
Low-Income Subgoal (5 – 50 Unit Properties)	10,000	39,473	$3,086

Notes:
Figures calculated by Freddie Mac. Final figures will be calculated and published by FHFA.
Volume includes UPB amounts related to underlying Multifamily units with and without rental information, as reflected on Table 3A of the 2017 AMR.

B. Information Required Under § 307(f)(2)(B)

§ 307(f)(2)(B) requires that this report include, in aggregate form and by appropriate category, statements of the number of families served by the Corporation, the income class, race, and gender of homebuyers served, the income class of tenants of rental housing (to the extent such information is available), the characteristics of the census tracts, and the geographic distribution of the housing financed.

In 2017, Freddie Mac financed housing for over 2.3 million families, including more than 1.5 million single-family owner-occupied and rental units and more than 820,000[9] multifamily rental units.

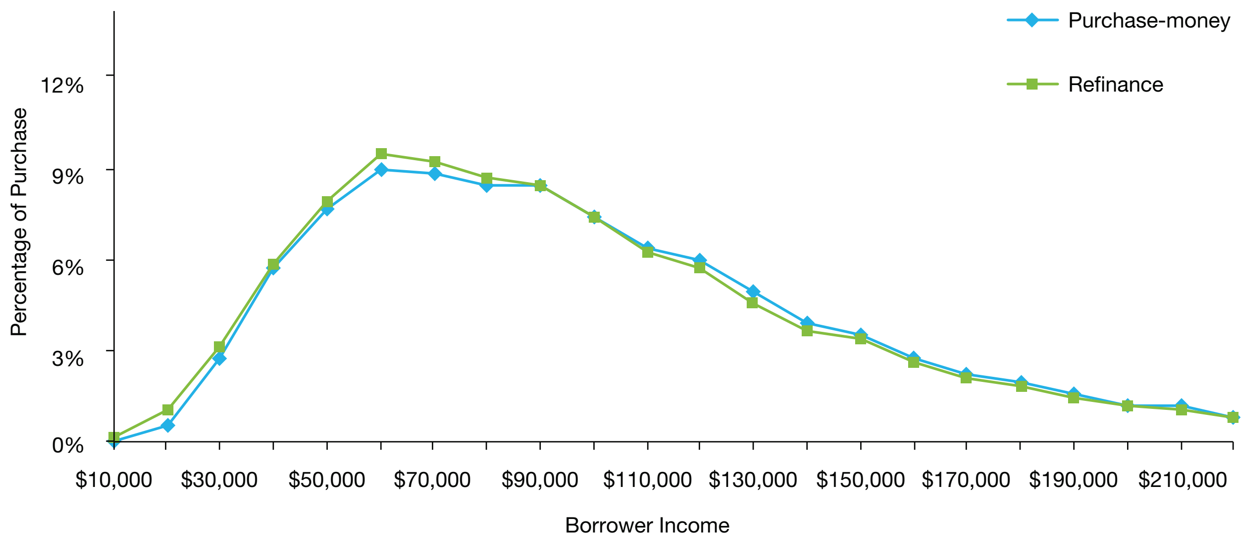
The following exhibits provide the information required under § 307(f)(2)(B).

8 12 CFR §1282.12.

9 Additionally, Freddie Mac provided financing for approximately 4,000 multifamily cooperative units.

EXHIBIT B-1:

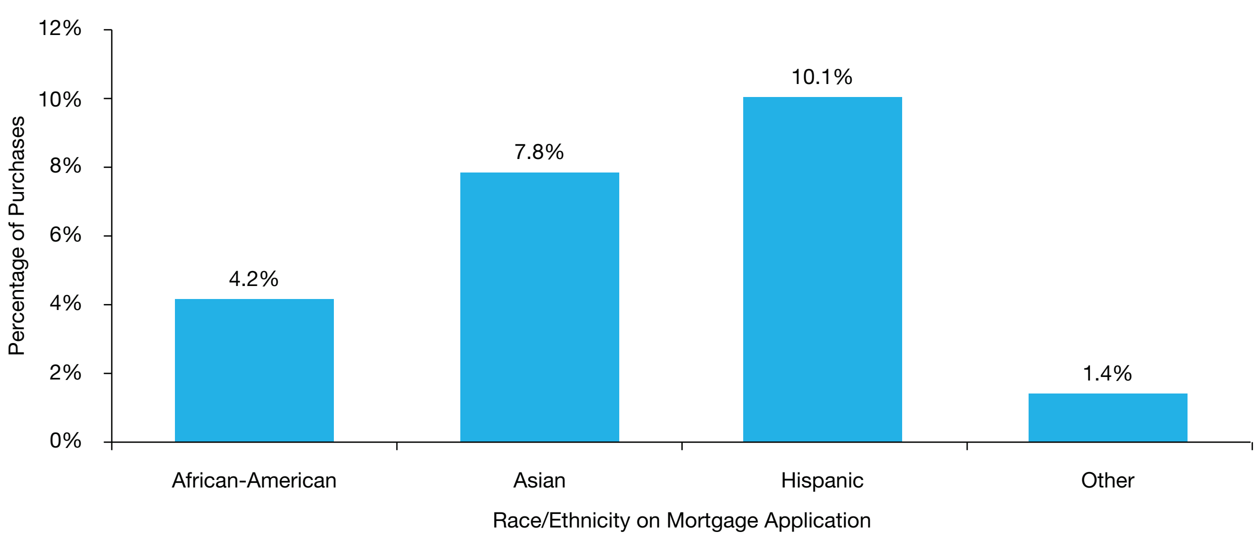
Freddie Mac's 2017 Single-Family Owner-Occupied Mortgage Purchases, by Borrower Income



Source: Freddie Mac internal data. Exhibit B-1 represents the vast majority of Freddie Mac's Single-Family purchase-money and refinance mortgage purchase activity by income.

EXHIBIT B-2:

Freddie Mac's 2017 Single-Family Owner-Occupied Mortgage Purchases, by Race/Ethnicity of Minority Borrowers

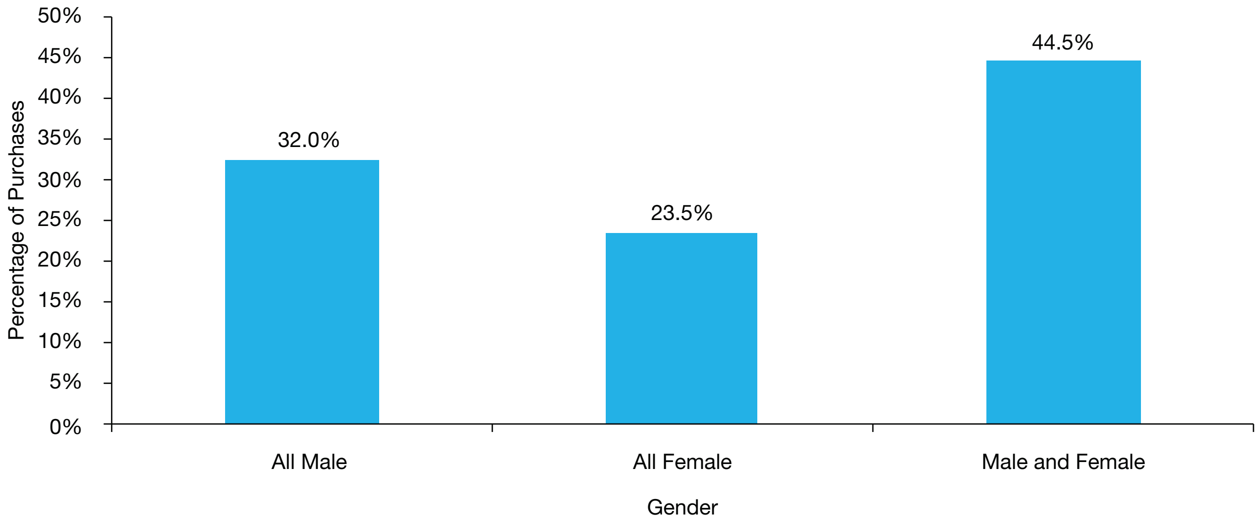


Note: The "Other" category includes American Indian or Alaskan Native, Native Hawaiian or Other Pacific Islander, mortgages that have White and minority co-borrowers, and mortgages where a borrower defines him or herself to be of two or more races. The Hispanic borrower category overlaps with other minority categories, since borrowers may define themselves to be of Hispanic ethnicity and also belong to one or more racial classifications. Minority shares exclude mortgages where (a) ethnicity is non-Hispanic and race is missing, (b) race is White and ethnicity is missing, or (c) both race and ethnicity are missing.

Source: Table 5A & 5B of the 2017 AMR.

EXHIBIT B-3:

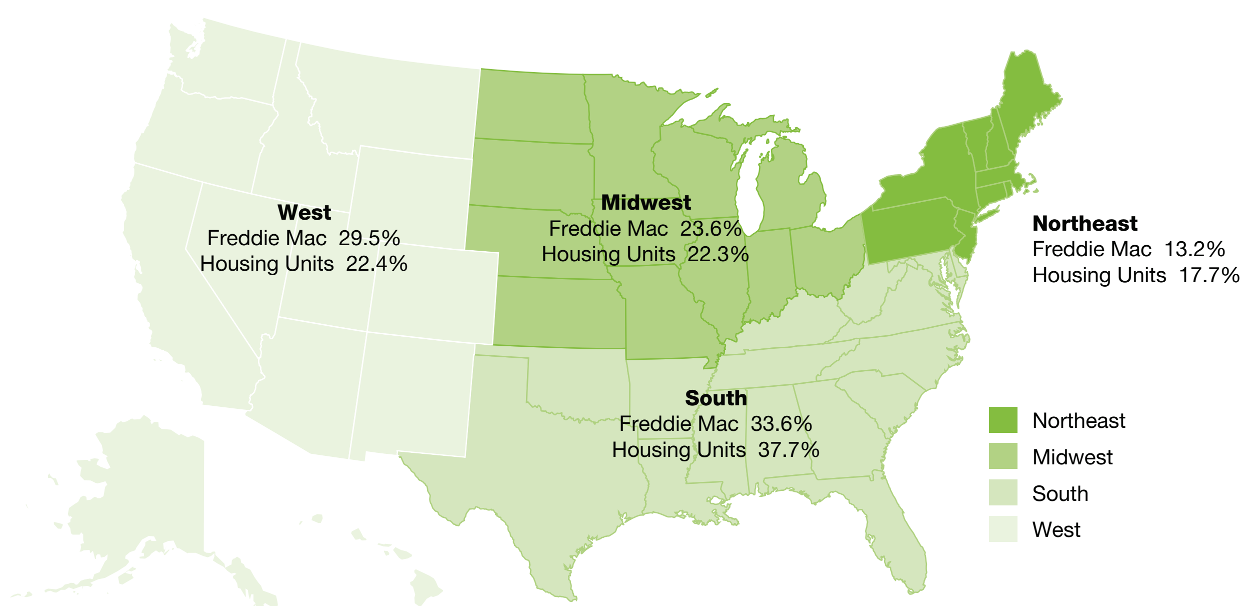
Freddie Mac's 2017 Single-Family Owner-Occupied Mortgage Purchases, by Borrower Gender



Note: These calculations exclude those mortgages for which we do not have borrower gender information.
Source: Table 6 of the 2017 AMR.

EXHIBIT B-4:

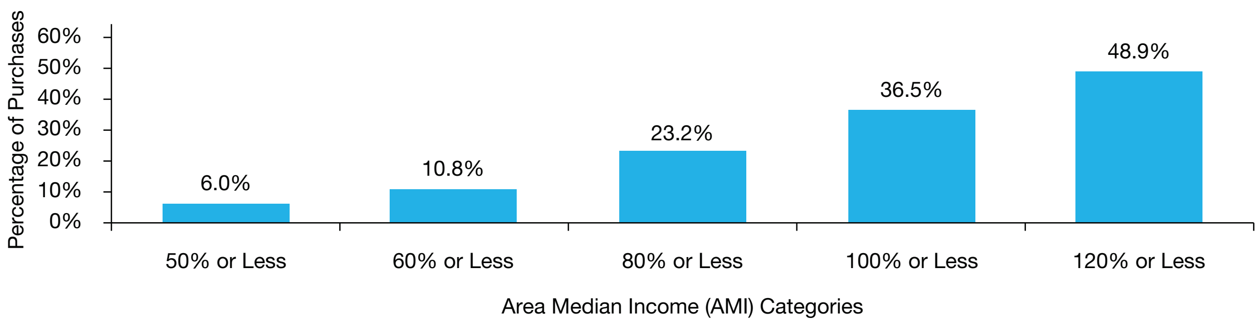
Freddie Mac's 2017 Single-Family Units Compared to 2016 Occupied Single-Family Housing Units, by Census Region



Note: Does not include Puerto Rico, Guam or U.S. Virgin Islands.
Sources: Table 10A for Freddie Mac data and Housing Unit data from 2016 American Community Survey.

EXHIBIT B-5:

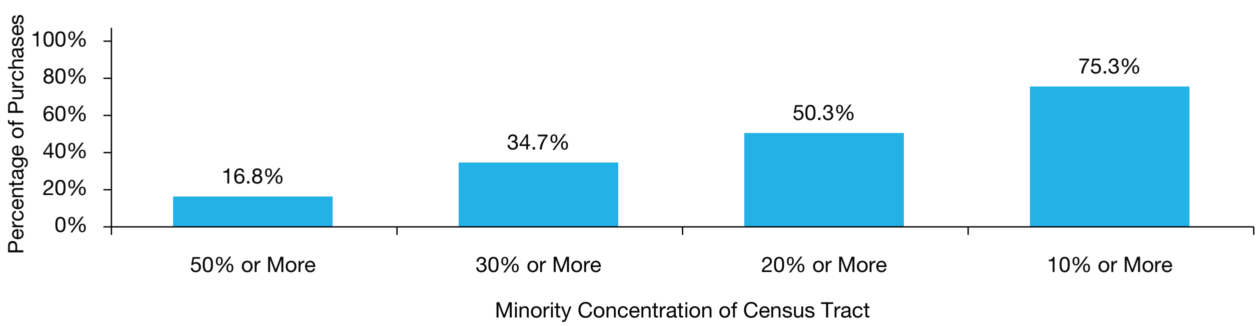
Freddie Mac's 2017 Single-Family Owner-Occupied Mortgage Purchases, by Borrower Income Relative to Area Median Income



Note: These calculations exclude those mortgages for which we do not have borrower income information.
Source: Table 2 of the 2017 AMR.

EXHIBIT B-6:

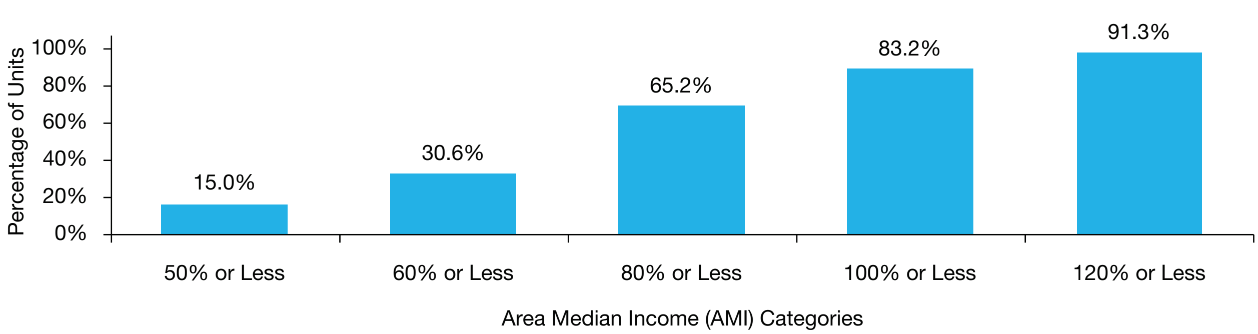
Freddie Mac's 2017 Single-Family Owner-Occupied Mortgage Purchases, by Minority Concentration of Census Tract



Source: Table 7 of the 2017 AMR.

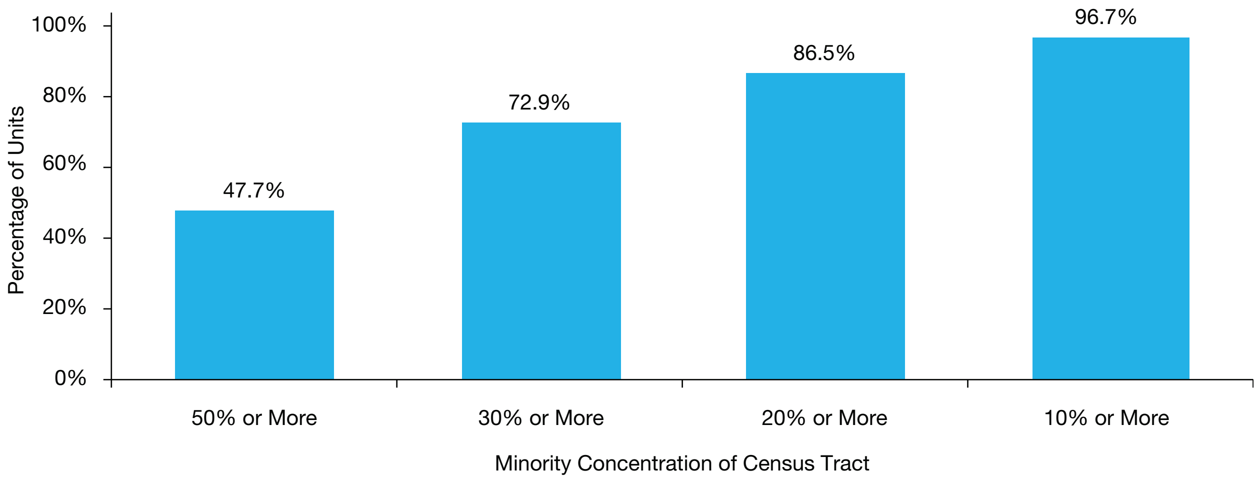
EXHIBIT B-7:

Freddie Mac's 2017 Multifamily Rental Units, by Affordability Relative to Area Median Income



Note: These calculations exclude those rental units for which we do not have rent information or single family rentals.
Source: Table 3A of the 2017 AMR.

EXHIBIT B-8:
Freddie Mac's 2017 Multifamily Rental Units,
by Minority Concentration of Census Tract



Note: These calculations exclude those rental units for which we do not have rent information or single family rentals.
Source: Table 8A of the 2017 AMR.

C. Information Required Under § 307(f)(2)(C)

§ 307(f)(2)(C) requires that this report include a statement of the extent to which the mortgages purchased by the Corporation have been used in conjunction with public subsidy programs under federal law.

In 2017, Freddie Mac purchased or guaranteed almost $113 million in single-family mortgages (financing approximately 1,000 mortgages) and approximately $8.4 billion in multifamily mortgages (financing approximately 101,000 units)[10] that had been used in conjunction with various federal public subsidy programs including the following:

- the Federal Housing Administration (FHA) program;
- the Department of Veterans Affairs (VA) program;
- the U.S. Department of Agriculture's Guaranteed Rural Housing program;
- Mortgage Revenue Bonds (MRBs) issued by various state and local housing finance agencies (HFAs);
- Low Income Housing Tax Credits; and
- Section 8 and Section 236 programs.

In addition, Freddie Mac securitizes pools of multifamily mortgage revenue bonds under its Tax-Exempt Bond Securitization (TEBS) execution and credit enhances tax-exempt multifamily mortgage revenue bonds through its bond credit enhancement program. These multifamily transactions totaled almost $2.1 billion in 2017, financing approximately 13,100 units. Freddie Mac also purchases tax-exempt loans (TELs) from HFAs. In 2017, these TEL multifamily transactions totaled almost $485 million, financing approximately 4,800 units.

10 Approximately 42,000 of these units were Section 8, LIHTC, and Section 236 supported units.

D. Information Required Under § 307(f)(2)(D)

§ 307(f)(2)(D) requires that this report include statements of the proportion of mortgages on housing consisting of 1 to 4 dwelling units purchased by the Corporation that have been made to first-time homebuyers, as soon as providing such data is practicable, and identifying any special programs (or revisions to conventional practices) facilitating homeownership opportunities for first-time homebuyers.

In 2017, Freddie Mac purchased over 312,000 mortgages of first-time homebuyers, representing 43.8 percent of our owner-occupied, purchase money mortgages for which information on the borrower's ownership history is available.[11]

Freddie Mac facilitated homeownership opportunities for first-time homebuyers through its Single-Family products, programs, and services. In particular, Freddie Mac's Single-Family Affordable Lending and Access to Credit organization continues to focus its efforts on meeting the needs of first-time and underserved homebuyers through responsible offerings, the development of strong relationships and a heightened focus on broadening access to credit. For example, Freddie Mac's affordable products, Home Possible®, Home Possible Advantage®, and the HFA Advantage® mortgage products, continue to gain interest and have been very successful in providing financing for first-time homebuyers. For example, as of December 31, 2017, 80 percent of all mortgages from our Home Possible Suite were attributable to first-time homebuyers. Additionally, Freddie Mac continues to engage non-profit organizations, lenders and housing professionals in educational and outreach initiatives designed to inform and prepare homebuyers and homeowners on how to build and maintain better credit, make sound financial decisions and understand the steps to successful long-term homeownership.

These actions complement the significant outreach and business related activities Freddie Mac is continuously engaged in with our Single-Family lenders and State and Local Housing Finance Agencies. For more information on these and other areas that Freddie Mac is engaged in support of affordable housing, please see Section K.

11 We do not have information on the borrower's ownership history for 0.09 percent (643) of the single-family, owner-occupied, purchase money mortgages we purchased in 2017. Therefore, we excluded those mortgages from the calculations underlying the information presented in this section.

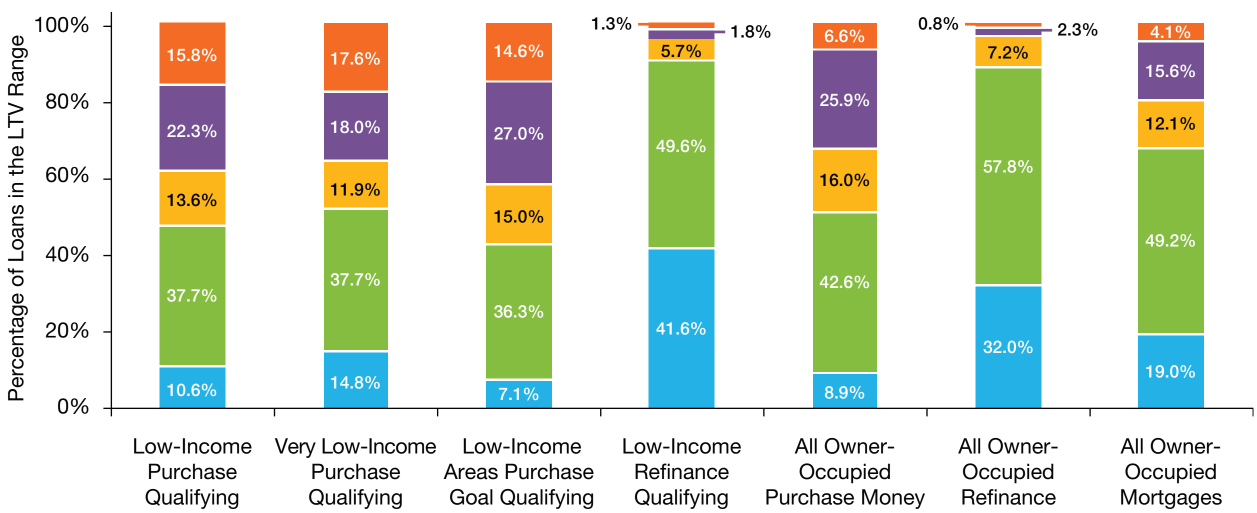
E. Information Required Under § 307(f)(2)(E)

§ 307(f)(2)(E) requires that this report include, in aggregate form and by appropriate category, the data provided to the Director of FHFA under subsection (e)(1)(B) [loan-to-value ratios of purchased mortgages at the time of origination].

Exhibit E compares the LTV distribution on the goal-qualifying, single-family owner-occupied mortgages acquired by Freddie Mac in 2017 to the LTV distribution on all single-family owner-occupied mortgages acquired by Freddie Mac in 2017, as measured at the time of origination.

EXHIBIT E:

Distribution of Freddie Mac Single-Family Owner-Occupied Mortgage Purchases by LTV



Note: These calculations exclude those mortgages for which we do not have LTV information.
Source: Table 11 of the 2017 AMR.

F. Information Required Under § 307(f)(2)(F)

§ 307(f)(2)(F) requires that this report compare the level of securitization versus portfolio activity.

During 2017, Freddie Mac securitized approximately $411 billion in single-family and multifamily mortgage loans. We had total portfolio acquisitions of $280 billion. In 2017, Freddie Mac's portfolio decreased by $45 billion.

G. Information Required Under § 307(f)(2)(G)

§ 307(f)(2)(G) requires that this report assess underwriting standards, business practices, repurchase requirements, pricing, fees, and procedures, that affect the purchase of mortgages for low- and moderate-income families, or that may yield disparate results based on the race of the borrower, including revisions thereto to promote affordable housing or fair lending.[12]

12 As implemented by § 81.43(a) of the U.S. Department of Housing and Urban Development's regulations, 24 C.F.R. § 81.43(a) (2005).

Freddie Mac regularly evaluates market conditions, the credit environment and the performance of our mortgage purchases in an effort to ensure that our underwriting standards, business practices, repurchase requirements, pricing, fees and procedures serve our mission to provide liquidity and stability to the conforming mortgage market, and to promote affordable housing and fair lending.

During 2017, Freddie Mac continued to take steps consistent with prudent risk management to manage the risk of our credit terms, provide mortgage credit risk leadership in the marketplace, and help lenders make mortgage financing available for homeowners on terms intended to sustain successful homeownership. In doing so, Freddie Mac made the following significant credit policy changes and enhancements in 2017 to help serve low- and moderate-income families:

Updated Home Possible Mortgages Down Payment Assistance Requirements

- Reinforces sustainable solutions to make homeownership accessible to more borrowers by permitting gifts or grants from the seller as the originating lender provided the Borrower also contributes at least 3 percent of value from Borrower's personal funds and/or other eligible sources of funds. The 3 percent contribution requirement is an important factor in ensuring Freddie Mac continues to provide reasonable financing options and creates a sustainable homeownership opportunity for Borrower's with limited down-payment funds.
- Gifts or grants from the Seller as the originating lender must not be funded through the mortgage transaction, including differential pricing in rate, discount points, fee ("premium pricing") for individual loans or across the Home Possible offering.

Introduced the Freddie Mac Enhanced Relief Refinance℠ Offering

- A new high loan-to-value (LTV) refinance offering available in late 2018, that will replace Freddie Mac's current Relief Refinance℠ Mortgage offering.
- Provides refinance opportunities to borrowers with existing Freddie Mac mortgages who are making their mortgage payments on time but cannot take advantage of the Freddie Mac "no cash-out" refinance offering because the LTV ratio of the new mortgage exceeds the maximum limits.

Increased access to credit by expanding the eligible types of assets used as a basis for repayment of mortgage obligation

- Focuses on borrowers such as seniors who may rely on savings to meet monthly obligations, Freddie Mac revised its credit policy to allow depository accounts and securities as eligible assets for mortgage qualification, subject to certain conditions.
- Removes certain restrictions on asset calculation when establishing debt payment-to-income (DTI) ratios.

Updated requirements for calculating certain monthly DTI ratios, including our requirements for the treatment of student loan debt and contingent liabilities

- Recognizing many borrowers receive assistance in making certain debt payments, we updated our requirements to permit installment, revolving and lease payments to be excluded from the monthly DTI ratio when a party other than the borrower has been making timely payments on the debt for the most recent 12 months and certain other requirements are met.
- Revises requirements for qualifying borrowers with student loan debt to support access to credit and provide sellers with a responsible, simplified approach that addresses student loan repayment plans and student loan forgiveness programs offered today.
    - *Student loans in repayment* - Simplified documentation requirements for borrowers under a traditional, fully amortizing repayment plan or an income-derived student loan repayment plan.

- *Student loans in deferment or forbearance* - Sellers use the greater of the monthly payment amount on the credit report or one percent of the original loan balance or outstanding balance on the credit report. These options reflect a simple approach based on information provided on the borrower's credit report and requires no additional documentation from the borrower.
- *Student loan forgiveness, cancellation, discharge and employment-contingent repayment programs* - Exclude student loan debt from the monthly DTI ratio when certain conditions are met. This flexible approach excludes student loan debt when it is likely that such loan payments will no longer be required in the near future, or are not required currently and will not be required in the future.

Additional Mortgage Financing Options and Flexibility Changes

- Permitting 5-year ARMs as eligible ARM products for Home Possible Mortgages, Relief Refinance Mortgages and Financed Permanent Buydown Mortgages
- Streamlining the origination process for Home Possible Mortgages by enabling sellers to verify only the income needed to qualify the borrower for the Home Possible Mortgage, rather than all income reported on the loan application.
- Expanding the ability to qualify a borrower for a mortgage when the borrower's qualifying income will commence after the mortgage closing.

H. Information Required Under § 307(f)(2)(H)

§ 307(f)(2)(H) requires that this report describe trends in both the primary and secondary multifamily housing mortgage markets, including a description of the progress made, and any factors impeding progress, toward standardization and securitization of mortgage products for multifamily housing.

National Trends in the Primary and Secondary Multifamily Mortgage Markets

Apartment completions are an indication of the supply of rental housing. Net absorption, which is a measurement of the rate at which available apartments are occupied, is an indication of demand for rental housing.

While vacancy rates increased during 2017 as apartment completions outpaced net absorption, these rates remain well below the long-term average. Due to the introduction of a significant amount of new supply in the latter half of the year, net absorptions significantly lagged behind new apartment completions in 2017. We expect continued strong demand, however it may take longer to absorb these new units compared to prior years. In addition, Reis, Inc. reported that effective rent (i.e., the average rent paid by the tenant over the term of the lease, adjusted for concessions by the landlord and costs borne by the tenant) growth for 2017 remained strong relative to the long-term averages, primarily due to an increase in potential renters from healthy employment, higher single family home prices and a growing household preference for rental housing due to changes in lifestyle preferences and demographic trends. Our financial results for 2017 were not significantly affected by these market conditions.

Multifamily property prices continued to grow with 11 percent annualized growth in 2017, indicating a healthy multifamily market, though prices were tempered by moderating effective rent growth, higher vacancy rates and rising interest rates.

While the impacts of Hurricanes Irma and Maria on the multifamily markets located in the affected areas are still being evaluated, we have seen effective rents increase and vacancy rates decrease in the areas affected by Hurricane Harvey, as displaced single-family homeowners require temporary housing, resulting in increased demand for rental housing.

During 2017, the multifamily mortgage market grew significantly because of stronger demand for multifamily loan products due to an elevated number of new apartment completions, strong multifamily market fundamentals and low interest rates. Multifamily market fundamentals were primarily driven by a healthy job market, population growth, high propensity to rent among young adults and rising single-family home prices. We expect continued growth in the multifamily mortgage market during 2018 due to these same drivers. Our share of multifamily mortgage debt outstanding grew slightly during 2017, primarily due to our strategic pricing efforts and the expansion of our new product offerings, which were generally excluded from the Conservator Scorecard production cap.

We report multifamily delinquency rates based on the UPB of loans in our multifamily mortgage portfolio that are two monthly payments or more past due or in the process of foreclosure, as reported by our servicers. Loans that have been modified (or are subject to forbearance agreements) are not counted as delinquent as long as the borrower is less than two monthly payments past due under the modified (or forbearance) terms. The vast majority of our forbearance agreements are short-term (3 months) and resulted from the 3Q 2017 hurricane impacts. At December 31, 2017, the total loan UPB subject to forbearance agreements was $673 million, which consisted of $489 million of loans underlying off-balance-sheet securitizations and $184 million of on-balance-sheet loans held in our retained portfolio. We expect the majority of these loans will be current at the expiration of the forbearance period, resulting in no significant impact to our financial results.

Our multifamily delinquency rates during 2017 remained low compared to other industry participants, ending the year at 2 bps, primarily due to our prior-approval underwriting approach, strong multifamily market fundamentals and low interest rates. We expect the credit losses and delinquency rates for the multifamily mortgage portfolio to remain low in the near term.

Freddie Mac Multifamily Financing and Initiatives

The 2017 Conservatorship Scorecard production cap remained unchanged at $36.5 billion. Our new business volume and outstanding loan purchase commitments were higher during 2017 compared to 2016 due to the overall growth of the multifamily mortgage market resulting from stronger demand for multifamily loan products and our strategic pricing efforts. Despite the unchanged production cap, we had a record volume in 2017 primarily due to a focus on purchase activity associated with targeted loan types that were considered uncapped.

Approximately 46 percent of our new business volume for 2017 counted towards the 2017 Conservatorship Scorecard production cap, while the remaining 54 percent was considered uncapped. The increase in uncapped new business volume was primarily driven by the growth in purchases of loans originated pursuant to our Green Advantage initiative, which we expanded during 2017, along with our effort to support the growth of the overall multifamily market. Approximately 83 percent of the eligible units we financed during 2017 were affordable to households earning at or below the median income in their area (eligible units are multifamily units that qualify towards our affordable housing goal). Furthermore, during 2017, we continued our support of workforce housing through our continued purchases of manufactured housing community loans and small balance loans.

Approximately 88 percent of our 2017 new business volume was designated for securitization and included in our securitization pipeline. Combined with market demand for our securities, our new business volumes from the second half of 2017 will be the primary driver of our credit risk transfer securitizations, primarily our K Certificate and SB Certificate issuances, for the first half of 2018.

While our share of multifamily mortgage debt outstanding increased slightly during 2017, we expect increased competition from other market participants to continue in the future.

The Conservator Scorecard production cap will decrease to $35.0 billion in 2018. The production cap is subject to reassessment throughout the year by FHFA to determine whether an increase in the cap is appropriate based on a stronger than expected overall market. We do not expect that the decrease in the cap will have a material impact on our 2018 new business volume.

Standardization and Securitization

Our primary business model is to acquire multifamily loans for aggregation and then securitization through the issuance and guarantee of debt securities. The returns we generate from these activities are primarily derived from (i) the net interest income we earn on the loans prior to their securitization, (ii) the price received upon securitization of the loans versus the price we paid to acquire the loans and (iii) the ongoing guarantee fee we receive in exchange for providing our guarantee of the issued debt securities. We evaluate these factors collectively in order to maximize our returns and to assess the profitability of any given transaction.

Our securitization activities generally provide us with a mechanism to finance our loan product offerings and to transfer a large majority of expected and stress credit losses of the loans that we purchase to third parties. For multifamily loans that we do not intend to securitize, we may pursue other strategies, including structured sales or the execution of other credit risk transfer products designed to transfer all or a portion of the loans' credit risk to third parties, therefore reducing taxpayer exposure.

Through our network of approved lenders, we offer borrowers a variety of loan products for the acquisition, construction, refinance and/or rehabilitation of multifamily properties. While our approved lenders originate the loans that we purchase, we use a prior-approval underwriting approach, in contrast to the delegated underwriting approach used in our Single-Family Guarantee segment. Under this approach, we maintain credit discipline by completing our own underwriting, credit review and legal review for each loan, including review of third-party appraisals and cash flow analysis, prior to issuing a loan purchase commitment. We also price every loan or transaction based on the specific terms, structure and type of execution.

While most of our securitizations result in the transfer of credit risk through the issuance of multi-class securities, typically through the issuance of K Certificates and SB Certificates, we also issue and guarantee a smaller number of other types of single-class and multi-class securities that do not result in the transfer of credit risk.

Since 2009, we have transferred a large majority of the expected and stress credit losses related to $249 billion in UPB of multifamily loans through our credit risk transfer products, primarily K Certificates and SB Certificates. While our K Certificate and SB Certificate issuances continue to be our primary mechanism to transfer multifamily mortgage credit risk, we introduced new initiatives to transfer credit risk during 2017 and continue to seek new and innovative credit risk transfer opportunities beyond our current product offerings so that we can provide further liquidity to the multifamily market and reduce taxpayer exposure to credit risk.

I. Information Required Under § 307(f)(2)(I)

§ 307(f)(2)(I) requires that this report describe trends in the delinquency and default rates of mortgages secured by housing for low- and moderate-income families that have been purchased by the Corporation, including a comparison of such trends with delinquency and default information for mortgage products serving households with incomes above the median level that have been purchased by the Corporation, and evaluate the impact of such trends on the standards and levels of risk of mortgage products serving low- and moderate-income families.

Two measures contrast the delinquency and default performance of mortgages serving low- and moderate-income (LMI) borrowers to the performance of mortgages serving borrowers who are above the area median income (non-LMI). In Exhibit I, the chart compares Early 90-day delinquencies (occurring within the first 12 months of acquisition) and defaults.[13]

13 The information presented in this section and in Exhibit I is based upon an analysis of unseasoned, conforming, conventional, forward amortizing, first lien, non-Graduated Equity Mortgages/Graduated Payment Mortgages. Delinquency is defined as the borrower ever being 90 or more days delinquent on the mortgage within 12 months of Freddie Mac's acquisition. Default is defined as a foreclosure, deed-in-lieu of foreclosure, or third party sale occurring at any point since Freddie Mac acquired the mortgage. With respect to the delinquency rate, we analyzed only the performance during the first year so that we could present a trend over time that avoided commingling mortgages of different ages. The analysis presented here does not control for other risk factors, such as LTV or credit history.

EXHIBIT I:

Relative Early 90-Day Delinquency and Default Rates between Freddie Mac Single-Family Loans Serving Low- and Moderate-Income Families and Loans Serving Families with Income above the Median Level, by Year

Acquisition Year	Income Group	Likelihood of Serious Early 90-Day Delinquency	Increased Likelihood of Serious Early 90-Day Delinquency	Likelihood of Default	Increased Likelihood of Default
2002	Above Median Income	0.2%		0.6%	
	Low-Mod Income	0.5%	184%	2.1%	259%
2003	Above Median Income	0.1%		0.7%	
	Low-Mod Income	0.3%	172%	2.2%	206%
2004	Above Median Income	0.2%		1.6%	
	Low-Mod Income	0.4%	132%	3.7%	136%
2005	Above Median Income	0.3%		3.7%	
	Low-Mod Income	0.5%	75%	6.0%	59%
2006	Above Median Income	0.7%		7.5%	
	Low-Mod Income	0.8%	16%	8.7%	16%
2007	Above Median Income	2.0%		9.5%	
	Low-Mod Income	2.2%	13%	11.8%	25%
2008	Above Median Income	1.4%		3.4%	
	Low-Mod Income	2.0%	41%	6.2%	80%
2009	Above Median Income	0.2%		0.4%	
	Low-Mod Income	0.3%	94%	1.2%	193%
2010	Above Median Income	0.1%		0.3%	
	Low-Mod Income	0.2%	112%	0.9%	210%
2011	Above Median Income	0.1%		0.2%	
	Low-Mod Income	0.3%	137%	0.6%	230%
2012	Above Median Income	0.1%		0.2%	
	Low-Mod Income	0.3%	114%	0.5%	233%
2013	Above Median Income	0.1%		0.1%	
	Low-Mod Income	0.2%	130%	0.4%	222%
2014	Above Median Income	0.1%		0.1%	
	Low-Mod Income	0.2%	125%	0.3%	211%
2015	Above Median Income	0.1%		0.0%	
	Low-Mod Income	0.1%	112%	0.1%	133%
2016	Above Median Income	0.1%		0.0%	
	Low-Mod Income	0.2%	72%	0.0%	140%

Source: Internal Freddie Mac delinquency study.

J. Information Required Under § 307(f)(2)(J)

§ 307(f)(2)(J) requires that this report describe in the aggregate the seller and servicer network of the Corporation, including the volume of mortgages purchased from minority-owned, women-owned, and community-oriented lenders, and any efforts to facilitate relationships with such lenders.

Freddie Mac purchases mortgages from a network of more than 1,786 Single-Family lenders and approximately 33 active Multifamily lenders, benefiting borrowers and renters across the U.S. and its territories. Freddie Mac purchases mortgages from all major lender types. Some of these firms sell mortgages to Freddie Mac on a regular basis, while others sell to Freddie Mac only occasionally.

Of the total Single-Family seller network, about 1,160 Single-Family lenders sold mortgages to Freddie Mac in 2017, and approximately 88 percent of these Single-Family lenders are considered community-oriented lenders. In 2017, Freddie Mac purchased approximately $66 billion in Single-Family mortgages from community-oriented lenders, approximately $68 billion in Single-Family mortgages from regional lenders, and approximately $17 billion in Single-Family mortgages from lenders which identified themselves as minority-owned and women-owned. Freddie Mac's ongoing efforts to facilitate relationships with community-oriented lenders supported our continued ability to source mortgages from these lender institutions.

We continued our alliances with the Independent Community Bankers of America, the Credit Union National Association, the Capital Markets Cooperative, the Mortgage Bankers Association, The Mortgage Collaborative, Lenders One and The Community Mortgage Lenders of America. In 2017, 614 Single-Family lenders participated in our alliance programs, which provide additional services to our lender customers, including customized training opportunities and involvement in local and regional strategic market initiatives. Approximately 18 percent of Single-Family dollar volume was from community and regional lenders participating in our alliance programs.

Of the total Multifamily mortgages purchased by Freddie Mac in 2017, 28 of the 33 active Multifamily lenders sold the large majority of such mortgages to Freddie Mac,[14] with the 5 remaining lenders participating in one-time structured transactions. Of the total Multifamily active lender network, 2 such lenders identified themselves as community-oriented lenders and 1 such lender identified themselves as a woman-owned lender.

K. Information Required Under § 307(f)(2)(K)

§ 307(f)(2)(K) requires that this report describe the activities undertaken by the Corporation with non-profit and for-profit organizations and with State and local governments and housing finance agencies, including how the Corporation's activities support the objective of comprehensive housing affordability strategies under section 12705 of Title 42.

Freddie Mac undertakes numerous activities in support of affordable housing with state and local governments, housing finance agencies, our lender customers, and a wide variety of non-profit and for-profit organizations. The following sections describe some of these affordable activities Freddie Mac continued to take in 2017 that should also support the objectives of the Cranston-Gonzalez National Affordable Housing Act.

14 These lenders include our Conventional, Targeted Affordable Housing, Seniors Housing and Small Balance Loan lenders. This list is available at http://www.freddiemac.com/multifamily/lenders/.

HFA Activities

Freddie Mac recognizes the vital role housing finance agencies (HFAs) play in providing financing and programs that create housing opportunities for low to moderate income borrowers, and believes working collaboratively with HFAs is critical to advancing affordable, sustainable homeownership. To that end, Freddie Mac continues to explore and identify opportunities to partner with HFAs in a variety of ways.

Consistent and Sustainable Liquidity Source: Our HFA Advantage mortgage product was specifically created to support state and local HFAs' affordable lending efforts. HFA Advantage allows 97 percent maximum loan-to-value (LTV) and 105 percent maximum total LTV (TLTV) ratio limits, offers preferential pricing, enables HFAs to apply their own mission-driven income limits, allows their preferred homebuyer education programs, and requires minimum mortgage insurance coverage. A growing number of HFAs offer HFA Advantage and it continues to gain momentum in the market. In 2017, 88 percent of HFA Advantage purchase mortgages were attributable to first-time homebuyers, and approximately 60 percent of the HFA loans delivered to Freddie Mac qualified for at least one Single-Family affordable housing goal.

Outreach and Training: In 2017, approximately 3,100 housing industry professionals, including various HFA staff, HFA master servicers and key personnel from HFA-approved participating lenders participated in 43 Freddie Mac-hosted HFA Advantage webinar training sessions nationwide. Additionally, various Freddie Mac teams provided dozens of in-person training sessions, operational support, and consultation on Freddie Mac loan products, program design and housing market trends. Freddie Mac's numerous on-site visits, training offerings, continued presence at HFA conferences, and regularly scheduled calls and meetings with HFAs and their trade associations (including the National Council of State Housing Agencies and the National Association of Local Housing Finance Agencies) ensures that Freddie Mac stays in-step with our HFA customers and their business partners.

Collaboration and Input: Freddie Mac's dedicated internal HFA teams focus on actively growing our relationships with state and local HFAs. We endeavor to seek HFAs' counsel on particularly innovative affordable housing activities in which they regularly engage. Additionally, HFAs we partner with actively participate in key corporate advisory groups such as the Affordable Housing Advisory Council and the Manufactured Housing Initiative Task Group, and most recently, in April 2017, we established the HFA Technology Working Group dedicated to HFAs.

Housing Finance Agency Initiative

On behalf of the U.S. Department of the Treasury, Freddie Mac continues to effectively manage the administration of the HFA Initiative – New Issue Bond Program (NIBP). As part of the Homeowner Affordability and Stability Plan, the HFA Initiative was an interim solution designed in 2009 to assist state and local HFAs' lending programs and support their infrastructure. To ensure effective and proper governance of the NIBP program, Freddie Mac employees from Single-Family, Multifamily, Counterparty Credit Risk and Legal continue to support Freddie Mac's administration of the NIBP jointly with Fannie Mae.

The Temporary Credit and Liquidity Program (TCLP), another component of the HFA Initiative, was successfully closed on December 31, 2015.

Foreclosure Prevention Activities

In 2017, Freddie Mac continued to support foreclosure prevention activities through outreach initiatives, events, and activities with housing professionals. These efforts have resulted in approximately 31,000 borrowers receiving information and education on alternatives to foreclosure through our trusted non-profit housing counseling relationships.

In support of FHFA's Neighborhood Stabilization Initiative (NSI), an effort to stabilize communities that have been hardest hit by the housing crisis, Freddie Mac continued its Block-by-Block initiative designed to revitalize urban neighborhoods that are continuing to recover from the recent economic housing crisis. Through collaboration with neighborhood organizations, local residents, and key stakeholders, the initiative is intended to help facilitate sustainable neighborhood recovery.

In Chicago's Auburn Gresham neighborhood, the Block-by-Block initiative has resulted in more than 550 individuals receiving housing and/or financial counseling, 24 homes receiving home improvements, and more than 1,500 people attending community outreach events. As a result, homeownership in this neighborhood is increasing while vacancies continue to decrease. Due to the initiative's success in the Auburn Gresham neighborhood, adjacent neighborhoods sought similar assistance. In late 2017, Freddie Mac introduced the Block-by-Block initiative in Chicago's Chatham neighborhood resulting in 2 new homeowners, 46 individuals receiving housing and/or financial counseling, and 3 individuals receiving MHA Hardest Hit Funds® to assist in avoiding foreclosure.

Finally, the Block-by-Block initiative in Baltimore, launched in 2016 to rebuild one of the city's hardest-hit neighborhoods, continues to build and expand. To date, this initiative has educated more than 625 individuals on homebuying and financial capability, and provided approximately 160 housing industry professionals with information on affordable housing products and tools. The initiative's participating non-profit has acquired 11 properties in the designated area, with rehabilitation completed on 2 of the properties. Community events and meetings with residents and key stakeholders are regularly held to discuss initiative progress.

Borrower Help Centers/Borrower Help Network

Freddie Mac continued to maintain its "Borrower Help Centers & Network" (BHC/N) with selected non-profit organizations in several metropolitan areas, as a single source of mortgage-related help with HUD-certified counselors. Most recently, we opened a 14th Borrower Help Center in McComb, Mississippi, located in the Mississippi Delta. Given the success of the BHC/N in reducing borrower delinquencies, the BHC/N repositioned its purpose in the community to now focus on preparing potential homebuyers for homeownership through financial capability, homebuyer education and counseling, and Freddie Mac is generally seeing a significant increase in the number of individuals seeking to enter or re-enter the housing market.

In 2017, the BHC/N and other partners provided approximately 35,000 individuals with one-on-one pre-purchase counseling, homebuyer education to more than 38,000 consumers, financial capability education to more than 194,000 individuals, referred more than 11,000 potential homebuyers to lenders for homeownership opportunities, and provided foreclosure avoidance education and counseling to approximately 32,000 households.

Other Initiatives with Non-Profits

Freddie Mac continues to engage non-profit organizations, lenders and housing professionals in educational and outreach initiatives designed to inform and prepare homebuyers and homeowners on how to build and maintain better credit, make sound financial decisions and understand the steps to successful long-term homeownership. The educational tools used to support these initiatives include CreditSmart®, a multilingual financial education curriculum[15] offering training opportunities 3 times per year, "CreditSmart Online," "Workforce Home Benefit," "Your Step-By-Step Mortgage Guide," "Get the Facts on Homeownership," and "Take Root" outreach campaigns.

2017 continued to see a significant increase in the requests for CreditSmart training and materials from the non-profits we work with as they are seeing an increase in the numbers of potential borrowers wanting to enter or re-enter the home buying space. Additionally, we began building a CreditSmart training opportunity offered in Spanish, a CreditSmart module for service members, and, alongside Easter Seals, provided a training opportunity for those with disabilities.

15 http://www.freddiemac.com/creditsmart/.

Regional and Local Initiatives

Freddie Mac also undertakes numerous outreach initiatives designed to expand homeownership opportunities specifically in minority and underserved communities in states and localities across the country. These initiatives include financial literacy, homebuyer education and counseling, access to bilingual homeownership information and counseling, outreach to military service members, outreach to women and outreach to individuals and families with disabilities. Freddie Mac also continued to conduct workshops to increase the awareness, understanding and focus of local housing industry participants in the first-time home buying process. These workshops were conducted in 5 markets with approximately 400 industry professionals attending.

Affordable Housing Advisory Council (AHAC)

The AHAC is an annual in person meeting and quarterly conference call series that Freddie Mac hosts to engage affordable housing leaders to discuss, review and confirm various aspects of our affordable housing approach, policies and initiatives. In November, AHAC convened to discuss key topics facing the affordable housing industry, with approximately 25 executive level representatives from housing finance agencies, lenders, housing intermediaries, housing advocates, realtors and other industry stakeholders attending. Attendees were broken into 2 sub-groups in order to provide an opportunity to rotate and fully engage with Freddie Mac staff on discussions around the Borrower of the Future℠ and Reimagining the Mortgage Experience℠.[16,17] Subject matter experts from Freddie Mac led these interactive discussions.

16 http://www.freddiemac.com/singlefamily/pdf/2017CONNECTBecketti.pdf.

17 http://www.freddiemac.com/perspectives/michael_bradley/20171116_big_data_freddie_mac.html.

