

# Global Markets Analysis Report

A MONTHLY PUBLICATION OF GINNIE MAE'S  
OFFICE OF CAPITAL MARKETS



PREPARED FOR GINNIE MAE  
BY STATE STREET GLOBAL ADVISORS  
URBAN INSTITUTE, HOUSING FINANCE POLICY CENTER

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# HIGHLIGHTS

## Are we in another housing bubble?

US national nominal home prices regained their pre-crisis peak level in August this year (see page 12), leading many to wonder if we are in another housing bubble. Housing bubble typically is a result of house price growth that isn't sustainable because it isn't consistent with underlying fundamentals. After adjusting for inflation, real home prices have increased by 34 percent since 2012. Though significant, this increase is less than half the pace seen in the years leading up to the previous housing bubble between 1997 and 2006, which saw home price growth outpace inflation by 87 percent.

The more important question is whether the recent price appreciation is driven by fundamentals such as growth in household incomes. In 2012, a family earning the median income needed to devote 18 percent of that income towards their monthly payment to buy the median home with a typical mortgage. Today, this measure has increased to 22 percent due to increases in both home prices and mortgage rates. But it is still below the historical average of 24 percent, suggesting that nationwide home prices are tracking the broader economic expansion and are likely sustainable.

Although at national level, we are not likely in another housing bubble there are greater concerns in a few local regions. Cities like San Francisco and the bay area, Miami, Portland, Seattle and Los Angeles have experienced the fastest home price growth in recent years, and are also among the least affordable areas in the nation. Home financing in these high-priced areas rely more on the conventional market, e.g., Freddie Mac, Fannie Mae and jumbo mortgages, than on the government programs, e.g., FHA and VA. In other words, geographies that are currently at a higher risk of being in a housing bubble comprise a relatively smaller share of the Ginnie Mae market (Page 13).

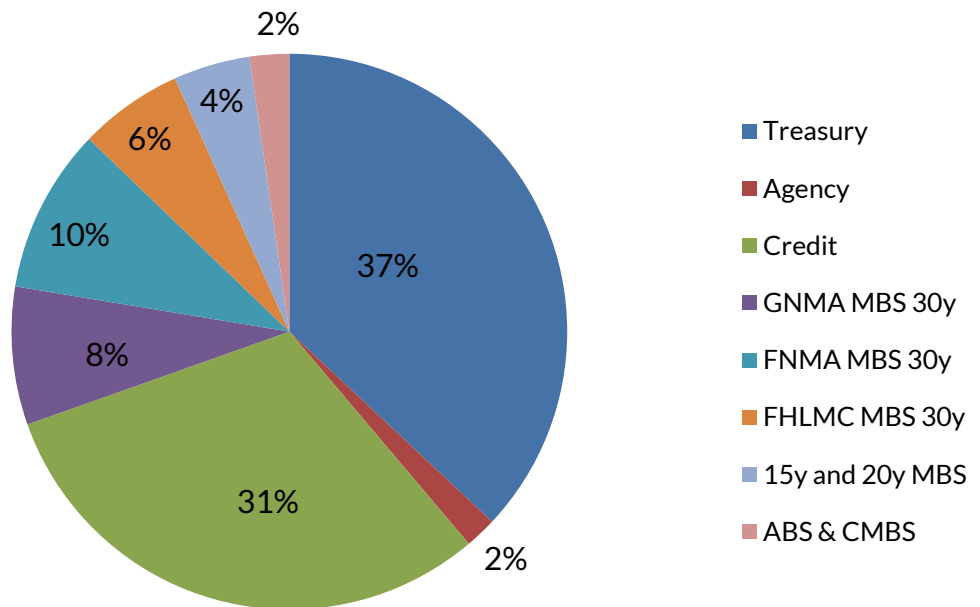
### ***Highlights this month:***

- As the Federal Reserve began to wind down its portfolio in October, Treasury and Ginnie Mae MBS yields both increased slightly, while current coupon Ginnie Mae MBS spreads relative to Treasuries tightened by 4-5bp (Pages 5 and 6).
- The attractiveness of US MBS yields versus JGBs and German bunds marginally improved in October 2017 due to slightly higher US yields and lower Bund yields (Pages 7-8).
- Nominal national home prices reached the pre-crisis peak level in August 2017 (Page 12).
- The refinance share edged up while agency gross issuance fell in September, a typical seasonal effect associated with lower purchase volumes attributable to the end of the heavy summer purchase activity (Pages 19 and 20).

# Relative Attractiveness of US Fixed Income and Ginnie Mae MBS

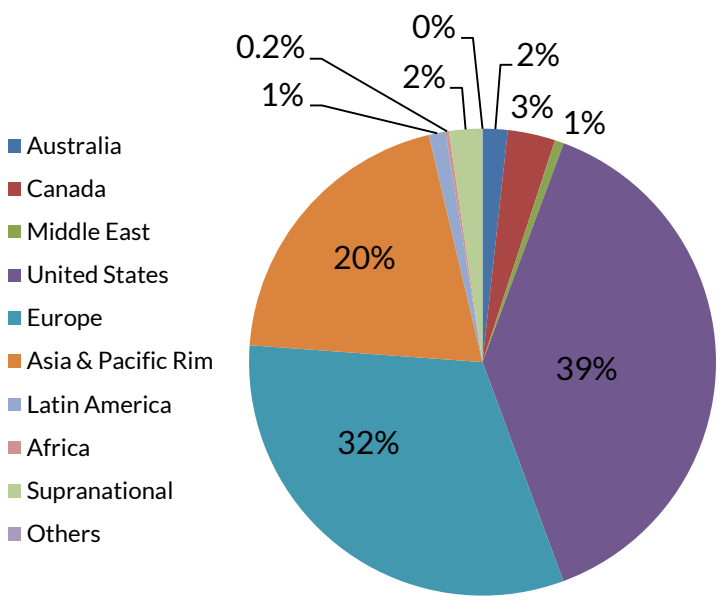
US MBS comprise 28 percent of the Barclays US Aggregate Index-- slightly less than either the US Treasury share (37%) or the US Credit share (31%). Fannie Mae 30-year MBS comprises the largest percent of US MBS (10%), while Ginnie Mae 30-year MBS and Freddie Mac 30-year MBS comprise 8 percent and 6 percent of the market, respectively. Mortgages with terms of 15- and 20- year comprise the balance (4%) of the US MBS share. US securities are the largest single contributor to the Barclays Global Aggregate, accounting for 39 percent of the global total. US MBS comprises 11 percent of the global aggregate.

**Barclays US Aggregate Index**



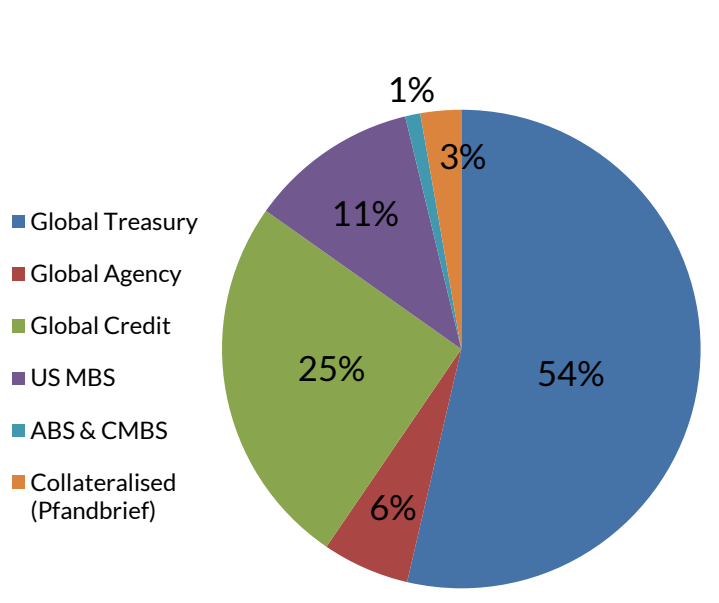
Sources: Bloomberg and State Street Global Advisors. Note: Data as of September 2017

**Barclays Global Aggregate Index by Country**



Sources: Bloomberg and State Street Global Advisors. Note: Data as of September 2017

**Barclays Global Aggregate Index by Sector**

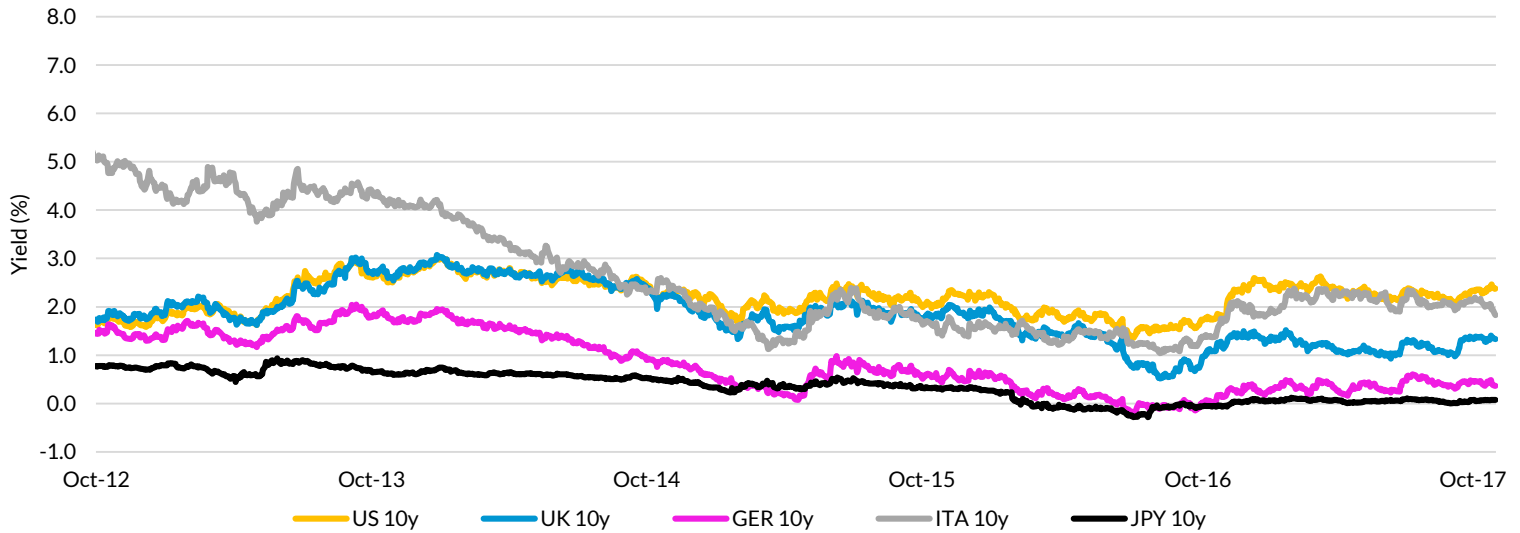


Sources: Bloomberg and State Street Global Advisors. Note: Data as of September 2017

# Relative Attractiveness of US Fixed Income and Ginnie Mae MBS

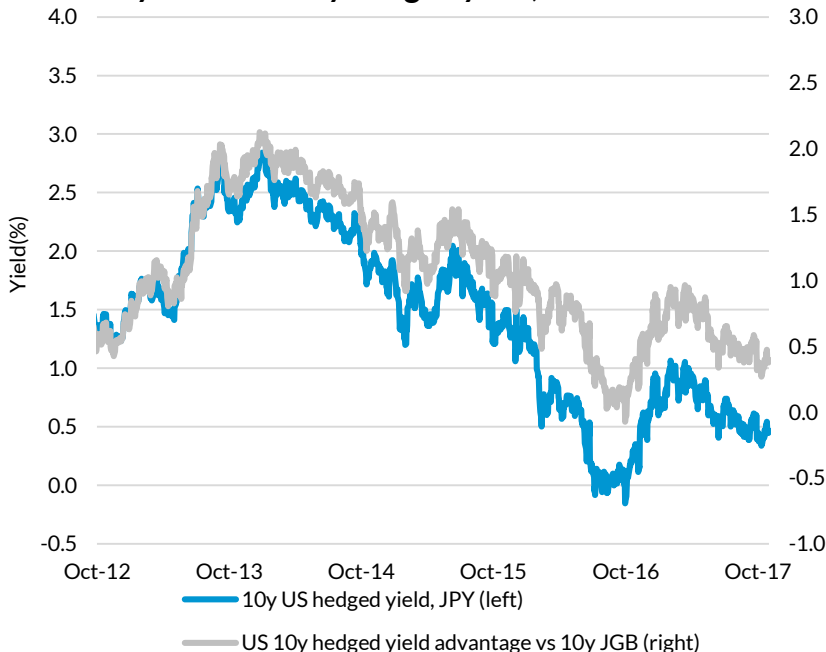
Over the past few years, US Treasury interest rates, as measured by the 10-year note have generally been the highest in the developed world, along with Italy. The US 10-year Treasury note was at 2.33 percent in September, and has edged up to 2.38 percent this month. Interest rates for Italy, Germany, and the UK declined slightly to 1.83, 0.36, and 1.33, respectively. Interest rates for Japan stayed stable at 0.07. If the Treasury notes are hedged into foreign currencies, 10-year US Treasury yields are 40 basis points (bps) above 10-year JGBs, and 17 below 10-year Bunds. This month the positive hedged yield differential between 10-year Treasuries and JGBs increased by 4 bps while the negative hedged yield spread relative to 10-year Bunds decreased by 7 bps.

### Global 10-year Treasury Yields



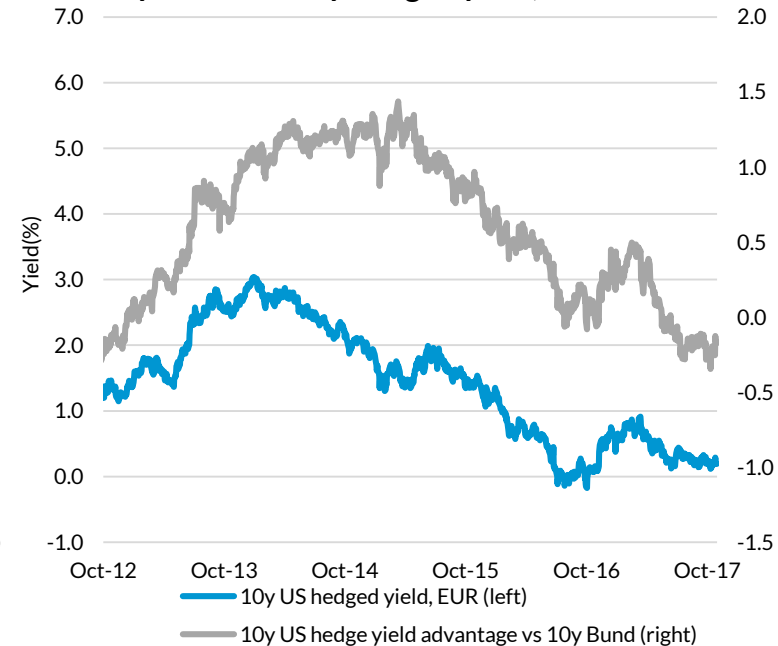
Sources: Bloomberg and State Street Global Advisors. Note: Data as of October 2017

### 10yr US Treasury hedged yield, JPY



Sources: Bloomberg and State Street Global Advisors.  
Note: Data as of October 2017

### 10yr US Treasury hedged yield, EUR

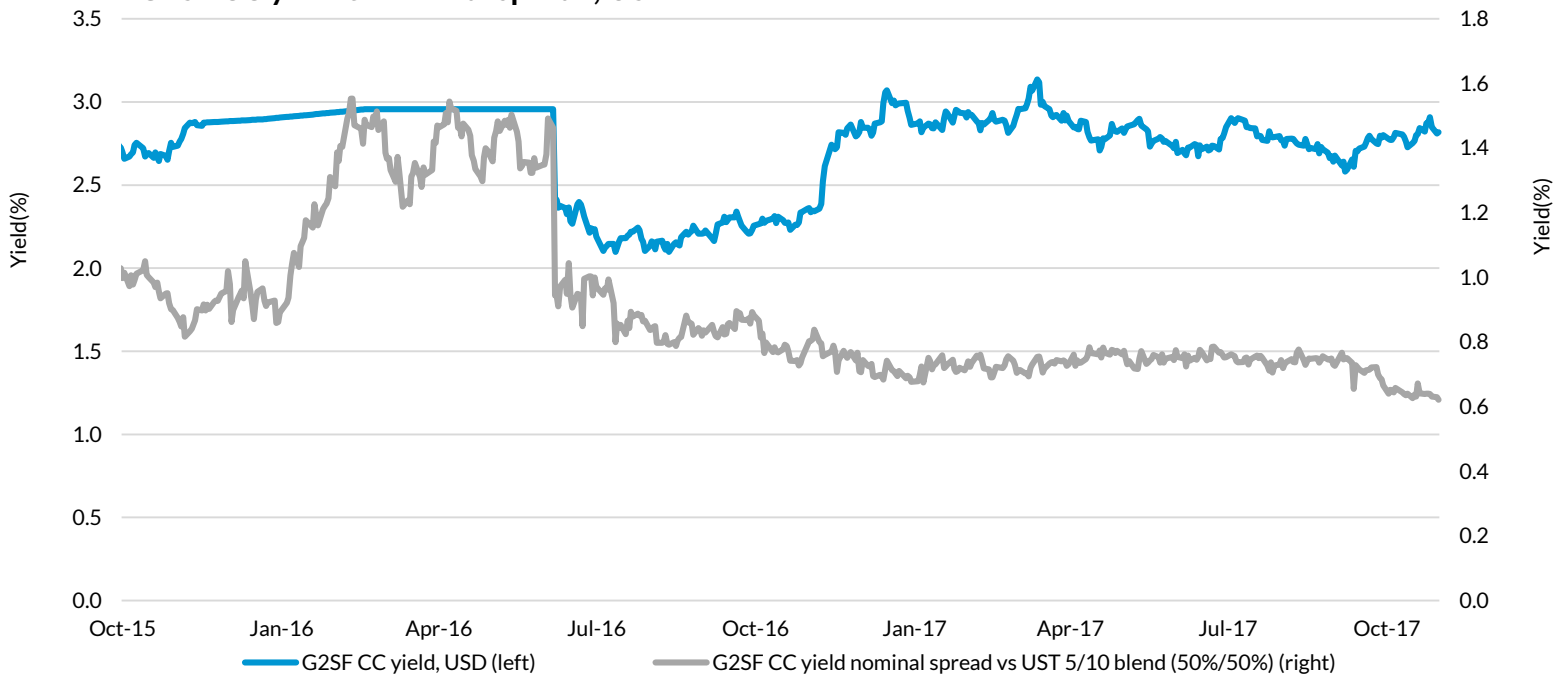


Sources: Bloomberg and State Street Global Advisors  
Note: Data as of October 2017

# Relative Attractiveness of US Fixed Income and Ginnie Mae MBS

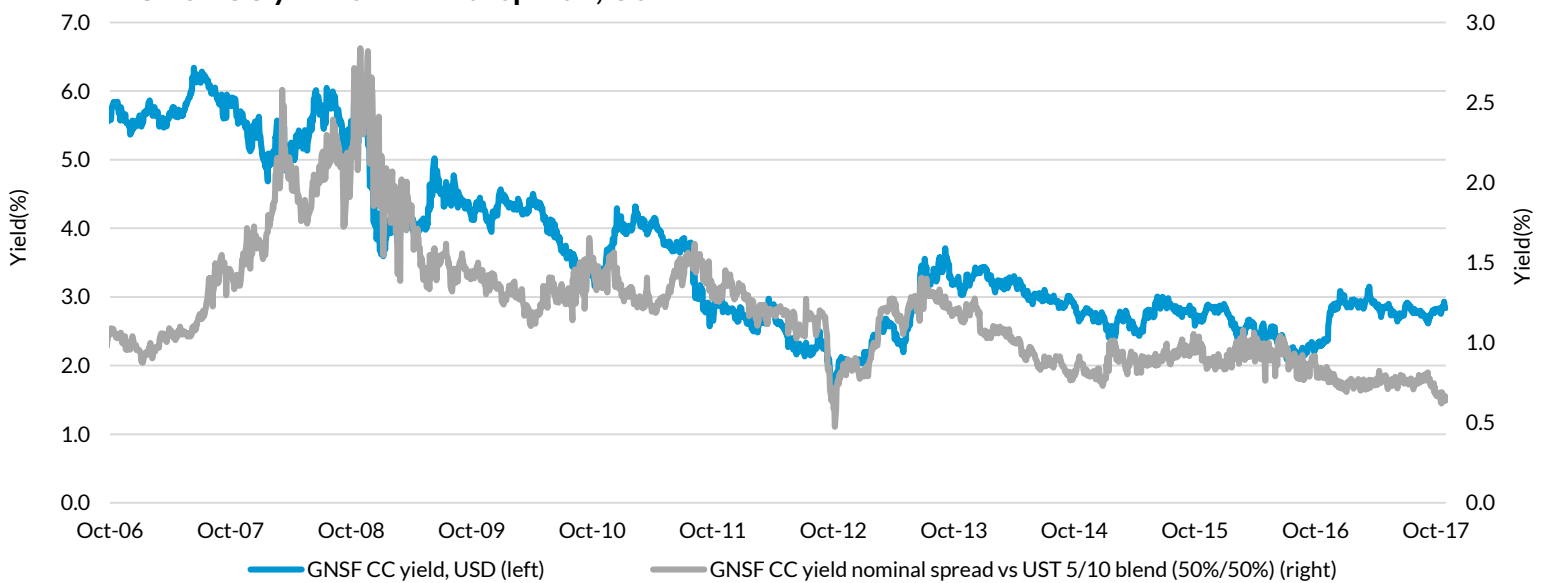
With the Fed beginning to shrink its investments in MBS and Treasuries in October 2017, nominal yield spreads on current coupon GNMA II and GNMA I securities tightened by 5 bps and 4 bps, respectively. Current coupon Ginnie Mae securities currently out yield their Treasury counterparts by approximately 63 bps (relative to the average of 5- and 10-year Treasury yields).

**G2SF CC yield & nominal spread, USD**



Sources: Bloomberg and State Street Global Advisors. Note: Data as of October 2017

**GNSF CC yield & nominal spread, USD**

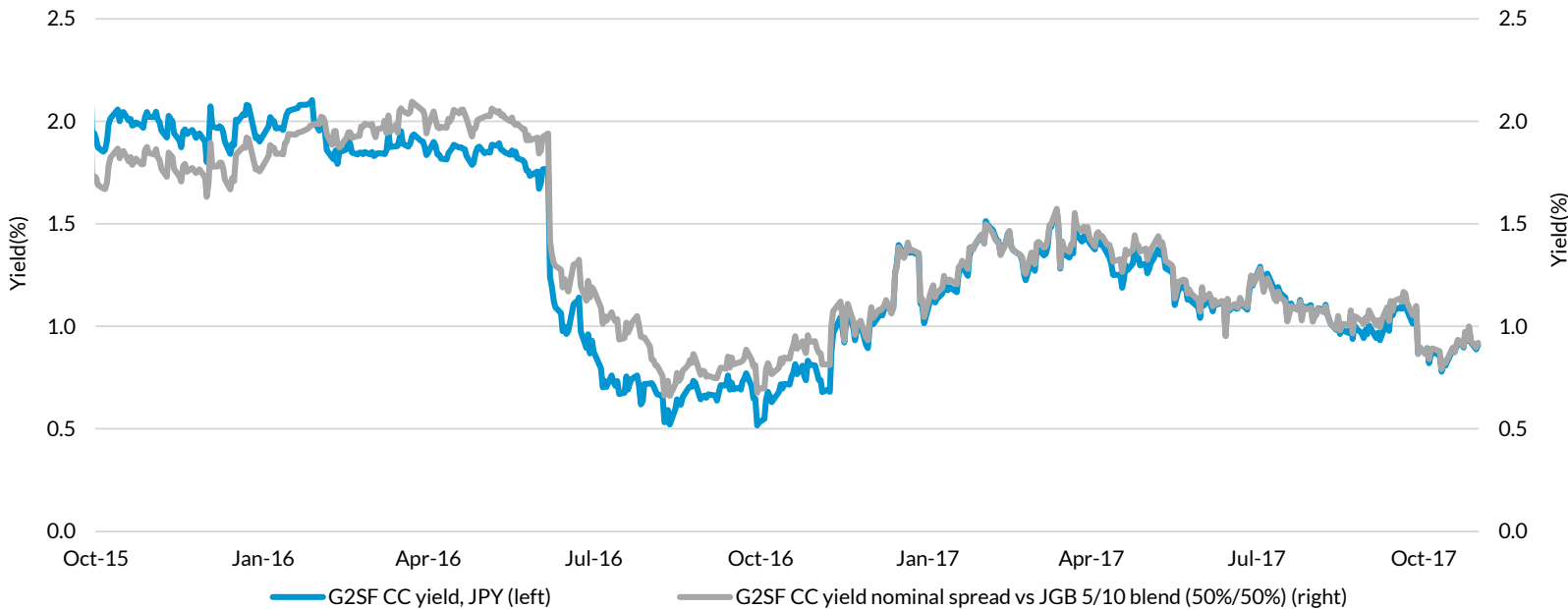


Sources: Bloomberg and State Street Global Advisors. Note: Data as of October 2017

# Relative Attractiveness of US Fixed Income and Ginnie Mae MBS

If Ginnie Mae securities are hedged into foreign currencies, they look attractive on a yield basis versus many sovereign alternatives. The figures show that current coupon GNMA MBS hedged into Japanese yen provide a yield advantage of 93 bps relative to blended yield of 5-year and 10-year JGBs.

**G2SF CC yield & nominal spread, JPY**



Sources: Bloomberg and State Street Global Advisors. Note: Data as of October 2017

**GNSF CC yield & nominal spread, JPY**

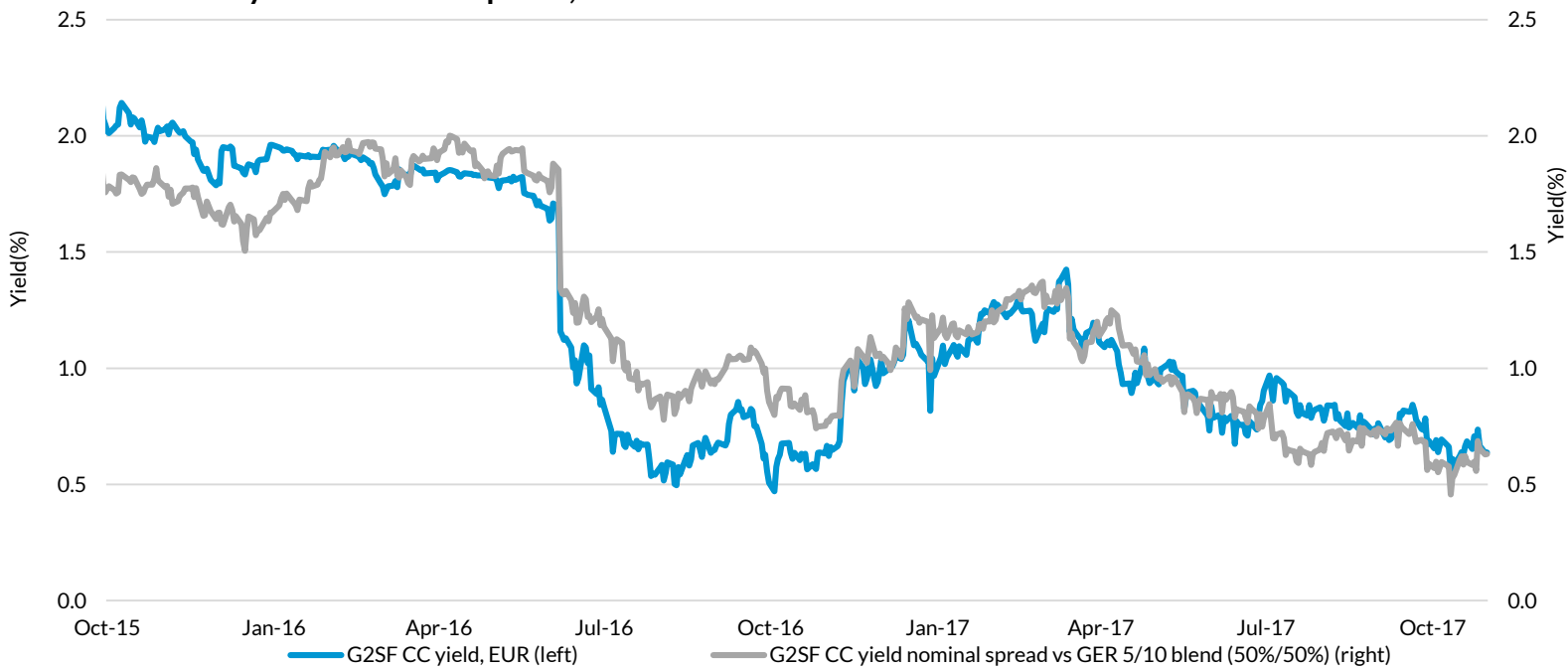


Sources: Bloomberg and State Street Global Advisors. Note: Data as of October 2017

# Relative Attractiveness of US Fixed Income and Ginnie Mae MBS

If Ginnie Mae securities are hedged into foreign currencies, they look attractive on a yield basis versus sovereign alternatives. The figures show that current coupon GNMA MBS hedged with euros provide a yield advantage of 64 bps relative to the blended yield of 5-year and 10-year German bunds.

**G2SF CC yield & nominal spread, EUR**



Sources: Bloomberg and State Street Global Advisors. Note: Data as of October 2017

**GNSF CC yield & nominal spread, EUR**

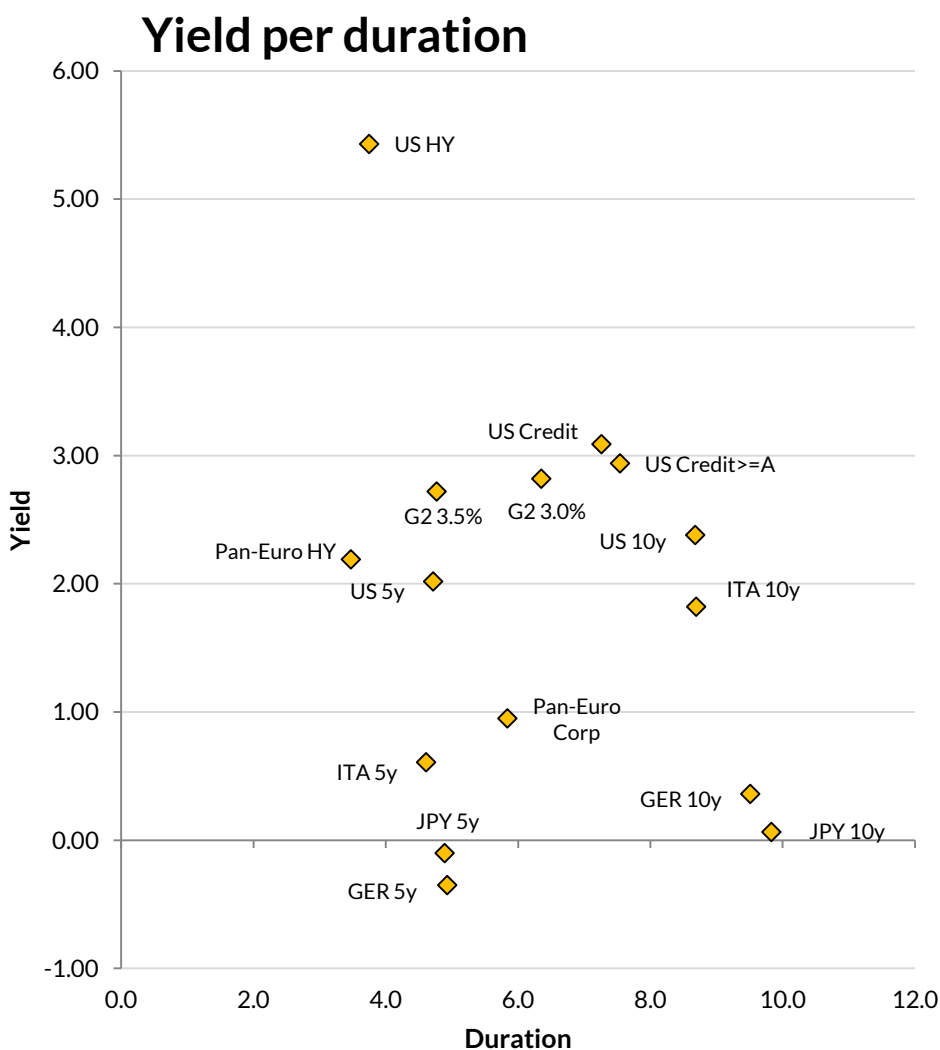


Sources: Bloomberg and State Street Global Advisors. Note: Data as of October 2017



# Relative Attractiveness of US Fixed Income and Ginnie Mae MBS

US MBS yields are about the same or higher than most securities with the same or longer durations. The only security class with significantly higher yield is the US high yield index, where interest rate risk does not fully capture the volatility of the high yield asset class. Investors are unable to match the yield on Ginnie Mae securities, while preserving the full government guarantee, even if they extend their duration significantly.



| Security       | Duration | Yield |
|----------------|----------|-------|
| US 5y          | 4.7      | 2.02  |
| US 10y         | 8.7      | 2.38  |
| GNMA II 3%     | 6.4      | 2.82  |
| GNMA II 3.5%   | 4.8      | 2.72  |
| JPY 5y         | 4.9      | -0.10 |
| JPY 10y        | 9.8      | 0.06  |
| GER 5y         | 4.9      | -0.35 |
| GER 10y        | 9.5      | 0.36  |
| ITA 5y         | 4.6      | 0.61  |
| ITA 10y        | 8.7      | 1.82  |
| US credit      | 7.3      | 3.09  |
| US credit >= A | 7.5      | 2.94  |
| US HY          | 3.8      | 5.43  |
| Pan-Euro corp  | 5.8      | 0.95  |
| Pan-Euro HY    | 3.5      | 2.2   |

Sources: Bloomberg and State Street Global Advisors. Note: Yields are in base currency of security and unhedged. Data as of October 2017.

# Relative Attractiveness of US Fixed Income and Ginnie Mae MBS

The average return on the Ginnie Mae index over the past decade has been in line with the US Treasury index, but lower than many alternatives, including the US Investment-Grade Corporate and US and European High Yield indices. However, the standard deviation of the Ginnie Mae index is the lowest of any sector, as it has the least price volatility. The result: the excess return per unit of risk for the mortgage market is the highest of any market over the past decade, as measured by the Sharpe Ratio.

## Average Return (Per Month)

| Time Period | US MBS Ginnie Mae | US Treasury | US Credit Corp | Pan Euro Credit Corp | US High Yield* | Pan Euro High Yield* |
|-------------|-------------------|-------------|----------------|----------------------|----------------|----------------------|
| 1 year      | 0.02              | -0.05       | 0.29           | 0.25                 | 0.72           | 0.71                 |
| 3 year      | 0.15              | 0.14        | 0.32           | 0.24                 | 0.47           | 0.48                 |
| 5 year      | 0.14              | 0.11        | 0.28           | 0.34                 | 0.52           | 0.61                 |
| 10 year     | 0.33              | 0.30        | 0.47           | 0.38                 | 0.68           | 0.76                 |

## Average Excess Return (Per Month)

| Time Period | US MBS Ginnie Mae | US Treasury | US Credit Corp | Pan Euro Credit Corp | US High Yield* | Pan Euro High Yield* |
|-------------|-------------------|-------------|----------------|----------------------|----------------|----------------------|
| 1 year      | -0.05             | -0.12       | 0.22           | 0.33                 | 0.65           | 0.78                 |
| 3 year      | 0.12              | 0.11        | 0.30           | 0.29                 | 0.44           | 0.53                 |
| 5 year      | 0.12              | 0.09        | 0.26           | 0.37                 | 0.50           | 0.64                 |
| 10 year     | 0.31              | 0.28        | 0.45           | 0.35                 | 0.66           | 0.74                 |

## Standard Deviation

| Time Period | US MBS Ginnie Mae | US Treasury | US Credit Corp | Pan Euro Credit Corp | US High Yield* | Pan Euro High Yield* |
|-------------|-------------------|-------------|----------------|----------------------|----------------|----------------------|
| 1 year      | 0.60              | 0.96        | 1.04           | 0.73                 | 0.75           | 0.64                 |
| 3 year      | 0.46              | 1.00        | 1.13           | 1.15                 | 1.67           | 1.44                 |
| 5 year      | 0.65              | 0.91        | 1.15           | 1.11                 | 1.51           | 1.30                 |
| 10 year     | 0.76              | 1.22        | 1.74           | 1.46                 | 3.04           | 3.62                 |

## Sharpe Ratio

| Time Period | US MBS Ginnie Mae | US Treasury | US Credit Corp | Pan Euro Credit Corp | US High Yield | Pan Euro High Yield* |
|-------------|-------------------|-------------|----------------|----------------------|---------------|----------------------|
| 1 year      | -0.08             | -0.13       | 0.22           | 0.44                 | 0.87          | 1.23                 |
| 3 year      | 0.26              | 0.11        | 0.26           | 0.25                 | 0.26          | 0.37                 |
| 5 year      | 0.19              | 0.10        | 0.22           | 0.33                 | 0.33          | 0.49                 |
| 10 year     | 0.40              | 0.23        | 0.26           | 0.24                 | 0.22          | 0.20                 |

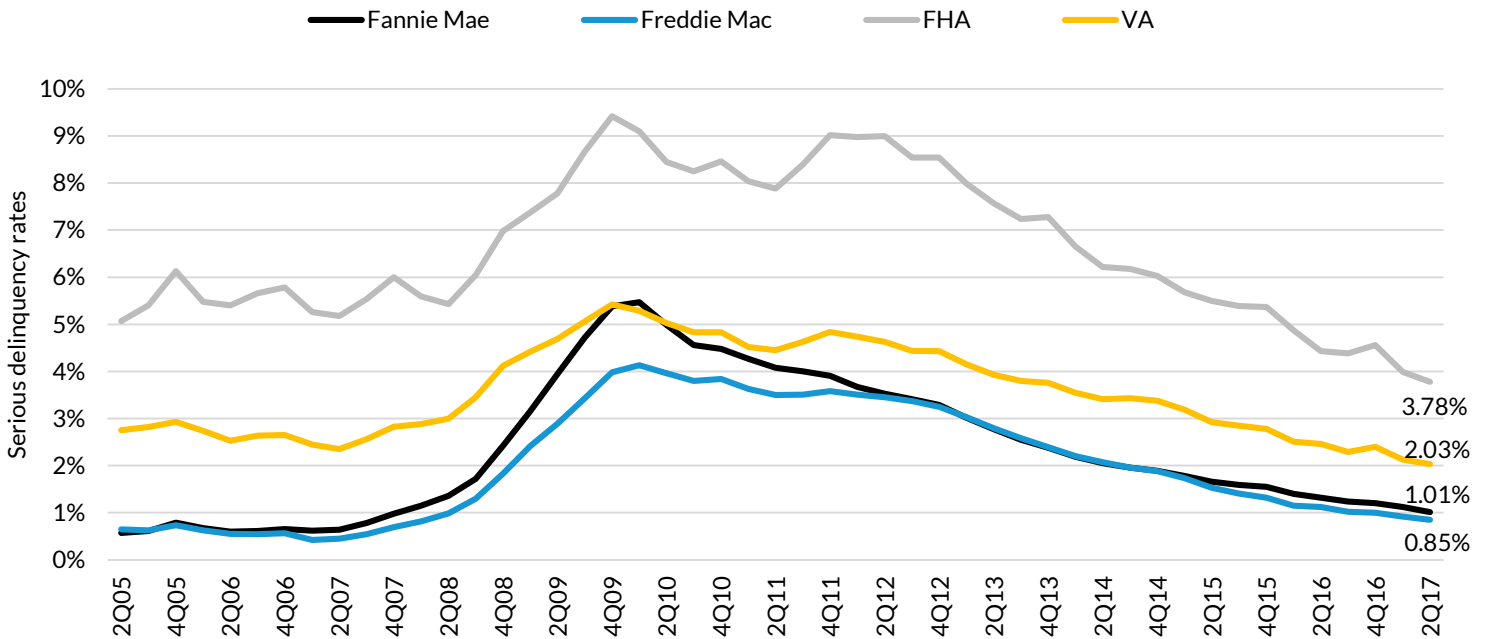
\*Assumes 2% capitalization max per issuer on high yield indices

Sources: Barclays Indices, Bloomberg and State Street Global Advisors Note: Data as of October 2017

# State of the US Housing Market

Serious delinquencies for GSE single-family loans continued to decline. After the seasonal upswing in Q4 2016, both FHA and VA delinquencies resumed their decline to 3.78 and 2.03 percent in Q2 2017. GSE delinquencies remain higher relative to 2005-2007, while FHA and VA delinquencies (which are higher than their GSE counterparts) are at levels lower than 2005-2007. Home price changes turned positive in 2012, and continue to increase 6.7-6.9 percent per year, as measured by both CoreLogic and Zillow.

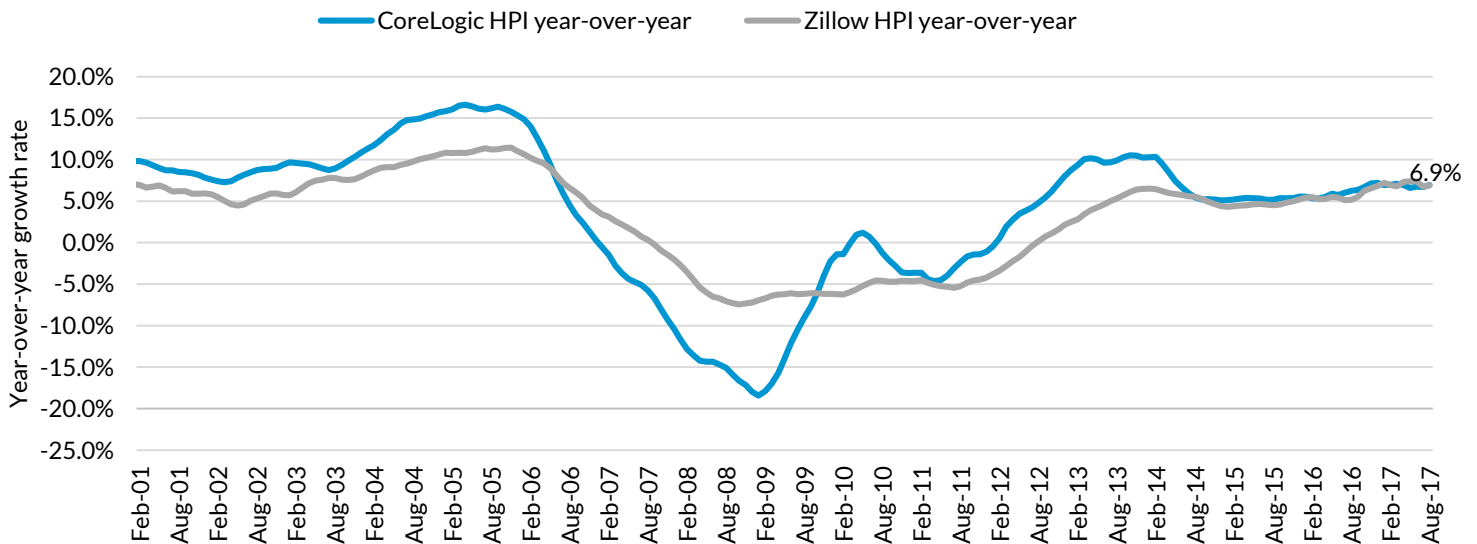
## Serious Delinquency Rates: Single-Family Loans



Sources: Fannie Mae, Freddie Mac, MBA Delinquency Survey and Urban Institute.

Note: Serious delinquency is defined as 90 days or more past due or in the foreclosure process. Data as of Q2 2017.

## National Year-Over-Year HPI Growth



Sources: CoreLogic, Zillow, and Urban Institute. Note: Data as of August 2017

# State of the US Housing Market

Nationally, the nominal home prices have improved by 49.9 percent since the trough, and have achieved peak valuation. However, the picture is very different for different states, with many states well in excess of the prior peak, while Nevada is 34.3 percent below peak levels and Florida is 21.9 percent below peak levels.

| State                | HPI Changes  |                |                   | YOY   | Current HPI % Below Peak |
|----------------------|--------------|----------------|-------------------|-------|--------------------------|
|                      | 2000 to Peak | Peak to Trough | Trough to Current |       |                          |
| <b>National</b>      | 93.7%        | -33.3%         | 49.9%             | 6.9%  | 0.0%                     |
| Alabama              | 46.4%        | -20.7%         | 22.7%             | 3.4%  | 2.8%                     |
| Alaska               | 68.7%        | -9.4%          | 18.8%             | 1.6%  | -7.1%                    |
| Arizona              | 121.5%       | -50.6%         | 66.8%             | 6.1%  | 21.3%                    |
| Arkansas             | 39.6%        | -7.7%          | 15.3%             | 3.4%  | -6.0%                    |
| California           | 149.0%       | -42.5%         | 74.2%             | 7.1%  | -0.2%                    |
| Colorado             | 40.4%        | -13.8%         | 65.3%             | 8.6%  | -29.9%                   |
| Connecticut          | 79.5%        | -24.9%         | 10.6%             | 2.0%  | 20.4%                    |
| Delaware             | 90.3%        | -23.9%         | 18.0%             | 1.5%  | 11.3%                    |
| District of Columbia | 150.6%       | -10.4%         | 38.3%             | 3.8%  | -19.3%                   |
| Florida              | 149.2%       | -49.7%         | 62.9%             | 6.2%  | 21.9%                    |
| Georgia              | 40.3%        | -30.8%         | 52.5%             | 6.2%  | -5.2%                    |
| Hawaii               | 152.6%       | -20.5%         | 45.7%             | 6.7%  | -13.7%                   |
| Idaho                | 85.7%        | -40.9%         | 70.5%             | 8.7%  | -0.7%                    |
| Illinois             | 60.0%        | -32.7%         | 31.7%             | 3.8%  | 12.8%                    |
| Indiana              | 24.3%        | -16.4%         | 27.9%             | 5.0%  | -6.5%                    |
| Iowa                 | 25.5%        | -4.8%          | 21.4%             | 4.2%  | -13.5%                   |
| Kansas               | 33.2%        | -13.9%         | 26.7%             | 3.7%  | -8.3%                    |
| Kentucky             | 27.0%        | -8.9%          | 23.5%             | 5.9%  | -11.1%                   |
| Louisiana            | 58.5%        | -7.6%          | 24.1%             | 5.3%  | -12.8%                   |
| Maine                | 92.5%        | -19.6%         | 37.4%             | 8.6%  | -9.4%                    |
| Maryland             | 137.7%       | -31.2%         | 21.5%             | 3.1%  | 19.5%                    |
| Massachusetts        | 81.8%        | -21.3%         | 39.5%             | 6.6%  | -8.9%                    |
| Michigan             | 26.1%        | -43.3%         | 75.9%             | 8.7%  | 0.3%                     |
| Minnesota            | 69.7%        | -28.2%         | 43.5%             | 6.1%  | -2.9%                    |
| Mississippi          | 35.0%        | -18.6%         | 20.5%             | 4.6%  | 2.0%                     |
| Missouri             | 46.2%        | -22.2%         | 31.3%             | 5.6%  | -2.1%                    |
| Montana              | 80.3%        | -16.7%         | 38.1%             | 6.0%  | -13.1%                   |
| Nebraska             | 25.2%        | -5.3%          | 27.1%             | 5.4%  | -16.9%                   |
| Nevada               | 129.0%       | -59.9%         | 85.8%             | 8.5%  | 34.3%                    |
| New Hampshire        | 82.5%        | -23.9%         | 30.8%             | 5.5%  | 0.5%                     |
| New Jersey           | 109.6%       | -26.4%         | 17.3%             | 2.2%  | 15.8%                    |
| New Mexico           | 64.5%        | -26.6%         | 20.6%             | 3.3%  | 12.9%                    |
| New York             | 102.2%       | -13.8%         | 33.4%             | 7.9%  | -13.0%                   |
| North Carolina       | 39.6%        | -14.6%         | 27.7%             | 5.5%  | -8.3%                    |
| North Dakota         | 49.6%        | -2.1%          | 52.1%             | 5.5%  | -32.8%                   |
| Ohio                 | 22.2%        | -20.5%         | 31.5%             | 5.0%  | -4.3%                    |
| Oklahoma             | 35.7%        | -3.2%          | 15.5%             | 1.9%  | -10.6%                   |
| Oregon               | 87.5%        | -29.3%         | 67.7%             | 8.6%  | -15.6%                   |
| Pennsylvania         | 71.6%        | -12.8%         | 16.8%             | 3.2%  | -1.8%                    |
| Rhode Island         | 130.9%       | -34.4%         | 32.0%             | 6.2%  | 15.5%                    |
| South Carolina       | 61.4%        | -22.2%         | 32.6%             | 5.4%  | -3.1%                    |
| South Dakota         | 37.2%        | -3.5%          | 32.7%             | 5.7%  | -21.9%                   |
| Tennessee            | 41.1%        | -13.4%         | 36.3%             | 7.1%  | -15.3%                   |
| Texas                | 39.3%        | -13.2%         | 47.7%             | 5.7%  | -22.0%                   |
| Utah                 | 64.8%        | -31.8%         | 64.0%             | 11.2% | -10.6%                   |
| Vermont              | 81.6%        | -9.1%          | 14.3%             | 4.7%  | -3.7%                    |
| Virginia             | 135.1%       | -30.6%         | 30.5%             | 3.0%  | 10.5%                    |
| Washington           | 90.2%        | -28.1%         | 68.3%             | 13.0% | -17.3%                   |
| West Virginia        | 83.1%        | -27.1%         | 21.7%             | -1.7% | 12.7%                    |
| Wisconsin            | 48.6%        | -17.2%         | 27.5%             | 6.1%  | -5.3%                    |
| Wyoming              | 75.5%        | -14.5%         | 28.5%             | 1.7%  | -9.0%                    |

Sources: CoreLogic and Urban Institute. Note: HPI data as of August 2017. Negative sign indicates that state is above earlier peak. Peak refers to the month when HPI reached the highest level for each state/US during the housing boom period, ranging from 09/2005 to 09/2008. Trough represents the month when HPI fell to the lowest level for each state/US after the housing bust, ranging from 01/2009 to 03/2012. Current is 07/2017, the latest HPI data period.

# State of the US Housing Market

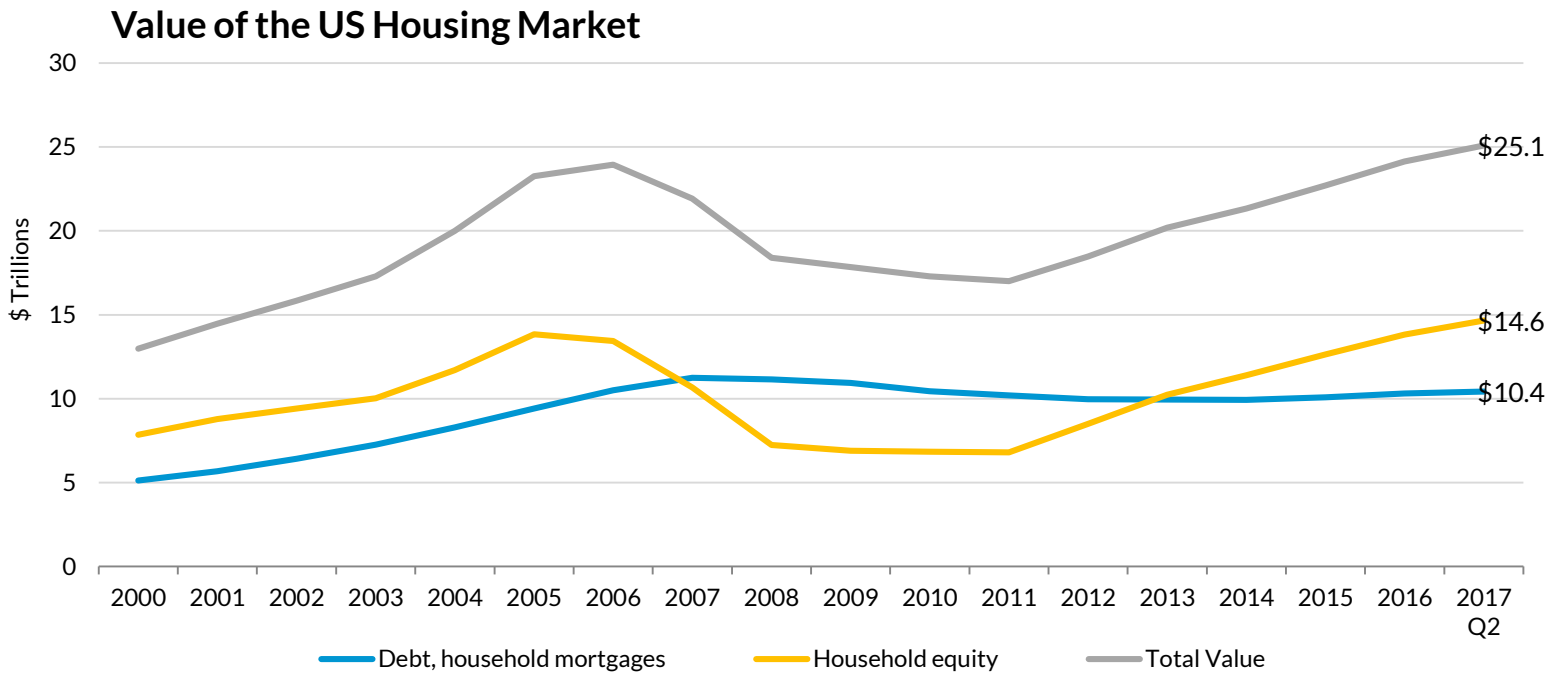
Ginnie Mae loans constitute 32.9 percent of outstanding agency issuance by loan balance, 33.4 percent of the issuance over the past year. However, the Ginnie Mae share varies widely across states, with the share of outstandings (as measured by loan balance) as low as 18.0 percent in the District of Columbia and as high as 53.2 percent in Mississippi. In general, the Ginnie Mae share is higher in states with lower home prices.

| State                | Agency Issuance (past 1 year) |  |                                   | Agency Outstanding |  |                                   |
|----------------------|-------------------------------|--|-----------------------------------|--------------------|--|-----------------------------------|
|                      | Ginnie Mae Share              | Ginnie Mae Average Loan Size (Thousands) | GSE Average Loan Size (Thousands) | Ginnie Mae Share   | Ginnie Mae Average Loan Size (Thousands) | GSE Average Loan Size (Thousands) |
| <b>National</b>      | <b>33.4%</b>                  | <b>211.0</b>                             | <b>228.4</b>                      | <b>32.9%</b>       | <b>175.9</b>                             | <b>206.6</b>                      |
| Alabama              | 45.7%                         | 158.7                                    | 180.0                             | 47.8%              | 140.7                                    | 167.6                             |
| Alaska               | 53.5%                         | 279.6                                    | 243.1                             | 52.5%              | 254.1                                    | 226.7                             |
| Arizona              | 36.3%                         | 202.7                                    | 207.1                             | 35.5%              | 173.3                                    | 188.8                             |
| Arkansas             | 43.5%                         | 140.3                                    | 165.6                             | 47.5%              | 121.5                                    | 151.8                             |
| California           | 27.2%                         | 335.7                                    | 320.8                             | 22.7%              | 280.2                                    | 289.7                             |
| Colorado             | 32.5%                         | 266.9                                    | 258.4                             | 31.3%              | 222.9                                    | 233.3                             |
| Connecticut          | 31.2%                         | 214.5                                    | 228.7                             | 30.1%              | 202.9                                    | 217.6                             |
| Delaware             | 39.7%                         | 211.8                                    | 220.0                             | 37.9%              | 197.1                                    | 206.6                             |
| District of Columbia | 17.8%                         | 403.6                                    | 358.4                             | 18.0%              | 321.7                                    | 331.4                             |
| Florida              | 39.5%                         | 202.7                                    | 199.9                             | 37.2%              | 169.9                                    | 182.9                             |
| Georgia              | 41.4%                         | 178.4                                    | 203.8                             | 41.5%              | 152.6                                    | 184.6                             |
| Hawaii               | 38.9%                         | 479.5                                    | 371.4                             | 31.9%              | 411.2                                    | 342.6                             |
| Idaho                | 35.7%                         | 186.0                                    | 190.6                             | 36.0%              | 159.7                                    | 172.9                             |
| Illinois             | 25.0%                         | 176.3                                    | 200.7                             | 25.5%              | 154.2                                    | 182.5                             |
| Indiana              | 39.4%                         | 138.2                                    | 155.6                             | 40.3%              | 120.7                                    | 140.5                             |
| Iowa                 | 25.0%                         | 142.5                                    | 163.6                             | 27.5%              | 123.9                                    | 147.6                             |
| Kansas               | 35.4%                         | 150.9                                    | 174.2                             | 37.7%              | 131.5                                    | 155.8                             |
| Kentucky             | 40.7%                         | 146.5                                    | 165.8                             | 40.8%              | 132.2                                    | 149.0                             |
| Louisiana            | 42.9%                         | 168.2                                    | 189.4                             | 44.4%              | 149.5                                    | 176.2                             |
| Maine                | 35.6%                         | 180.3                                    | 195.7                             | 33.3%              | 165.2                                    | 179.5                             |
| Maryland             | 44.4%                         | 281.4                                    | 264.9                             | 40.3%              | 250.2                                    | 245.8                             |
| Massachusetts        | 22.2%                         | 281.3                                    | 277.1                             | 20.0%              | 250.3                                    | 253.2                             |
| Michigan             | 26.2%                         | 142.8                                    | 167.6                             | 27.4%              | 122.1                                    | 150.2                             |
| Minnesota            | 25.5%                         | 192.1                                    | 205.2                             | 26.3%              | 168.1                                    | 188.7                             |
| Mississippi          | 50.2%                         | 148.9                                    | 168.1                             | 53.2%              | 130.8                                    | 156.8                             |
| Missouri             | 35.5%                         | 148.9                                    | 172.1                             | 37.2%              | 131.5                                    | 154.9                             |
| Montana              | 31.5%                         | 207.9                                    | 209.0                             | 32.4%              | 180.3                                    | 189.6                             |
| Nebraska             | 31.7%                         | 158.0                                    | 168.0                             | 36.4%              | 133.6                                    | 152.1                             |
| Nevada               | 42.7%                         | 226.0                                    | 216.5                             | 41.7%              | 192.5                                    | 194.9                             |
| New Hampshire        | 32.4%                         | 225.3                                    | 219.9                             | 30.7%              | 206.9                                    | 200.4                             |
| New Jersey           | 29.4%                         | 248.4                                    | 265.1                             | 28.6%              | 231.7                                    | 247.6                             |
| New Mexico           | 44.5%                         | 175.7                                    | 184.5                             | 44.6%              | 155.3                                    | 171.8                             |
| New York             | 26.6%                         | 240.2                                    | 265.0                             | 27.0%              | 203.0                                    | 241.0                             |
| North Carolina       | 35.0%                         | 176.2                                    | 199.6                             | 36.7%              | 153.4                                    | 183.2                             |
| North Dakota         | 27.8%                         | 206.1                                    | 202.7                             | 27.4%              | 177.9                                    | 183.6                             |
| Ohio                 | 36.8%                         | 138.9                                    | 156.5                             | 38.5%              | 124.3                                    | 143.2                             |
| Oklahoma             | 46.7%                         | 150.0                                    | 168.8                             | 50.8%              | 130.1                                    | 155.9                             |
| Oregon               | 27.6%                         | 241.0                                    | 247.1                             | 26.3%              | 206.0                                    | 218.1                             |
| Pennsylvania         | 34.1%                         | 166.8                                    | 192.8                             | 34.5%              | 151.2                                    | 179.8                             |
| Rhode Island         | 36.9%                         | 217.9                                    | 214.7                             | 34.4%              | 198.3                                    | 201.7                             |
| South Carolina       | 40.5%                         | 179.2                                    | 190.6                             | 39.7%              | 156.4                                    | 176.2                             |
| South Dakota         | 36.4%                         | 172.7                                    | 180.8                             | 37.6%              | 153.1                                    | 163.2                             |
| Tennessee            | 41.8%                         | 174.1                                    | 194.4                             | 43.9%              | 148.1                                    | 176.2                             |
| Texas                | 35.7%                         | 188.9                                    | 209.3                             | 39.4%              | 150.3                                    | 189.1                             |
| Utah                 | 31.6%                         | 224.8                                    | 237.5                             | 33.1%              | 197.6                                    | 215.3                             |
| Vermont              | 23.3%                         | 194.2                                    | 193.0                             | 20.1%              | 180.7                                    | 181.5                             |
| Virginia             | 45.4%                         | 274.2                                    | 262.6                             | 42.3%              | 241.3                                    | 243.1                             |
| Washington           | 31.8%                         | 267.6                                    | 269.3                             | 31.2%              | 228.4                                    | 239.8                             |
| West Virginia        | 48.3%                         | 153.5                                    | 154.0                             | 46.3%              | 137.8                                    | 146.1                             |
| Wisconsin            | 22.0%                         | 162.7                                    | 175.0                             | 22.1%              | 145.6                                    | 159.9                             |
| Wyoming              | 41.8%                         | 209.7                                    | 207.5                             | 42.2%              | 191.9                                    | 193.9                             |

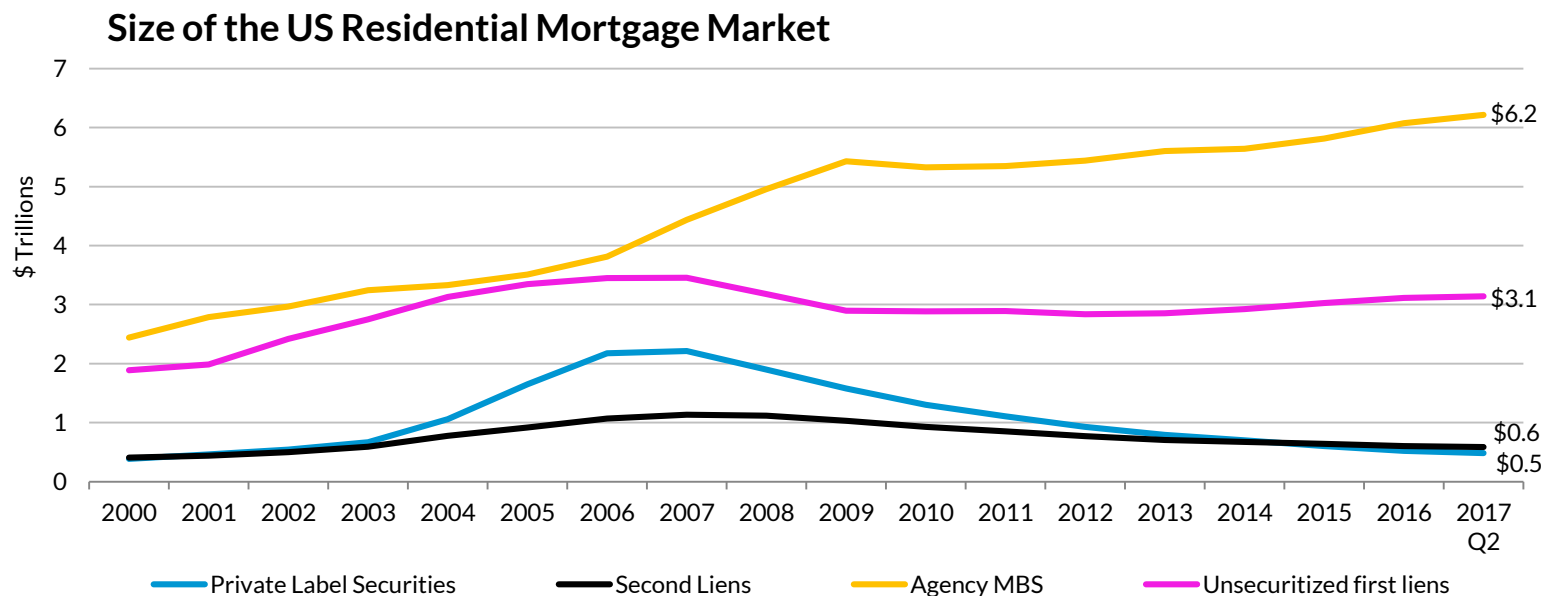
Sources: eMBS and Urban Institute. Note: Ginnie Mae share are based on loan balance as of August 2017.

# State of the US Housing Market

The Federal Reserve's Flow of Funds report has consistently indicated an increasing total value of the housing market driven by growing household equity since 2012, and 2017 Q2 was no different. While total debt and mortgages was stable at \$10.4 trillion, household equity reached a new high of \$14.7 trillion, bringing the total value of the housing market to \$25.1 trillion, surpassing the pre-crisis peak of \$23.9 trillion in 2006. Agency MBS make up 59.6 percent of the total mortgage market, private-label securities make up 4.7 percent, and unsecuritized first liens at the GSEs, commercial banks, savings institutions, and credit unions make up 30.1 percent. Second liens comprise the remaining 5.6 percent of the total.



Sources: Federal Reserve Flow of Funds and Urban Institute. Data as of Q2 2017.



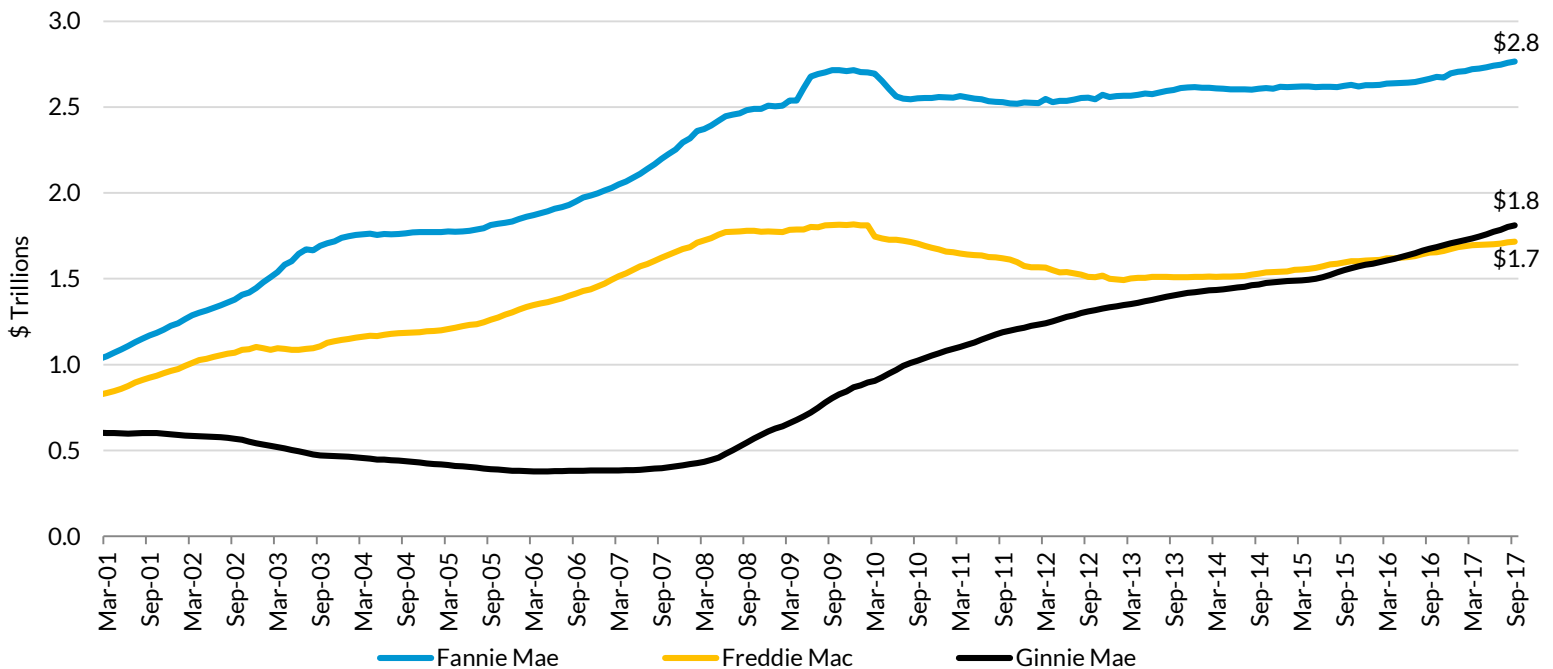
Sources: Federal Reserve Flow of Funds, Inside Mortgage Finance, Fannie Mae, Freddie Mac, eMBS and Urban Institute.

Note: Unsecuritized first liens includes loans held by commercial banks, GSEs, savings institutions, and credit unions. Data as of Q2 2017.

# State of the US Housing Market

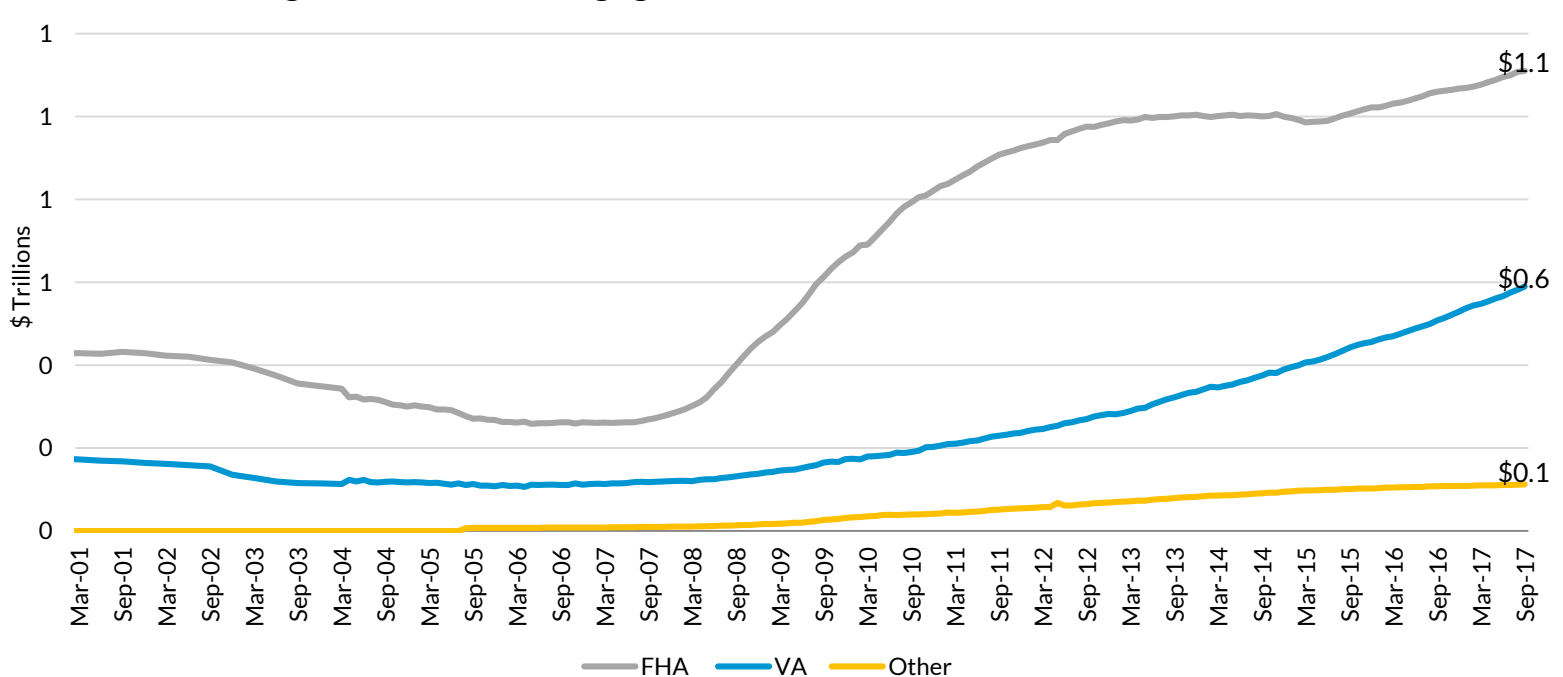
As of September 2017, outstanding securities in the agency market totaled \$6.29 trillion and were 43.9 percent Fannie Mae, 27.3 percent Freddie Mac, and 28.8 percent Ginnie Mae. Ginnie Mae now has more outstandings than Freddie Mac. Within the Ginnie Mae market, VA has been growing very rapidly--comprising 32.5 percent of total Ginnie Mae outstandings.

## Outstanding Agency Mortgage-Backed Securities



Sources: eMBS and Urban Institute Note: Data as of September 2017

## Outstanding Ginnie Mae Mortgage-Backed Securities

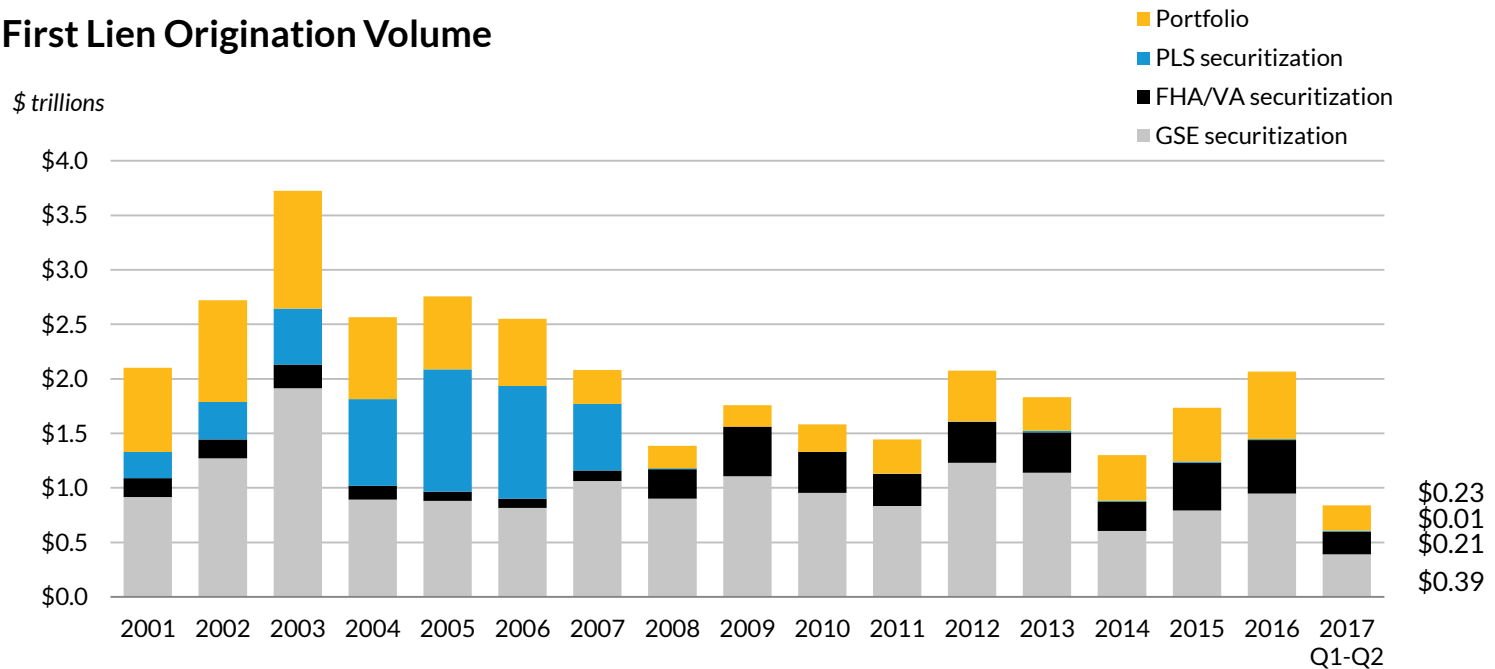


Sources: eMBS and Urban Institute. Note: Data as of September 2017

# State of the US Housing Market

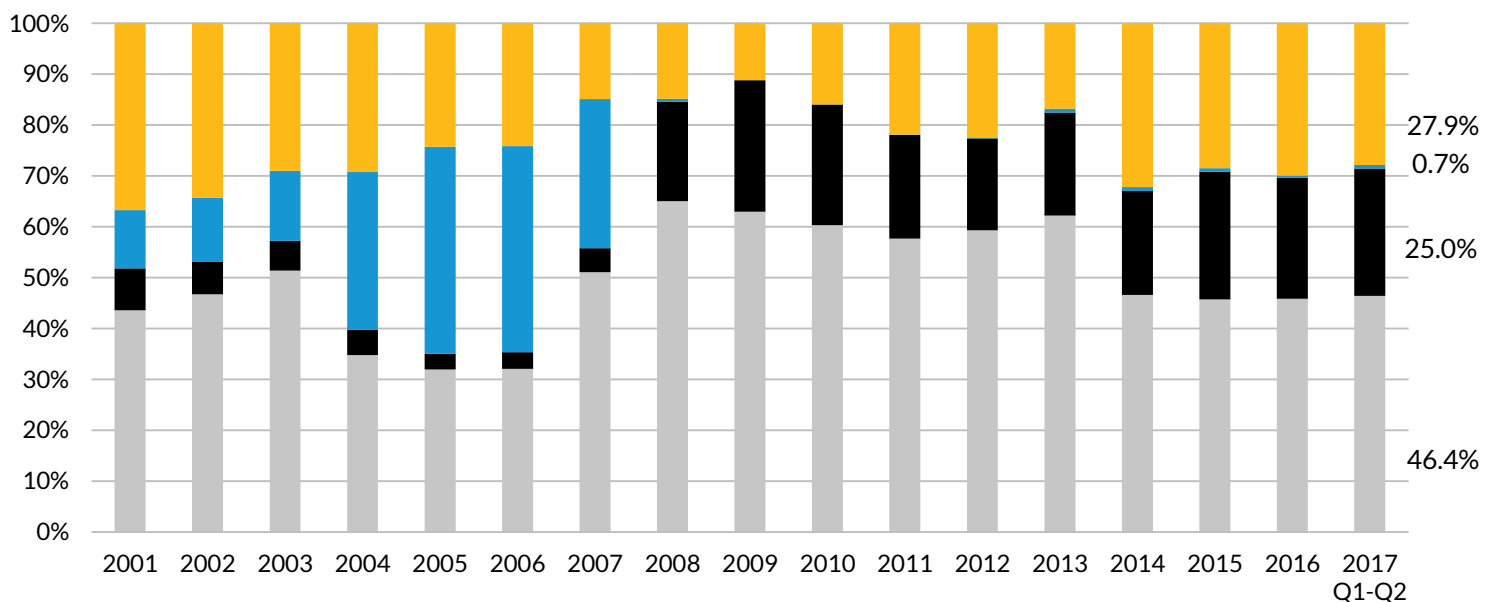
After a record high origination year in 2016 (\$2.1 trillion) since the great recession, the first lien originations totaled \$840 billion in the first half of 2017, down 6 percent from the same period last year, mostly due to the elevated interest rates. The share of portfolio originations was 28 percent, down slightly from 30 percent in 2016. The GSE share stayed at about 46 percent. The FHA/VA share was slightly up: 25 percent for the first half of 2017 versus 24 percent in 2016. Origination of private-label securities was well under 1 percent in both periods.

## First Lien Origination Volume



Sources: Inside Mortgage Finance and Urban Institute. Note: Data as of Q2 2017.

## First Lien Origination Share



Sources: Inside Mortgage Finance and Urban Institute. Note: Data as of Q2 2017.



# US Agency Market, Originations

Agency gross issuance totaled \$1,315.9 billion in the first three quarters of 2017, a 6.4 percent decrease from the same period last year. Ginnie Mae and GSE gross issuance were both down by 6.4 percent. Within the Ginnie Mae market, FHA is down by 4.7 percent and VA origination is down by 9.9 percent. As a result of higher rates, origination for full year 2017 is expected to be down substantially compared to 2016.

| Agency Gross Issuance |            |             |           |            |              |
|-----------------------|------------|-------------|-----------|------------|--------------|
| Issuance Year         | Fannie Mae | Freddie Mac | GSE Total | Ginnie Mae | Total Agency |
| 2000                  | \$202.8    | \$157.9     | \$360.6   | \$102.2    | \$462.8      |
| 2001                  | \$506.9    | \$378.2     | \$885.1   | \$171.5    | \$1,056.6    |
| 2002                  | \$710.0    | \$529.0     | \$1,238.9 | \$169.0    | \$1,407.9    |
| 2003                  | \$1,174.4  | \$700.5     | \$1,874.9 | \$213.1    | \$2,088.0    |
| 2004                  | \$517.5    | \$355.2     | \$872.6   | \$119.2    | \$991.9      |
| 2005                  | \$514.1    | \$379.9     | \$894.0   | \$81.4     | \$975.3      |
| 2006                  | \$500.2    | \$352.9     | \$853.0   | \$76.7     | \$929.7      |
| 2007                  | \$633.0    | \$433.3     | \$1,066.2 | \$94.9     | \$1,161.1    |
| 2008                  | \$562.7    | \$348.7     | \$911.4   | \$267.6    | \$1,179.0    |
| 2009                  | \$817.1    | \$462.9     | \$1,280.0 | \$451.3    | \$1,731.3    |
| 2010                  | \$626.6    | \$377.0     | \$1,003.5 | \$390.7    | \$1,394.3    |
| 2011                  | \$578.2    | \$301.2     | \$879.3   | \$315.3    | \$1,194.7    |
| 2012                  | \$847.6    | \$441.3     | \$1,288.8 | \$405.0    | \$1,693.8    |
| 2013                  | \$749.9    | \$426.7     | \$1,176.6 | \$393.6    | \$1,570.2    |
| 2014                  | \$392.9    | \$258.0     | \$650.9   | \$296.3    | \$947.2      |
| 2015                  | \$493.9    | \$351.9     | \$845.7   | \$436.3    | \$1,282.0    |
| 2016                  | \$600.5    | \$391.1     | \$991.6   | \$508.2    | \$1,499.8    |
| 2017 YTD              | \$399.7    | \$244.0     | \$643.7   | \$343.3    | \$986.9      |
| 2017 YTD %Change YOY  | -3.2%      | -11.1%      | -6.4%     | -6.4%      | -6.4%        |
| 2017 Ann.             | \$532.9    | \$325.3     | \$858.2   | \$457.7    | \$1,315.9    |

| Ginnie Mae Breakdown: Agency Gross Issuance |         |         |        |              |
|---|---------|---------|--------|--------------|
| Issuance Year                               | FHA     | VA      | Other  | Total Agency |
| 2000  | \$80.2  | \$18.8  | \$3.2  | \$102.2      |
| 2001  | \$133.8 | \$34.7  | \$3.1  | \$171.5      |
| 2002  | \$128.6 | \$37.9  | \$2.5  | \$169.0      |
| 2003  | \$147.9 | \$62.7  | \$2.5  | \$213.1      |
| 2004  | \$85.0  | \$31.8  | \$2.5  | \$119.2      |
| 2005  | \$55.7  | \$23.5  | \$2.1  | \$81.4       |
| 2006  | \$51.2  | \$23.2  | \$2.3  | \$76.7       |
| 2007  | \$67.7  | \$24.2  | \$3.0  | \$94.9       |
| 2008  | \$221.7 | \$39.0  | \$6.9  | \$267.6      |
| 2009  | \$359.9 | \$74.6  | \$16.8 | \$451.3      |
| 2010  | \$304.9 | \$70.6  | \$15.3 | \$390.7      |
| 2011  | \$216.1 | \$82.3  | \$16.9 | \$315.3      |
| 2012  | \$253.4 | \$131.3 | \$20.3 | \$405.0      |
| 2013  | \$239.2 | \$132.2 | \$22.2 | \$393.6      |
| 2014  | \$163.9 | \$111.4 | \$21.0 | \$296.3      |
| 2015  | \$261.5 | \$155.6 | \$19.2 | \$436.3      |
| 2016  | \$281.8 | \$206.5 | \$19.9 | \$508.2      |
| 2017 YTD                                    | \$196.9 | \$131.1 | \$15.2 | \$343.3      |
| 2017 YTD %Change YOY                        | -4.7%   | -9.9%   | 4.8%   | -6.4%        |
| 2017 Ann.                                   | \$262.5 | \$174.9 | \$20.3 | \$457.7      |

Sources: eMBS and Urban Institute (top and bottom).

Note: Dollar amounts are in billions. Annualized figure based on data from August 2017. "Other" refers to loans insured by HUD's Office of Public and Indian Housing and the Department of Agriculture's Rural Development. All data is as of September 2017.

# US Agency Market, Originations

Agency net issuance totaled \$218.1 billion for the first three quarters of 2017, up 22.7 percent over the same period last year. This increase is partly driven by slow prepayment with higher interest rates. Ginnie Mae net issuance was \$105.5 billion, comprising 48.4 percent of total agency net issuance. Note that Ginnie Mae net issuance is up 11.3 percent versus the same time last year. Ginnie Mae net issuance is comprised of 56.5 percent VA issuance, 40.0 percent FHA issuance and 3.5 percent other issuance.

| Agency Net Issuance  |            |             |           |            |              |
|----------------------|------------|-------------|-----------|------------|--------------|
| Issuance Year        | Fannie Mae | Freddie Mac | GSE Total | Ginnie Mae | Total Agency |
| 2000                 | \$92.0     | \$67.8      | \$159.8   | \$29.3     | \$189.1      |
| 2001                 | \$216.6    | \$151.8     | \$368.4   | -\$9.9     | \$358.5      |
| 2002                 | \$218.9    | \$138.3     | \$357.2   | -\$51.2    | \$306.1      |
| 2003                 | \$293.7    | \$41.1      | \$334.9   | -\$77.6    | \$257.3      |
| 2004                 | \$32.3     | \$50.2      | \$82.5    | -\$40.1    | \$42.4       |
| 2005                 | \$62.5     | \$111.7     | \$174.2   | -\$42.2    | \$132.0      |
| 2006                 | \$164.3    | \$149.3     | \$313.6   | \$0.2      | \$313.8      |
| 2007                 | \$296.1    | \$218.8     | \$514.9   | \$30.9     | \$545.7      |
| 2008                 | \$213.0    | \$101.8     | \$314.8   | \$196.4    | \$511.3      |
| 2009                 | \$208.1    | \$42.5      | \$250.6   | \$257.4    | \$508.0      |
| 2010                 | -\$156.4   | -\$146.8    | -\$303.2  | \$198.3    | -\$105.0     |
| 2011                 | -\$32.6    | -\$95.8     | -\$128.4  | \$149.6    | \$21.2       |
| 2012                 | \$32.9     | -\$75.3     | -\$42.4   | \$119.1    | \$76.8       |
| 2013                 | \$57.5     | \$11.6      | \$69.1    | \$87.9     | \$157.0      |
| 2014                 | \$0.5      | \$30.0      | \$30.5    | \$61.6     | \$92.1       |
| 2015                 | \$10.2     | \$65.0      | \$75.1    | \$97.3     | \$172.5      |
| 2016                 | \$68.6     | \$66.8      | \$135.5   | \$125.3    | \$260.8      |
| 2017 YTD             | \$69.7     | \$42.9      | \$120.7   | \$105.5    | \$218.1      |
| 2017 YTD %Change YOY | 87.9%      | -6.5%       | 45.5%     | 11.3%      | 22.7%        |
| 2017 Ann.            | \$92.9     | \$57.2      | \$144.9   | \$140.7    | \$290.8      |

| Ginnie Mae Breakdown: Net Issuance |         |         |        |         |
|------------------------------------|---------|---------|--------|---------|
| Issuance Year                      | FHA     | VA      | Other  | Total   |
| 2000                               | \$29.0  | \$0.3   | \$0.0  | \$29.3  |
| 2001                               | \$0.7   | -\$10.6 | \$0.0  | -\$9.9  |
| 2002                               | -\$22.5 | -\$28.7 | \$0.0  | -\$51.2 |
| 2003                               | -\$56.5 | -\$21.1 | \$0.0  | -\$77.6 |
| 2004                               | -\$45.2 | \$5.1   | \$0.0  | -\$40.1 |
| 2005                               | -\$37.3 | -\$12.1 | \$7.2  | -\$42.2 |
| 2006                               | -\$4.7  | \$3.8   | \$1.2  | \$0.2   |
| 2007                               | \$20.2  | \$8.7   | \$2.0  | \$30.9  |
| 2008                               | \$173.3 | \$17.7  | \$5.4  | \$196.4 |
| 2009                               | \$206.4 | \$35.1  | \$15.8 | \$257.4 |
| 2010                               | \$158.6 | \$29.6  | \$10.0 | \$198.3 |
| 2011                               | \$102.8 | \$34.0  | \$12.8 | \$149.6 |
| 2012                               | \$58.9  | \$45.9  | \$14.3 | \$119.1 |
| 2013                               | \$20.7  | \$53.3  | \$13.9 | \$87.9  |
| 2014                               | -\$4.8  | \$53.9  | \$12.5 | \$61.6  |
| 2015                               | \$22.5  | \$66.9  | \$7.9  | \$97.3  |
| 2016                               | \$45.6  | \$73.2  | \$6.0  | \$124.9 |
| 2017 YTD                           | \$42.2  | \$59.6  | \$3.7  | \$105.5 |
| 2017 YTD %Change YOY               | 11.1%   | 16.2%   | -32.6% | 11.3%   |
| 2017 (Ann.)                        | \$56.3  | \$79.5  | \$4.9  | \$140.7 |

Sources: eMBS and Urban Institute (top and bottom)

Note: Dollar amounts are in billions. Annualized figure based on data from August 2017. "Other" refers to loans insured by HUD's Office of Public and Indian Housing and the Department of Agriculture's Rural Development. All data is as of September 2017.

# US Agency Market, Originations

Agency gross issuance totaled 115.5 billion in September 2017, down slightly from 121.1 billion of issuance in August 2017, after growing for five consecutive months. The monthly agency gross issuance is down year-over-year since March 2017, due to the elevated mortgage rates. Less dependent on refinances, Ginnie Mae share has increased from 29 percent to 35 percent in the first nine months of 2017. Despite the variability in gross issuance, Ginnie Mae net issuance is relatively constant; 11.7 billion per month through September in 2017, versus 10.4 billion per month in 2016.

## Monthly Agency Issuance

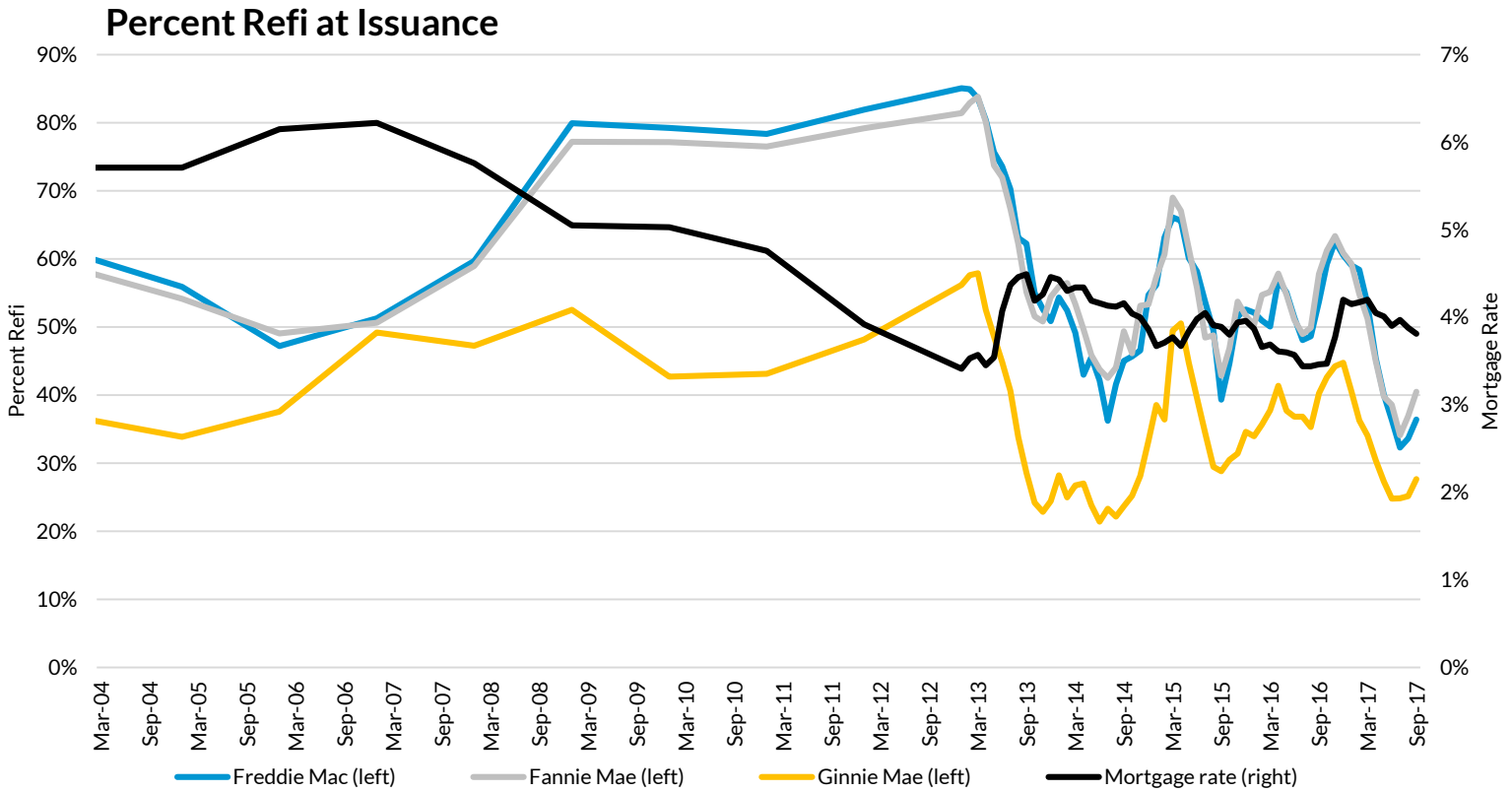
| Date   | Gross Issuance |             |            | Net Issuance |             |            |
|--------|----------------|-------------|------------|--------------|-------------|------------|
|        | Fannie Mae     | Freddie Mac | Ginnie Mae | Fannie Mae   | Freddie Mac | Ginnie Mae |
| Jan-14 | \$28.2         | \$20.0      | \$21.6     | -\$4.9       | \$0.5       | \$4.9      |
| Feb-14 | \$27.9         | \$17.9      | \$20.1     | -\$0.2       | \$1.2       | \$5.2      |
| Mar-14 | \$24.1         | \$14.7      | \$16.7     | -\$2.3       | -\$0.9      | \$1.9      |
| Apr-14 | \$28.0         | \$18.7      | \$21.7     | -\$1.9       | \$1.2       | \$5.2      |
| May-14 | \$27.7         | \$18.1      | \$23.9     | -\$3.7       | \$0.0       | \$4.9      |
| Jun-14 | \$32.1         | \$20.7      | \$24.9     | -\$0.4       | \$1.8       | \$4.5      |
| Jul-14 | \$36.3         | \$23.2      | \$27.4     | \$0.6        | \$2.6       | \$5.4      |
| Aug-14 | \$34.2         | \$28.4      | \$30.0     | -\$2.7       | \$7.4       | \$7.9      |
| Sep-14 | \$39.6         | \$25.9      | \$27.0     | \$4.8        | \$5.6       | \$5.2      |
| Oct-14 | \$39.5         | \$25.8      | \$29.9     | \$4.3        | \$6.2       | \$8.4      |
| Nov-14 | \$32.0         | \$23.1      | \$26.4     | -\$3.0       | \$2.7       | \$4.2      |
| Dec-14 | \$43.3         | \$21.6      | \$26.7     | \$9.9        | \$1.8       | \$4.1      |
| Jan-15 | \$36.8         | \$22.9      | \$27.5     | -\$1.2       | \$0.8       | \$2.5      |
| Feb-15 | \$35.4         | \$29.9      | \$23.9     | \$1.5        | \$10.1      | \$2.9      |
| Mar-15 | \$44.8         | \$26.0      | \$30.7     | \$3.1        | \$1.1       | \$0.6      |
| Apr-15 | \$49.3         | \$33.8      | \$40.6     | -\$1.2       | \$3.8       | \$4.3      |
| May-15 | \$42.4         | \$33.2      | \$39.4     | -\$2.9       | \$6.6       | \$5.8      |
| Jun-15 | \$44.6         | \$34.4      | \$40.5     | \$0.8        | \$8.3       | \$9.1      |
| Jul-15 | \$46.0         | \$39.2      | \$45.6     | \$1.0        | \$12.3      | \$13.3     |
| Aug-15 | \$39.4         | \$27.6      | \$43.4     | -\$2.2       | \$3.1       | \$14.9     |
| Sep-15 | \$45.3         | \$30.4      | \$39.4     | \$7.6        | \$7.9       | \$12.7     |
| Oct-15 | \$41.5         | \$28.4      | \$39.2     | \$4.8        | \$6.4       | \$12.4     |
| Nov-15 | \$28.8         | \$23.3      | \$35.8     | -\$8.1       | \$1.3       | \$10.6     |
| Dec-15 | \$39.7         | \$22.8      | \$30.3     | \$7.1        | \$3.2       | \$8.2      |
| Jan-16 | \$35.6         | \$22.5      | \$32.5     | -\$0.6       | \$1.0       | \$7.3      |
| Feb-16 | \$32.4         | \$21.2      | \$30.5     | \$2.4        | \$3.1       | \$8.4      |
| Mar-16 | \$39.7         | \$27.5      | \$32.9     | \$7.9        | \$8.2       | \$9.6      |
| Apr-16 | \$43.8         | \$26.2      | \$40.1     | \$0.8        | -\$0.2      | \$8.8      |
| May-16 | \$44.2         | \$29.9      | \$41.6     | \$2.4        | \$4.4       | \$11.4     |
| Jun-16 | \$46.7         | \$30.1      | \$43.9     | \$2.7        | \$3.0       | \$11.9     |
| Jul-16 | \$49.8         | \$35.3      | \$46.1     | \$2.3        | \$6.3       | \$10.8     |
| Aug-16 | \$54.9         | \$37.9      | \$46.7     | \$10.4       | \$11.0      | \$13.8     |
| Sep-16 | \$65.8         | \$44.0      | \$52.5     | \$8.7        | \$9.0       | \$12.5     |
| Oct-16 | \$66.0         | \$35.9      | \$47.4     | \$11.8       | \$2.7       | \$9.3      |
| Nov-16 | \$48.8         | \$40.2      | \$47.2     | -\$3.5       | \$7.9       | \$10.3     |
| Dec-16 | \$72.7         | \$40.5      | \$46.8     | \$23.3       | \$10.4      | \$10.8     |
| Jan-17 | \$55.6         | \$38.5      | \$42.6     | \$10.3       | \$10.7      | \$10.3     |
| Feb-17 | \$37.6         | \$27.4      | \$33.1     | \$3.1        | \$6.5       | \$9.2      |
| Mar-17 | \$39.5         | \$24.4      | \$31.3     | \$10.3       | \$6.2       | \$9.6      |
| Apr-17 | \$39.3         | \$21.2      | \$36.4     | \$4.8        | \$0.4       | \$11.7     |
| May-17 | \$40.3         | \$22.6      | \$36.4     | \$7.6        | \$2.7       | \$13.1     |
| Jun-17 | \$45.7         | \$25.1      | \$39.9     | \$8.3        | \$2.4       | \$13.2     |
| Jul-17 | \$45.3         | \$27.6      | \$40.6     | \$5.8        | \$3.5       | \$12.1     |
| Aug-17 | \$49.1         | \$29.3      | \$42.8     | \$12.0       | \$6.7       | \$15.6     |
| Sep-17 | \$47.3         | \$27.9      | \$40.2     | \$7.4        | \$3.8       | \$10.5     |

Sources: eMBS and Urban Institute

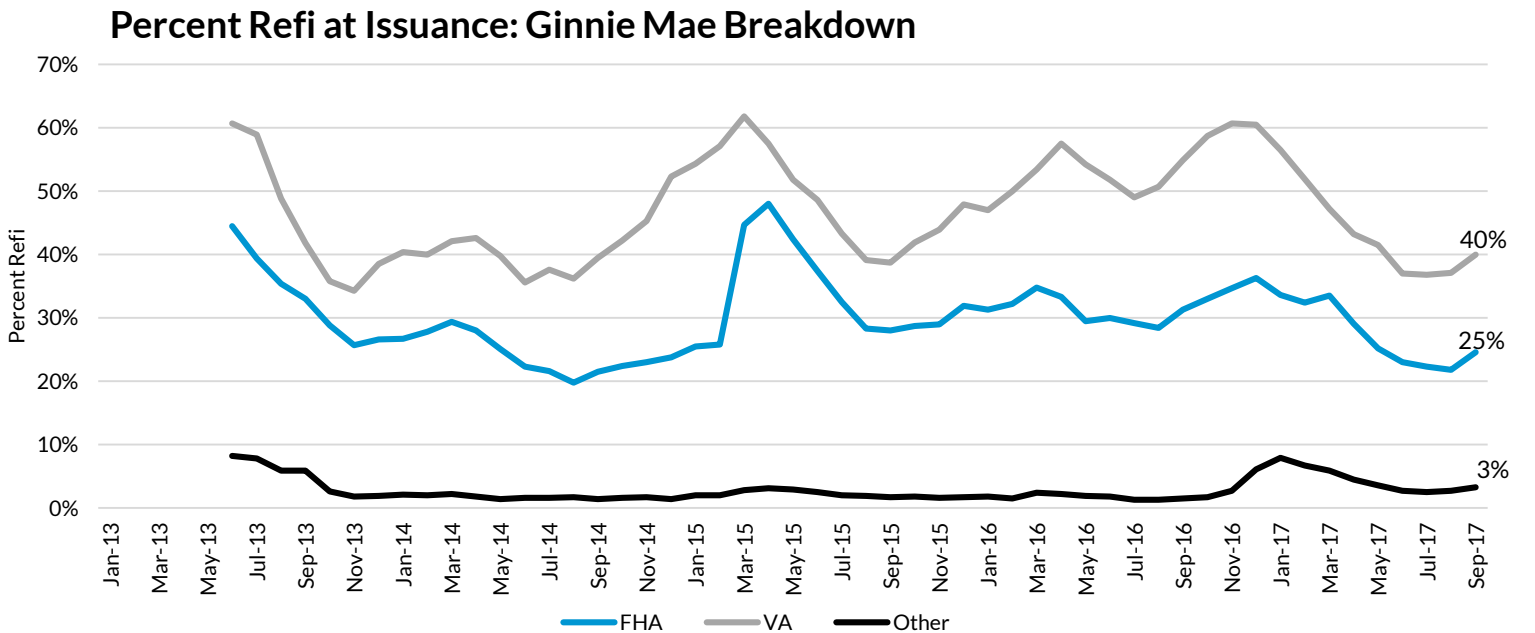
Note: Dollar amounts are in billions. "Other" refers to loans insured by HUD's Office of Public and Indian Housing and the Department of Agriculture's Rural Development. All data is as of September 2017.

# US Agency Market, Originations

The Ginnie Mae refi share stood at 28 percent in September 2017, below the 36 and 40 percent shares for Fannie Mae and Freddie Mac, respectively. Within Ginnie Mae, VA had the highest refi share at 40 percent in September 2017, followed by FHA's 25 percent refi share.



Sources: eMBS and Urban Institute. Note: Based on at-issuance balance. Data as of September 2017.



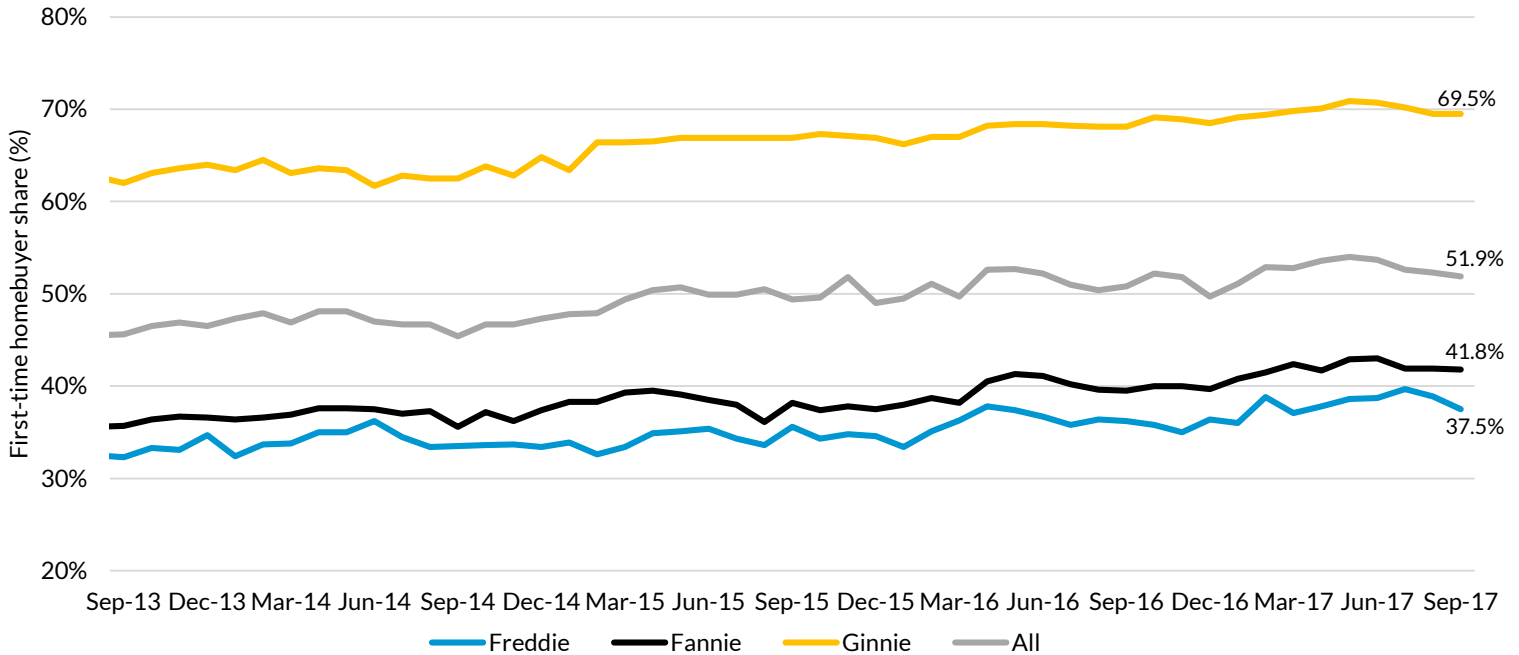
Sources: eMBS and Urban Institute.

Note: Based on at-issuance balance. "Other" refers to loans insured by HUD's Office of Public and Indian Housing and the Department of Agriculture's Rural Development. Data as of September 2017.

# Credit Box

First time homebuyers are important to the Ginnie Mae market, comprising 70 percent of purchase originations, compared to Fannie and Freddie’s respective 42 percent and 38 percent share of the first-time homebuyer market. The bottom table shows that based on mortgages originated in September 2017, the average first-time homebuyer was more likely than an average repeat buyer to take out a smaller loan and have a lower credit score, a much higher LTV and a higher DTI, thus requiring a higher interest rate.

## First Time Homebuyer Share: Purchase Only Loans



Sources: eMBS and Urban Institute. Note: Data as of September 2017.

|                           | Fannie Mae |         | Freddie Mac |         | Ginnie Mae |         | All        |         |
|---------------------------|------------|---------|-------------|---------|------------|---------|------------|---------|
|                           | First-Time | Repeat  | First-Time  | Repeat  | First-Time | Repeat  | First-Time | Repeat  |
| Loan Amount (\$Thousands) | 223,566    | 252,826 | 230,555     | 253,156 | 202,454    | 248,858 | 213,454    | 251,722 |
| Credit Score              | 738.5      | 755.2   | 741.2       | 755.3   | 683.1      | 703.7   | 709.3      | 739.6   |
| LTV (%)                   | 87.2       | 78.6    | 86.7        | 79.6    | 96.8       | 95.4    | 92.3       | 84.0    |
| DTI (%)                   | 34.6       | 34.9    | 34.6        | 35.1    | 40.9       | 41.6    | 38.0       | 37.0    |
| Loan Rate (%)             | 4.22       | 4.06    | 4.18        | 4.07    | 4.18       | 4.04    | 4.19       | 4.06    |

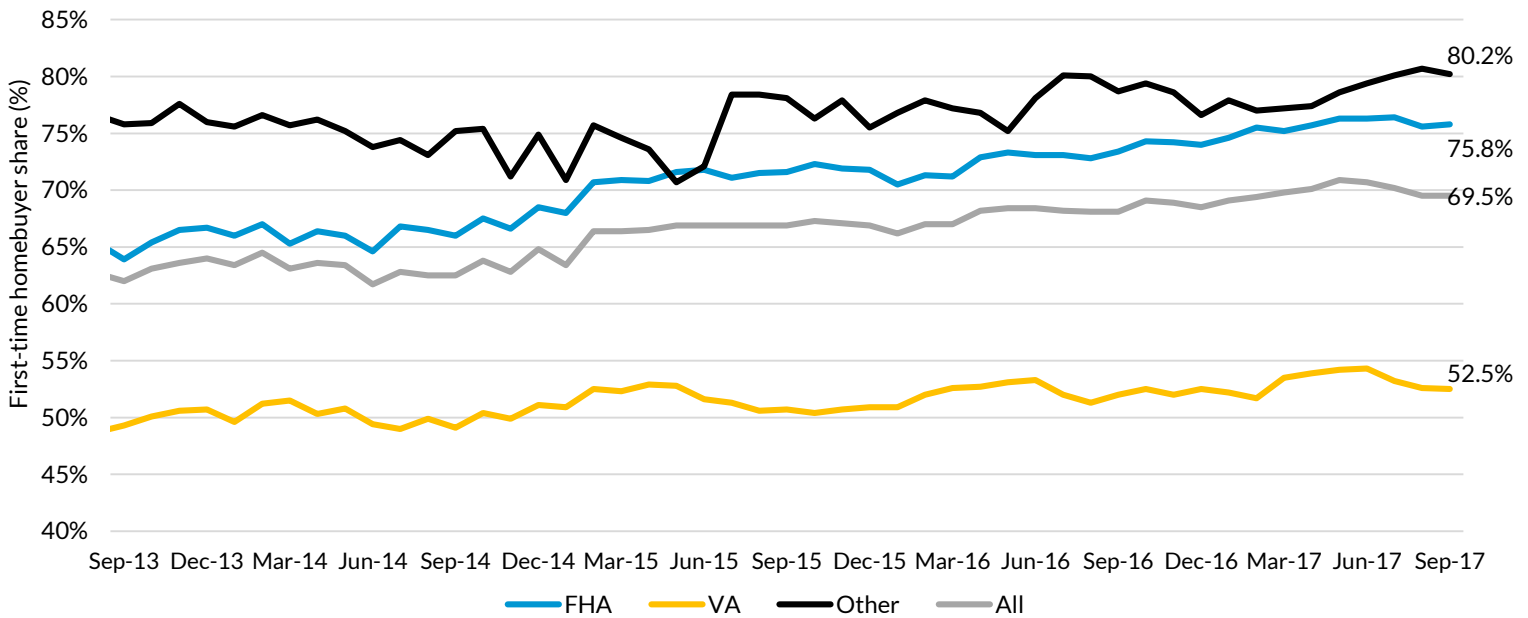
Sources: eMBS and Urban Institute.

Note: In May 2017 Ginnie Mae began disclosing issuer-reported LTV for FHA loans, which includes the financed upfront mortgage insurance premium. To make it consistent with the previously reported LTV, we removed the financed upfront mortgage insurance premium by subtracting 169 bps from this new issuer-reported LTV. Data as of September 2017.

# Credit Box

Within the Ginnie Mae purchase market, 76 percent of FHA loans, 53 percent of VA loans and 80 percent of other loans represent financing for first time home buyers. The bottom table shows that based on mortgages originated in September 2017, the average first-time homebuyer was more likely than an average repeat buyer to take out a smaller loan and have a lower credit score, a higher LTV and slightly lower DTI, thus requiring a higher interest rate.

## First Time Homebuyer Share: Ginnie Mae Purchase Only Loans Breakdown by Source



Sources: eMBS and Urban Institute. Note: Data as of September 2017.

|                            | FHA        |         | VA         |         | Other      |         | Ginnie Mae Total |         |
|----------------------------|------------|---------|------------|---------|------------|---------|------------------|---------|
|                            | First-Time | Repeat  | First-Time | Repeat  | First-Time | Repeat  | First-Time       | Repeat  |
| Loan Amount (\$ Thousands) | 199,816    | 221,216 | 240,929    | 291,963 | 142,529    | 158,883 | 202,454          | 248,858 |
| Credit Score               | 675.8      | 681.5   | 699.8      | 728.7   | 695.3      | 700.1   | 683.1            | 703.7   |
| LTV (%)                    | 95.5       | 94.0    | 99.8       | 96.4    | 99.3       | 99.3    | 96.8             | 95.4    |
| DTI (%)                    | 42.2       | 43.1    | 39.8       | 40.8    | 34.9       | 35.4    | 40.9             | 41.6    |
| Loan Rate (%)              | 4.24       | 4.16    | 4.01       | 3.88    | 4.10       | 4.12    | 4.18             | 4.04    |

Sources: eMBS and Urban Institute. Note: Data as of September 2017. "Other" refers to loans insured by HUD's Office of Public and Indian Housing and the Department of Agriculture's Rural Development. In May 2017 Ginnie Mae began disclosing issuer-reported LTV for FHA loans, which includes the financed upfront mortgage insurance premium. To make it consistent with the previously reported LTV, we removed the financed upfront mortgage insurance premium by subtracting 169 bps from this new issuer-reported LTV.

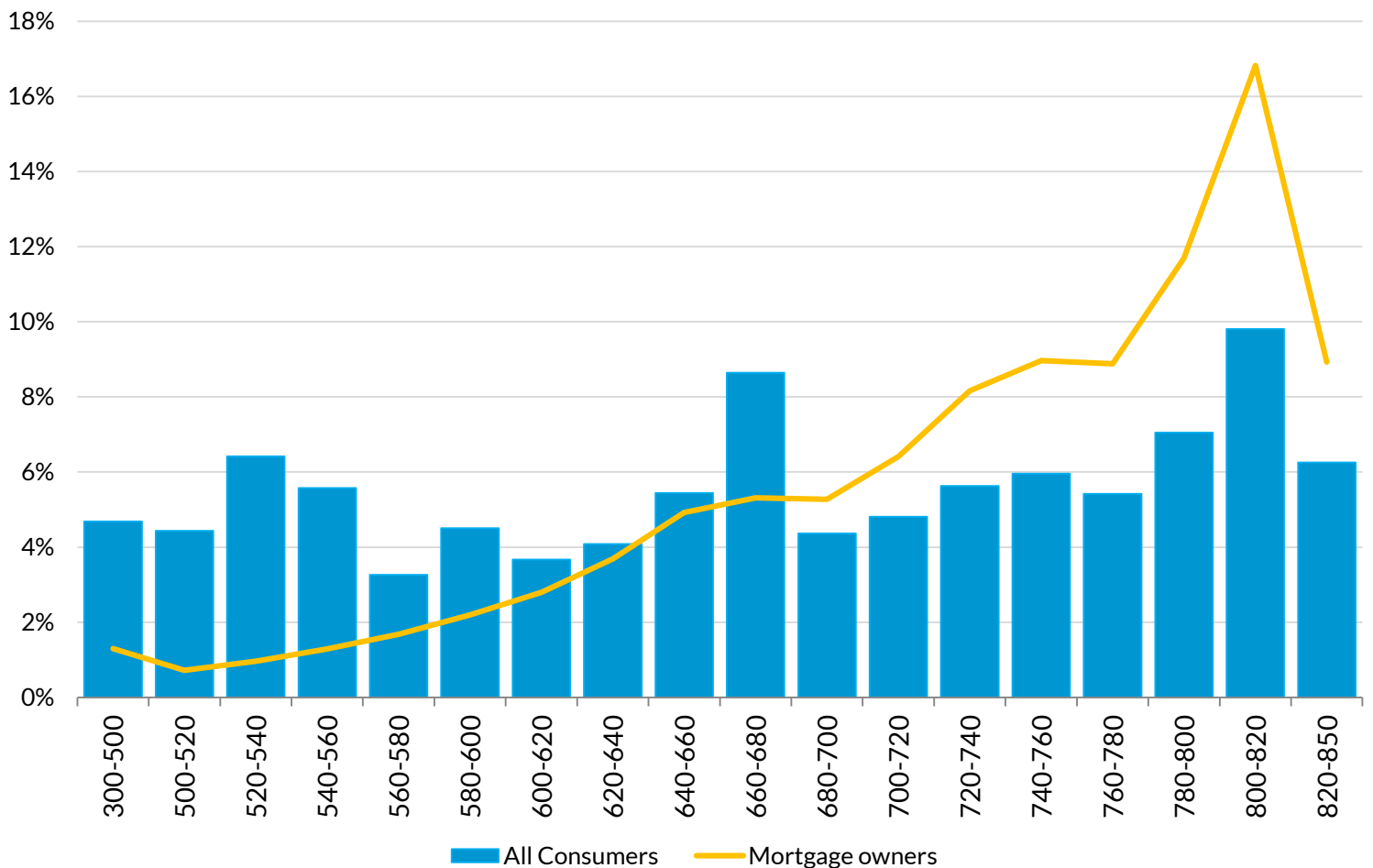
# Credit Box

Consumers who have a mortgage are concentrated at the high end of the general credit score spectrum. The top table shows that the median FICO score for all consumers (676) is lower than the 25th percentile of those with a mortgage (680).

## FICO Score Distribution: Mortgage Owners vs All Consumers

| All Consumers- Percentiles |     |     |     |     |     |     |     |         |
|----------------------------|-----|-----|-----|-----|-----|-----|-----|---------|
| Minimum                    | P5  | P10 | P25 | P50 | P75 | P90 | P95 | Maximum |
| 300                        | 502 | 524 | 583 | 676 | 772 | 813 | 822 | 839     |

| Mortgage Owners- Percentiles |     |     |     |     |     |     |     |         |
|------------------------------|-----|-----|-----|-----|-----|-----|-----|---------|
| Minimum                      | P5  | P10 | P25 | P50 | P75 | P90 | P95 | Maximum |
| 308                          | 569 | 613 | 680 | 751 | 801 | 818 | 824 | 839     |



Sources: Credit Bureau Data and Urban Institute.  
 Note: Data as of August 2016.

# September 2017 Credit Box at a Glance

In September 2017, the median Ginnie Mae FICO score was 681 versus 752 for Fannie and 753 for Freddie. Note that the FICO score for the 10<sup>th</sup> percentile was 623 for Ginnie Mae, versus 675 for Fannie and 680 for Freddie. Within the Ginnie Mae market, FHA loans have a median FICO score of 670, VA loans have a median FICO score of 706 and other loans have a median FICO score of 692.

| Purchase FICO |                 |     |     |        |     |     |      |
|---------------|-----------------|-----|-----|--------|-----|-----|------|
|               | Number of Loans | P10 | P25 | Median | P75 | P90 | Mean |
| All           | 314,314         | 645 | 681 | 731    | 776 | 797 | 726  |
| Fannie        | 114,058         | 684 | 717 | 757    | 787 | 802 | 749  |
| Freddie       | 74,666          | 688 | 721 | 759    | 788 | 802 | 751  |
| Ginnie        | 125,590         | 626 | 649 | 682    | 726 | 771 | 689  |

| Refi FICO |                 |     |     |        |     |     |      |
|-----------|-----------------|-----|-----|--------|-----|-----|------|
|           | Number of Loans | P10 | P25 | Median | P75 | P90 | Mean |
| All       | 170,050         | 643 | 681 | 726    | 771 | 796 | 722  |
| Fannie    | 78,321          | 663 | 700 | 742    | 779 | 800 | 736  |
| Freddie   | 47,162          | 668 | 702 | 743    | 779 | 799 | 737  |
| Ginnie    | 44,567          | 612 | 643 | 679    | 723 | 767 | 683  |

| All FICO |                 |     |     |        |     |     |      |
|----------|-----------------|-----|-----|--------|-----|-----|------|
|          | Number of Loans | P10 | P25 | Median | P75 | P90 | Mean |
| All      | 484,364         | 645 | 681 | 729    | 774 | 797 | 725  |
| Fannie   | 192,379         | 675 | 709 | 752    | 784 | 801 | 744  |
| Freddie  | 121,828         | 680 | 713 | 753    | 785 | 801 | 746  |
| Ginnie   | 170,157         | 623 | 648 | 681    | 725 | 770 | 688  |

| Purchase FICO: Ginnie Mae Breakdown By Source |                 |     |     |        |     |     |      |
|---|-----------------|-----|-----|--------|-----|-----|------|
|   | Number of Loans | P10 | P25 | Median | P75 | P90 | Mean |
| All   | 125,590         | 626 | 649 | 682    | 726 | 771 | 689  |
| FHA   | 77,942          | 622 | 644 | 671    | 707 | 745 | 677  |
| VA  | 35,844          | 634 | 665 | 713    | 765 | 794 | 714  |
| Other   | 11,804          | 641 | 660 | 692    | 731 | 766 | 696  |

| Refi FICO: Ginnie Mae Breakdown By Source |                 |     |     |        |     |     |      |
|---|-----------------|-----|-----|--------|-----|-----|------|
|   | Number of Loans | P10 | P25 | Median | P75 | P90 | Mean |
| All                                       | 44,567          | 612 | 643 | 679    | 723 | 767 | 683  |
| FHA                                       | 23,225          | 601 | 633 | 665    | 701 | 741 | 667  |
| VA  | 20,958          | 627 | 658 | 698    | 745 | 782 | 700  |
| Other                                     | 384             | 610 | 651 | 687    | 731 | 772 | 688  |

| All FICO: Ginnie Mae Breakdown By Source |                 |     |     |        |     |     |      |
|--|-----------------|-----|-----|--------|-----|-----|------|
|  | Number of Loans | P10 | P25 | Median | P75 | P90 | Mean |
| All                                      | 170,157         | 623 | 648 | 681    | 725 | 770 | 688  |
| FHA                                      | 101,167         | 619 | 642 | 670    | 706 | 744 | 675  |
| VA                                       | 56,802          | 632 | 662 | 706    | 758 | 791 | 708  |
| Other                                    | 12,188          | 640 | 660 | 692    | 731 | 766 | 696  |

Sources: eMBS and Urban Institute. Note: "Other" refers to loans insured by HUD's Office of Public and Indian Housing and the Department of Agriculture's Rural Development. Data as of September 2017.



# September 2017 Credit Box at a Glance

In September 2017, the median loan-to-value ratio (LTV) was 96.5 percent for Ginnie Mae, and 80.0 percent for Fannie Mae and Freddie Mac. The 10<sup>th</sup> percentile was 82.4 percent for Ginnie Mae and 50-51 percent for the GSEs. Within the Ginnie Mae market, the median LTV was 96.5 for FHA, 100.0 for VA and 101.0 for other programs.

| Purchase LTV |                 |      |      |        |       |       |      |
|--------------|-----------------|------|------|--------|-------|-------|------|
|              | Number of Loans | P10  | P25  | Median | P75   | P90   | Mean |
| All          | 314,629         | 72.0 | 80.0 | 95.0   | 96.5  | 100.0 | 87.6 |
| Fannie       | 113,979         | 62.0 | 79.0 | 80.0   | 95.0  | 97.0  | 81.9 |
| Freddie      | 74,759          | 63.0 | 79.0 | 80.0   | 95.0  | 95.0  | 81.6 |
| Ginnie       | 125,891         | 92.7 | 96.5 | 96.5   | 100.0 | 101.6 | 96.4 |

| Refi LTV |                 |      |      |        |      |       |      |
|----------|-----------------|------|------|--------|------|-------|------|
|          | Number of Loans | P10  | P25  | Median | P75  | P90   | Mean |
| All      | 172,788         | 46.0 | 61.0 | 75.0   | 83.0 | 94.0  | 71.5 |
| Fannie   | 78,327          | 42.0 | 56.0 | 70.0   | 79.0 | 80.0  | 66.0 |
| Freddie  | 47,216          | 42.0 | 57.0 | 70.0   | 79.0 | 80.0  | 66.3 |
| Ginnie   | 47,245          | 68.1 | 81.2 | 86.5   | 96.5 | 100.0 | 85.9 |

| All LTV |                 |      |      |        |       |       |      |
|---------|-----------------|------|------|--------|-------|-------|------|
|         | Number of Loans | P10  | P25  | Median | P75   | P90   | Mean |
| All     | 487,417         | 57.0 | 75.0 | 85.0   | 96.5  | 98.8  | 81.9 |
| Fannie  | 192,306         | 50.0 | 67.0 | 80.0   | 90.0  | 95.0  | 75.4 |
| Freddie | 121,975         | 51.0 | 68.0 | 80.0   | 90.0  | 95.0  | 75.7 |
| Ginnie  | 173,136         | 82.4 | 92.5 | 96.5   | 100.0 | 101.0 | 93.5 |

| Purchase LTV: Ginnie Mae Breakdown By Source |                 |      |       |        |       |       |      |
|--|-----------------|------|-------|--------|-------|-------|------|
|  | Number of Loans | P10  | P25   | Median | P75   | P90   | Mean |
| All  | 125,891         | 92.7 | 96.5  | 96.5   | 100.0 | 101.6 | 96.4 |
| FHA  | 78,117          | 92.9 | 96.5  | 96.5   | 96.5  | 96.5  | 95.1 |
| VA   | 35,914          | 91.1 | 100.0 | 100.0  | 102.2 | 103.3 | 98.2 |
| Other  | 11,860          | 95.4 | 99.2  | 101.0  | 101.0 | 101.0 | 99.3 |

| Refi LTV: Ginnie Mae Breakdown By Source |                 |      |      |        |       |       |      |
|--|-----------------|------|------|--------|-------|-------|------|
|  | Number of Loans | P10  | P25  | Median | P75   | P90   | Mean |
| All                                      | 47,245          | 68.1 | 81.2 | 86.5   | 96.5  | 100.0 | 85.9 |
| FHA                                      | 23,600          | 66.8 | 79.7 | 86.5   | 87.0  | 96.4  | 82.6 |
| VA                                       | 23,260          | 69.7 | 83.2 | 93.0   | 100.0 | 102.1 | 89.2 |
| Other                                    | 385             | 77.0 | 89.1 | 97.7   | 101.1 | 102.1 | 93.1 |

| All LTV: Ginnie Mae Breakdown By Source |                 |      |      |        |       |       |      |
|---|-----------------|------|------|--------|-------|-------|------|
|   | Number of Loans | P10  | P25  | Median | P75   | P90   | Mean |
| All                                     | 173,136         | 82.4 | 92.5 | 96.5   | 100.0 | 101.0 | 93.5 |
| FHA                                     | 101,717         | 82.9 | 90.7 | 96.5   | 96.5  | 96.5  | 92.2 |
| VA                                      | 59,174          | 79.9 | 91.8 | 100.0  | 100.5 | 103.0 | 94.7 |
| Other                                   | 12,245          | 94.9 | 99.1 | 101.0  | 101.0 | 101.0 | 99.1 |

Sources: eMBS and Urban Institute. Note: "Other" refers to loans insured by HUD's Office of Public and Indian Housing and the Department of Agriculture's Rural Development. In May 2017 Ginnie Mae began disclosing issuer-reported LTV for FHA loans, which includes the financed upfront mortgage insurance premium. To make it consistent with the previously reported LTV, we removed the financed upfront mortgage insurance premium by subtracting 169 bps from this new issuer-reported LTV. Data as of September 2017.

# September 2017 Credit Box at a Glance

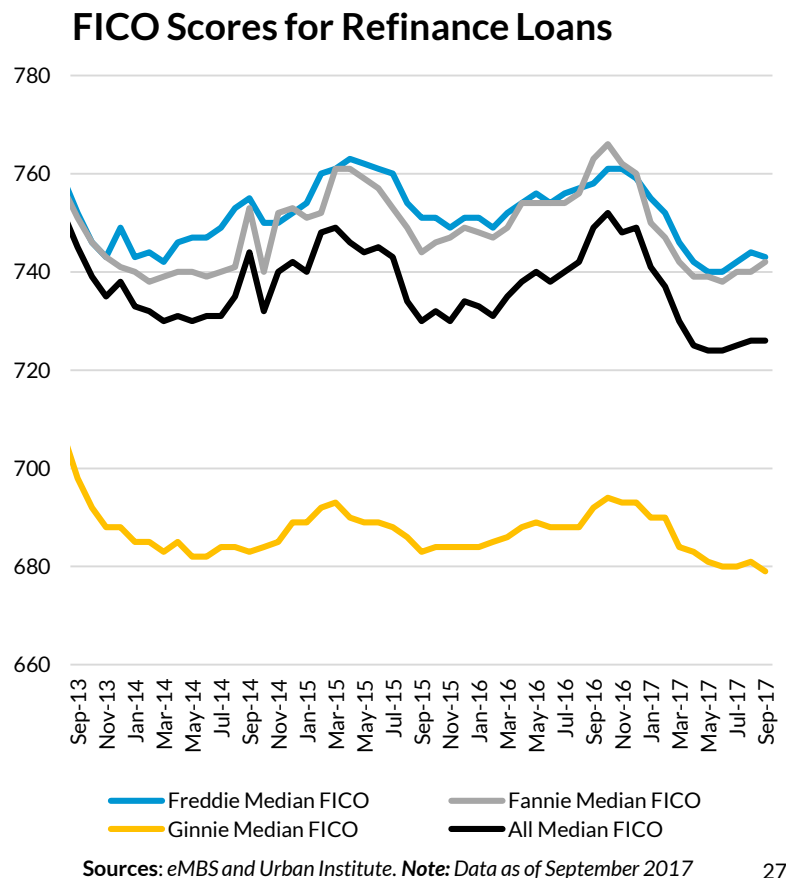
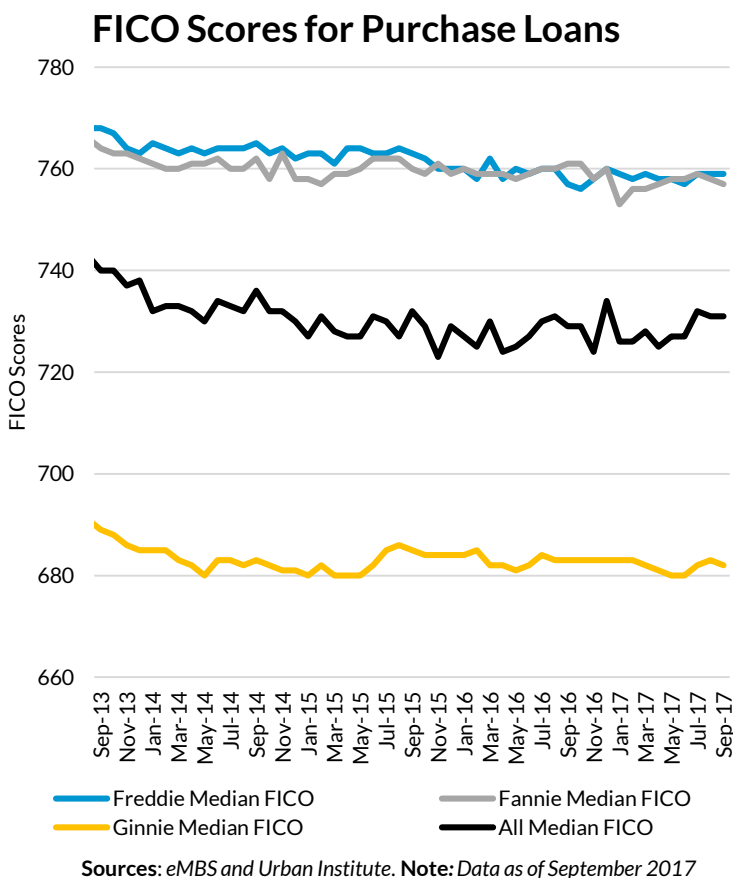
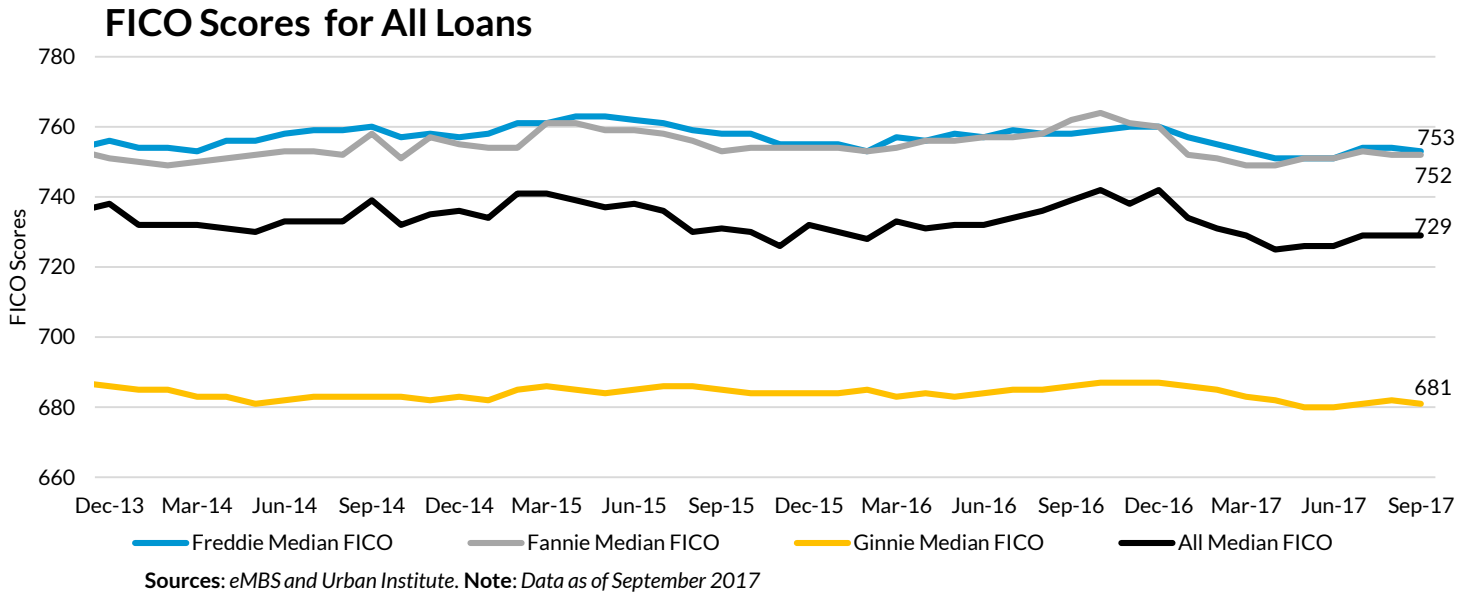
In September 2017, the median Ginnie Mae debt-to-income ratio (DTI) was 41.6 percent, considerably higher than the 36.0 percent median DTIs for Fannie Mae and Freddie Mac. The 90<sup>th</sup> percentile for Ginnie Mae was 53.3 percent, also much higher than the 45-46 percent DTIs for the GSEs. Fannie Mae has recently announced they will raise their DTI limit from 45.0 to 50.0. Within the Ginnie Mae market, the median FHA DTI ratio was 43.2 percent, versus 40.6 percent for VA and 35.8 percent for other lending programs.

| Purchase DTI                                 |                 |      |      |        |      |      |      |
|--|-----------------|------|------|--------|------|------|------|
|  | Number of Loans | P10  | P25  | Median | P75  | P90  | Mean |
| All  | 314,375         | 24.0 | 30.9 | 38.0   | 44.0 | 49.0 | 37.2 |
| Fannie                                       | 114,161         | 22.0 | 28.0 | 36.0   | 42.0 | 45.0 | 34.6 |
| Freddie                                      | 74,710          | 22.0 | 28.0 | 36.0   | 42.0 | 46.0 | 34.8 |
| Ginnie                                       | 125,504         | 28.2 | 34.8 | 41.7   | 48.1 | 53.3 | 41.1 |
| Refi DTI                                     |                 |      |      |        |      |      |      |
|  | Number of Loans | P10  | P25  | Median | P75  | P90  | Mean |
| All  | 157,893         | 22.0 | 29.0 | 37.0   | 43.0 | 48.0 | 35.9 |
| Fannie                                       | 77,018          | 21.0 | 28.0 | 36.0   | 42.0 | 45.0 | 34.4 |
| Freddie                                      | 46,164          | 22.0 | 28.0 | 37.0   | 43.0 | 46.0 | 35.2 |
| Ginnie                                       | 34,711          | 25.8 | 33.2 | 41.2   | 48.0 | 53.0 | 40.2 |
| All DTI                                      |                 |      |      |        |      |      |      |
|  | Number of Loans | P10  | P25  | Median | P75  | P90  | Mean |
| All  | 472,268         | 23.0 | 30.0 | 38.0   | 44.0 | 48.9 | 36.8 |
| Fannie                                       | 191,179         | 22.0 | 28.0 | 36.0   | 42.0 | 45.0 | 34.5 |
| Freddie                                      | 120,874         | 22.0 | 28.0 | 36.0   | 43.0 | 46.0 | 34.9 |
| Ginnie                                       | 160,215         | 27.7 | 34.5 | 41.6   | 48.1 | 53.3 | 40.9 |
| Purchase DTI: Ginnie Mae Breakdown By Source |                 |      |      |        |      |      |      |
|  | Number of Loans | P10  | P25  | Median | P75  | P90  | Mean |
| All  | 125,504         | 28.2 | 34.8 | 41.7   | 48.1 | 53.3 | 41.1 |
| FHA  | 78,099          | 29.8 | 36.4 | 43.4   | 49.3 | 54.0 | 42.4 |
| VA   | 35,710          | 26.6 | 33.6 | 40.8   | 47.4 | 52.9 | 40.3 |
| Other  | 11,695          | 25.6 | 30.6 | 35.9   | 40.1 | 43.1 | 35.0 |
| Refi DTI: Ginnie Mae Breakdown By Source     |                 |      |      |        |      |      |      |
|  | Number of Loans | P10  | P25  | Median | P75  | P90  | Mean |
| All  | 34,711          | 25.8 | 33.2 | 41.2   | 48.0 | 53.0 | 40.2 |
| FHA  | 18,567          | 27.0 | 34.3 | 42.3   | 48.7 | 53.4 | 41.0 |
| VA   | 15,842          | 25.0 | 32.1 | 40.1   | 47.1 | 52.5 | 39.3 |
| Other  | 302             | 16.2 | 22.5 | 31.7   | 38.9 | 44.9 | 31.2 |
| All DTI: Ginnie Mae Breakdown By Source      |                 |      |      |        |      |      |      |
|  | Number of Loans | P10  | P25  | Median | P75  | P90  | Mean |
| All  | 160,215         | 27.7 | 34.5 | 41.6   | 48.1 | 53.3 | 40.9 |
| FHA  | 96,666          | 29.2 | 36.0 | 43.2   | 49.2 | 53.9 | 42.1 |
| VA   | 51,552          | 26.0 | 33.1 | 40.6   | 47.3 | 52.8 | 40.0 |
| Other  | 11,997          | 25.3 | 30.5 | 35.8   | 40.1 | 43.1 | 34.9 |

Sources: eMBS and Urban Institute. Note: "Other" refers to loans insured by HUD's Office of Public and Indian Housing and the Department of Agriculture's Rural Development. Data as of September 2017.

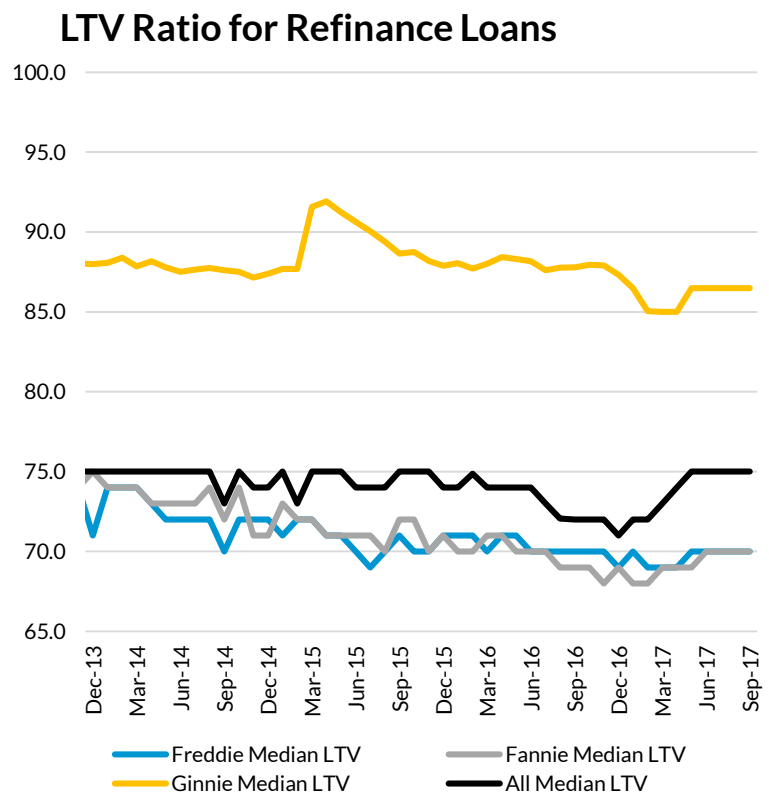
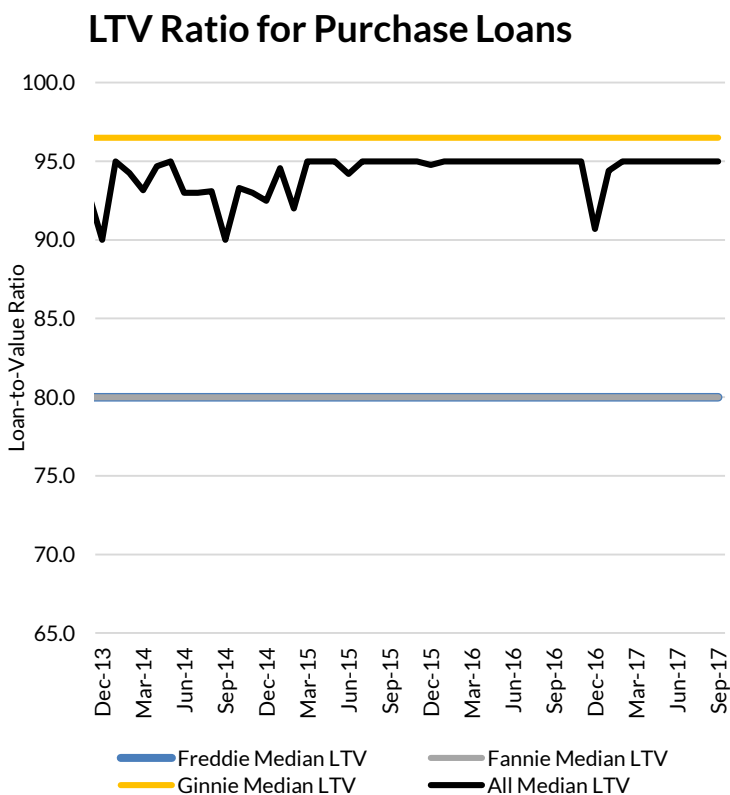
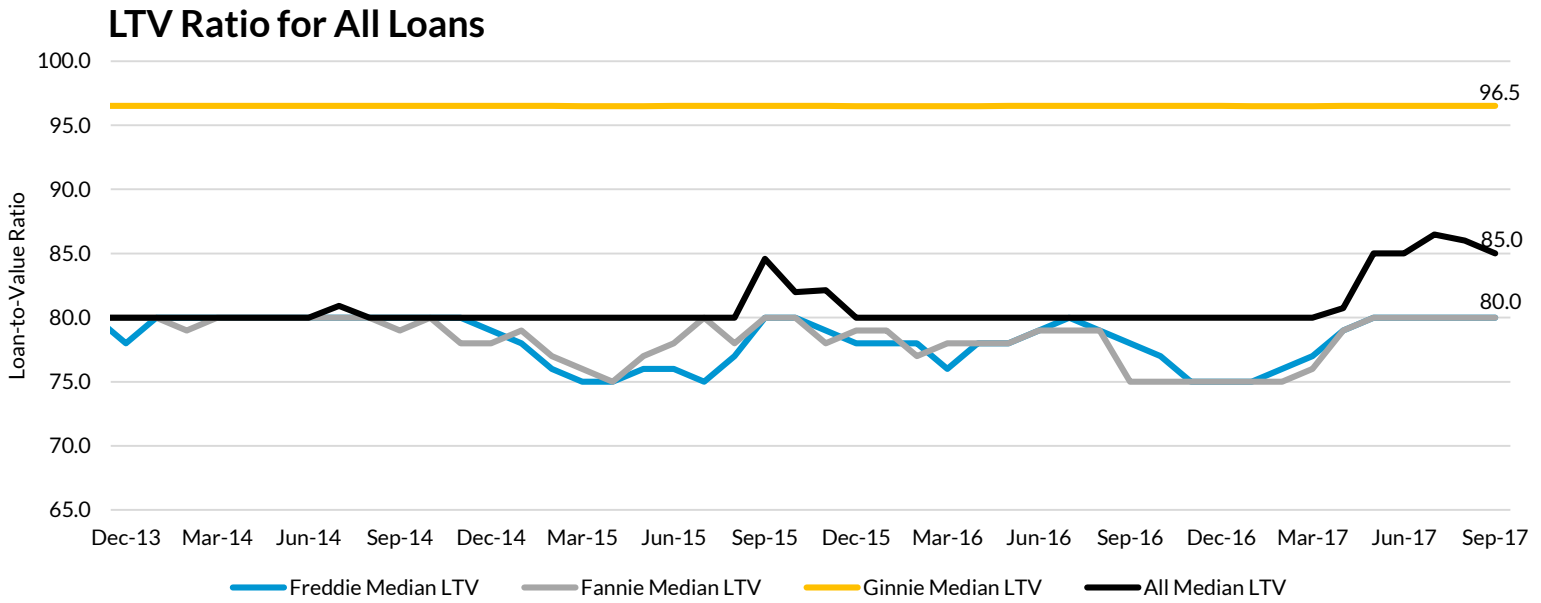
# Credit Box: Historical

The median FICO score for all agency MBS originated in September now stands at 729, stable since last month. The figures clearly shows the median FICO score for Ginnie Mae borrowers has always been considerably lower than for GSE borrowers. The difference between Ginnie Mae and GSE borrowers is wider in purchase loans than in refi loans.



# Credit Box: Historical

Median LTVs for Ginnie Mae loans have historically been at 96.5 percent, much higher than the 75-80 percent average for the GSEs. Through time, refinances have LTVs about 10 points lower than their purchase counterparts.

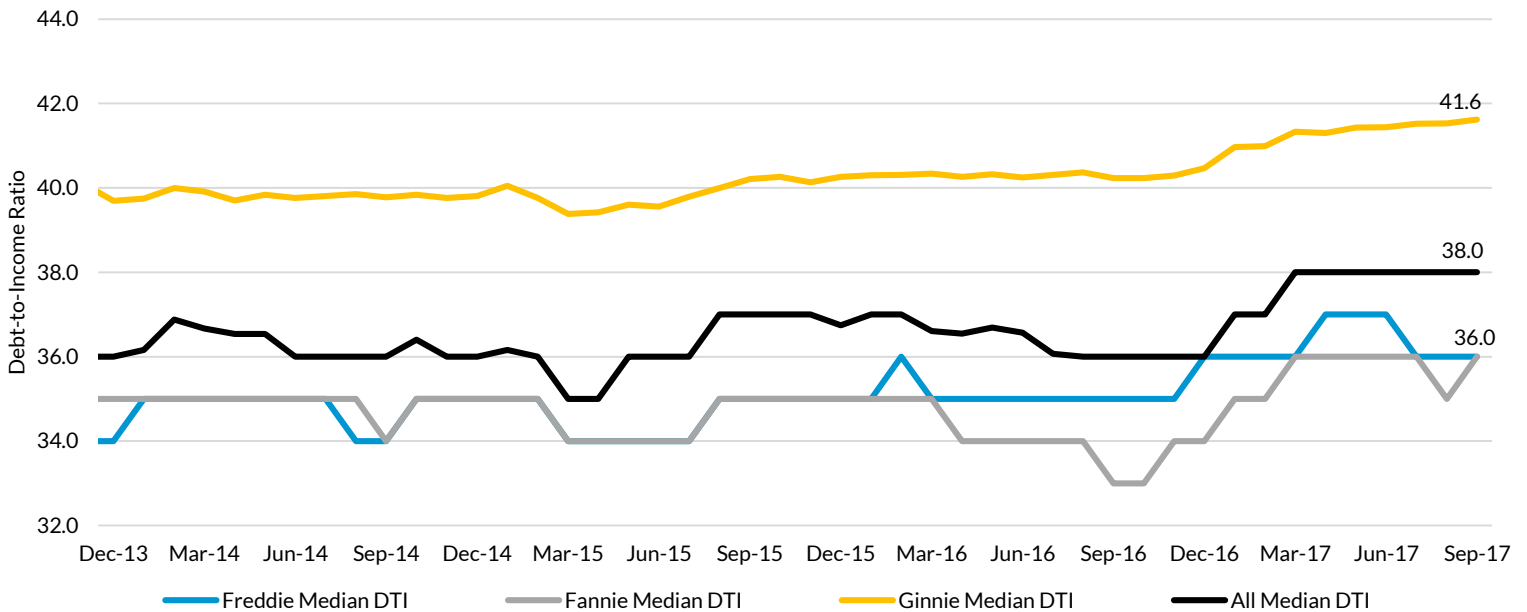


Sources: eMBS and Urban Institute. Note: In May 2017 Ginnie Mae began disclosing issuer-reported LTV for FHA loans, which includes the financed upfront mortgage insurance premium. To make it consistent with the previously reported LTV, we removed the financed upfront mortgage insurance premium by subtracting 169 bps from this new issuer-reported LTV. Sources and note apply to all three graphs. Data as of September 2017.

# Credit Box: Historical

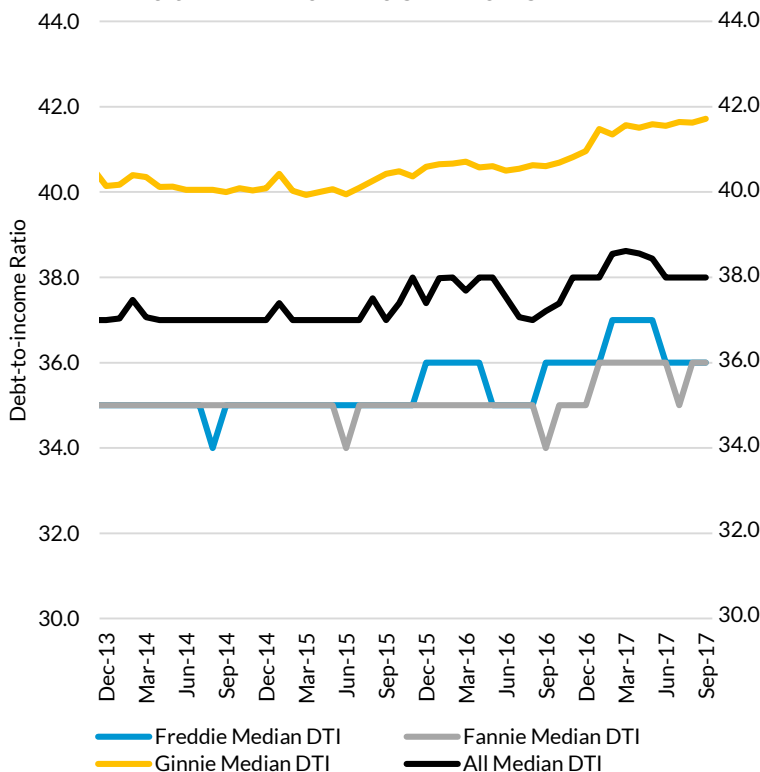
Median debt-to-income ratios on Ginnie Mae loans have historically been in the low 40s, considerably higher than the 35-36 percent DTIs for the GSEs. The DTIs for refinance loans have historically been much lower than for purchase loans, but the DTIs for refinance loans have been creeping up sharply since November 2016, and started to stabilize in recent months.

## DTI Ratio for All Loans



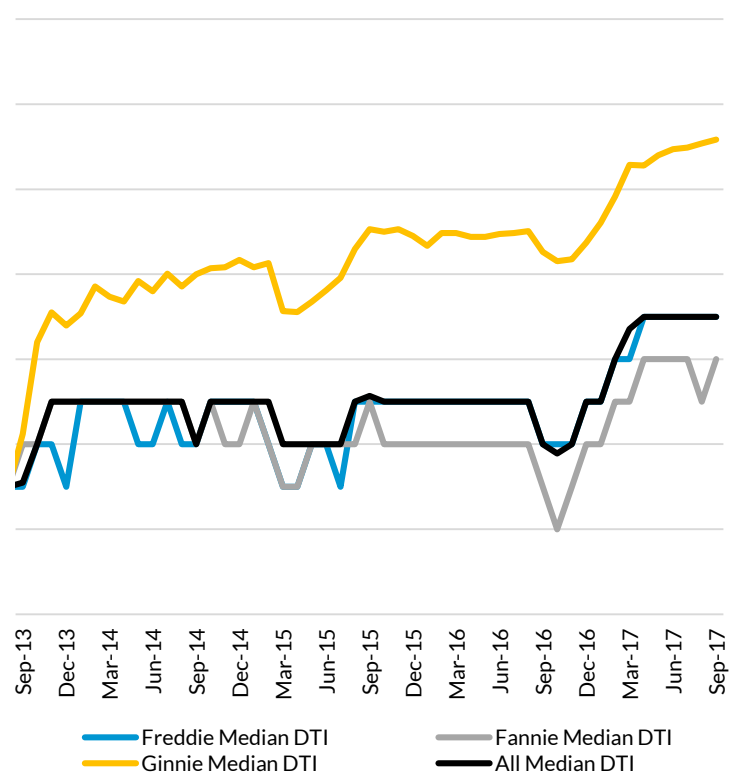
Sources: eMBS and Urban Institute. Note: Data as of September 2017

## DTI Ratio for Purchase Loans



Sources: eMBS and Urban Institute. Note: Data as of September 2017

## DTI Ratio for Refinance Loans

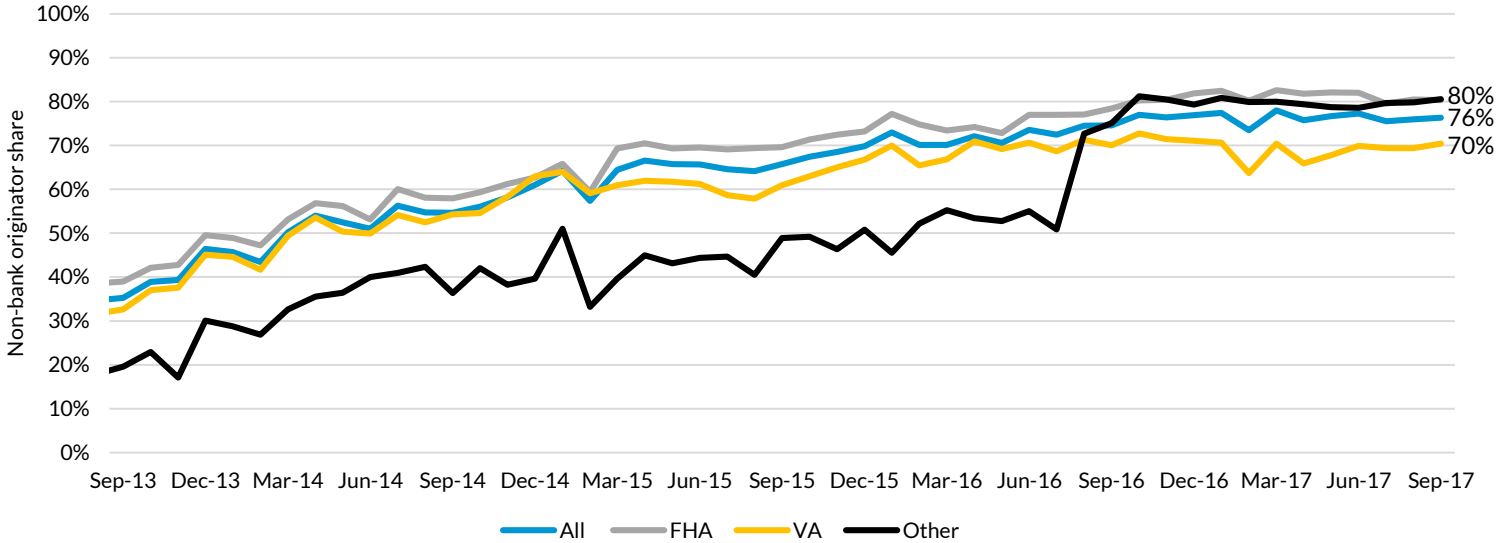


Sources: eMBS and Urban Institute. Note: Data as of September 2017

# Ginnie Mae Non-bank Originators

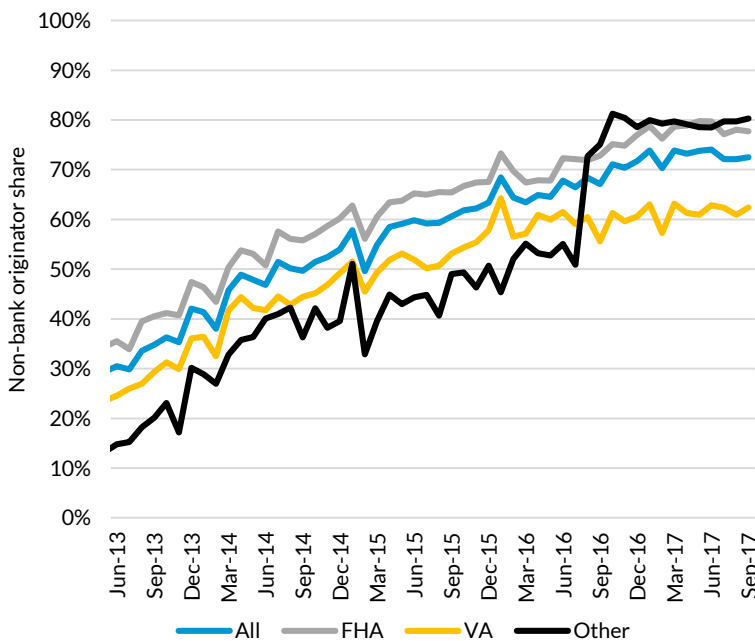
The non-bank originator share of the Ginnie Mae was 76 percent in September 2017, a slight decrease from June. The non-bank share of VA issuance stood at 70 percent in September, while the non-bank share of FHA issuance was 80 percent and Other issuance was 81 percent.

## Ginnie Mae Non-bank Originator Share: All Loans



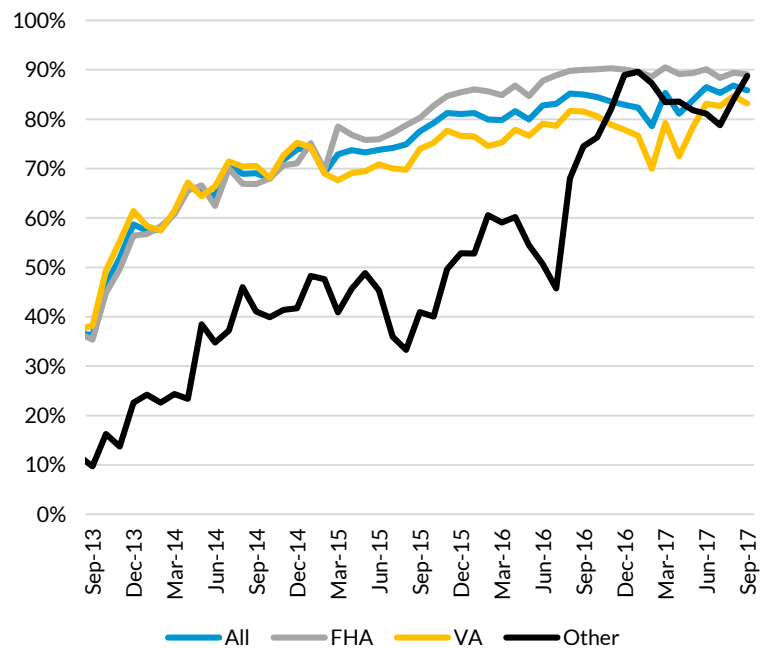
Sources: eMBS and Urban Institute. Note: "Other" refers to loans insured by HUD's Office of Public and Indian Housing and the Department of Agriculture's Rural Development. Data as of September 2017.

## Ginnie Mae Non-bank Share: Purchase Loans



Sources: eMBS and Urban Institute  
Note: Data as of September 2017.

## Ginnie Mae Non-bank Share: Refi Loans



Sources: eMBS and Urban Institute  
Note: Data as of September 2017.

# Ginnie Mae Non-bank Originators: August 2017 Credit Box

An analysis of recent origination suggests that non-bank originators have considerably lower median borrower FICO scores than do bank originators. Overall, the median Ginnie Mae FICO score is 681-- it is 702 for bank borrowers versus 676 for non-bank borrowers. For FHA borrowers, the median FICO score for bank originators is 685 versus 666 for non-banks. For VA borrowers, the median FICO score for bank originators is 729 versus 698 for non-banks. For “Other” loans, the median FICO score for bank originators is 711 versus 688 for non-banks.

| All Ginnie Mae FICO   |                 |     |     |        |     |     |      |
|-----------------------|-----------------|-----|-----|--------|-----|-----|------|
|                       | Number of Loans | P10 | P25 | Median | P75 | P90 | Mean |
| All                   | 169,220         | 623 | 648 | 681    | 725 | 770 | 688  |
| Bank                  | 39,180          | 643 | 665 | 702    | 752 | 788 | 707  |
| Non-Bank              | 130,040         | 621 | 643 | 676    | 717 | 761 | 682  |
| FHA Ginnie Mae FICO   |                 |     |     |        |     |     |      |
|                       | Number of Loans | P10 | P25 | Median | P75 | P90 | Mean |
| All                   | 100,476         | 619 | 642 | 670    | 706 | 744 | 675  |
| Bank                  | 19,910          | 641 | 659 | 685    | 722 | 760 | 692  |
| Non-Bank              | 80,566          | 614 | 637 | 666    | 701 | 739 | 671  |
| VA Ginnie Mae FICO    |                 |     |     |        |     |     |      |
|                       | Number of Loans | P10 | P25 | Median | P75 | P90 | Mean |
| All                   | 56,622          | 632 | 662 | 706    | 758 | 791 | 708  |
| Bank                  | 16,844          | 646 | 678 | 729    | 777 | 798 | 726  |
| Non-Bank              | 39,778          | 627 | 656 | 698    | 748 | 784 | 701  |
| Other Ginnie Mae FICO |                 |     |     |        |     |     |      |
|                       | Number of Loans | P10 | P25 | Median | P75 | P90 | Mean |
| All                   | 12,122          | 640 | 660 | 692    | 731 | 766 | 696  |
| Bank                  | 2,426           | 640 | 666 | 711    | 756 | 783 | 707  |
| Non-Bank              | 9,696           | 640 | 658 | 688    | 725 | 758 | 693  |

Sources: eMBS and Urban Institute. Note: “Other” refers to loans insured by HUD’s Office of Public and Indian Housing and the Department of Agriculture’s Rural Development. Data as of September 2017.

# Ginnie Mae Non-bank Originators: September 2017 Credit Box

An analysis of the loans backing Ginnie Mae origination indicates that there are virtually no differences in median LTV ratios between bank originated loans and non-bank originated loans. Mean LTVs for banks are actually marginally higher than their non-bank counterparts.

| All Ginnie Mae LTV   |                 |      |       |        |       |       |       |
|----------------------|-----------------|------|-------|--------|-------|-------|-------|
|                      | Number of Loans | P10  | P25   | Median | P75   | P90   | Mean  |
| All                  | 172,200         | 82.3 | 92.5  | 96.5   | 100.0 | 101.0 | 93.5  |
| Bank                 | 39,531          | 85.0 | 94.8  | 96.5   | 100.0 | 102.0 | 94.6  |
| Non-Bank             | 132,669         | 81.6 | 91.2  | 96.5   | 99.0  | 101.0 | 93.2  |
| FHA Ginnie Mae LTV   |                 |      |       |        |       |       |       |
|                      | Number of Loans | P10  | P25   | Median | P75   | P90   | Mean  |
| All                  | 101,027         | 82.9 | 90.5  | 96.5   | 96.5  | 96.5  | 92.2  |
| Bank                 | 20,087          | 86.5 | 94.8  | 96.5   | 96.5  | 97.3  | 93.8  |
| Non-Bank             | 80,940          | 81.5 | 89.6  | 96.5   | 96.5  | 96.5  | 91.8  |
| VA Ginnie Mae LTV    |                 |      |       |        |       |       |       |
|                      | Number of Loans | P10  | P25   | Median | P75   | P90   | Mean  |
| All                  | 58,995          | 79.9 | 91.8  | 100.0  | 100.5 | 103.0 | 94.7  |
| Bank                 | 16,984          | 80.0 | 92.3  | 100.0  | 100.0 | 103.0 | 94.8  |
| Non-Bank             | 42,011          | 79.5 | 91.5  | 100.0  | 101.5 | 103.1 | 94.6  |
| Other Ginnie Mae LTV |                 |      |       |        |       |       |       |
|                      | Number of Loans | P10  | P25   | Median | P75   | P90   | Mean  |
| All                  | 12,178          | 94.9 | 99.1  | 101.0  | 101.0 | 101.0 | 99.1  |
| Bank                 | 2,460           | 96.9 | 100.1 | 101.0  | 101.0 | 102.0 | 100.0 |
| Non-Bank             | 9,718           | 94.6 | 98.8  | 100.9  | 101.0 | 101.0 | 98.9  |

Sources: eMBS and Urban Institute.

Note: "Other" refers to loans insured by HUD's Office of Public and Indian Housing and the Department of Agriculture's Rural Development. In May 2017 Ginnie Mae began disclosing issuer-reported LTV for FHA loans, which includes the financed upfront mortgage insurance premium. To make it consistent with the previously reported LTV, we removed the financed upfront mortgage insurance premium by subtracting 169 bps from this new issuer-reported LTV. Data as of September 2017.



# Ginnie Mae Non-bank Originators: September 2017 Credit Box

An analysis of the borrowers' DTI ratios for bank versus non-bank originators indicates the former are very slightly more conservative. That is, the median DTI ratio for bank originators is 40.5, versus 42.0 for non-banks.

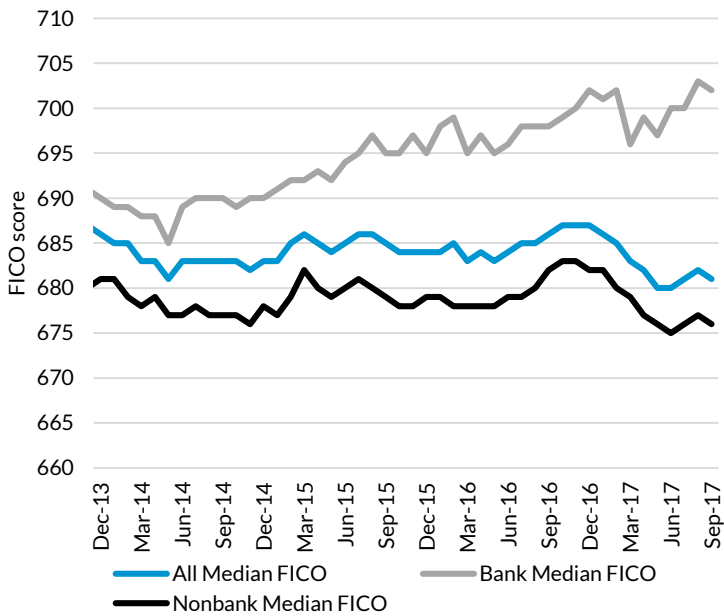
| All Ginnie Mae DTI   |                 |      |      |        |      |      |      |
|----------------------|-----------------|------|------|--------|------|------|------|
|                      | Number of Loans | P10  | P25  | Median | P75  | P90  | Mean |
| All                  | 159,278         | 27.7 | 34.5 | 41.6   | 48.1 | 53.3 | 40.9 |
| Bank                 | 37,860          | 26.3 | 33.3 | 40.5   | 46.7 | 52.2 | 39.7 |
| Non-Bank             | 121,418         | 28.1 | 34.9 | 42.0   | 48.5 | 53.5 | 41.3 |
| FHA Ginnie Mae DTI   |                 |      |      |        |      |      |      |
|                      | Number of Loans | P10  | P25  | Median | P75  | P90  | Mean |
| All                  | 95,975          | 29.2 | 36.1 | 43.2   | 49.2 | 53.9 | 42.1 |
| Bank                 | 19,277          | 28.8 | 35.5 | 42.3   | 47.8 | 53.1 | 41.3 |
| Non-Bank             | 76,698          | 29.3 | 36.2 | 43.5   | 49.5 | 54.0 | 42.4 |
| VA Ginnie Mae DTI    |                 |      |      |        |      |      |      |
|                      | Number of Loans | P10  | P25  | Median | P75  | P90  | Mean |
| All                  | 51,373          | 26.0 | 33.1 | 40.6   | 47.3 | 52.8 | 40.0 |
| Bank                 | 16,272          | 24.3 | 31.3 | 39.2   | 45.9 | 51.7 | 38.6 |
| Non-Bank             | 35,101          | 27.0 | 34.0 | 41.2   | 47.9 | 53.1 | 40.6 |
| Other Ginnie Mae DTI |                 |      |      |        |      |      |      |
|                      | Number of Loans | P10  | P25  | Median | P75  | P90  | Mean |
| All                  | 11,930          | 25.3 | 30.5 | 35.8   | 40.1 | 43.1 | 34.9 |
| Bank                 | 2,311           | 24.6 | 29.8 | 35.4   | 40.0 | 43.2 | 34.6 |
| Non-Bank             | 9,619           | 25.5 | 30.6 | 36.0   | 40.2 | 43.1 | 35.0 |

Sources: eMBS and Urban Institute. Note: "Other" refers to loans insured by HUD's Office of Public and Indian Housing and the Department of Agriculture's Rural Development. Data as of September 2017.

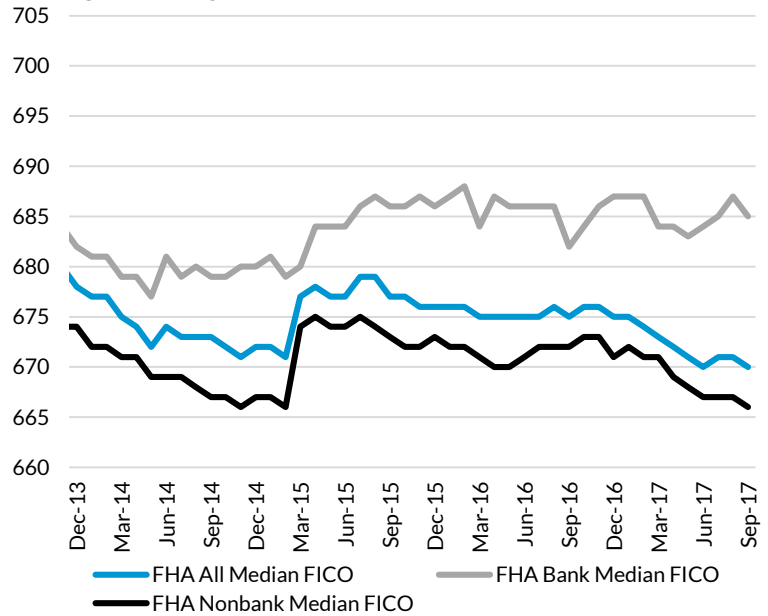
# Ginnie Mae Nonbank Originators: Historical Credit Box

The FICO scores for both Ginnie Mae bank and nonbank originators decreased slightly in September. The spread in the FICO scores between banks and non-banks remains at their widest level since the data became available in 2013.

### Ginnie Mae FICO Scores: Bank vs. Nonbank



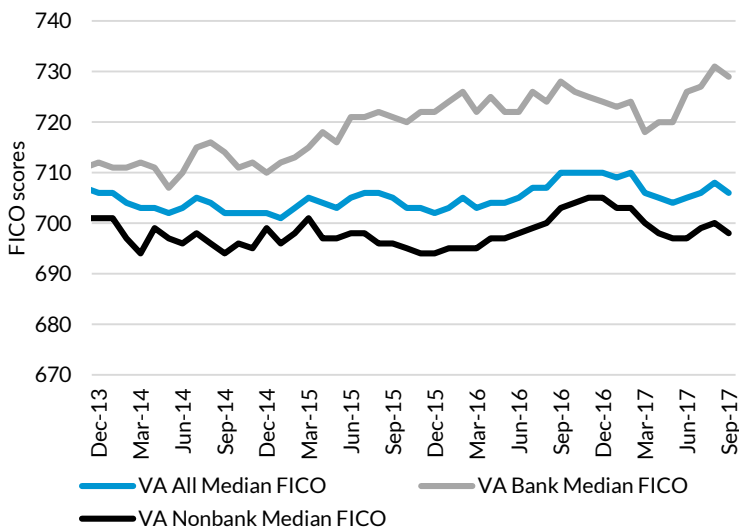
### Ginnie Mae FHA FICO Scores: Bank vs. Nonbank



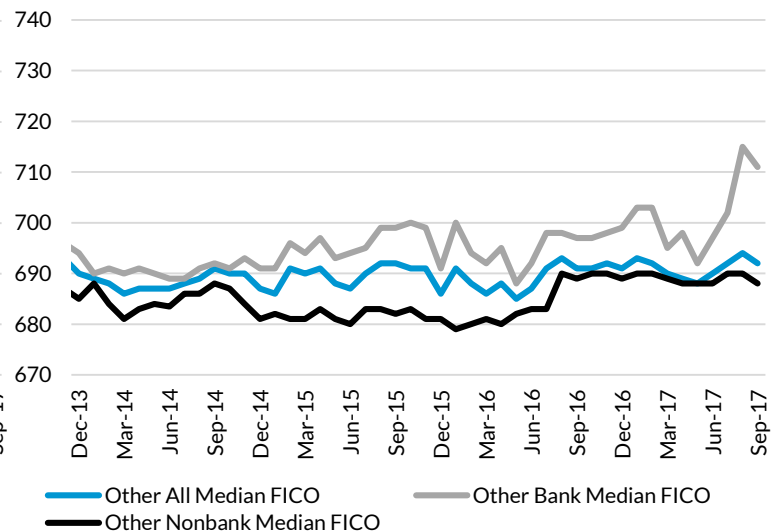
Sources: eMBS and Urban Institute Note: Data as of September 2017

Sources: eMBS and Urban Institute Note: Data as of September 2017

### Ginnie Mae VA FICO Scores: Bank vs. Nonbank



### Ginnie Mae Other FICO Scores: Bank vs. Nonbank



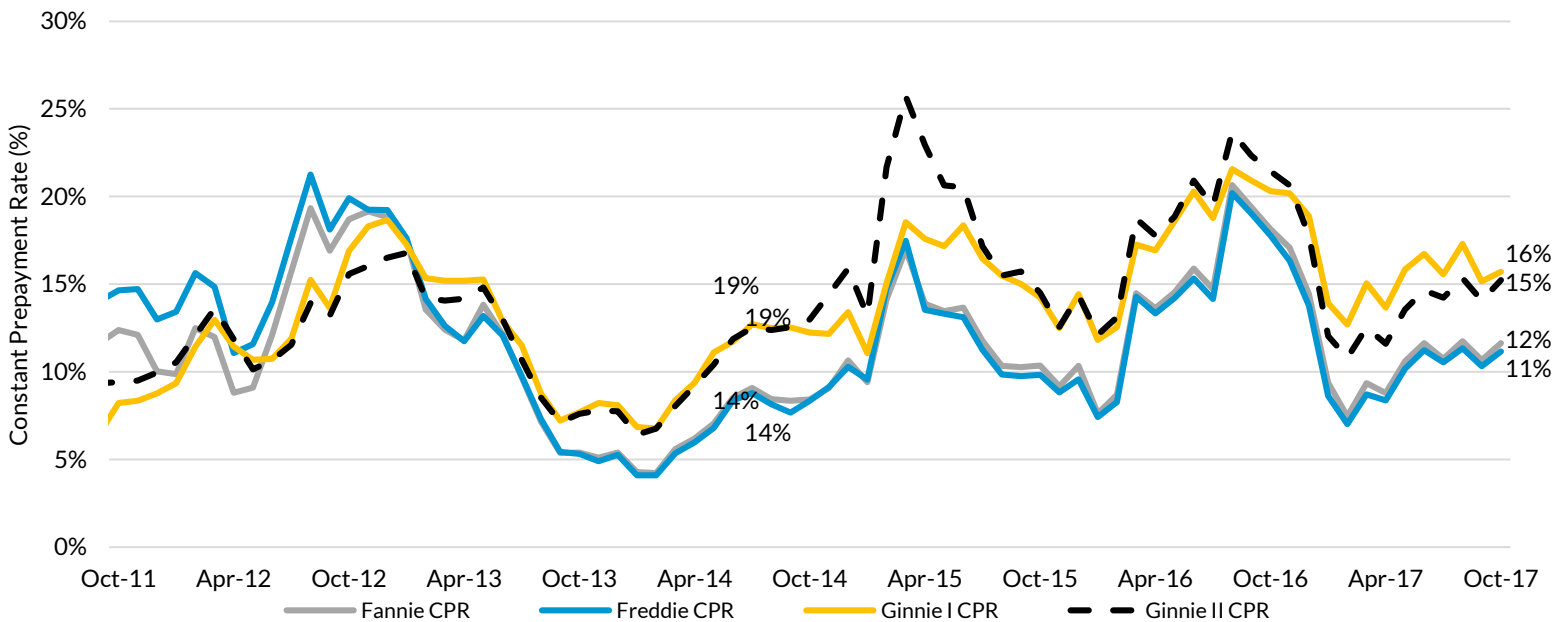
Sources: eMBS and Urban Institute Note: Data as of September 2017

Sources: eMBS and Urban Institute Note: "Other" refers to loans insured by HUD's Office of Public and Indian Housing and the Department of Agriculture's Rural Development. Data as of September 2017.

# Prepayments

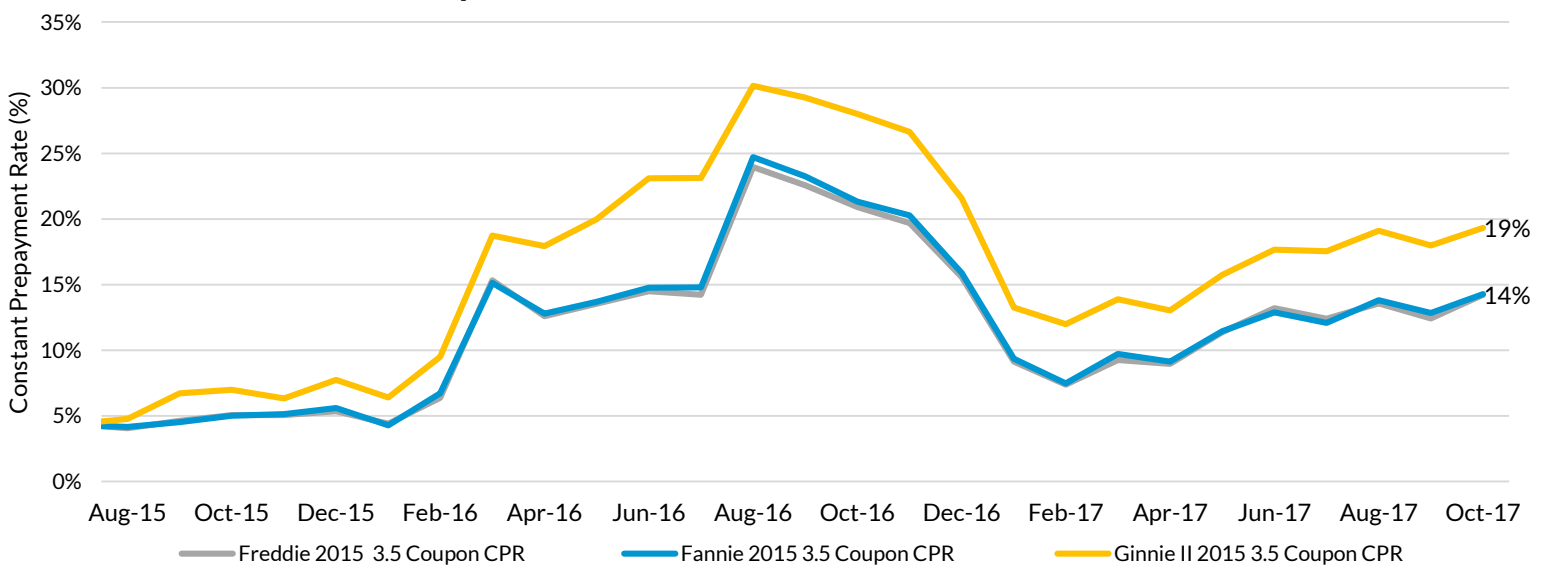
Prepayments on Ginnie Mae securities were lower than on GSE securities from 2011 through mid-2013, but have been higher since. These differences hold across all coupon buckets. The differences are especially pronounced on more recent production. These increased Ginnie speeds reflect the growing share of VA loans, which prepay at faster speeds than FHA loans. This also reflects the fact that FHA streamlined refinances apply to a wide range of borrowers and unlike GSE streamlined refinances, requires no credit report and no appraisal. Some of the upfront mortgage insurance premium can also be applied to the refinanced loan. Moreover, FHA permits refinancing of existing mortgages after 6 months, while the GSEs do not allow refinancing for a year. With the increase in interest rates since November 2016, the prepayment speeds for all agencies have slowed down considerably. In 2017, with the bulk of the mortgage universe finding it non-economic to refinance, the muted month to month variations in speeds reflect seasonality, changes in day count and changes in mortgage interest rates.

## Aggregate Prepayments



Sources: Credit Suisse and Urban Institute. Note: Data as of October 2017

## 2015 Issued 3.5 Coupon CPR

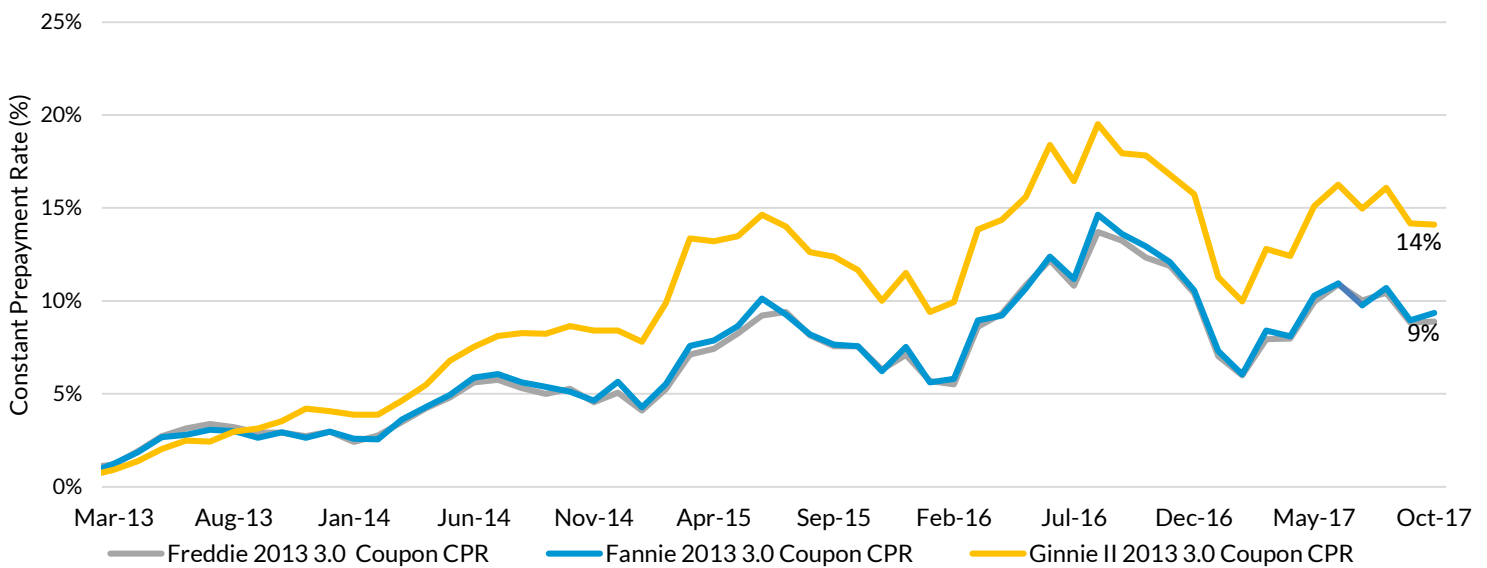


Sources: Credit Suisse and Urban Institute. Note: Data as of October 2017

# Prepayments

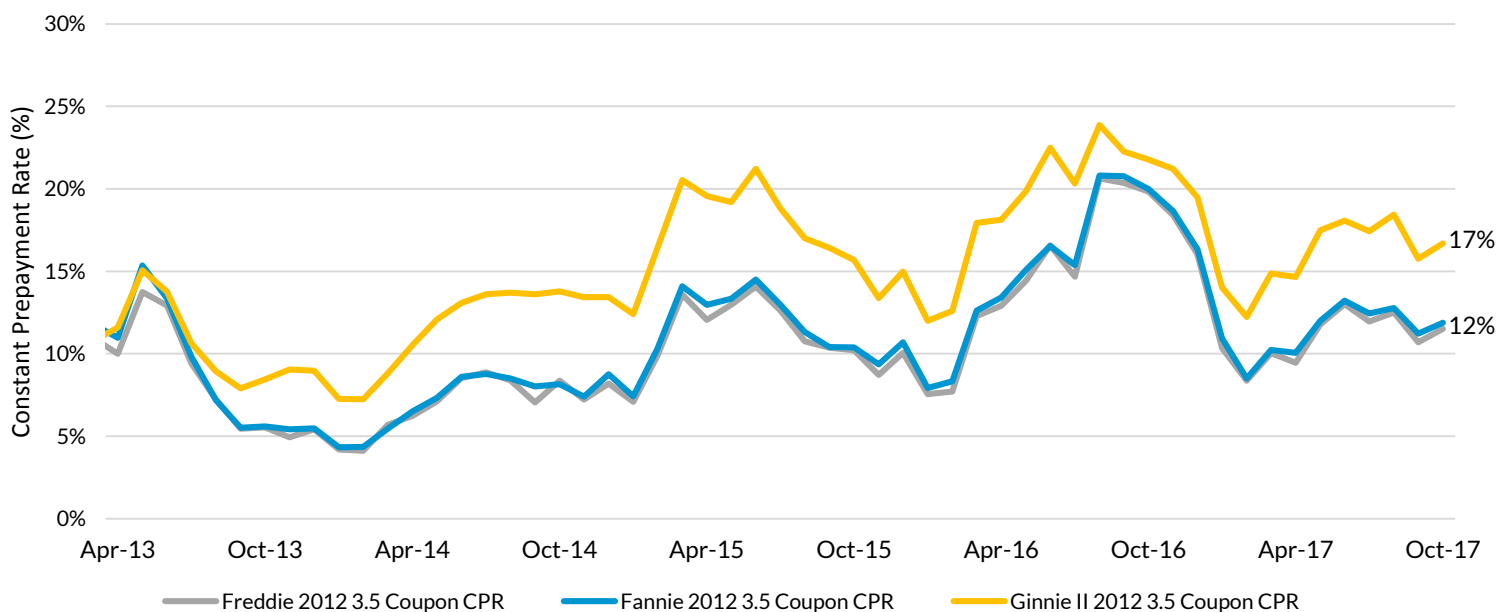
The 2013 Ginnie II 3.0s are prepaying faster than their conventional counterparts. 2012 Ginnie II 3.5s have been faster since mid-2013. The differences accelerated in 2015—potentially due to the FHA mortgage insurance premium (MIP) cut. In January 2015 FHA lowered its MIPs from 135 basis points per annum to 85 basis points per annum; this gives 2012 and 2013 FHA mortgages taken out with MIPs of 125-135 bps a 40-50 basis point rate incentive that conventional mortgages do not have. GSE guarantee fees have gone up over that same period, creating a disincentive for conventional loans. Moreover, recent originations are more heavily VA loans, which are more prepayment responsive than either FHA or Conventional loans. After a sharp mortgage rate rise in November, the prepayment speeds of Ginnie and Conventional loans both fell dramatically. In 2017, with the bulk of the mortgage universe finding it non-economic to refinance, the muted month to month variations in speeds reflect seasonality, changes in day count and changes in mortgage interest rates.

## 2013 Issued 3.0 Coupon CPR



Sources: Credit Suisse and Urban Institute. Note: Data as of October 2017

## 2012 Issued 3.5 Coupon CPR

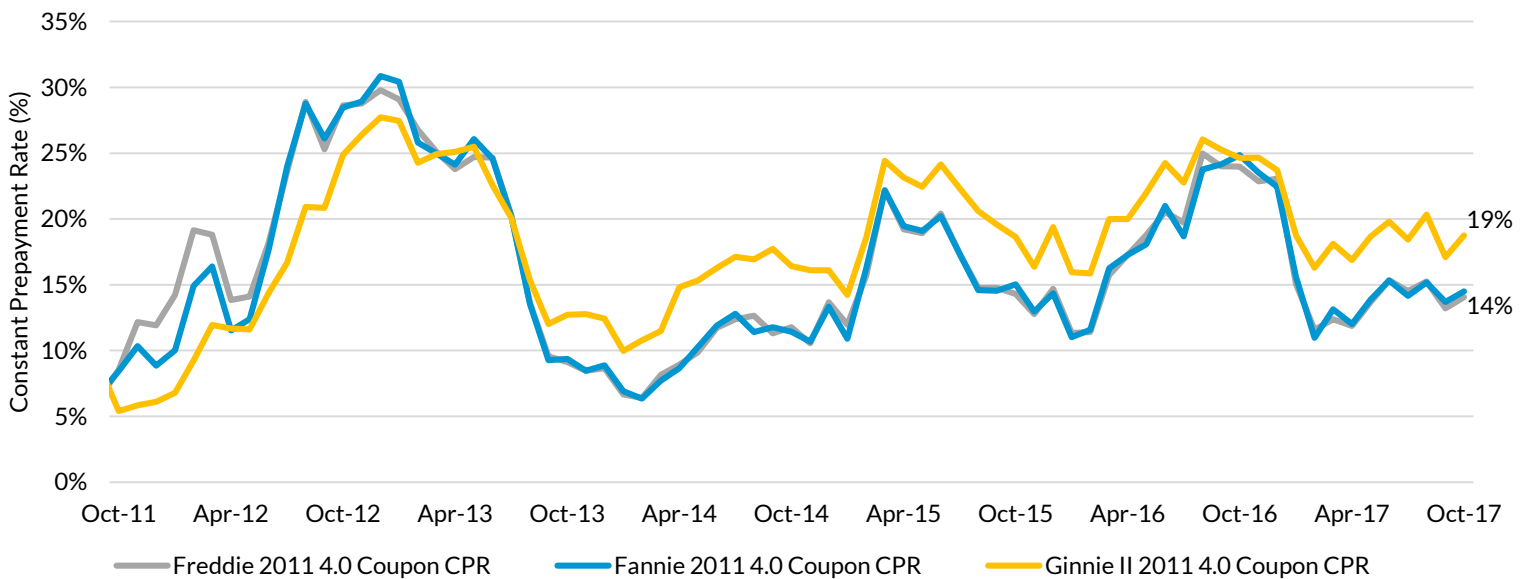


Sources: Credit Suisse and Urban Institute. Note: Data as of October 2017

# Prepayments

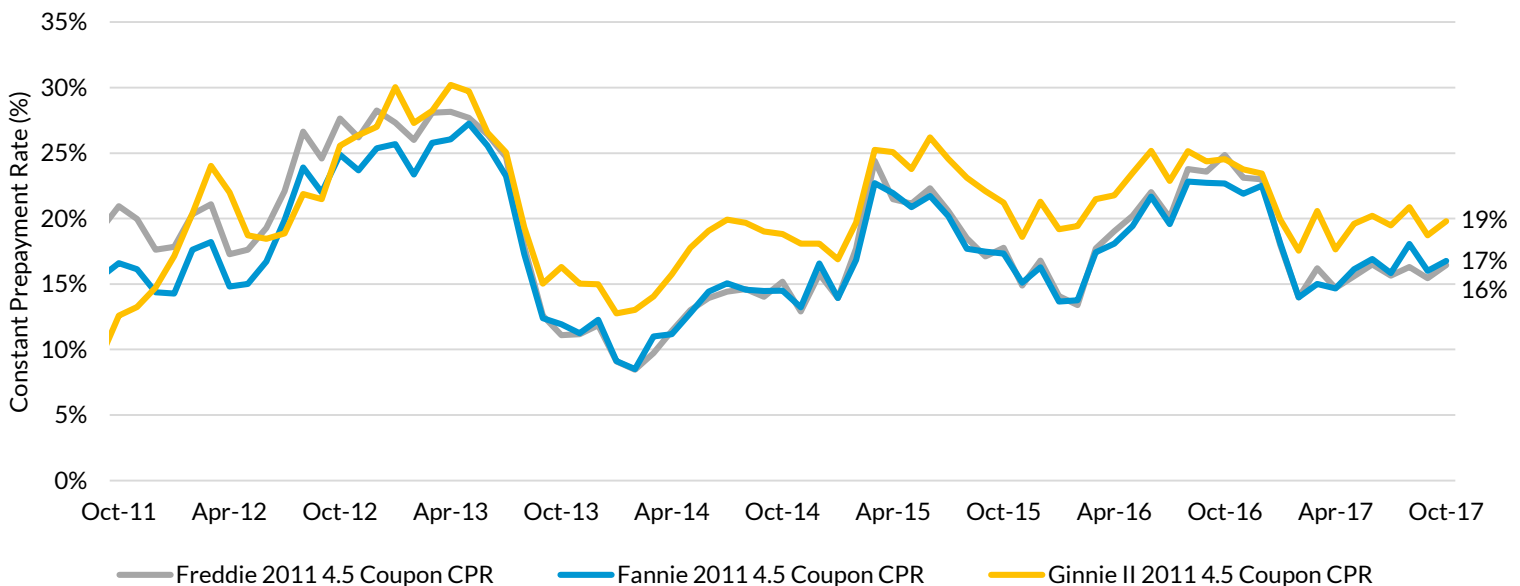
The 2011 Ginnie II 4.0s and 4.5s have been prepaying faster than their conventional counterparts since late 2013. Faster VA mortgage prepays plus simplifications to the FHA streamlined programs in 2013 are likely contributors to the faster speeds. However, as mortgage rates rose sharply since November 2016, the speeds for all agencies have slowed down considerably. In 2017, with the bulk of the mortgage universe finding it non-economic to refinance, the muted month to month variations in speeds reflect seasonality, changes in day count and changes in mortgage interest rates.

## 2011 Issued 4.0 Coupon CPR



Sources: Credit Suisse and Urban Institute. Note: Data as of October 2017

## 2011 Issued 4.5 Coupon CPR

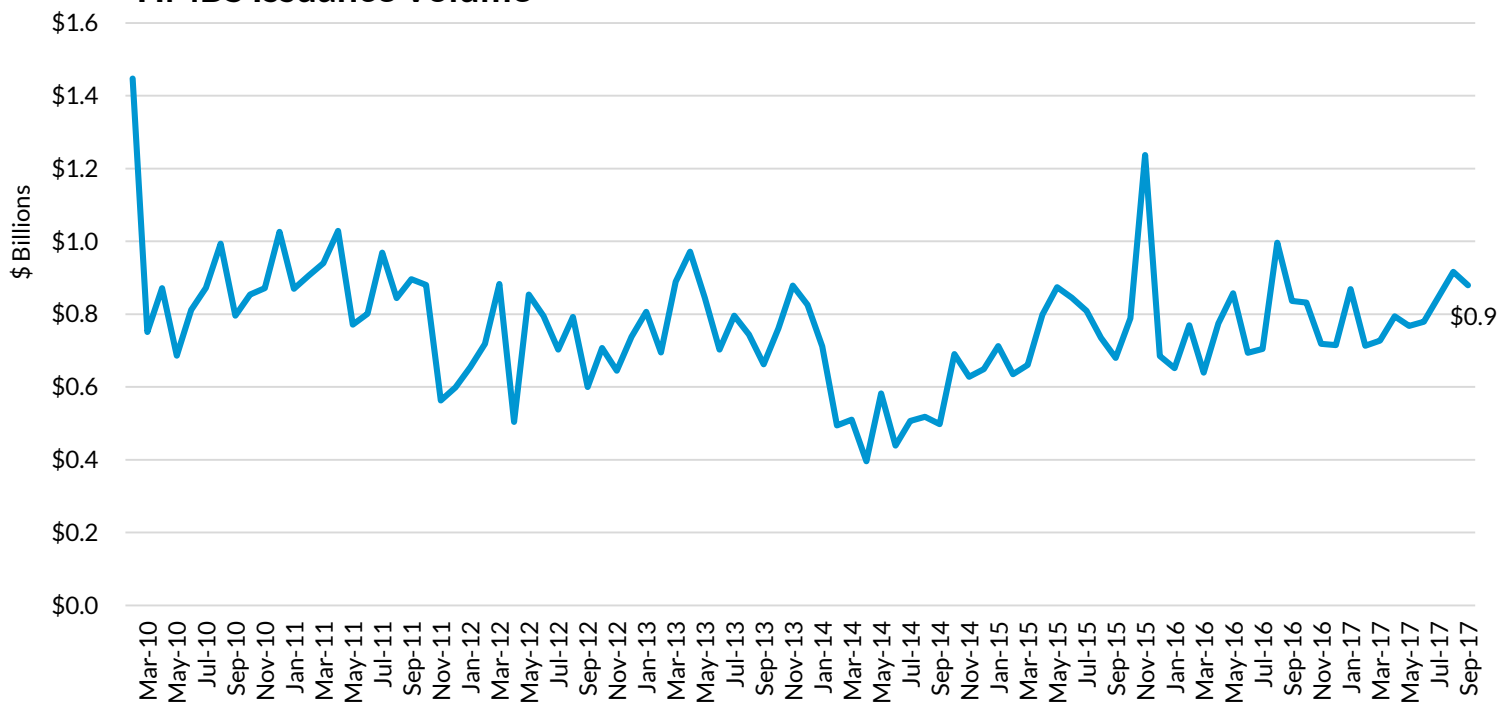


Sources: Credit Suisse and Urban Institute. Note: Data as of October 2017

# Other Ginnie Mae Programs Reverse Mortgage Volumes

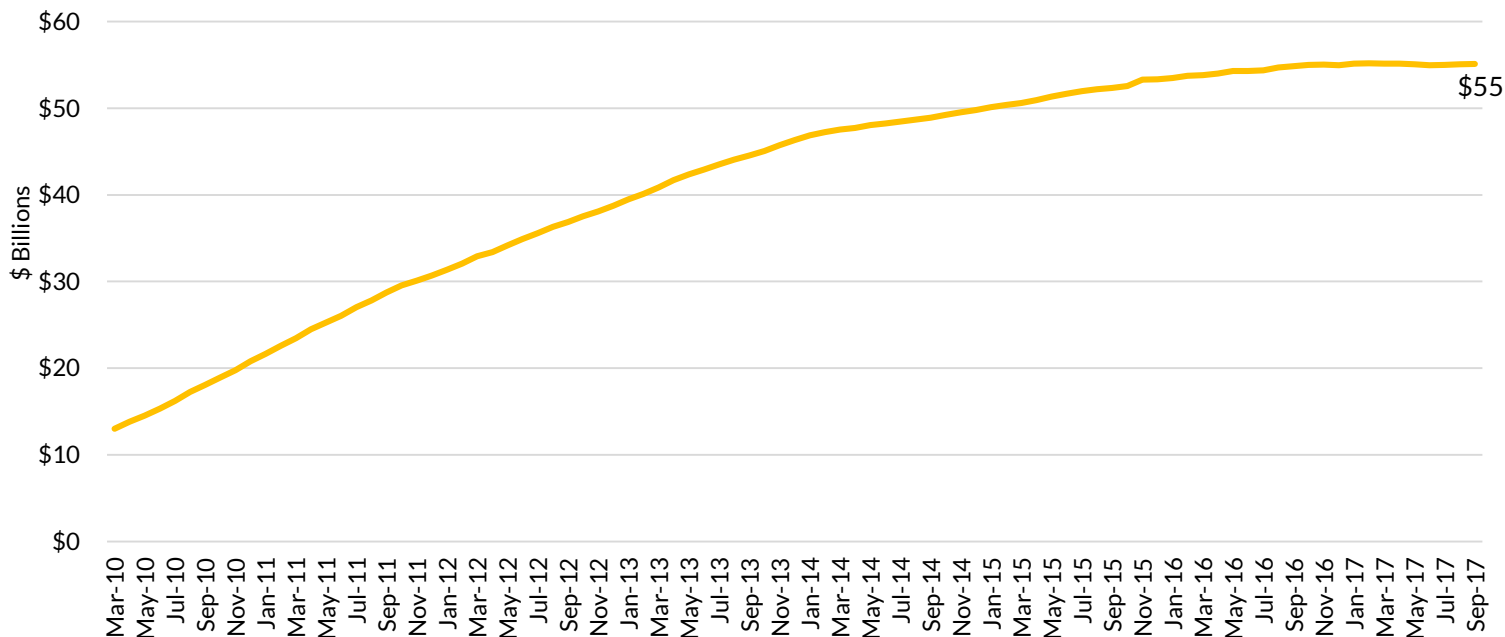
Ginnie Mae reverse mortgage volumes remain steady, with issuance of \$0.9 billion in September. Outstanding securities totaled \$55.0 billion in September.

## HMBS Issuance Volume



Sources: Ginnie Mae and Urban Institute. Note: Data as of September 2017

## HMBS Outstanding



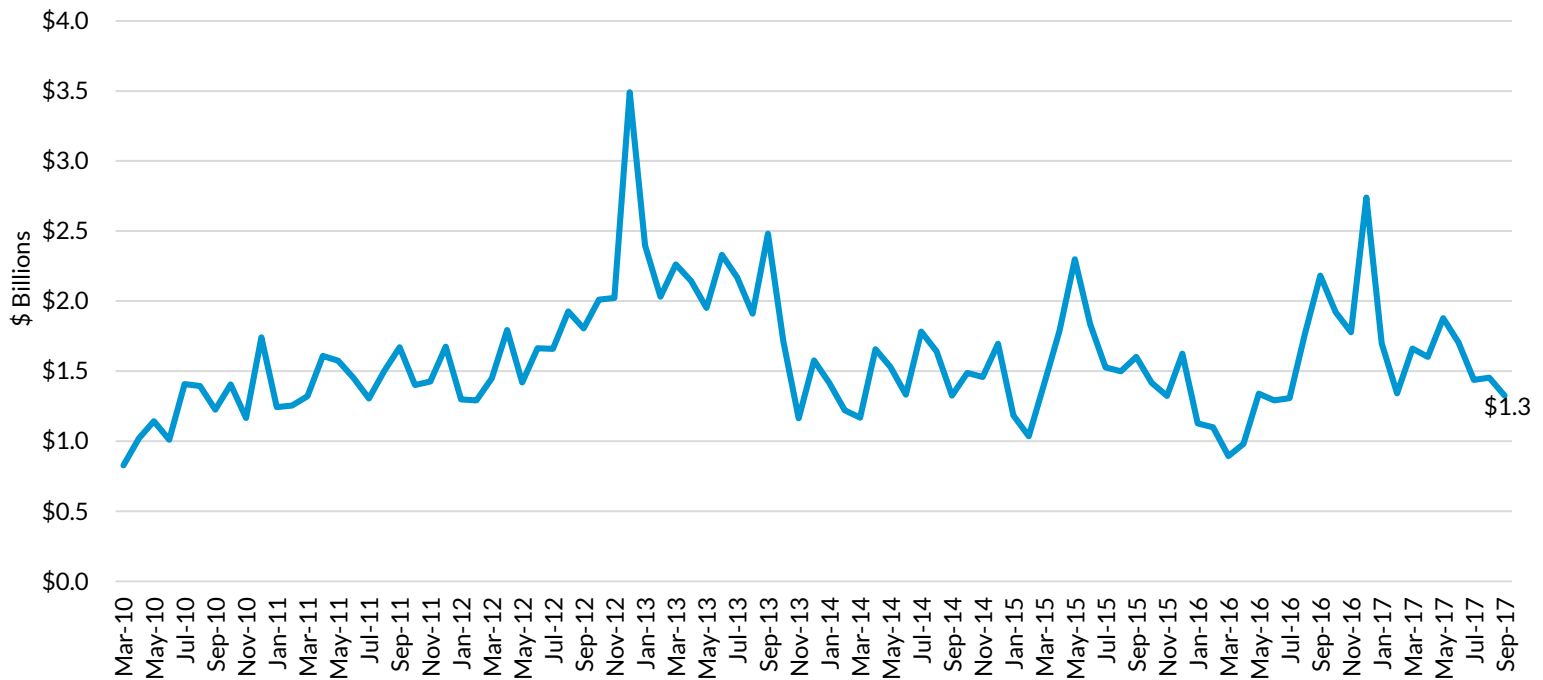
Sources: Ginnie Mae and Urban Institute. Note: Data as of September 2017

# Other Ginnie Mae Programs

## Multifamily Market

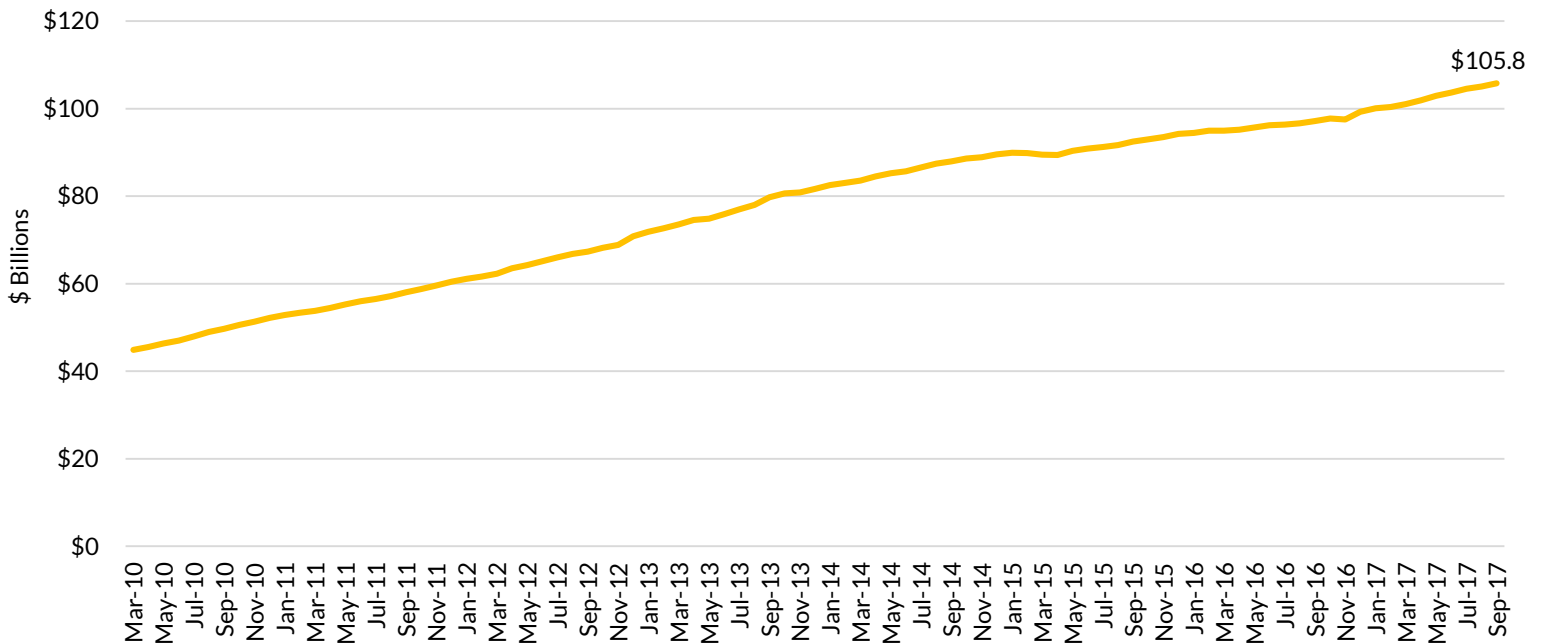
Ginnie Mae multifamily issuance volumes in September totaled \$1.3 billion. Outstanding multifamily securities totaled \$105.8 billion in September.

### Ginnie Mae Multifamily MBS Issuance



Sources: Ginnie Mae and Urban Institute. Note: Data as of September 2017.

### Ginnie Mae Multifamily MBS Outstanding

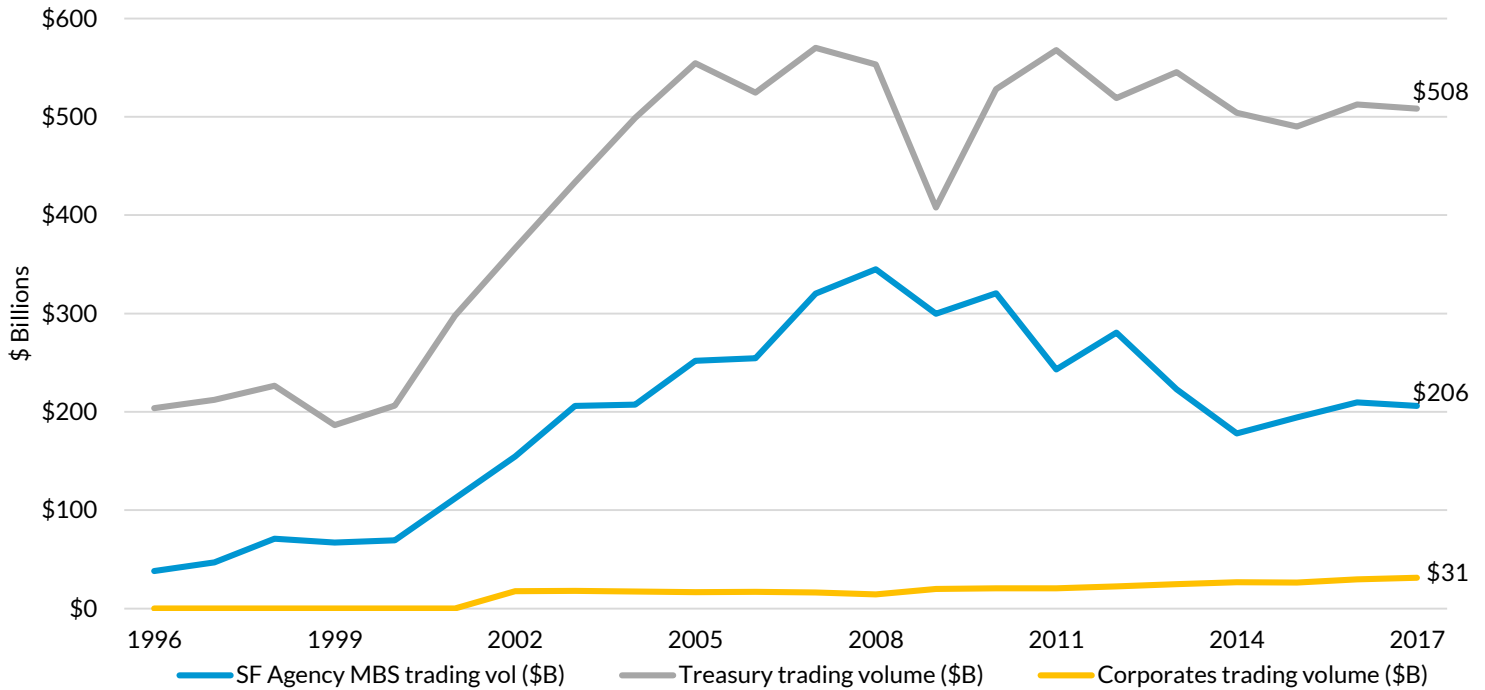


Sources: Ginnie Mae and Urban Institute. Note: Data as of September 2017

# Market Conditions

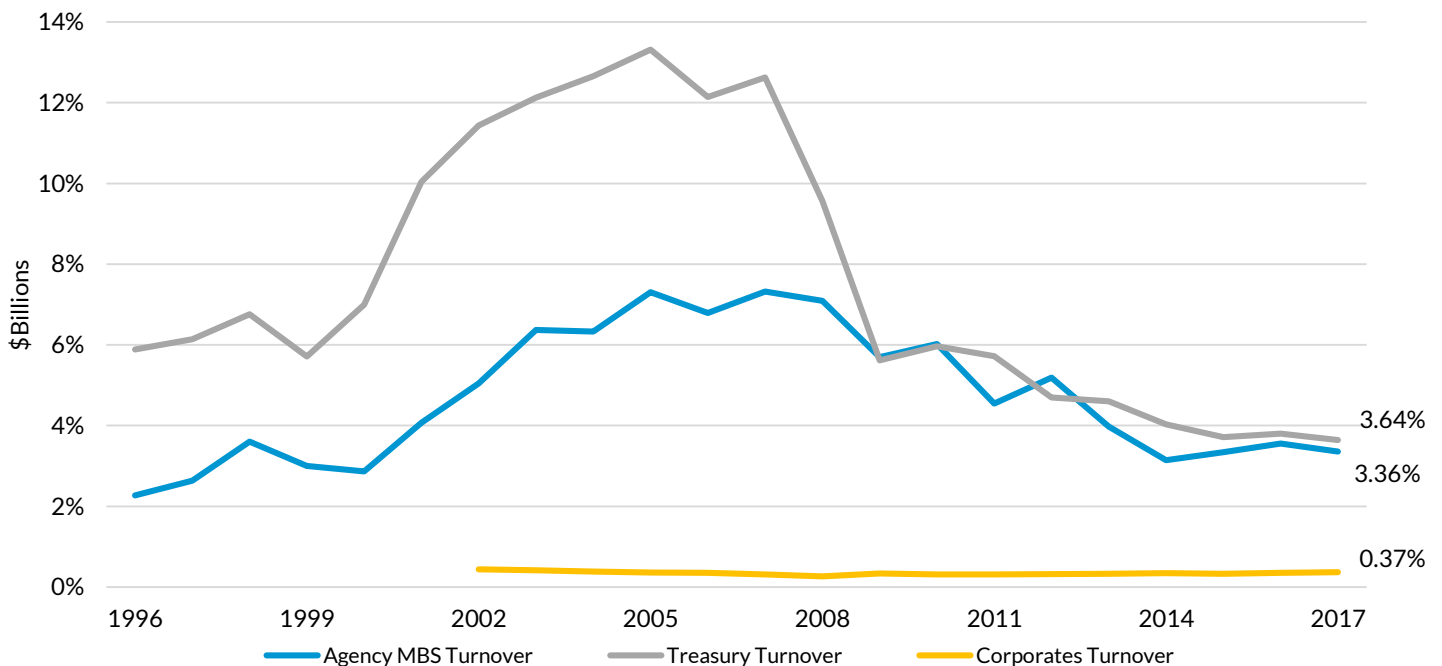
Agency MBS trading volume in 2017 has been slightly more robust than in the 2014-2015 period, and slightly less robust than 2016. Agency MBS turnover, however, has been lower in 2017 than in 2016; in the first ten months of 2017, daily MBS turnover was 3.36 percent versus 3.76 percent in 2016. Current turnover levels are on par with those in 2015. Note that average daily Treasury turnover is also down dramatically from its 2005 peak. Corporate turnover is miniscule relative to either Agency MBS or Treasury turnover.

## Average Daily Fixed Income Trading Volume by Sector



Sources: SIFMA and Urban Institute. Note: Data as of October 2017

## Average Daily Turnover by Sector



Sources: SIFMA and Urban Institute. Note: Data as of October 2017



# Market Conditions

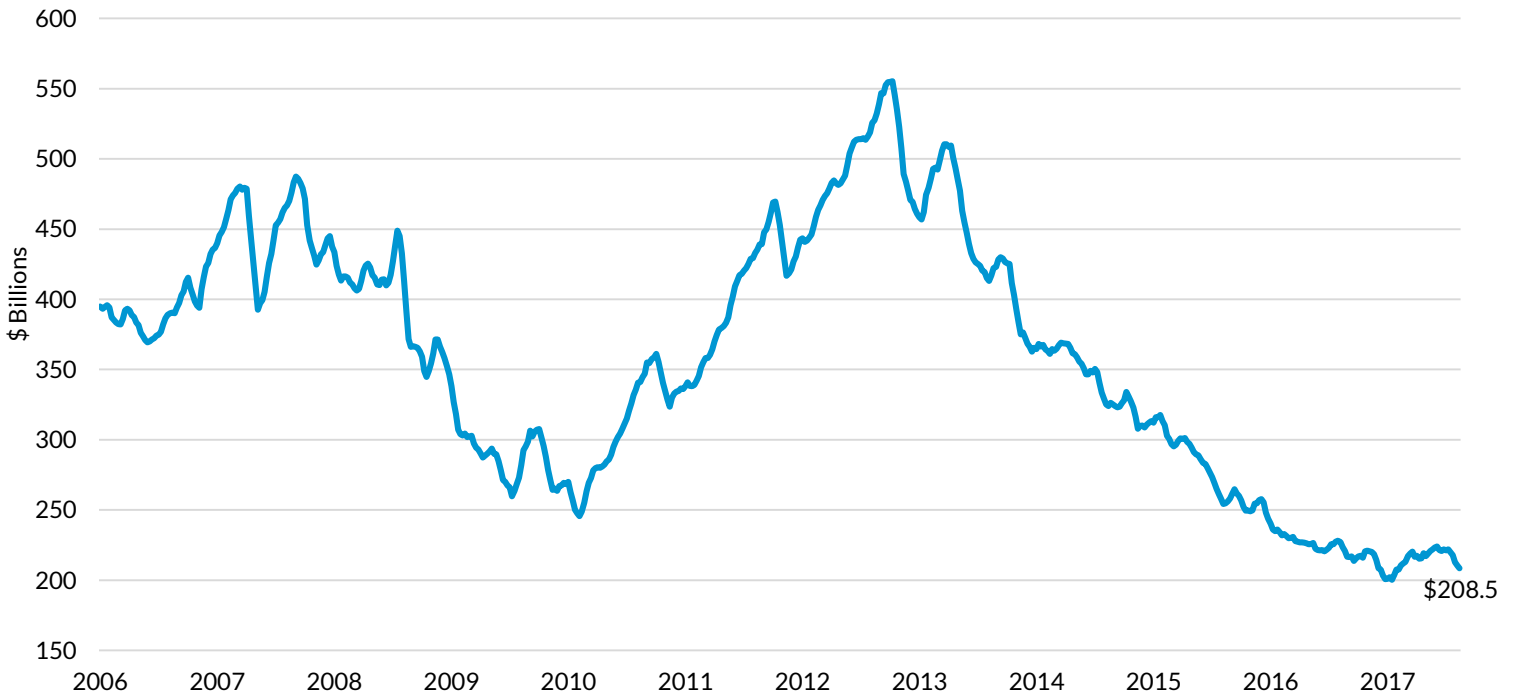
Dealer net positions in Agency MBS are now at the very lower end of the recent range, although gross positions may well be down more. The volume of repurchase activity is down sharply. This reflects banks cutting back on lower margin businesses.

### Dealer Net Positions: Federal Agency and GSE MBS



Sources: Federal Reserve Bank of New York Primary Dealer Statistics and Urban Institute. Note: Data as of October 2017

### Repo Volume: Securities In



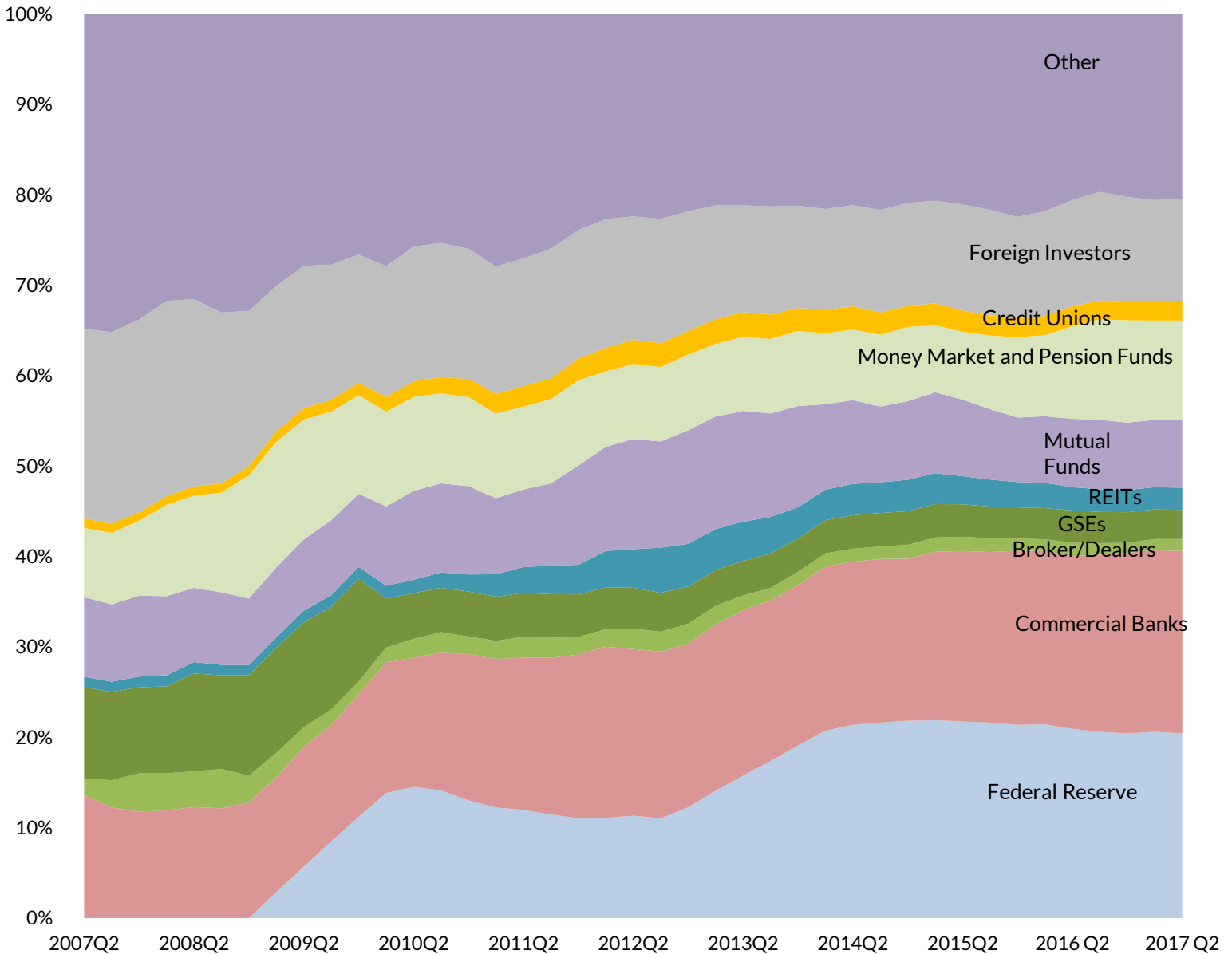
Sources: Federal Reserve Bank of New York Primary Dealer Statistics and Urban Institute. Note: Data as of October 2017

# MBS Ownership

The largest holders of agency debt (Agency MBS + Agency notes and bonds) include the Federal Reserve (20 percent), commercial banks (20 percent) and foreign investors (11 percent). The broker/dealer and GSE shares are a fraction of what they once were.

## Who owns Total Agency Debt?

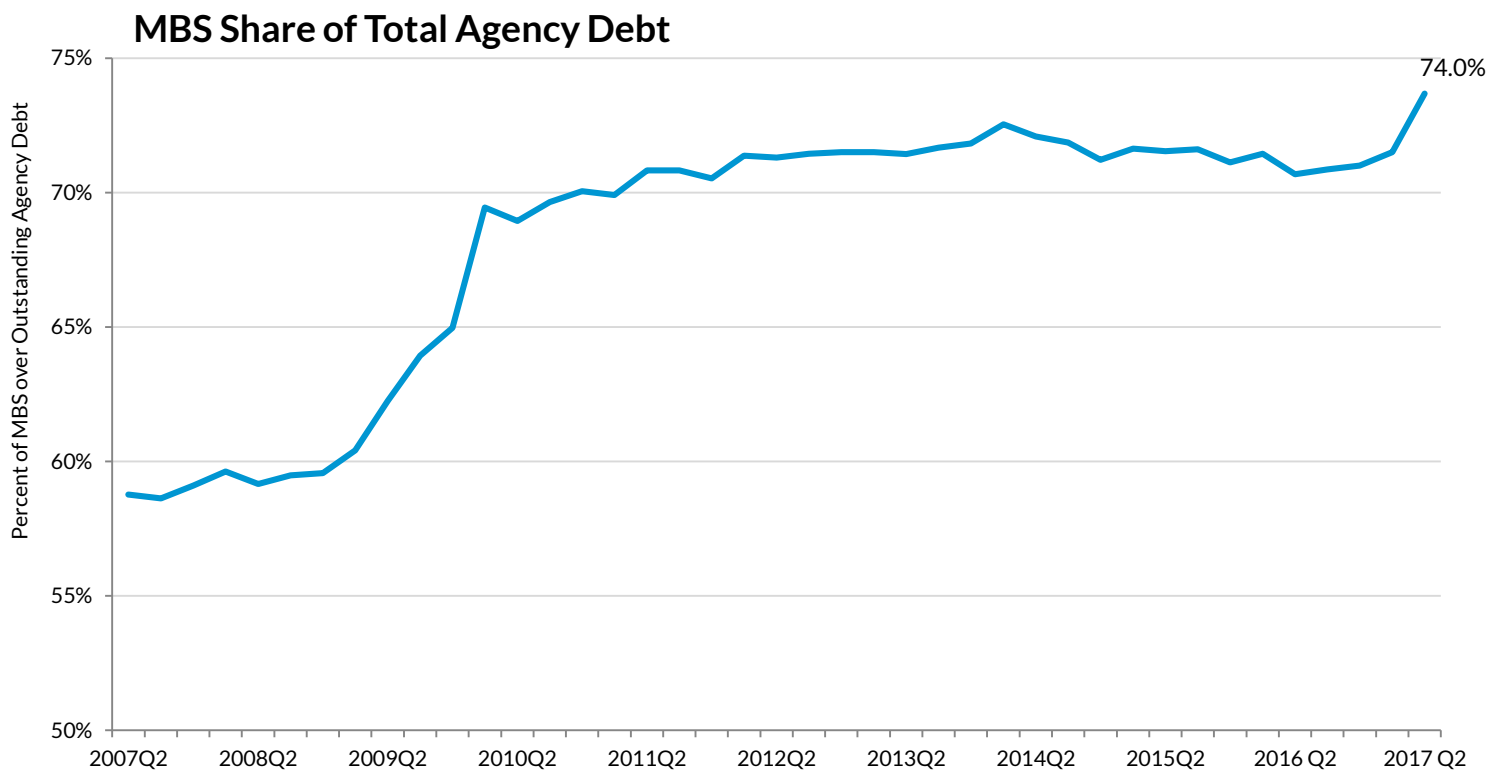
% of Total Agency Debt by Owner



Sources: Federal Reserve Flow of Funds and Urban Institute. Note: Data as of Q2 2017.

# MBS Ownership

As Fannie and Freddie reduce the size of their retained portfolio, fewer agency notes and bonds are required to fund that activity, hence the MBS share of total agency debt increases. For Q2 2017, the MBS share of total agency debt stood at 74.0 percent. Commercial banks are the second largest holders of Agency MBS behind the Federal Reserve. Out of their \$1.8 trillion in holdings as of the end of September 2017, \$1.3 trillion of it was held by the top 25 domestic banks.



Sources: Federal Reserve Flow of Funds and Urban Institute. Note: Data as of Q2 2017.

|                            | Commercial Bank Holdings (\$Billions) |        |        |        |        |        |        |        | Week Ending |        |        |        |
|----------------------------|---------------------------------------|--------|--------|--------|--------|--------|--------|--------|-------------|--------|--------|--------|
|                            | Sep-16                                | Mar-17 | Apr-17 | May-17 | Jun-17 | Jul-17 | Aug-17 | Sep-17 | Oct 4       | Oct 11 | Oct 18 | Oct 25 |
| Largest Domestic Banks     | 1205.3                                | 1233   | 1240.2 | 1258   | 1272.9 | 1285.7 | 1288.7 | 1296.9 | 1305.6      | 1307.3 | 1304.5 | 1309.7 |
| Small Domestic Banks       | 440.5                                 | 461.9  | 464.2  | 467.7  | 469.6  | 473.9  | 477.5  | 482    | 481.7       | 481.6  | 483.3  | 484.2  |
| Foreign Related Banks      | 13.7                                  | 13     | 13.1   | 12     | 12.5   | 12.5   | 12.6   | 11.8   | 11.7        | 11.7   | 11.9   | 12.1   |
| Total, Seasonally Adjusted | 1659.5                                | 1707.9 | 1717.5 | 1737.7 | 1755   | 1772.1 | 1778.8 | 1790.7 | 1799        | 1800.6 | 1799.7 | 1806   |

Sources: Federal Reserve Bank and Urban Institute. Note: Data as of October 2017

# MBS Ownership

Out of the \$1.8 trillion in MBS holdings at banks and thrifts, \$1.3 trillion is in agency pass-through form: \$985.1 billion in GSE pass-throughs and \$335.5 billion in Ginnie Mae pass-throughs. There are another \$417.9 billion in Agency CMOs. Non-agency holdings total \$60.2 billion. Ginnie Mae pass-throughs have been the fastest growing sector in the past 2 years. Bank and thrift holdings of MBS are concentrated, with the top 20 holders accounting for 70 percent of the total, and the top 5 holders accounting for 44 percent of the total.

## Bank and Thrift Residential MBS Holdings

|      | All Banks & Thrifts (\$Billions) |            |          |          |            |             |             |
|------|----------------------------------|------------|----------|----------|------------|-------------|-------------|
|      | Total                            | Agency MBS | GSE PT   | GNMA PT  | Agency CMO | Private MBS | Private CMO |
| 2000 | \$683.90                         | \$392.85   | \$234.01 | \$84.26  | \$198.04   | \$21.57     | \$71.43     |
| 2001 | \$810.50                         | \$459.78   | \$270.59 | \$109.53 | \$236.91   | \$37.62     | \$76.18     |
| 2002 | \$912.36                         | \$557.43   | \$376.11 | \$101.46 | \$244.98   | \$20.08     | \$89.88     |
| 2003 | \$982.08                         | \$619.02   | \$461.72 | \$75.11  | \$236.81   | \$19.40     | \$106.86    |
| 2004 | \$1,113.89                       | \$724.61   | \$572.40 | \$49.33  | \$208.18   | \$20.55     | \$160.55    |
| 2005 | \$1,139.68                       | \$708.64   | \$566.81 | \$35.92  | \$190.70   | \$29.09     | \$211.25    |
| 2006 | \$1,207.09                       | \$742.28   | \$628.52 | \$31.13  | \$179.21   | \$42.32     | \$243.28    |
| 2007 | \$1,236.00                       | \$678.24   | \$559.75 | \$31.58  | \$174.27   | \$26.26     | \$357.24    |
| 2008 | \$1,299.76                       | \$820.12   | \$638.78 | \$100.36 | \$207.66   | \$12.93     | \$259.04    |
| 2009 | \$1,345.74                       | \$854.40   | \$629.19 | \$155.00 | \$271.17   | \$7.53      | \$212.64    |
| 2010 | \$1,433.38                       | \$847.13   | \$600.80 | \$163.13 | \$397.30   | \$7.34      | \$181.61    |
| 2011 | \$1,566.88                       | \$917.10   | \$627.37 | \$214.81 | \$478.82   | \$3.28      | \$167.70    |
| 2012 | \$1,578.86                       | \$953.76   | \$707.87 | \$242.54 | \$469.27   | \$17.16     | \$138.67    |
| 2013 | \$1,506.60                       | \$933.73   | \$705.97 | \$231.93 | \$432.60   | \$26.11     | \$114.15    |
| 1Q14 | \$1,574.44                       | \$1,029.68 | \$713.50 | \$232.44 | \$500.09   | \$27.08     | \$104.97    |
| 2Q14 | \$1,526.12                       | \$951.82   | \$717.27 | \$232.75 | \$445.17   | \$24.72     | \$104.41    |
| 3Q14 | \$1,534.59                       | \$951.99   | \$725.96 | \$226.03 | \$447.46   | \$21.89     | \$113.24    |
| 4Q14 | \$1,539.32                       | \$964.16   | \$733.71 | \$230.45 | \$449.90   | \$20.33     | \$104.94    |
| 1Q15 | \$1,579.21                       | \$1,012.26 | \$767.71 | \$244.55 | \$455.47   | \$17.70     | \$93.78     |
| 2Q15 | \$1,583.22                       | \$1,032.26 | \$784.22 | \$248.05 | \$445.91   | \$16.47     | \$88.57     |
| 3Q15 | \$1,608.44                       | \$1,064.67 | \$805.05 | \$259.62 | \$447.01   | \$13.60     | \$83.16     |
| 4Q15 | \$1,643.56                       | \$1,115.40 | \$823.10 | \$292.30 | \$445.39   | \$11.14     | \$71.63     |
| 1Q16 | \$1,660.58                       | \$1,133.29 | \$833.25 | \$300.04 | \$448.63   | \$10.27     | \$68.39     |
| 2Q16 | \$1,684.33                       | \$1,169.67 | \$867.64 | \$302.03 | \$440.25   | \$9.11      | \$65.29     |
| 3Q16 | \$1,732.36                       | \$1,227.52 | \$924.81 | \$302.71 | \$435.77   | \$7.90      | \$61.17     |
| 4Q16 | \$1,736.93                       | \$1,254.13 | \$930.67 | \$323.46 | \$419.80   | \$7.40      | \$55.60     |
| 1Q17 | \$1,762.38                       | \$1,280.63 | \$950.72 | \$329.91 | \$419.34   | \$7.03      | \$55.39     |
| 2Q17 | \$1,798.66                       | \$1,320.59 | \$985.12 | \$335.47 | \$417.89   | \$6.38      | \$53.79     |

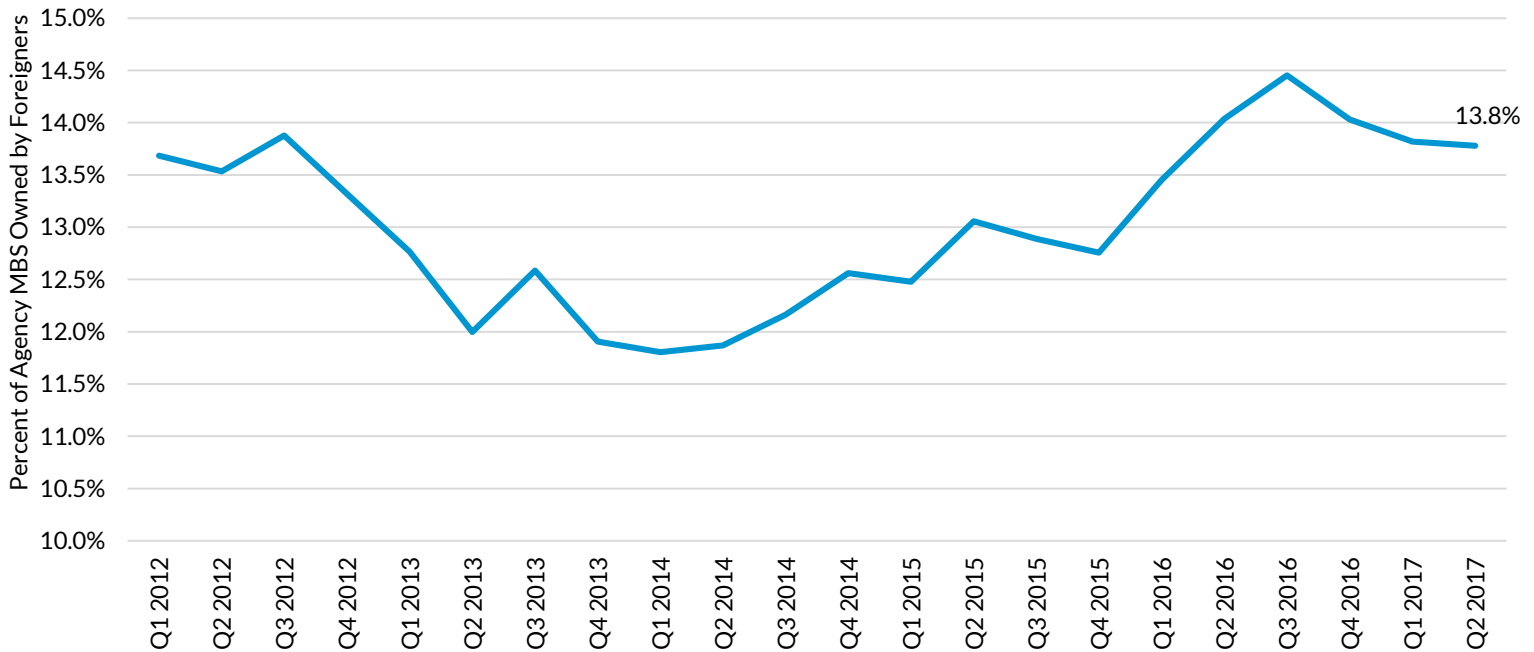
| Top Bank & Thrift Residential MBS Investors |                                       | Total (\$MM)       | GSE PT (\$MM)    | GNMA PT (\$MM)   | Agency REMIC (\$MM) | Non-Agency (\$MM) | Market Share  |
|---|---------------------------------------|--------------------|------------------|------------------|---------------------|-------------------|---------------|
| 1   | Bank of America Corporation           | \$316,509          | \$183,276        | \$118,810        | \$13,824            | \$599             | 17.60%        |
| 2   | Wells Fargo & Company                 | \$219,976          | \$176,267        | \$31,535         | \$5,035             | \$7,139           | 12.20%        |
| 3   | JP Morgan Chase & Co.                 | \$104,986          | \$72,022         | \$20,307         | \$560               | \$12,097          | 5.80%         |
| 4   | U S. Bancorp.                         | \$78,648           | \$32,324         | \$10,531         | \$35,790            | \$2               | 4.40%         |
| 5   | Charles Schwab Bank                   | \$68,270           | \$51,991         | \$1,645          | \$9,512             | \$5,122           | 3.80%         |
| 6   | Citi Group Inc.                       | \$62,429           | \$37,310         | \$10,123         | \$14,996            | \$0               | 3.50%         |
| 7   | Capital One Financial Corporation     | \$52,738           | \$17,877         | \$10,896         | \$22,275            | \$1,691           | 2.90%         |
| 8   | Bank of New York Mellon Corp.         | \$51,855           | \$31,363         | \$1,996          | \$16,165            | \$2,331           | 2.90%         |
| 9   | PNC Bank, National Association        | \$42,799           | \$31,409         | \$4,760          | \$3,378             | \$3,252           | 2.40%         |
| 10  | Branch Banking and Trust Company      | \$35,468           | \$9,572          | \$3,516          | \$21,748            | \$632             | 2.00%         |
| 11  | State Street Bank and Trust Company   | \$30,324           | \$3,710          | \$6,628          | \$10,678            | \$9,308           | 1.70%         |
|   | Morgan Stanley                        | \$24,627           | \$998            | \$1,267          | \$22,362            | \$0               | 1.40%         |
| 12  | KeyBank National Association          | \$24,581           | \$9,685          | \$7,110          | \$7,786             | \$0               | 1.40%         |
|   | SunTrust Bank                         | \$22,592           | \$13,074         | \$3,818          | \$5,701             | \$0               | 1.30%         |
| 13  | HSBC Bank USA, National Association   | \$22,335           | \$12,089         | \$10,178         | \$0                 | \$68              | 1.20%         |
| 16  | E*TRADE Bank                          | \$20,826           | \$6,225          | \$7,026          | \$7,569             | \$6               | 1.20%         |
| 17  | Regions Bank                          | \$18,641           | \$11,227         | \$5,278          | \$2,132             | \$4               | 1.00%         |
| 18  | Fifth Third Bank                      | \$17,614           | \$5,408          | \$5,119          | \$6,589             | \$499             | 1.00%         |
| 19  | MUFG Union Bank, National Association | \$16,177           | \$4,201          | \$3,830          | \$8,146             | \$0               | 1.00%         |
| 20  | Santander Bank, N.A.                  | \$15,889           | \$3,999          | \$3,725          | \$8,166             | \$0               | 0.90%         |
|   | <b>Total Top 20</b>                   | <b>\$1,247,283</b> | <b>\$714,026</b> | <b>\$268,096</b> | <b>\$222,411</b>    | <b>\$42,748</b>   | <b>69.60%</b> |

Sources: Inside Mortgage Finance and Urban Institute. Note: Data as of Q2 2017

# MBS Ownership

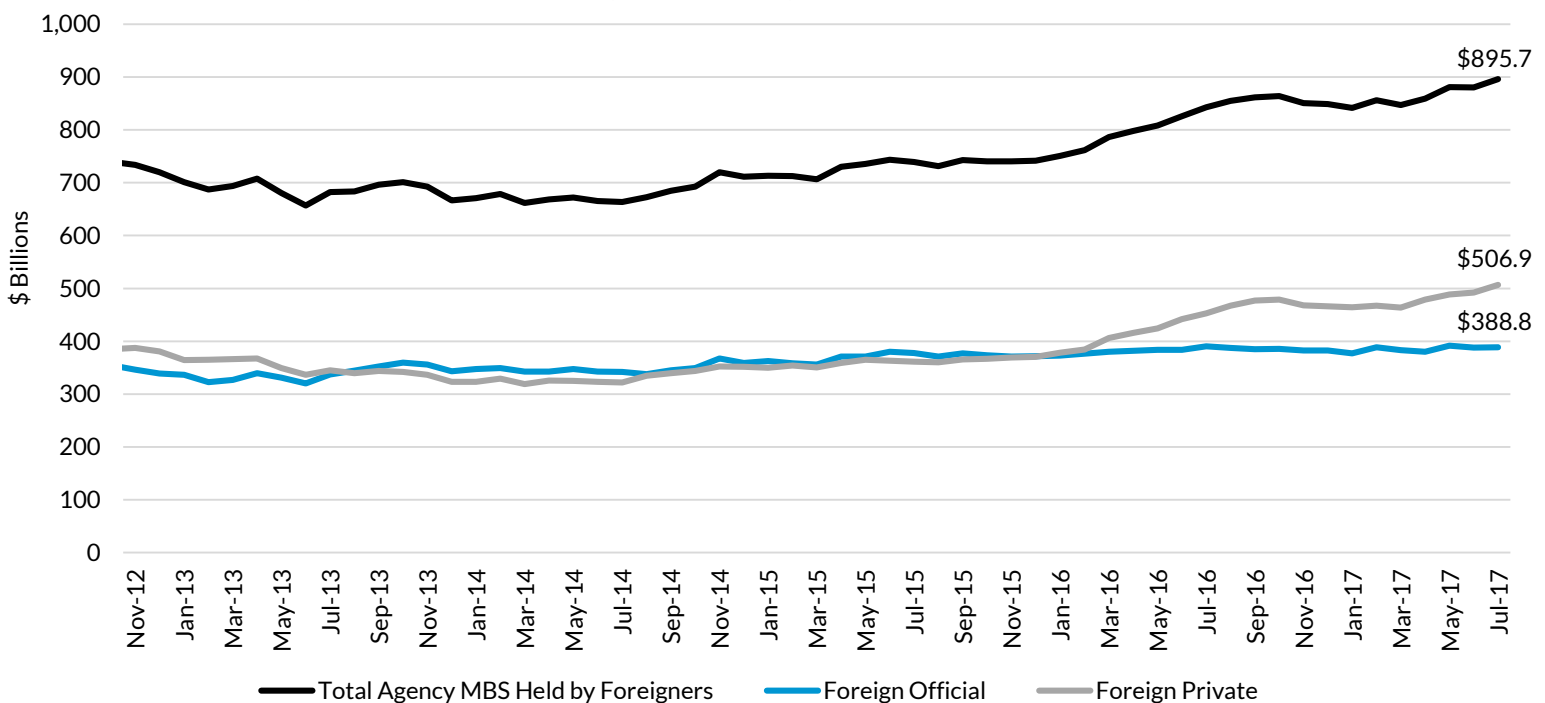
Foreign investors hold 13.8 percent of agency MBS, up from the lows in 2013. For the month of July, this represents \$895.7 billion in agency MBS, \$388.8 billion held by foreign official institutions and \$506.9 billion held by foreign private investors.

## Foreign Share of Agency MBS



Sources: SIFMA and Treasury International Capital (TIC). Note: Data as of Q2 2017.

## Monthly Agency MBS Holdings by Foreigners



Sources: Treasury International Capital (TIC) and Urban Institute. Note: Data as of July 2017.

# MBS Ownership

The largest foreign holders of agency MBS are Taiwan, China and Japan; these three countries comprise around 70 percent of all foreign holdings. Since June of 2016, we estimate Taiwan and Japan have expanded their holdings while China has contracted. Our estimates indicate that Japan has been the single largest buyer of MBS between September 2016 and July 2017, adding \$19 billion over the 11 month period.

## Agency MBS+ Agency Debt

| Country        | Level of Holdings (\$Millions)* |                |                |                |                |                | Change in Holdings (\$Millions)* |                |                |               |               |
|----------------|---------------------------------|----------------|----------------|----------------|----------------|----------------|----------------------------------|----------------|----------------|---------------|---------------|
|                | Jun-16                          | Sep-16         | Dec-16         | Mar-17         | Jun-17         | Jul-17         | Q3 2016                          | Q4 2016        | Q1 2017        | Q2 2017       | Jul-17        |
| Taiwan         | 207,164                         | 208,352        | 204,005        | 212,707        | 227,236        | 228,476        | 1,188                            | -4,347         | 8,702          | 14,529        | 1,240         |
| China          | 195,933                         | 191,743        | 184,151        | 187,664        | 183,396        | 184,110        | -4,190                           | -7,592         | 3,513          | -4,268        | 714           |
| Japan          | 197,101                         | 222,116        | 220,644        | 214,838        | 227,721        | 238,525        | 25,015                           | -1,472         | -5,806         | 12,883        | 10,804        |
| Ireland        | 47,635                          | 48,307         | 47,065         | 46,178         | 45,353         | 45,839         | 672                              | -1,242         | -887           | -825          | 486           |
| South Korea    | 50,323                          | 50,072         | 49,000         | 44,349         | 46,577         | 46,444         | -251                             | -1,072         | -4,651         | 2,228         | -133          |
| Luxembourg     | 32,164                          | 32,549         | 35,352         | 29,014         | 29,229         | 30,316         | 385                              | 2,803          | -6,338         | 215           | 1,087         |
| Bermuda        | 28,402                          | 28,714         | 27,624         | 26,960         | 26,793         | 26,877         | 312                              | -1,090         | -664           | -167          | 84            |
| Cayman Islands | 31,076                          | 30,686         | 30,186         | 29,014         | 28,763         | 29,380         | -390                             | -500           | -1,172         | -251          | 617           |
| Switzerland    | 16,240                          | 20,638         | 15,626         | 16,244         | 17,591         | 17,755         | 4,398                            | -5,012         | 618            | 1,347         | 164           |
| Netherlands    | 12,459                          | 10,536         | 10,326         | 11,018         | 12,039         | 12,388         | -1,923                           | -210           | 692            | 1,021         | 349           |
| Rest of World  | 148,288                         | 140,716        | 140,625        | 126,439        | 128,428        | 124,975        | -7,572                           | -91            | -14,186        | 1,989         | -3,453        |
| <b>Total</b>   | <b>954,326</b>                  | <b>984,429</b> | <b>964,604</b> | <b>944,425</b> | <b>973,126</b> | <b>985,085</b> | <b>30,103</b>                    | <b>-19,825</b> | <b>-20,179</b> | <b>28,701</b> | <b>11,959</b> |

## Agency MBS Only (Estimates)

| Country        | Level of Holdings (\$Millions)* |                |                |                |                |                | Change in Holdings (\$Millions)* |                |               |               |               |
|----------------|---------------------------------|----------------|----------------|----------------|----------------|----------------|----------------------------------|----------------|---------------|---------------|---------------|
|                | Jun-16                          | Sep-16         | Dec-16         | Mar-17         | Jun-17         | Jul-17         | Q3 2016                          | Q4 2016        | Q1 2017       | Q2 2017       | Jul-17        |
| Taiwan         | 206,954                         | 208,142        | 203,807        | 212,540        | 227,077        | 228,323        | 1,188                            | -4,335         | 8,734         | 14,536        | 1,247         |
| China          | 186,993                         | 185,881        | 178,556        | 183,103        | 178,934        | 179,807        | -1,112                           | -7,325         | 4,547         | -4,169        | 873           |
| Japan          | 185,034                         | 213,615        | 212,661        | 208,162        | 221,447        | 232,597        | 28,581                           | -954           | -4,499        | 13,285        | 11,150        |
| Ireland        | 37,695                          | 39,142         | 38,405         | 38,910         | 38,381         | 39,149         | 1,447                            | -737           | 505           | -530          | 769           |
| South Korea    | 34,173                          | 34,726         | 34,505         | 32,126         | 34,905         | 35,239         | 553                              | -221           | -2,379        | 2,779         | 334           |
| Luxembourg     | 27,187                          | 28,094         | 31,198         | 25,455         | 25,821         | 27,055         | 907                              | 3,104          | -5,744        | 366           | 1,234         |
| Bermuda        | 23,994                          | 24,767         | 23,888         | 23,825         | 23,786         | 23,989         | 773                              | -879           | -63           | -39           | 203           |
| Cayman Islands | 22,815                          | 22,918         | 22,851         | 22,847         | 22,855         | 23,716         | 103                              | -67            | -3            | 8             | 861           |
| Switzerland    | 11,717                          | 16,446         | 11,596         | 12,873         | 14,380         | 14,674         | 4,729                            | -4,850         | 1,277         | 1,507         | 294           |
| Netherlands    | 11,471                          | 9,717          | 9,553          | 10,383         | 11,442         | 11,817         | -1,754                           | -165           | 830           | 1,059         | 375           |
| Rest of World  | 83,560                          | 78,246         | 81,668         | 76,757         | 80,909         | 79,332         | -5,314                           | 3,422          | -4,910        | 4,152         | -1,577        |
| <b>Total</b>   | <b>831,593</b>                  | <b>861,694</b> | <b>848,688</b> | <b>846,981</b> | <b>879,935</b> | <b>895,697</b> | <b>30,101</b>                    | <b>-13,006</b> | <b>-1,707</b> | <b>32,954</b> | <b>15,762</b> |

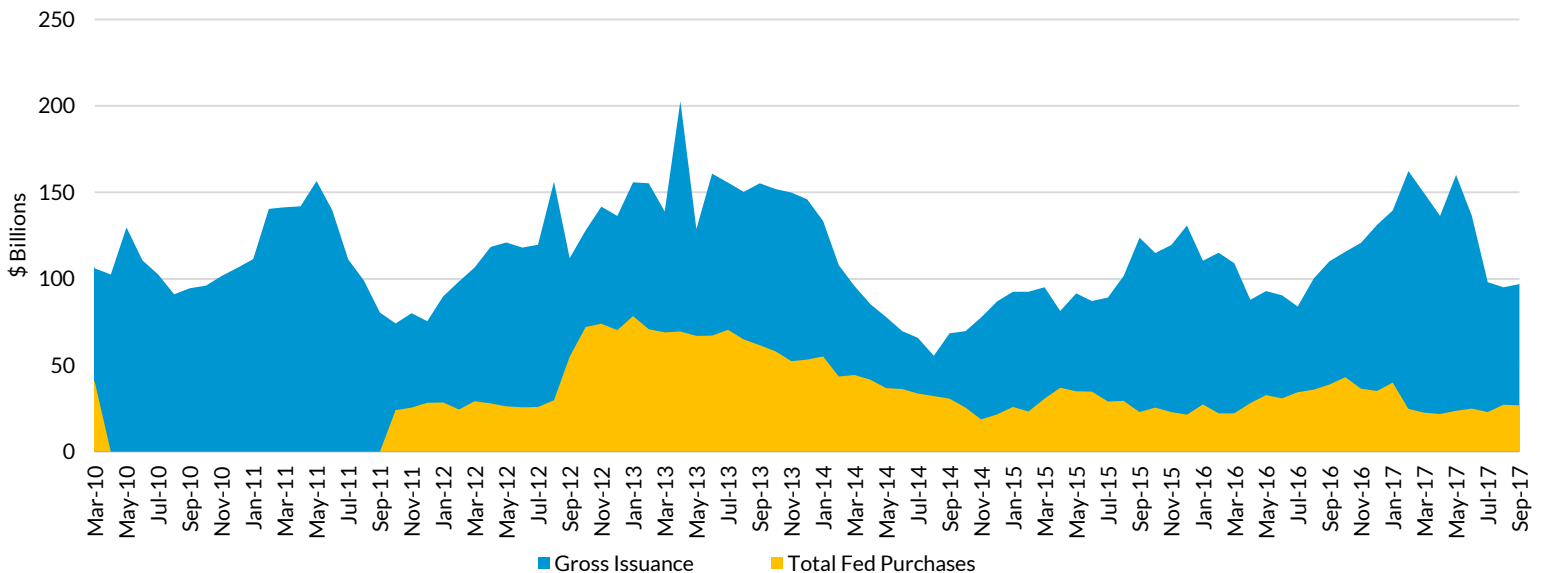
Sources: Treasury International Capital (TIC) and Urban Institute.

Note: \*calculated based on June 2016 report with amount asset backed per country. Revised to include Top 10 holders of MBS listed as of June 2016. Monthly data as of July 2017.

# MBS Ownership

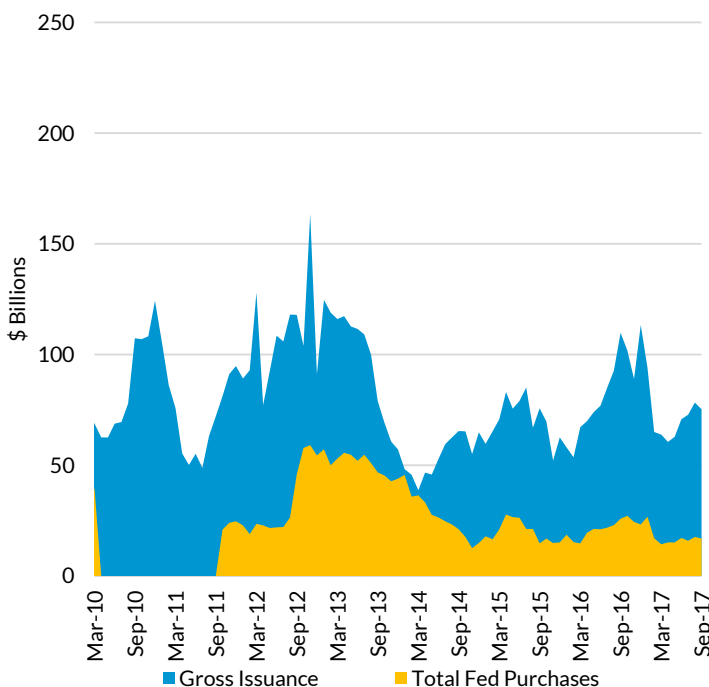
In October 2014, the Fed ended its purchase program, but continued buying at a significantly reduced level, reinvesting funds from pay downs on mortgages and agency debt into the mortgage market. Since then, the Fed's absorption of gross issuance has been between 20 and 30 percent; it was 23.2 percent for September 2017. During this month, the Fed has been buying 24.6 percent Ginnie Mae securities and 22.5 percent GSE securities. Over the past year, the Fed has absorbed an average of 24.4 percent of GSE and Ginnie Mae issuance. In their September 2017 meeting, the Fed announced that the balance sheet reduction plan, which would reduce the size of both their mortgage and treasury portfolios, will begin in October. This is a slow wind down; initially, the Fed would continue to reinvest, but by less than their run off.

## Total Fed Absorption



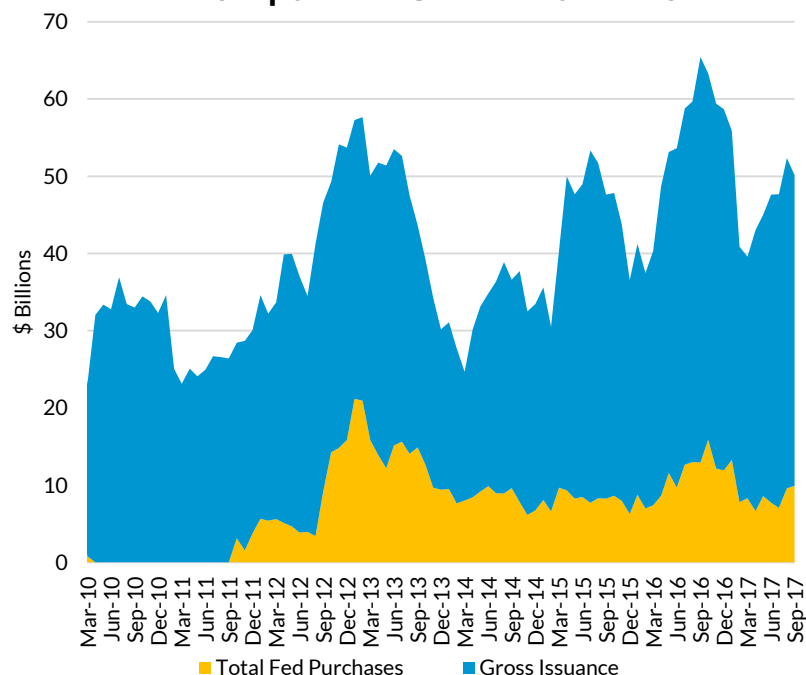
Sources: eMBS, Federal Reserve Bank of New York and Urban Institute. Note: Data as of September 2017.

## Fed Absorption of GSE MBS



Sources: eMBS, Federal Reserve Bank of New York and Urban Institute. Note: Data as of September 2017.

## Fed Absorption of Ginnie Mae MBS



Sources: eMBS, Federal Reserve Bank of New York and Urban Institute. Note: Data as of September 2017.

All the information contained in this document is as of date Indicated unless otherwise noted. The information provided does not constitute investment advice and it should not be relied on as such. All information has been obtained from sources believed to be reliable, but its accuracy is not guaranteed. The views expressed in this material are the views of Urban Institute and State Street Global Advisors as of November 15, 2017 and are subject to change based on market and other conditions. This document contains certain statements that may be deemed forward-looking statements. Please note that any such statements are not guarantees of any future performance and actual results or developments may differ materially from those projected.

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