AEI Housing Market Indicators (HMI)

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AEI.org/housing

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Link to AEI National and Metro Housing Market Indicators to obtain metro reports
Link to AEI Mortgage Risk Interactive to create your own risk charts
Link to AEI State of the Nation's Housing Market, which provides local housing data
Link to House Prices and Supply Interactive with house price appreciation and supply data

AEI Housing Market Indicators: An Introduction

- Provide accurate and timely metrics for the housing market. These include:
    - Mortgage Risk/Leverage
        - Particular attention is paid to agency first-time buyer volume and risk
    - House price appreciation trends
    - Housing sales
        - New and existing sales whether institutionally financed, cash, or other-financed
    - Months' inventory
- The housing market is influenced by many different levers. Measuring and evaluating with the right metrics provides a clearer understanding of market trends.
    - AEI HMI adds geography and price points to the broad set of metrics:
        - Geography: national, state, and selected metros
            - House prices down to the census tract level
        - Price points: low, low-medium, medium-high, and high price tiers
            - Price tiers are defined based on the availability of leverage for borrowers at the metro level.
- Expanded Housing Market Indicators use and connect many different datasets:
    - HMDA
    - Public Records Data
    - National Mortgage Risk Index (agency MBS data)
    - CoreLogic's LLMA and Black Knight's McDash (servicer data)
    - Fannie Mae's Loan Performance data and Freddie Mac's Loan-Level Data (acquisition data)
    - FHA Snapshot data (endorsement data)
    - Data from Zillow on existing home sales and unique listings
- Advantages of the AEI Housing Market Indicators:
    - Most in-depth resource for key housing data and trends (select data available online for download)
    - Accurate, timely, and in-depth coverage of purchase trends
    - Connects the dots for many housing indicators, yielding the most comprehensive analysis of the housing market and boom/bust cycles
- Detailed methodologies are available after "Remaining Briefing Dates" slide.

Indicators and Data

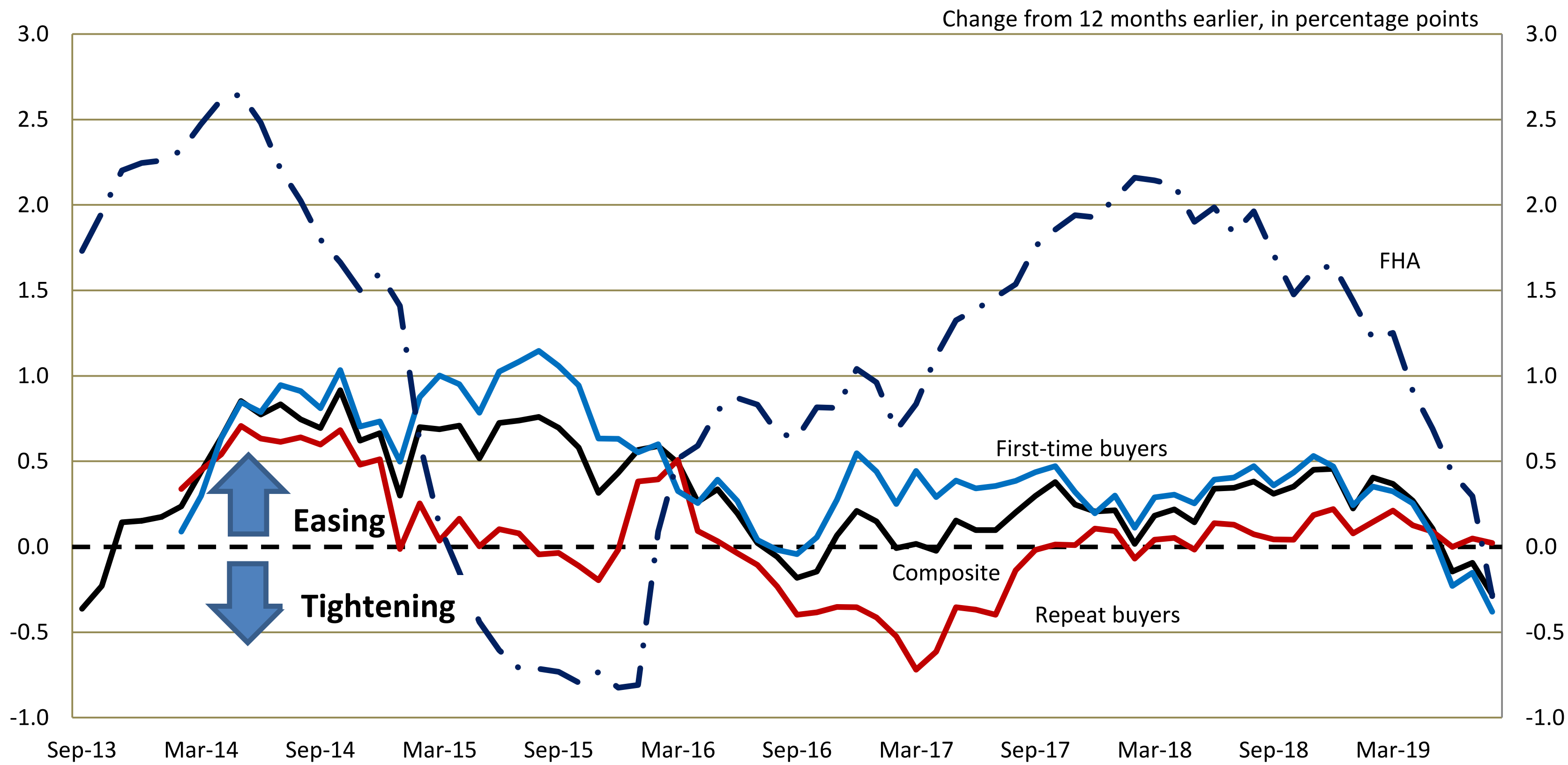
- Mortgage Risk Index (MRI) – based on 40m purchase & refi loans
  - MRI is a stress test, similar to a car crash safety rating or hurricane rating for buildings.
  - MRI assesses default risk based on the performance of the 2007 vintage loans with similar characteristics.
  - Goal: Monitor market stability through accurate, real-time tracking of leverage
  - Series begins in September 2012.
  - Data are for government guaranteed loans.
- Historical MRI – based on 92m purchase loans
  - Covers a quarter century of mortgage risk
- Home sales – based on 36m home sales
  - Data measure home sales for entire nation and include property and borrower level data.
  - Series begins in January 2012.
- Supply/Demand – based on over 2,200 counties
  - Data measure months' supply at metro and county level.
  - Series begins in 2013:Q1.
- New Construction Sales – based on 3.7m new construction sales
  - Data identify newly constructed home sales.
  - Series begins in January 2012.
- House Price Appreciation – based on 16m sales of existing homes
  - Using a "quasi" repeat sales index with a hedonic element.
  - Series begins in January 2012.

HMI Key Takeaways: Tracking Housing Finance Reform

- Slight credit tightening continues in August 2019:
  - The Composite NMRI for purchase loans declined 0.3 ppt year-over-year (yoy), the third month for this trend
  - This result has been led by Fannie and Freddie, but in August, FHA also declined 0.3 ppt yoy
  - The decline in the share of agency loans with a DTI > 43 has been most pronounced
- Tracking the progress on housing finance reform under Treasury's September 2019 report pursuant to the Presidential Memo from 2019:
  - FHFA should evaluate its "support for cash-out refinancings, investor loans, vacation home loans, [and] higher principal balance loans"
  - Each month we will track the progress of Housing Finance Reform in regards to the GSEs' core mission, and the progress being made on the steps outlined in the Treasury report
  - Bottom line: the GSEs have taken some steps in the right direction, but lots of work remains
- VA no cash out refinance (NCO) loan counts have begun to rise again
  - With rising mortgage rates in 2018, few VA loans cleared the economic benefits test enacted by Congress and Ginnie in early 2018
  - Once rates started dropping in late 2018, loans now cleared test and lenders rushed to originate
- First-time buyers (FTB) accounted for 56.8% of agency purchase loans
  - This is down 1.1 ppts from a year ago, with the largest declines coming from the GSEs and the VA
  - FTB loans are also showing a pause in credit easing
- Home price appreciation (HPA) rate increasing and remains strongly bifurcated
  - Prelim. numbers for Oct. 2019 indicate national HPA of 3.9% (yoy), up from 3.4% in Sept. 2019
  - Prelim. HPA in the low price tier: 5.2% (yoy); prelim. HPA in the high price tier: 2.5% (yoy)

Slight Credit Tightening Continues

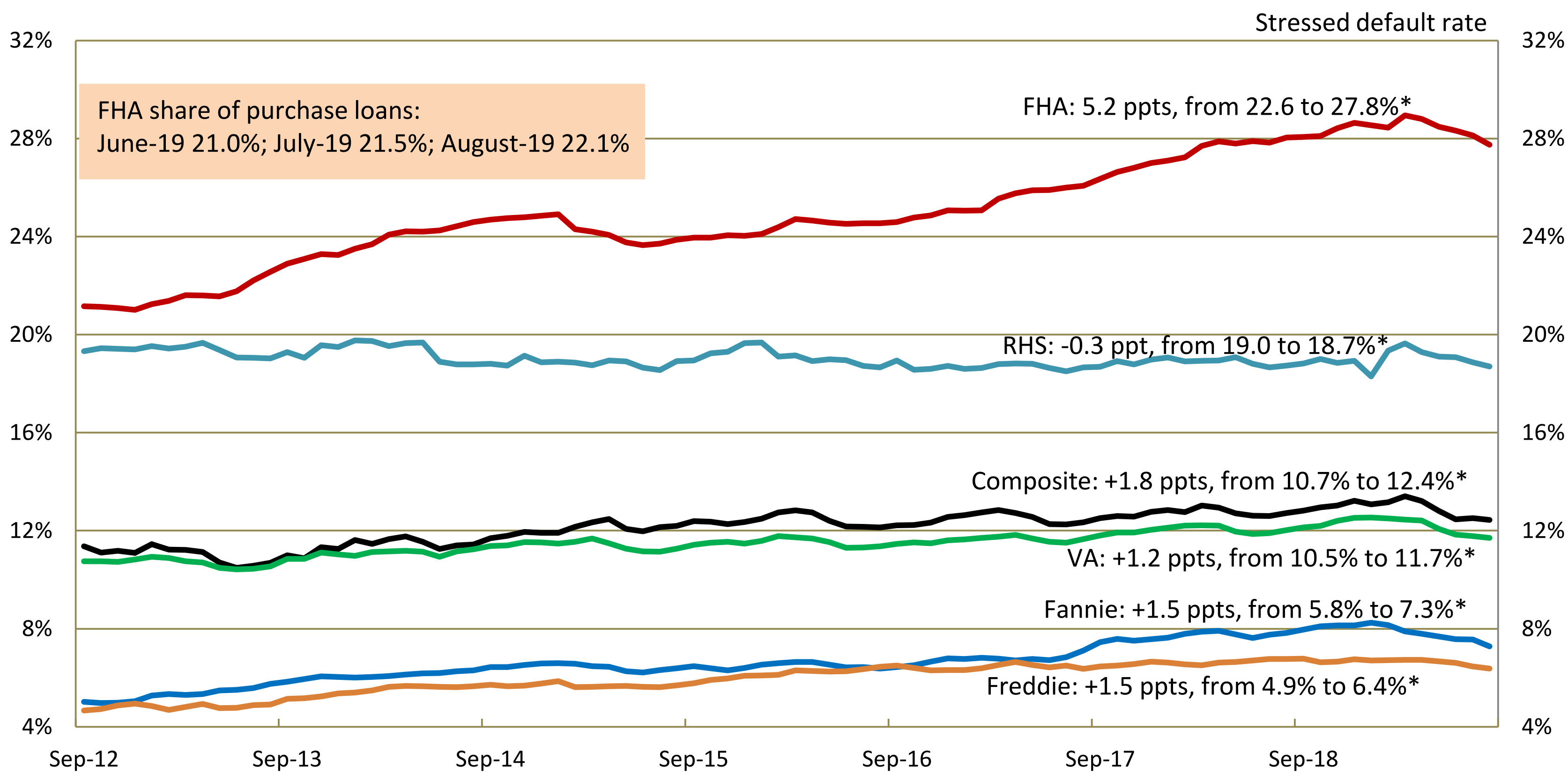
The Composite NMRI for purchase loans declined 0.3% year-over-year (yoy). For FHA, the index is also declining at a rate of 0.3% (yoy), and it is down substantially from a year ago. Interestingly, credit tightened for first-time buyers but remained unchanged for repeat buyers, in a significant trend reversal. Credit has slightly tightened for the last 3 months. Time will tell whether this trend continues.



Note: Includes all types of NMRI purchase loans (primary owner-occupied, second home, and investor loans).
Source: AEI Housing Center, www.AEI.org/housing.

NMRI for Agency Home Purchase Loans

After consistently trending upward until March 2019, the composite index has begun to decline, with Fannie and Freddie leading the way. FHA's March 2019 Total Scorecard changes appear to have slowed the increases in FHA's risk index.



*Change from August 2013 to August 2019.
Source: AEI Housing Center, www.AEI.org/housing. RHS is Rural Housing Service.

Tracking Housing Finance Reform

The Treasury's report from September 2019 pursuant the Presidential Memo from March 2019, stated that:

> ***Pending legislation, FHFA should assess whether each of the current products, services, and other single-family activities of each GSE is consistent with its statutory mission and should continue to benefit from support under Treasury's PSPA commitment (with appropriate amendments to the PSPA), and in particular, FHFA should solicit information on whether to tailor support for cash-out refinancings, investor loans, vacation home loans, higher principal balance loans, or other subsets of GSE-acquired mortgage loans.***

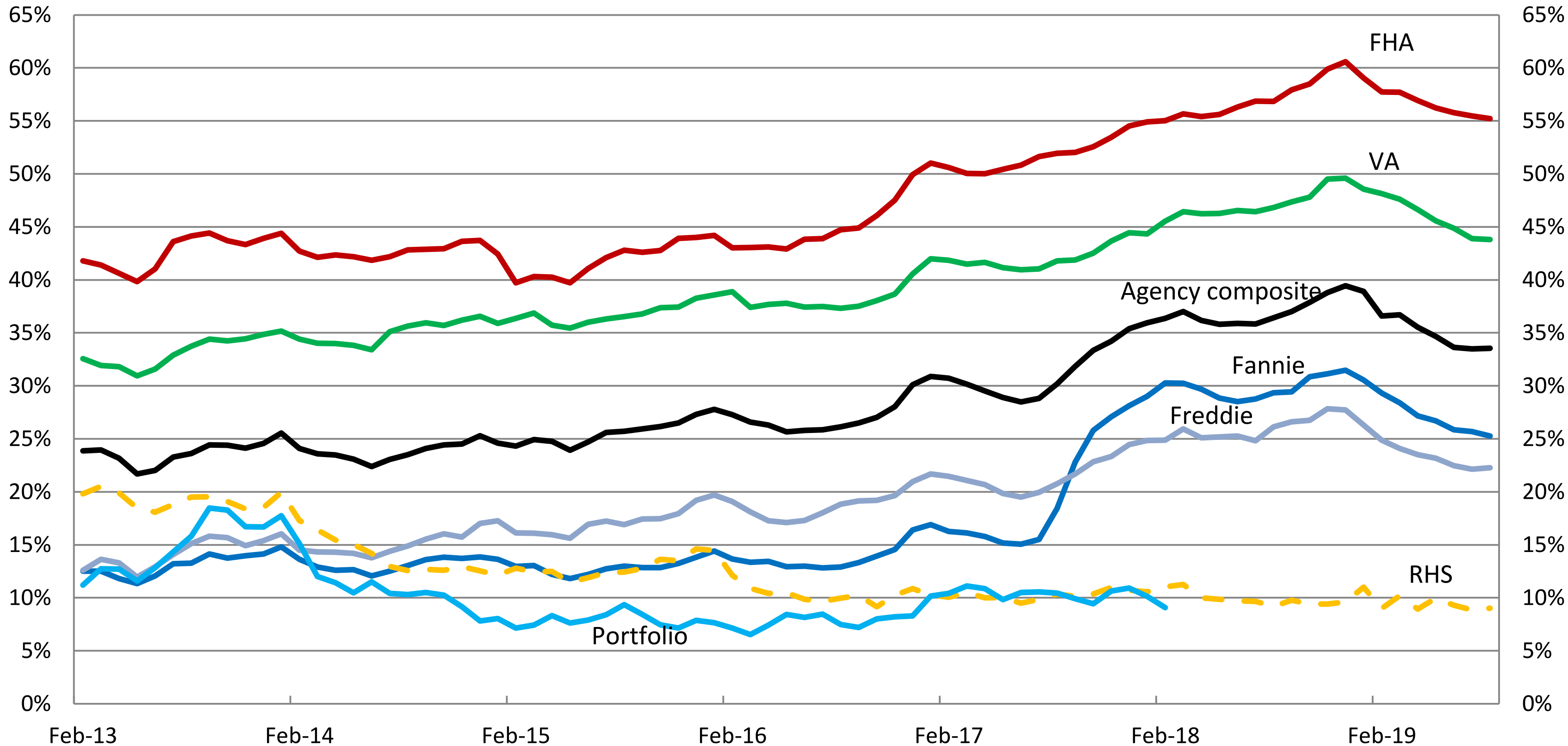
The GSEs core mission should be to assist low and moderate income homebuyers in acquiring a primary residence.

Starting today we will be tracking Housing Finance Reform from the GSEs' perspective in regards to this core mission and progress being made on the steps outlined in the Treasury report.

Source: AEI Housing Center, www.AEI.org/housing.

Purchase Loans with Total DTI Greater than 43%

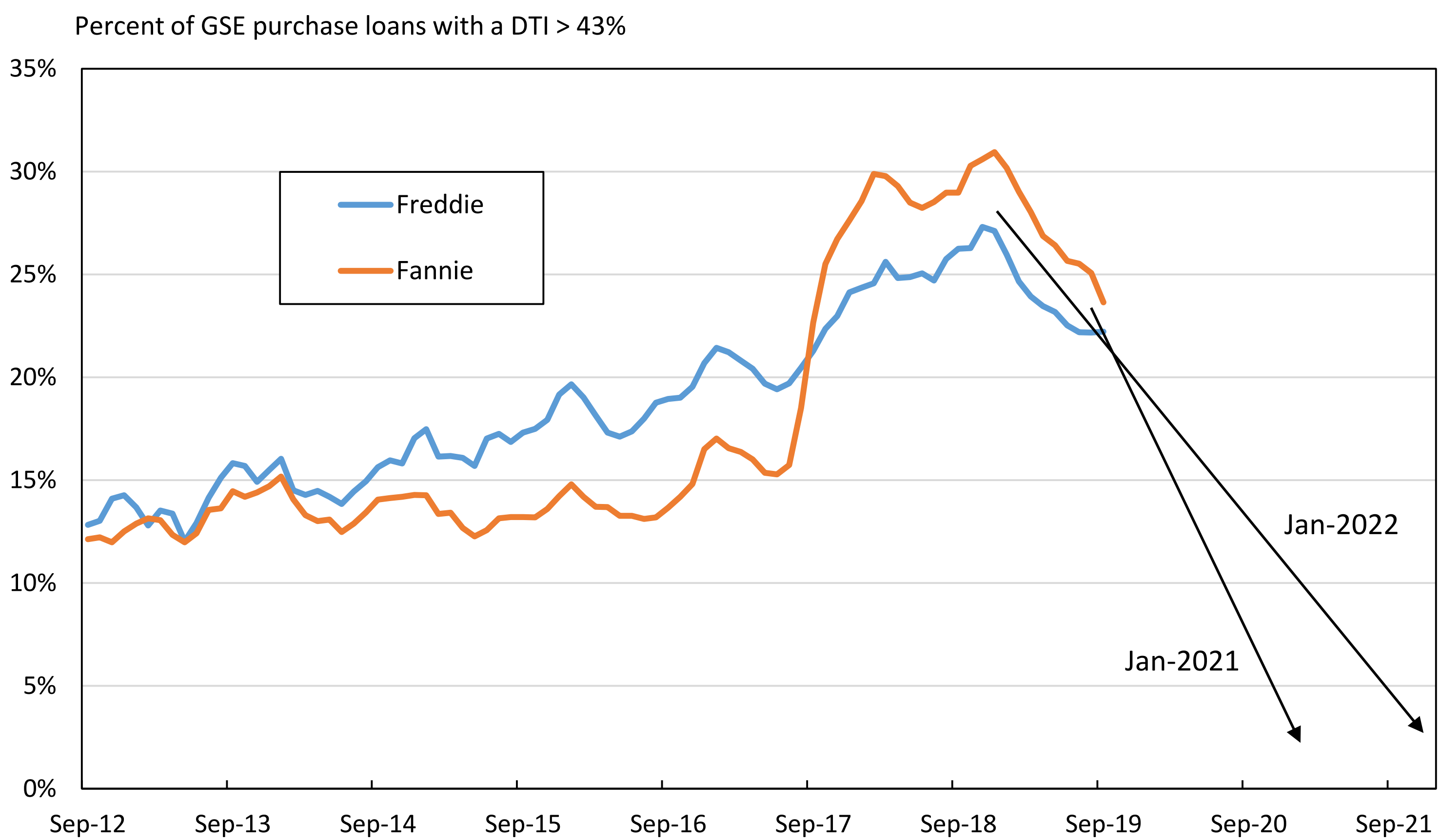
Despite the general seasonal decline in the DTI > 43 share that begins around January, this year's decline has been more pronounced. While this year's decline also coincides with a massive rate drop, some agencies (esp. FHA and Fannie) have announced their intent to reduce their share of high DTI loans or risk layering. Time will tell whether this trend is a sustainable one.



Note: Data pertain to purchase loans for primary owner-occupied properties. Data for the portfolio line come from LLMA and McDash after removing duplicative loans. The data are weighted by loan amount buckets and origination year using HMDA weights. The portfolio series is not shown for the most recent months to allow sufficient time for portfolio lenders to sell loans to the GSEs.
Source: AEI Housing Center, www.AEI.org/housing, CoreLogic, and Black Knight.

GSE Purchase Loan Share with a DTI > 43%

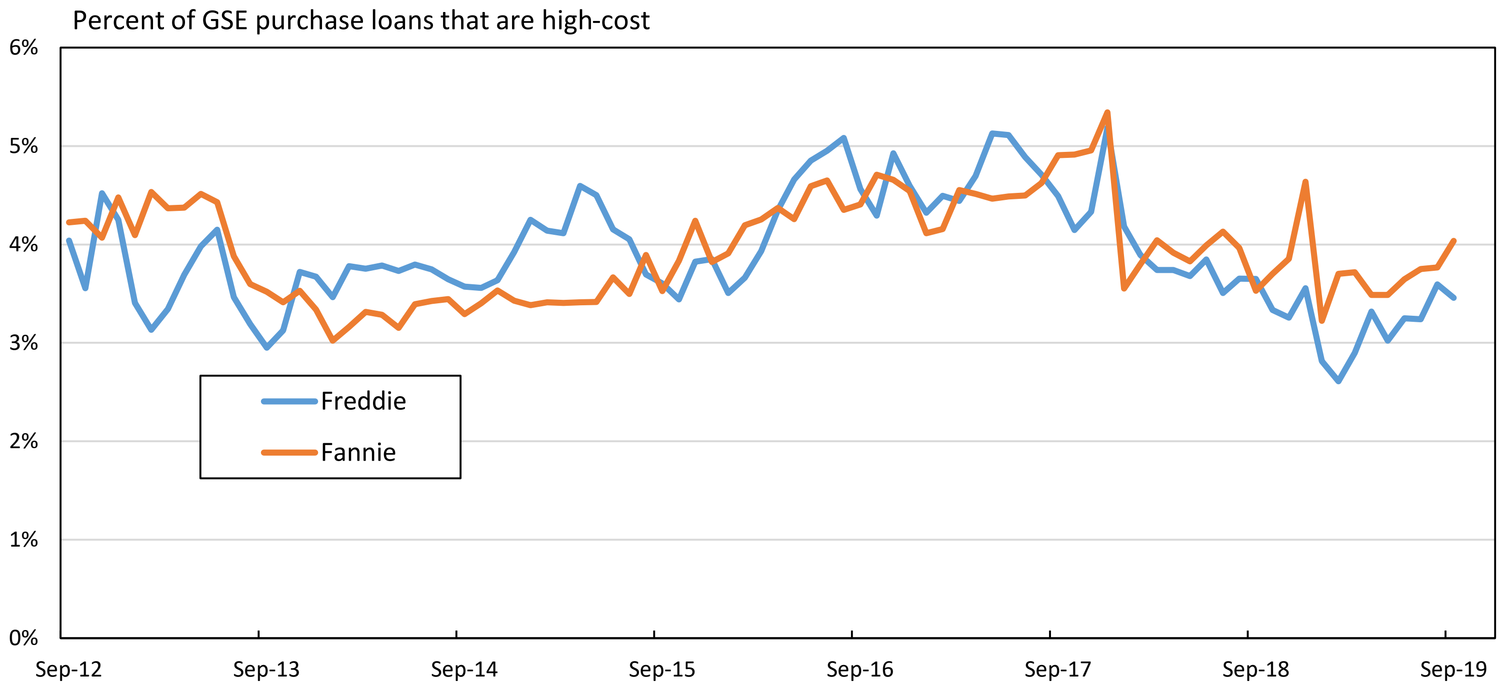
After growing to 31% and 27%, respectively, Fannie and Freddie have begun to shrink their share of loans with a DTI > 43%. With the Qualified Mortgage Patch set to expire in January 2021, the GSEs only need to slightly accelerate their current rate of shrinking this segment to meet the January 2021 sunset date.



Note: Data for September 2019 are preliminary.
Source: AEI Housing Center, www.AEI.org/housing.

High-Cost Share of GSE Purchase Loans

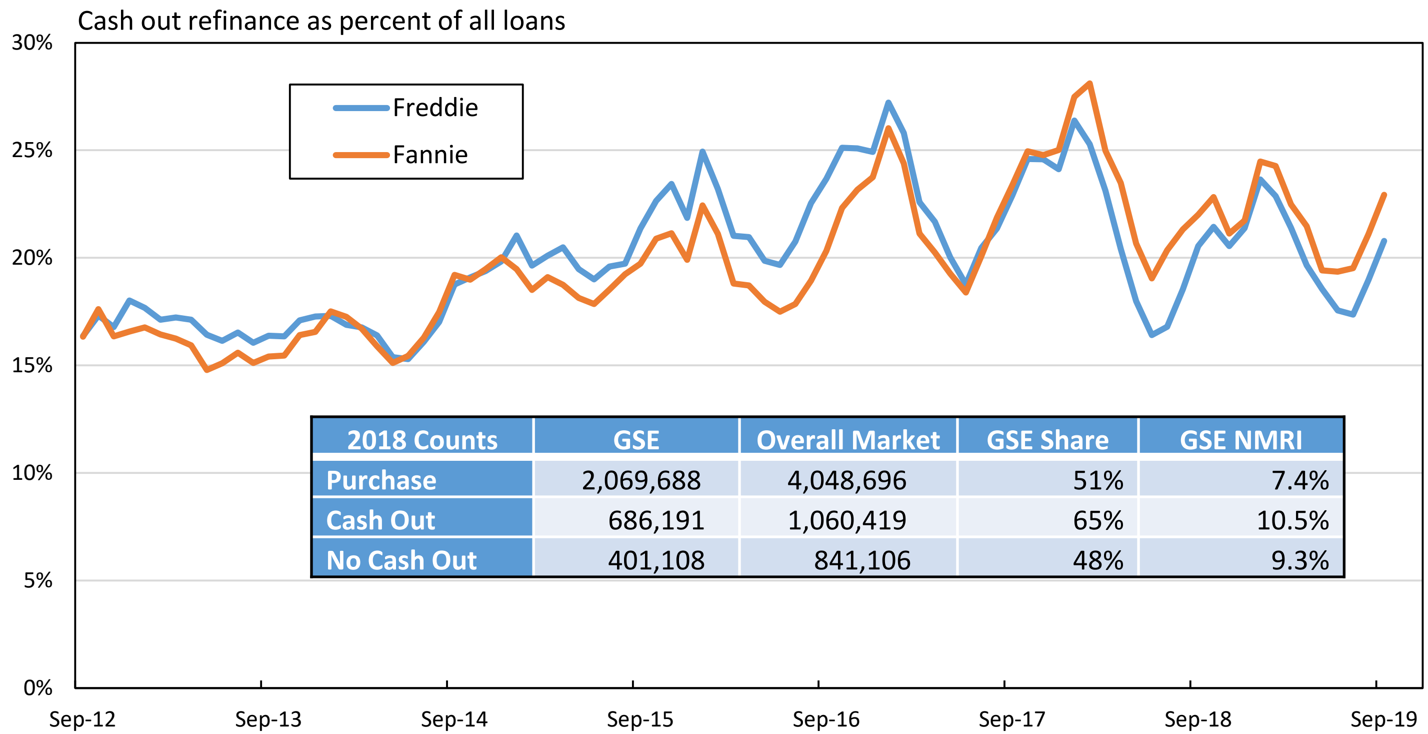
High-cost loans (those exceeding the GSE conforming loan limit set by FHFA) accounted for around 5% of the GSEs' purchase loans in 2017. Since then, that share has fallen to 3-4%. Some of this decline is due to rapidly rising conforming loan limits. Since high-cost loans crowd out competition from private lenders and were meant as a temporary fix after the financial crisis, it is best that they be eliminated entirely. At a minimum, substantial reductions could be accomplished by pricing, underwriting, or freezing high-cost limits. However, FHFA is expected to raise the conforming loan limits for 2020 to over $500,000.



Note: Data for September 2019 are preliminary.
Source: AEI Housing Center, www.AEI.org/housing.

Cash Out Refinance Share of all GSE Loans

The cash out refinance (CO) share fluctuates based on time of the year and interest rates, but since 2015, it has made up on average over 20% of all GSE loans. Especially for COs, the GSEs are holding an outsized 65% share of the overall market. COs do not help in the acquisition of a primary residence and are risky acquisitions with an NMRI of 10.5%. If the FHFA were to require the GSEs to exit this business, this would help de-risk their footprint.



2018 Counts	GSE	Overall Market	GSE Share	GSE NMRI
Purchase	2,069,688	4,048,696	51%	7.4%
Cash Out	686,191	1,060,419	65%	10.5%
No Cash Out	401,108	841,106	48%	9.3%

Note: Data for September 2019 are preliminary. The overall market count comes from HMDA, the GSE count from the NMRI. Both datasets are censuses, which allows us to subtract one from the other.
Source: AEI Housing Center, www.AEI.org/housing, and HMDA 2018.

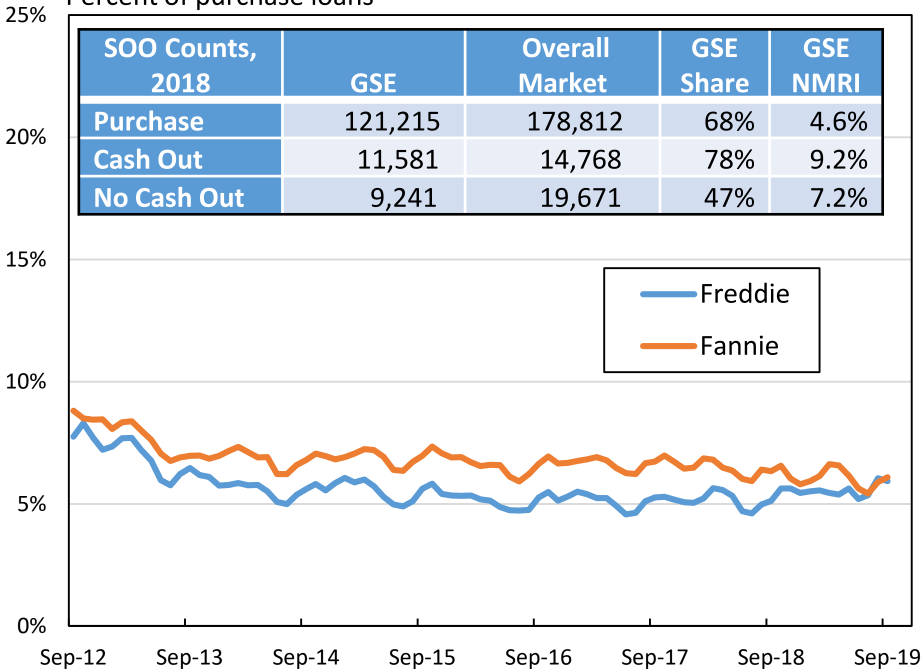
GSE Second Home and Investor Home Shares

Second and investor homes combined made up over 10% of both Fannie and Freddie's purchase loans in September 2019. While the second home share has remained relatively constant, the investor share has begun to shrink. Neither of these loan types serve the GSEs' core mission and should therefore be eliminated by FHFA.

GSE Second Home Shares (SOO)

Percent of purchase loans

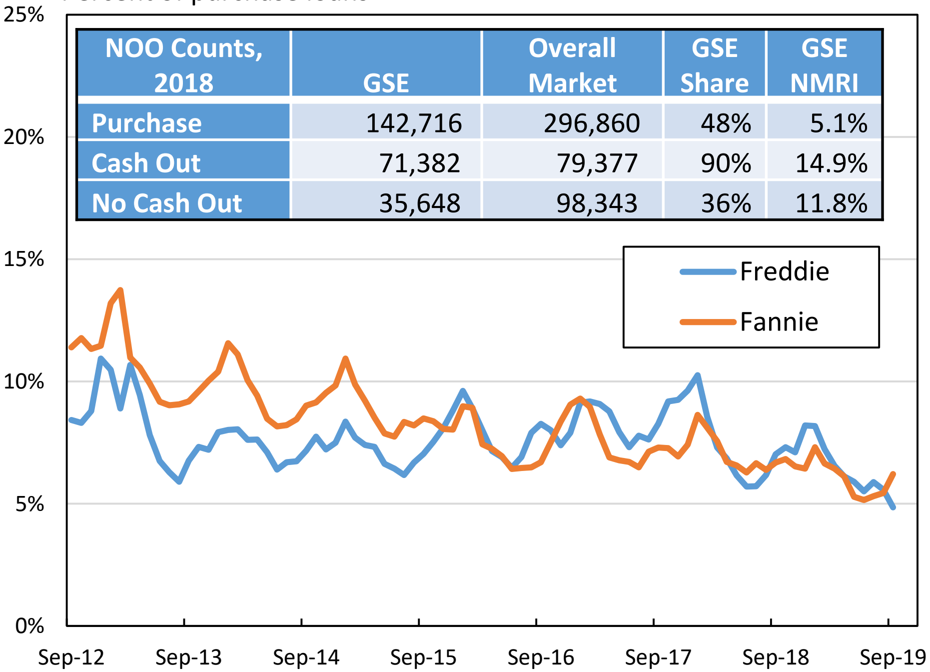
SOO Counts, 2018	GSE	Overall Market	GSE Share	GSE NMRI
Purchase	121,215	178,812	68%	4.6%
Cash Out	11,581	14,768	78%	9.2%
No Cash Out	9,241	19,671	47%	7.2%



GSE Investor Home Shares (NOO)

Percent of purchase loans

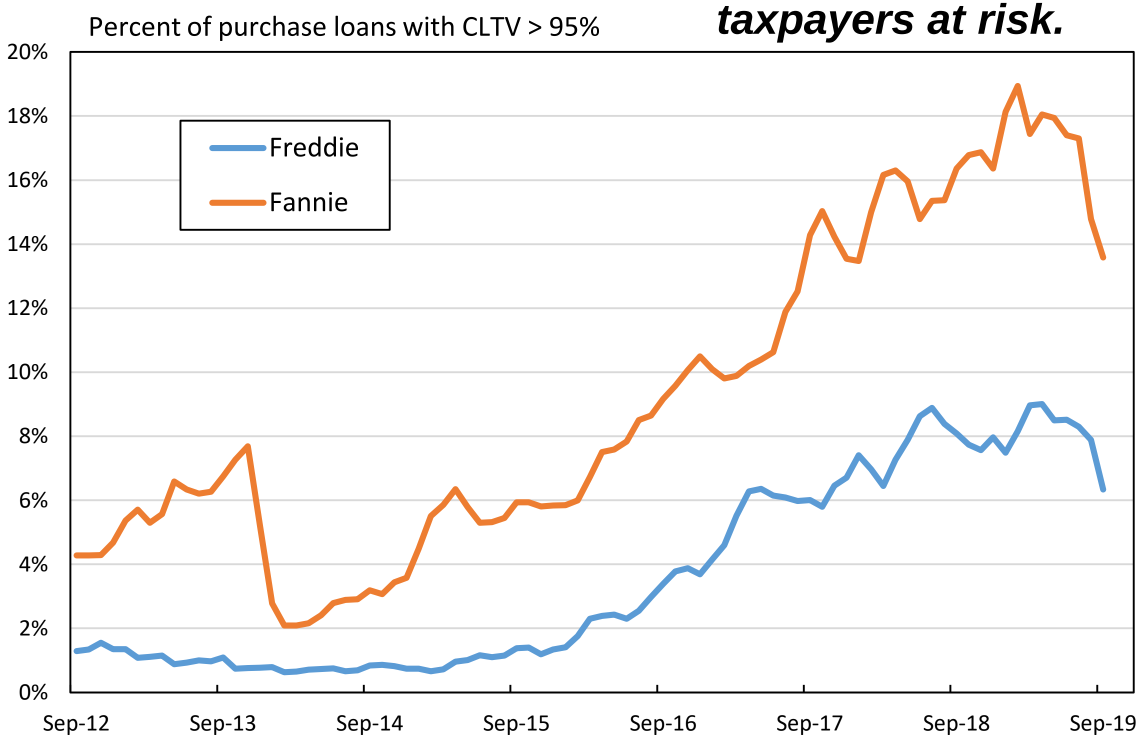
NOO Counts, 2018	GSE	Overall Market	GSE Share	GSE NMRI
Purchase	142,716	296,860	48%	5.1%
Cash Out	71,382	79,377	90%	14.9%
No Cash Out	35,648	98,343	36%	11.8%

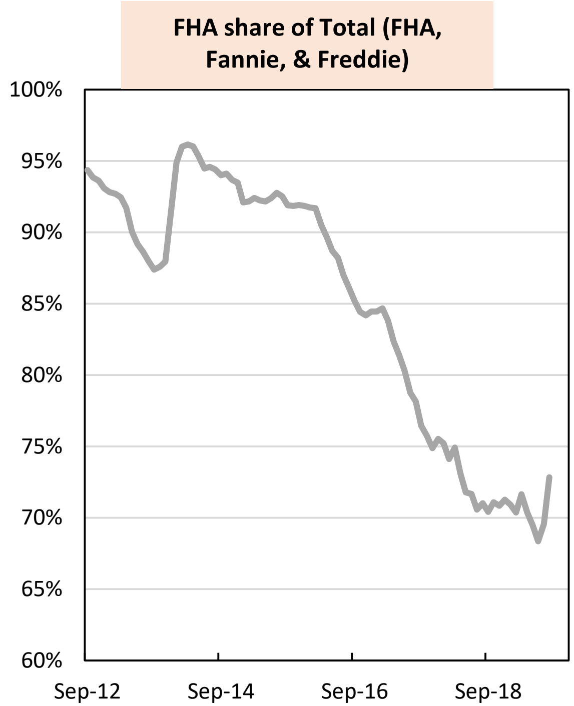


Note: Data for September 2019 are preliminary. The overall market count comes from HMDA, the GSE count from the NMRI. Both datasets are censuses, which allows us to subtract one from the other.
Source: AEI Housing Center, www.AEI.org/housing.

GSE Purchase Loans with CLTV > 95%

The GSEs' share of loans with combined loan-to-value (CLTV) ratios greater than 95% has risen dramatically, especially for Fannie. This occurred after both agencies were forced by their regulator to aggressively reenter this market. This increased competition with FHA and moved the risk curve even further out. As of August this trend appears to have reversed. If the FHFA were to revert to the policy that limited the GSEs to a maximum CLTV of 95%, this would help de-risk their footprint and establish a bright line between the GSEs and FHA, thereby ending an inappropriate competition between agencies. This competition unnecessarily drives up home prices and puts taxpayers at risk.

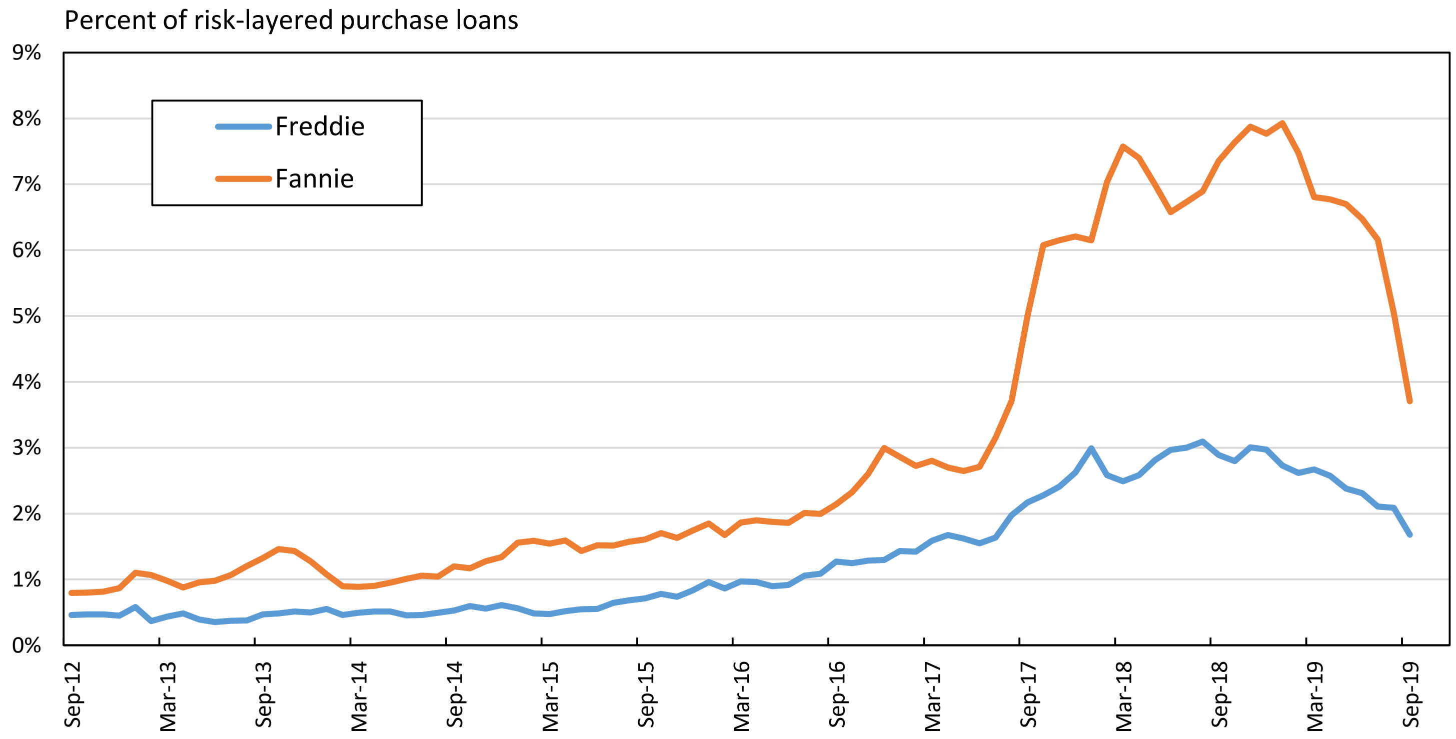




Note: Data for September 2019 are preliminary.
Source: AEI Housing Center, www.AEI.org/housing.

GSE Purchase Loan Risk Layering

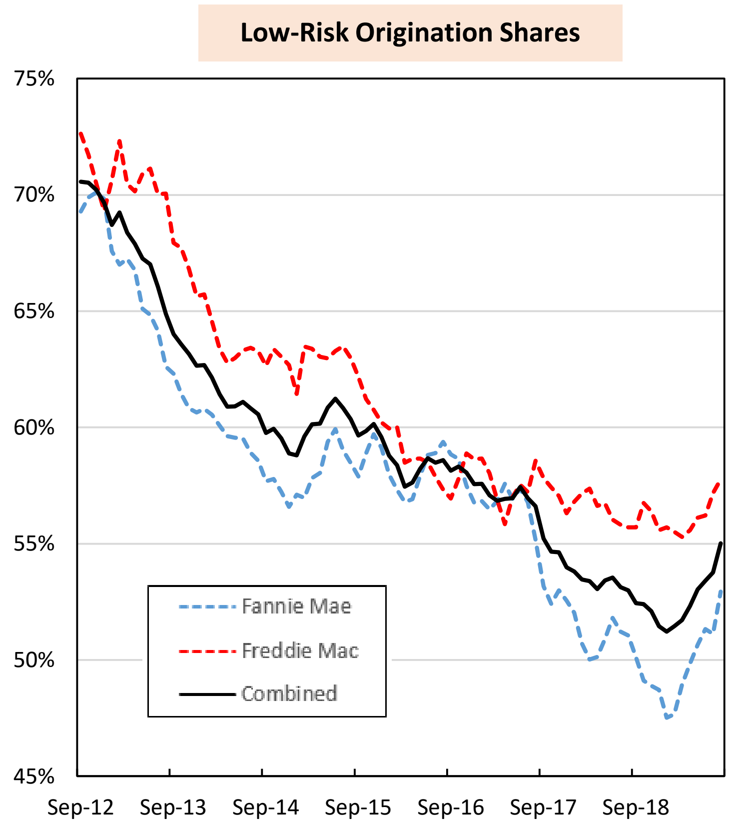
Risk layering occurs when at least three risk factors are present at origination. Risk factors include: Credit score < 660, DTI > 43, CLTV > 95%, and 30 year loan term. The number of risk layered loans rose dramatically beginning in 2017 as FHFA pushed the GSEs towards higher DTIs. Fortunately, due to the reduction in high DTI shares, this trend has begun to reverse.

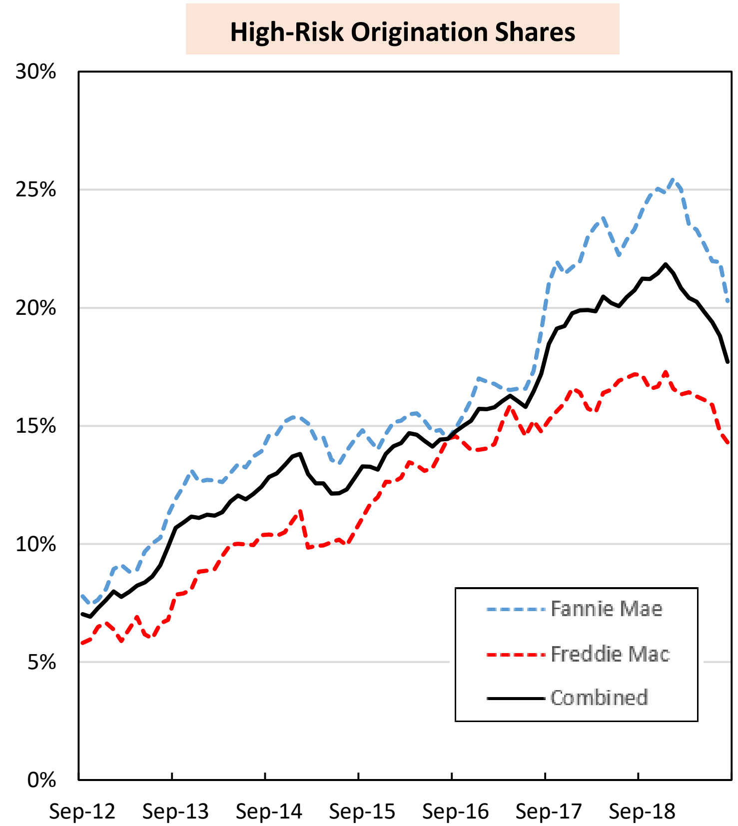


Note: Risk layering is defined as having at least 3 of 4 of the following features: Credit score < 660, DTI > 43, CLTV > 95%, 30 year loan term. Data for September 2019 are preliminary.
Source: AEI Housing Center, www.AEI.org/housing.

Low- & High-Risk Origination Shares, GSE Purchase Loans

There has been a significant divergence in trend between Fannie and Freddie around August 2017, when Fannie removed compensating factors for loans with a DTI above 50%. Fannie's share of low risk loans declined, while Freddie's held constant. Since January 2019, especially Fannie has managed to increase its share of low-risk loans, but still has a lot of work to do before once again being on par with Freddie.

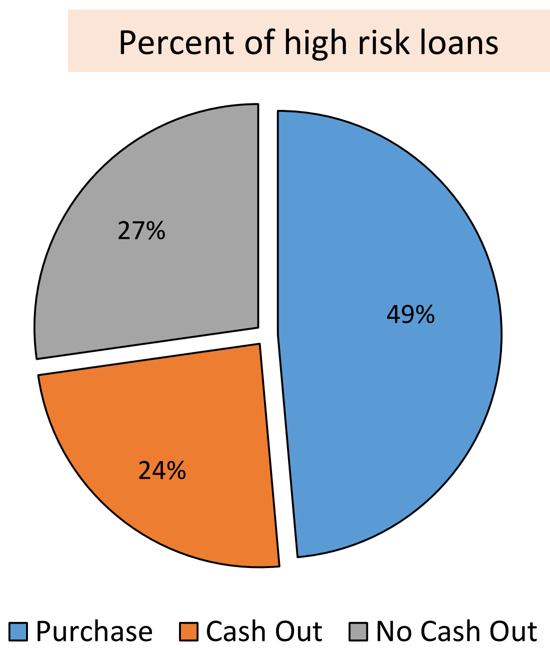


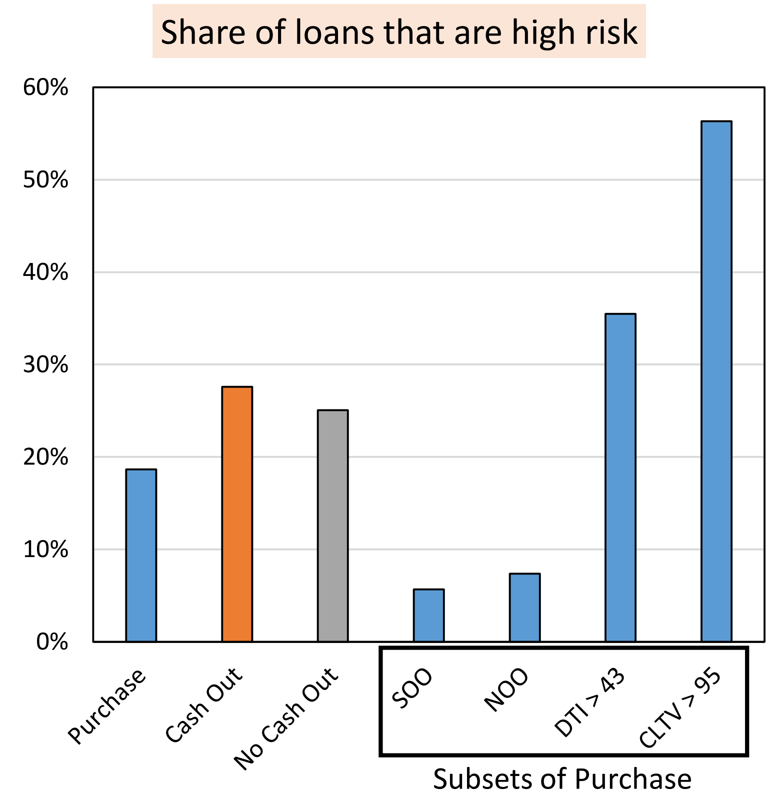


Note: We define prime loans as low-risk (with a stressed default rate of less than 6%), near prime as medium risk (with a stressed default rate of 6% to less than 12%), and subprime-like as high risk (with a stressed default rate of 12% or greater).
Source: AEI Housing Center, www.AEI.org/housing.

De-risking the GSEs, All Loans

The FHFA Director has set as a goal the de-risking of the GSEs' footprint. High risk loans (those with an MRI greater than or equal to a 12% stressed default rate) currently account for 21% of their August footprint and could be eliminated. The GSEs' high risk loans are about evenly split between purchase loans and refis. The biggest risk drivers are purchase loans with CLTVs > 95%, DTIs > 43%, and refis.

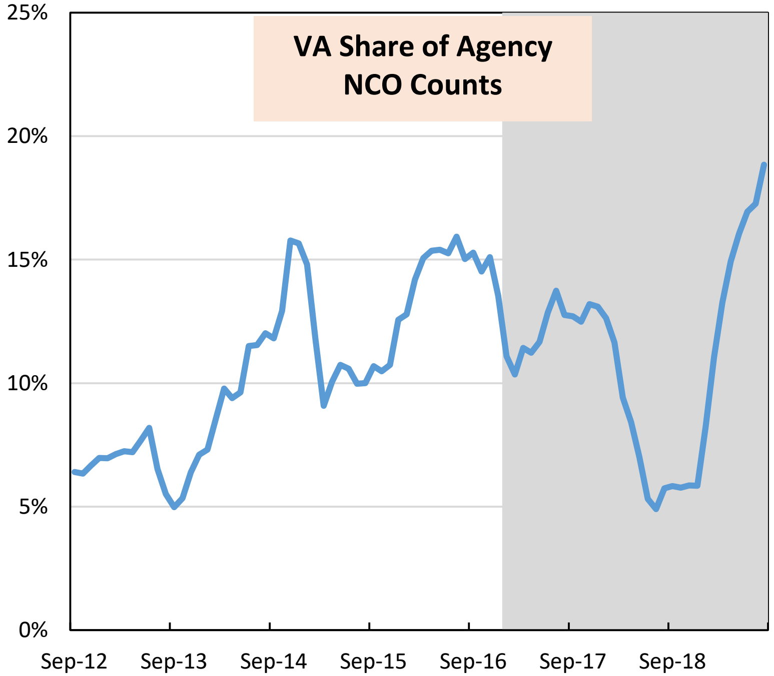


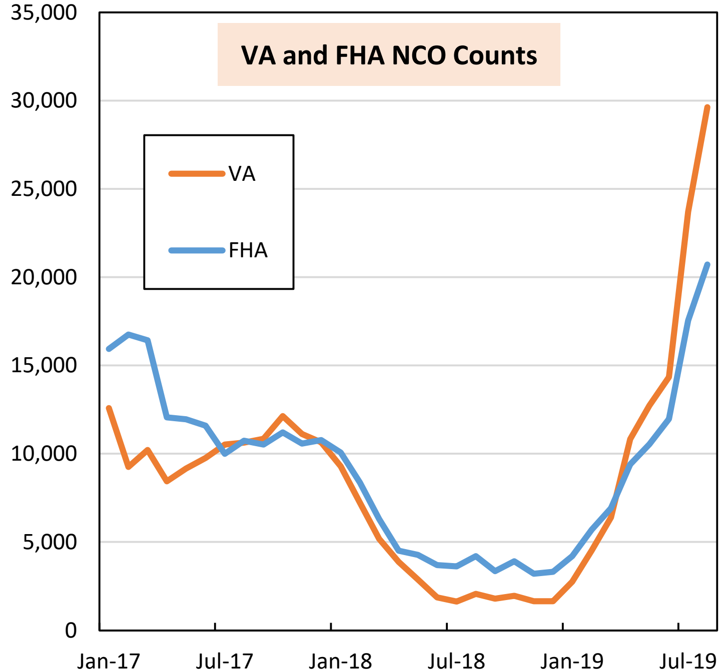


Note: Data are for June-August 2019. SOO refers to second owner occupied loans and NOO refers to investor owner occupied loans. High risk loans have a stressed default rate of 12% or greater.
Source: AEI Housing Center, www.AEI.org/housing.

VA No Cash Out Refis (NCO) Volume by Count

VA NCO volume set a series' high of 19% of NCO Agency loan volume by count, which is up significantly from the beginning of the series (about 7%) (left panel). In mid-2016, loan churning led to a 16% share. This led Congress and Ginnie to require a net tangible benefit test in early 2018. As a result, VA share fell to 5%, but has now picked up once again. The net tangible benefit test, in conjunction with rising rates, made VA refis near impossible. When mortgage rates dropped, the pent-up demand was released and lenders rushed to take advantage. As of Aug. 2019, the counts for the cumulative number of VA and FHA NCOs originated from April 2018 were almost identical (a difference of 18 loans) (right panel).

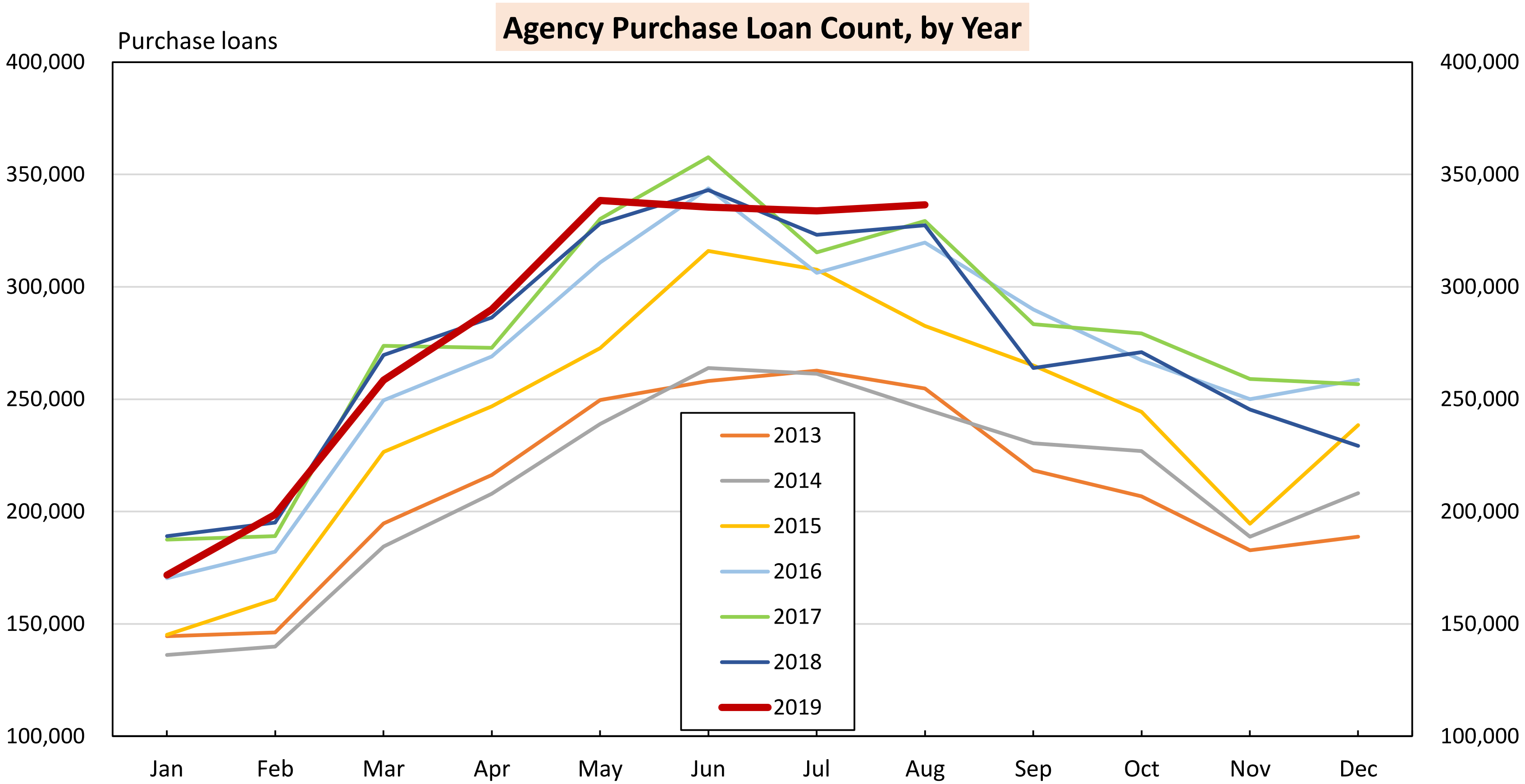




Note: Shading on the left panel chart denotes period from Jan. 2017 – Aug. 2019. The right panel chart focuses on this highlighted time period.
Source: AEI Housing Center, www.AEI.org/housing.

Agency Purchase Counts

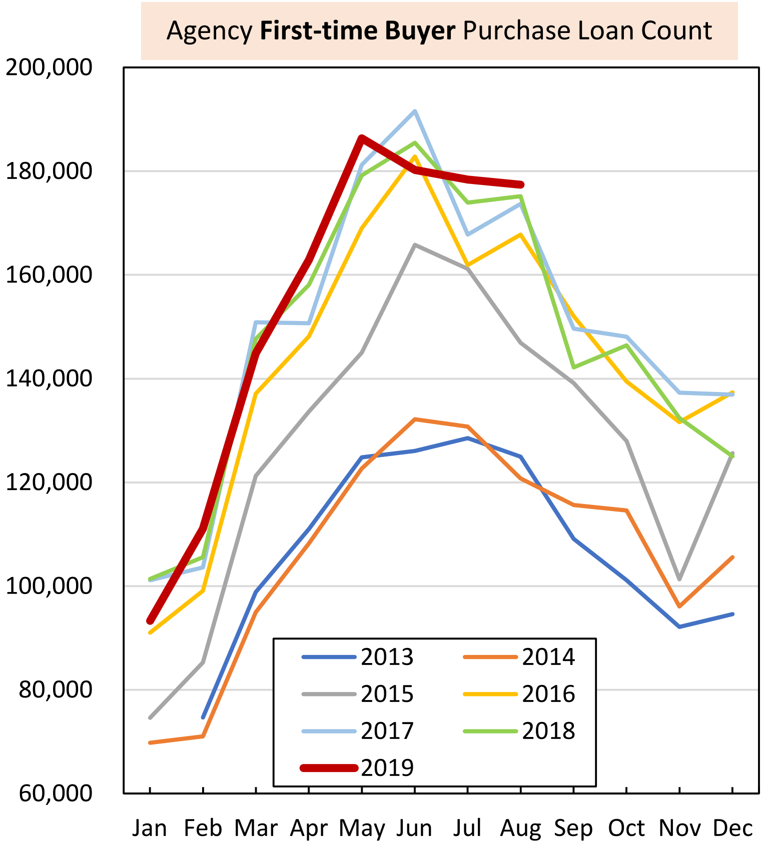
Agency purchase loan volume set a new series' high for the month of August. It was up 2.8% in August 2019 compared to a year ago. Overall, purchase volume in 2019 appears to have rebounded from the decline in the second half of 2018, when interest rates started to rise.

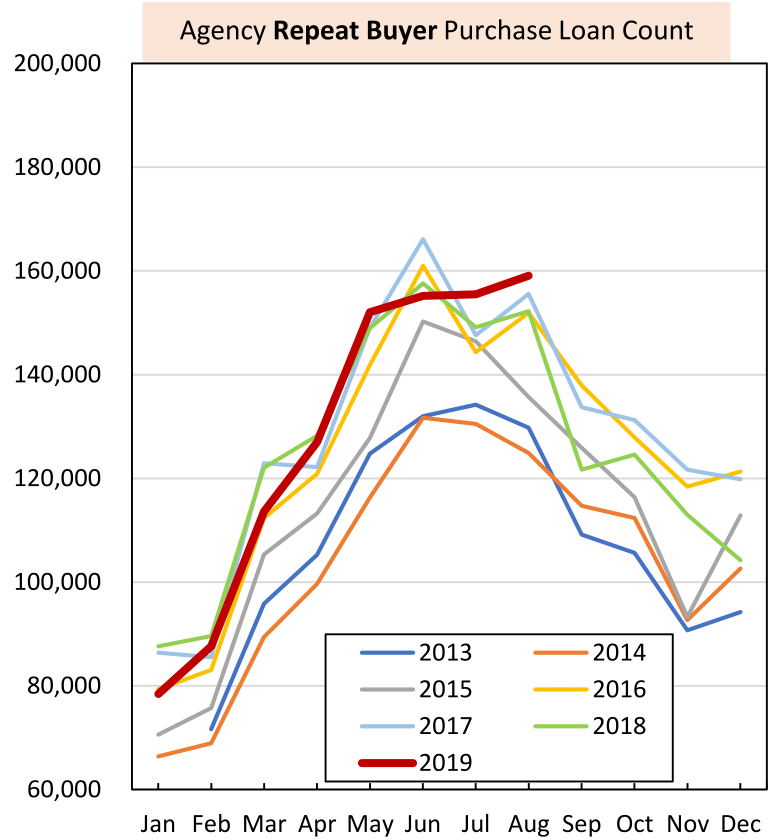


Source: AEI Housing Center, www.AEI.org/housing.

Agency Purchase Counts, by First-time Buyer Status

The increase in Agency volume was driven by a 5.3% increase in repeat buyer (RB) volume, while first-time buyer (FTB) volume only increased 1.3%. Over the last 5 years, growth in FTB volume has generally outpaced growth in RB volume.

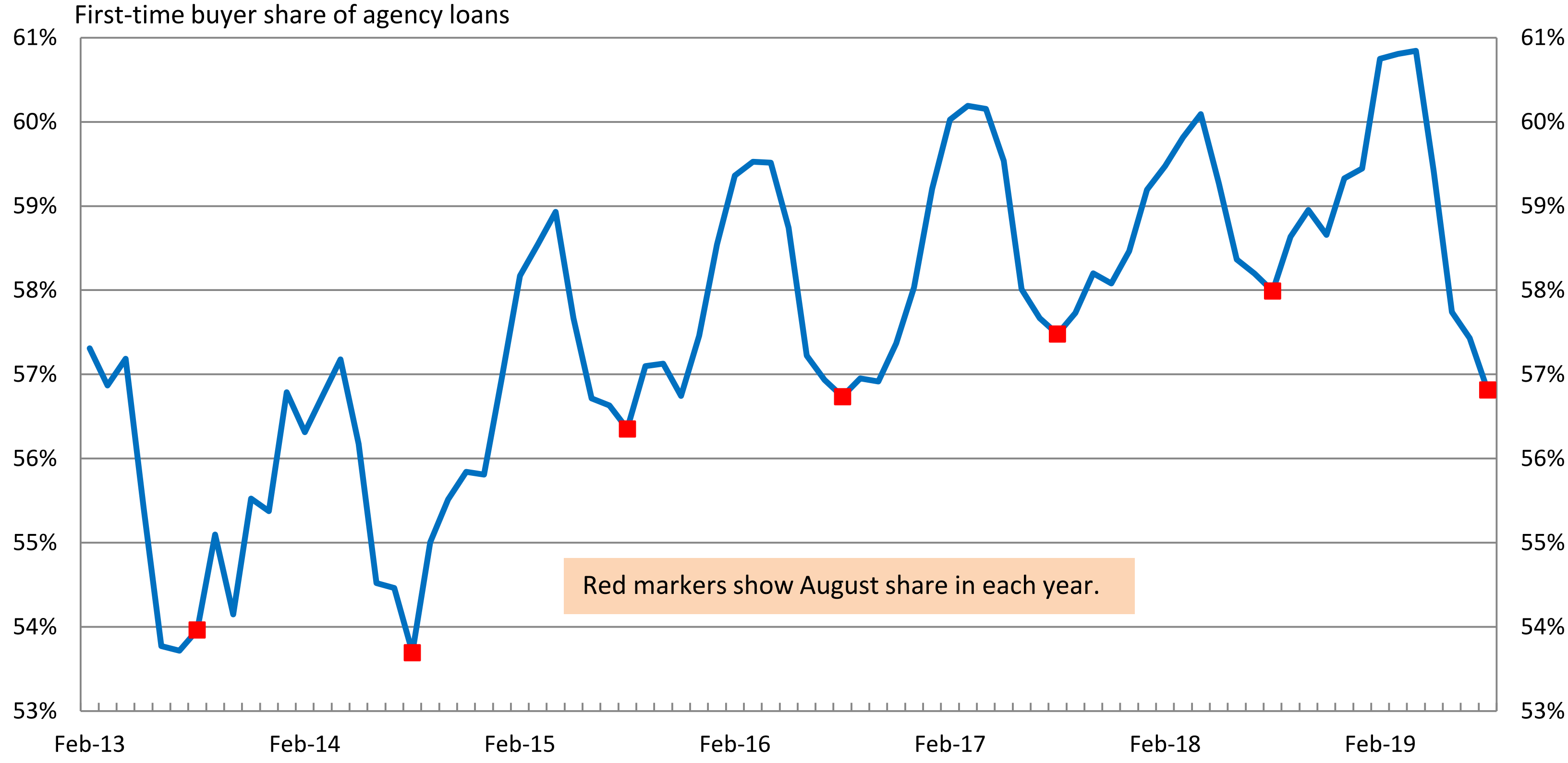




Note: Date for Jan-2013 are unavailable.
Source: AEI Housing Center, www.AEI.org/housing.

Agency First-time Buyer (FTB) Loan Share

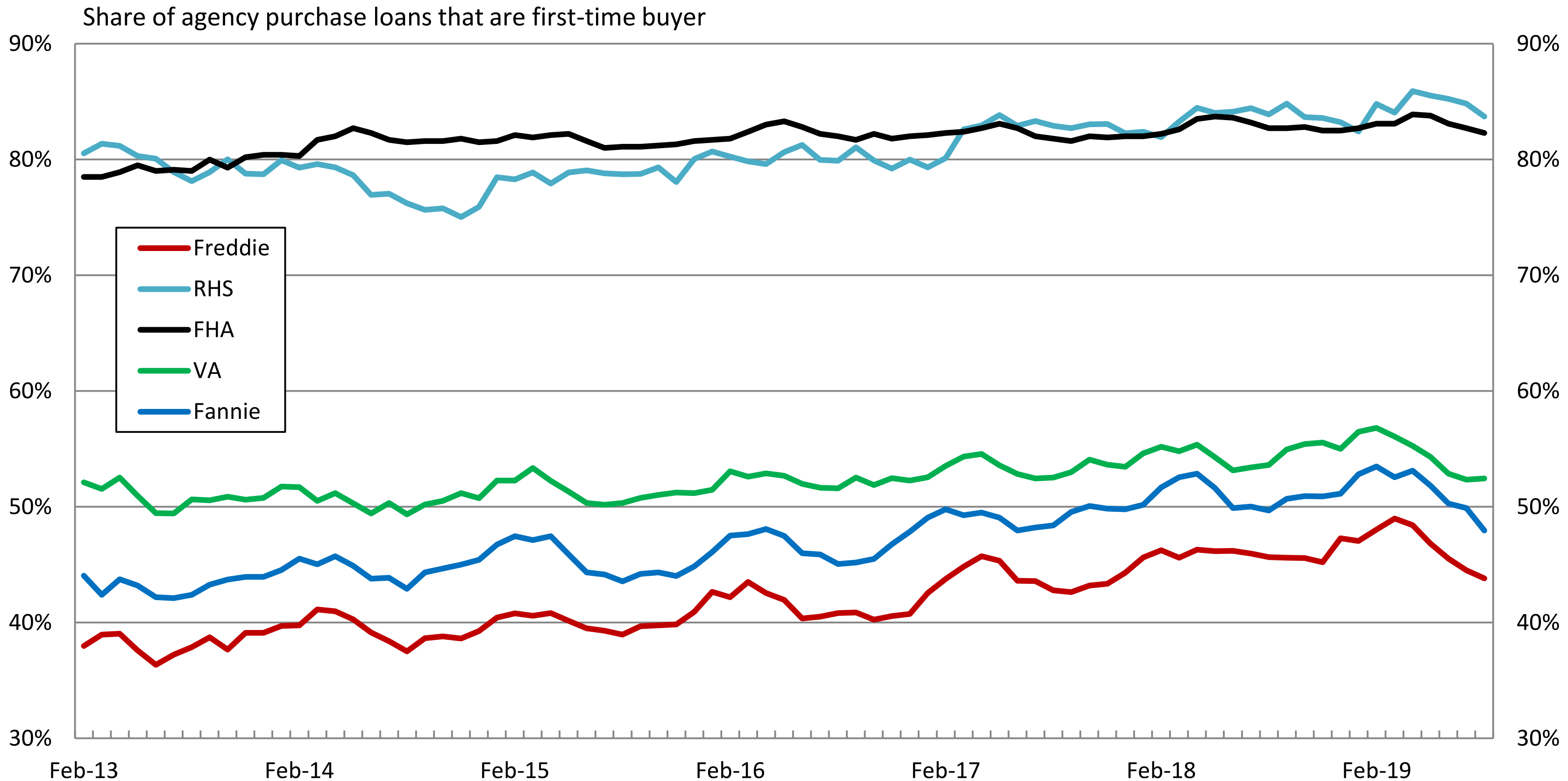
Because of faster growth in repeat buyer volume, the Agency FTB loans share has declined to 56.8% in August 2019. This is down from 58.0% in August 2018 and represents a significant trend reversal from the last 5 years, during which the FTB share continuously marched up.



Note: Data are for primary owner-occupied agency purchase loans.
Source: AEI Housing Center, www.AEI.org/housing.

Agency-Specific First-time Buyer (FTB) Mortgage Share Indices

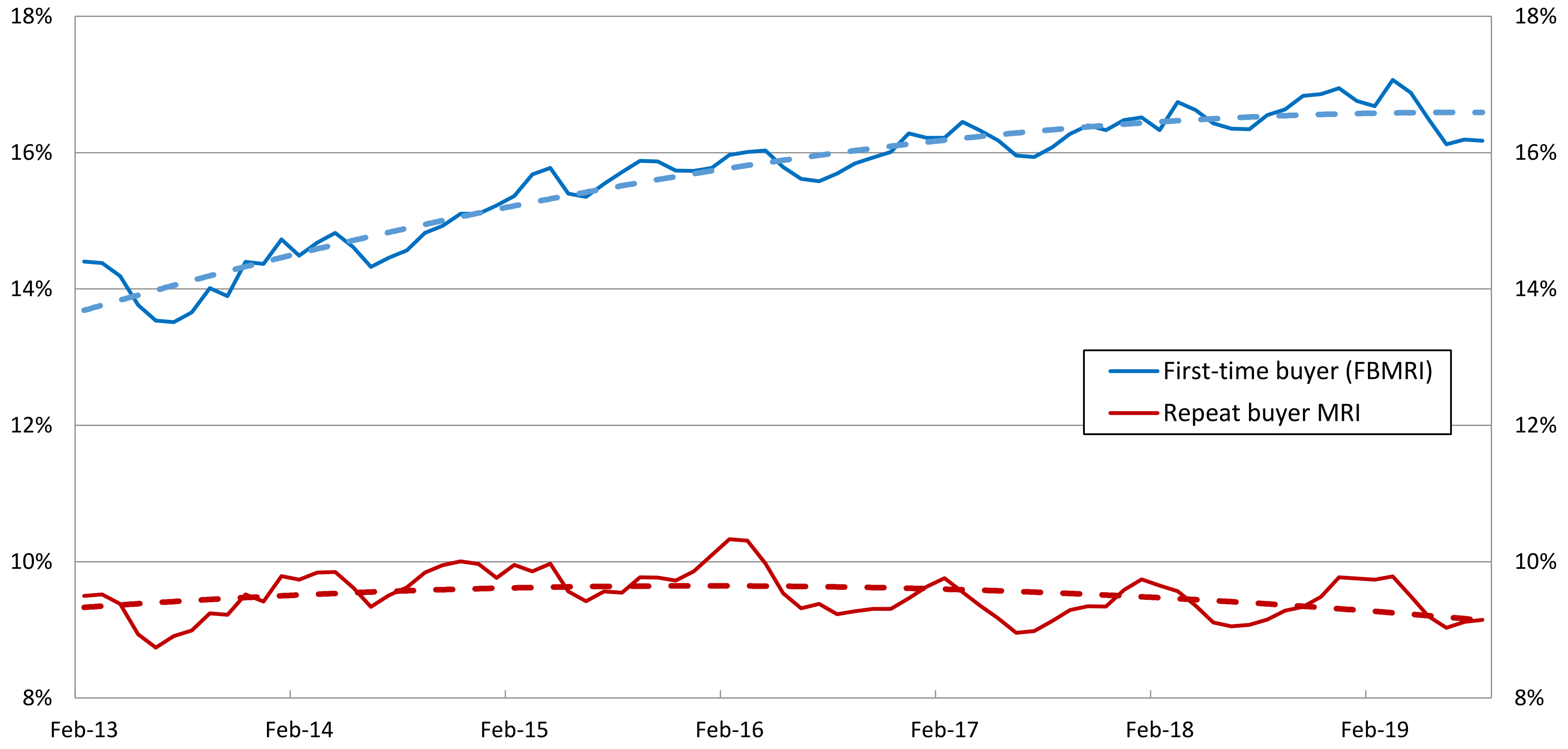
The recent decline in the agency FTB share has mostly been driven by the GSEs and the VA originating fewer FTB loans. Fannie's FTB share in August 2019 stood at 47.9%, its lowest level since December 2016.



Note: Data are for primary owner-occupied agency purchase loans.
Source: AEI Housing Center, www.AEI.org/housing.

Agency First-time and Repeat Buyer Mortgage Risk Indices

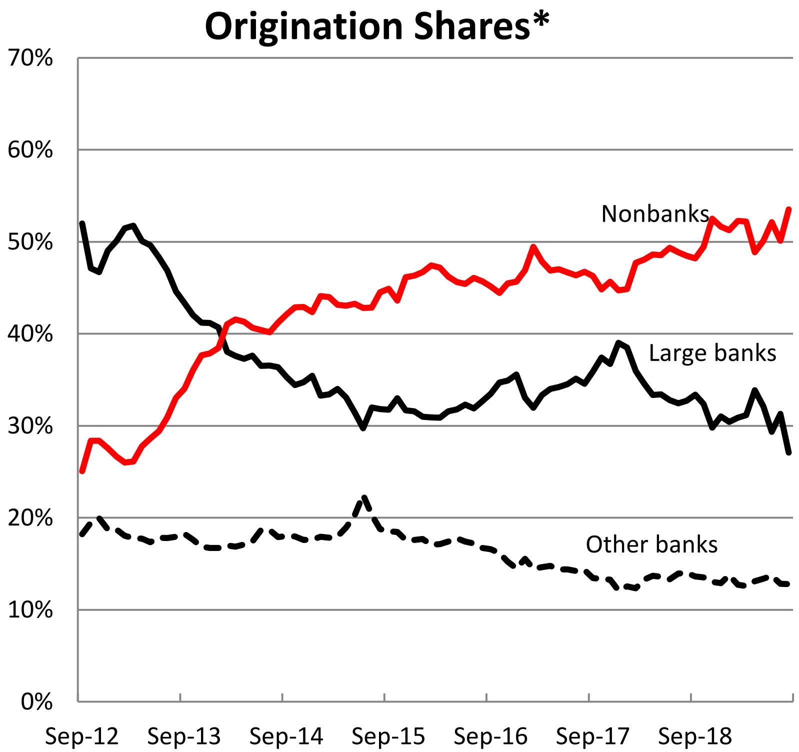
As the first-time buyer (FTB) share has declined over the last year, FTB loans also appear to have plateaued in risk – albeit at high levels. Time will tell whether this trend continues.

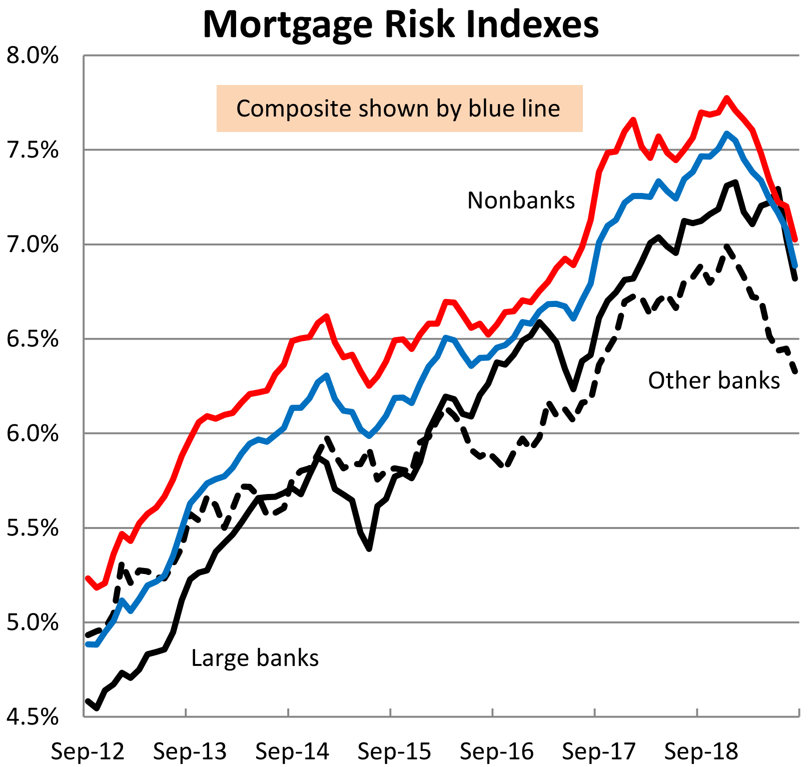


Source: AEI Housing Center, www.AEI.org/housing.

Origination Shares and MRIs by Seller Lender Type, GSE Purchase Loans

The gap in the risk index for GSE purchase loans between large banks and nonbanks appears to be closing. The nonbanks have reduced their risk since January 2019 at a faster pace than the large banks. So far, this has not translated into any significant share shifts between large banks and nonbanks.





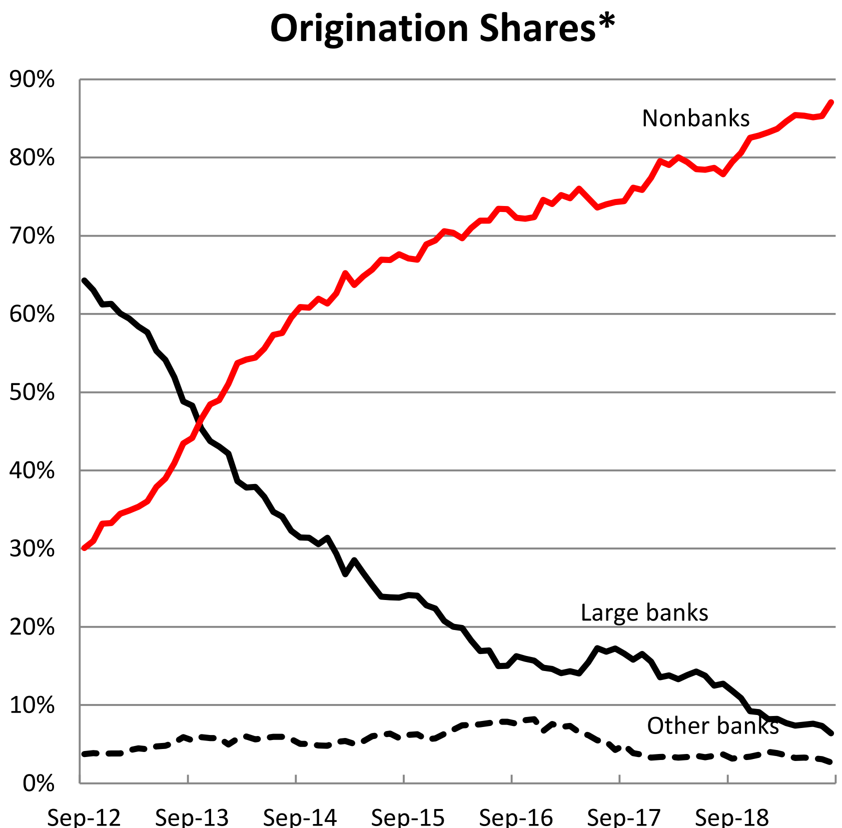
Note: Data for most recent months may understate large-bank share by perhaps 2 percentage points, as large banks are slower to move recent originations to the guarantee agencies for securitization and our market shares are based on securitized loans. MRIs for credit unions and state housing agencies are not shown because of low loan volumes.

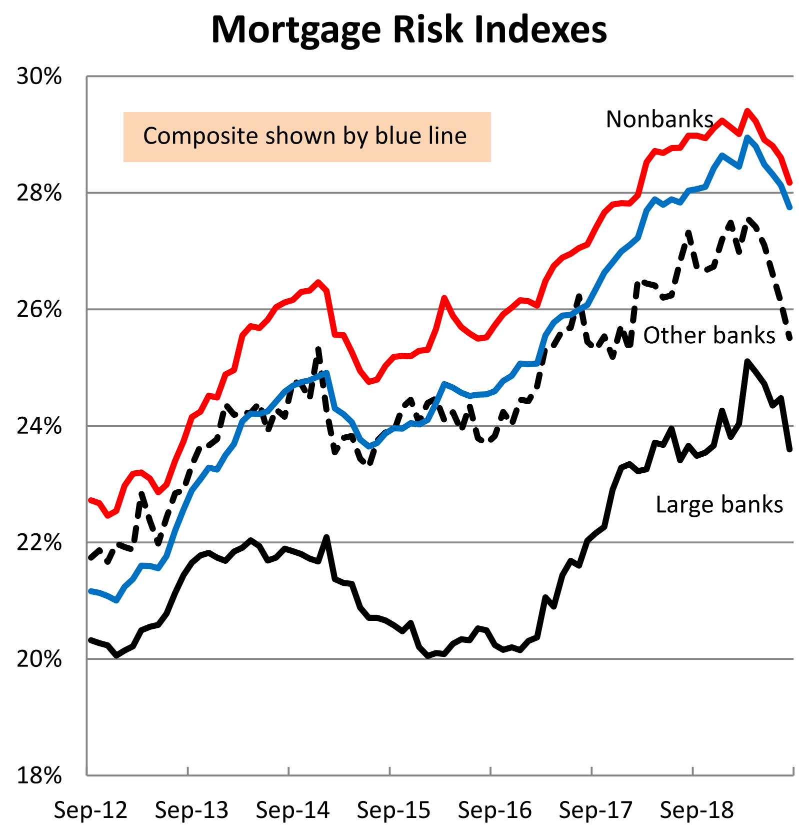
*Origination shares do not show shares for State Housing Finance Agencies or Credit Unions, which account for about 5% of the GSE Purchase market.

Source: AEI Housing Center, www.AEI.org/housing.

Origination Shares and MRIs by Issuer Lender Type, FHA Purchase Loans

The dramatic market shift from large banks to nonbanks for FHA loans continues. In August, the large bank share dropped to 6%, a new series low. Migration to nonbanks has boosted overall risk levels, as nonbanks are willing to originate riskier FHA loans than large banks. However, since March 2019, risk has declined for all lender types, but the gap remains wide between nonbanks and banks.





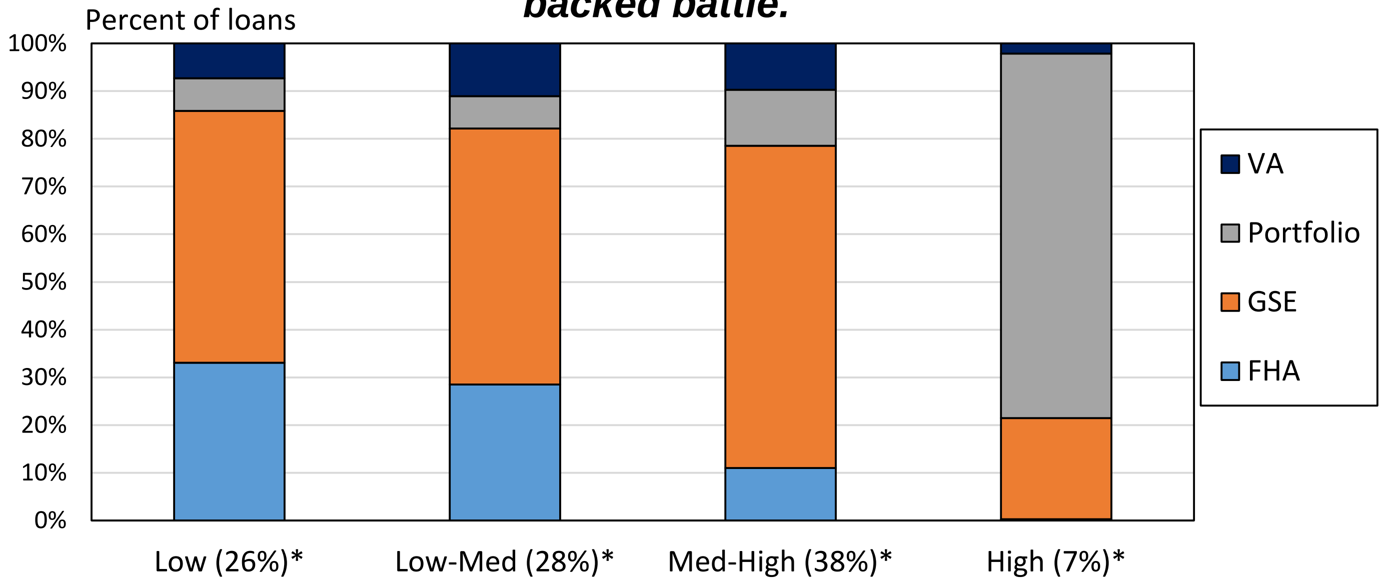
Note: Data for most recent months may understate large-bank share by perhaps 2 percentage points, as large banks are slower to move recent originations to the guarantee agencies for securitization and our market shares are based on securitized loans. MRIs for credit unions and state housing agencies are not shown because of low loan volumes.

*Origination shares do not show shares for State Housing Finance Agencies and Credit Unions, which account for about 4% of the FHA Purchase market.

Source: AEI Housing Center, www.AEI.org/housing.

Market Shares by Guarantor Type and Price Tier: 2018 Purchase Loans

To better track house price trends, we divide the market into 4 leverage-based price tiers. In the low and low-medium price tiers, FHA accounts for over a quarter share in each, while together FHA and the GSEs have a combined share of over 80%. The battle for market share between FHA and the GSEs is therefore largely taking place in these price tiers. Unsustainable constant-quality house price increases are the unfortunate consequence of this tax-payer backed battle.



2018	**Price Tier**			
	Entry-level		**Move-up**	
	Low	**Low-Med**	**Med-High**	**High**
Mortgage Risk Index	16.0%	14.6%	8.8%	3.2%
Market Share*	26%	28%	38%	7%

*Market share of all institutionally financed home sales in 2018 by tier.

Note: Data excludes Rural Housing Service. In 2017, Rural Housing Service loans made up 3% of the low tier, 2% of the low-medium tier, and a negligible amount of the two upper tiers.

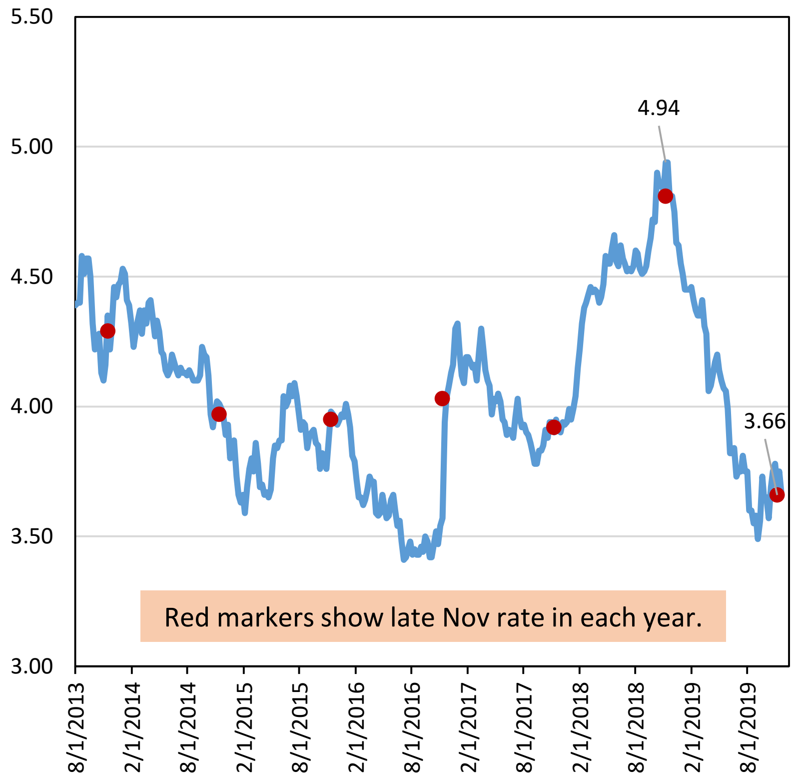
Price tiers are set at the metro level and are defined as follows: Low: all sales at or below the 40th percentile of FHA sales prices; Low-Medium: all sales at or below the 80th percentile of FHA sales prices; Medium-High: all sales at or below the 125% of the GSE loan limit; and High: all other sales.

Source: AEI Housing Center, www.AEI.org/housing.

Dovish Fed = Monetary Punchbowl Getting Spiked Again

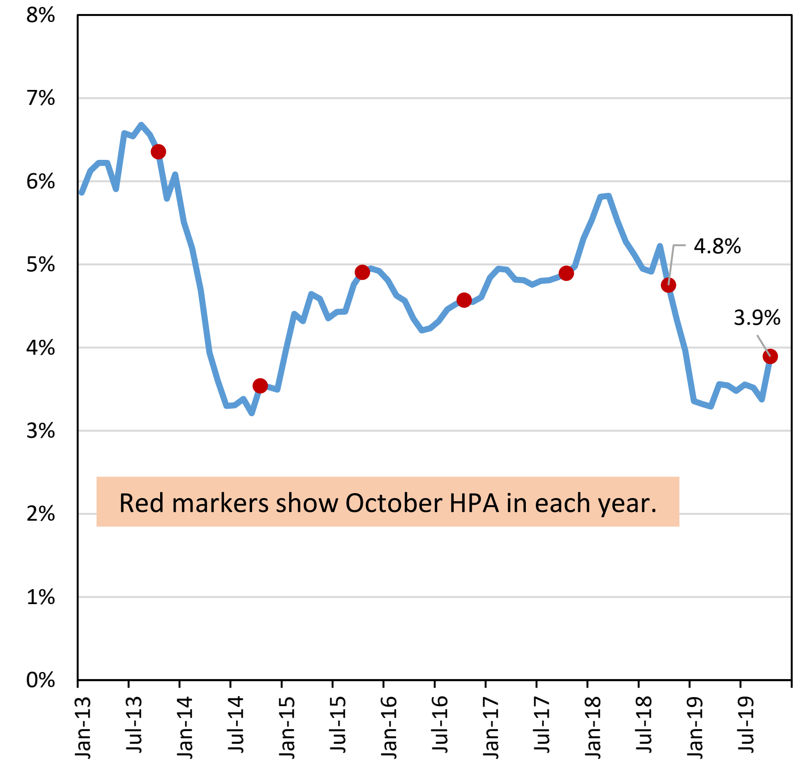
The national rate of HPA for October was 3.9%. This is down from its recent peak of 5.8% in March 2018, but up from 3.4% in January 2019. Nationally, HPA has stabilized due to recent mortgage rate movements, as the expected HPA uptick has been limited to more affordable metros. Rates, after having increased by 116 basis points from September 2017 to early November 2018, have since declined by 128 basis points.

30-year Fixed Rate Mortgage



Note: Data are for 30-year fixed-rate prime conventional conforming home purchase mortgages with a loan-to-value of 80 percent.
Source: Freddie Mac.

Year-over-Year Rate of House Price Appreciation

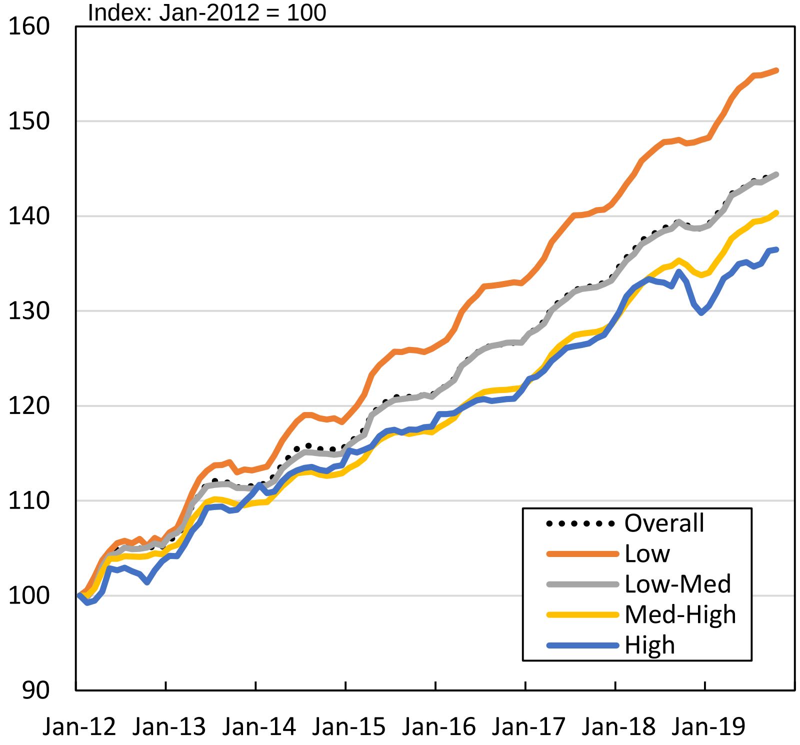


Note: Data are for the entire country. Data for October 2019 are preliminary.
Source: AEI Housing Center, www.AEI.org/housing.

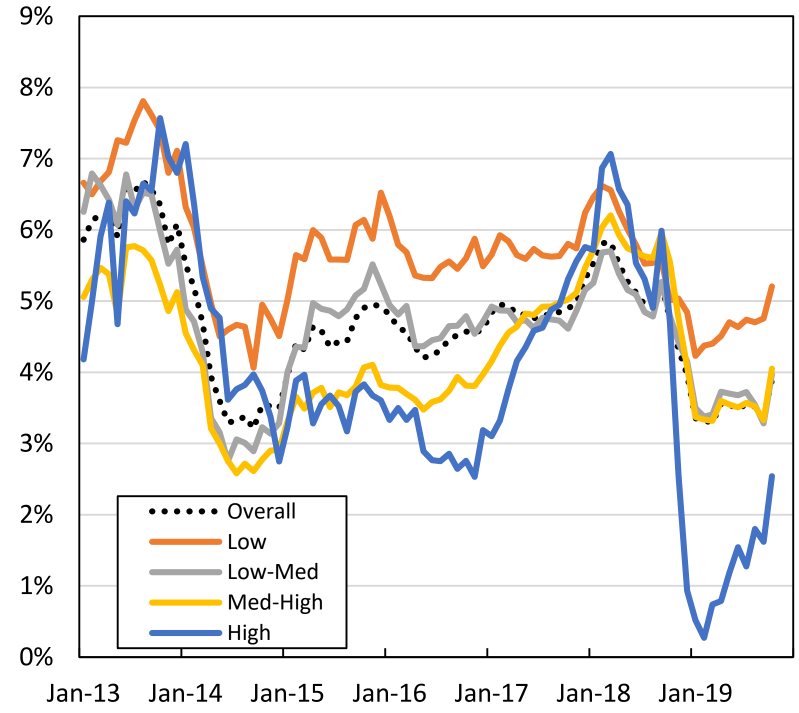
National House Price Appreciation (HPA) by Price Tier

In October 2019, overheating of the low price tier continued (right panel). HPA in the low price tier was 5.2% year-over-year (yoy). In both the low-medium and medium-high tiers, HPA was 4.0% and 4.1%, respectively. HPA in the high tier (about 7% of the market) was a more modest 2.5%.

Home Price Appreciation by Price Tier



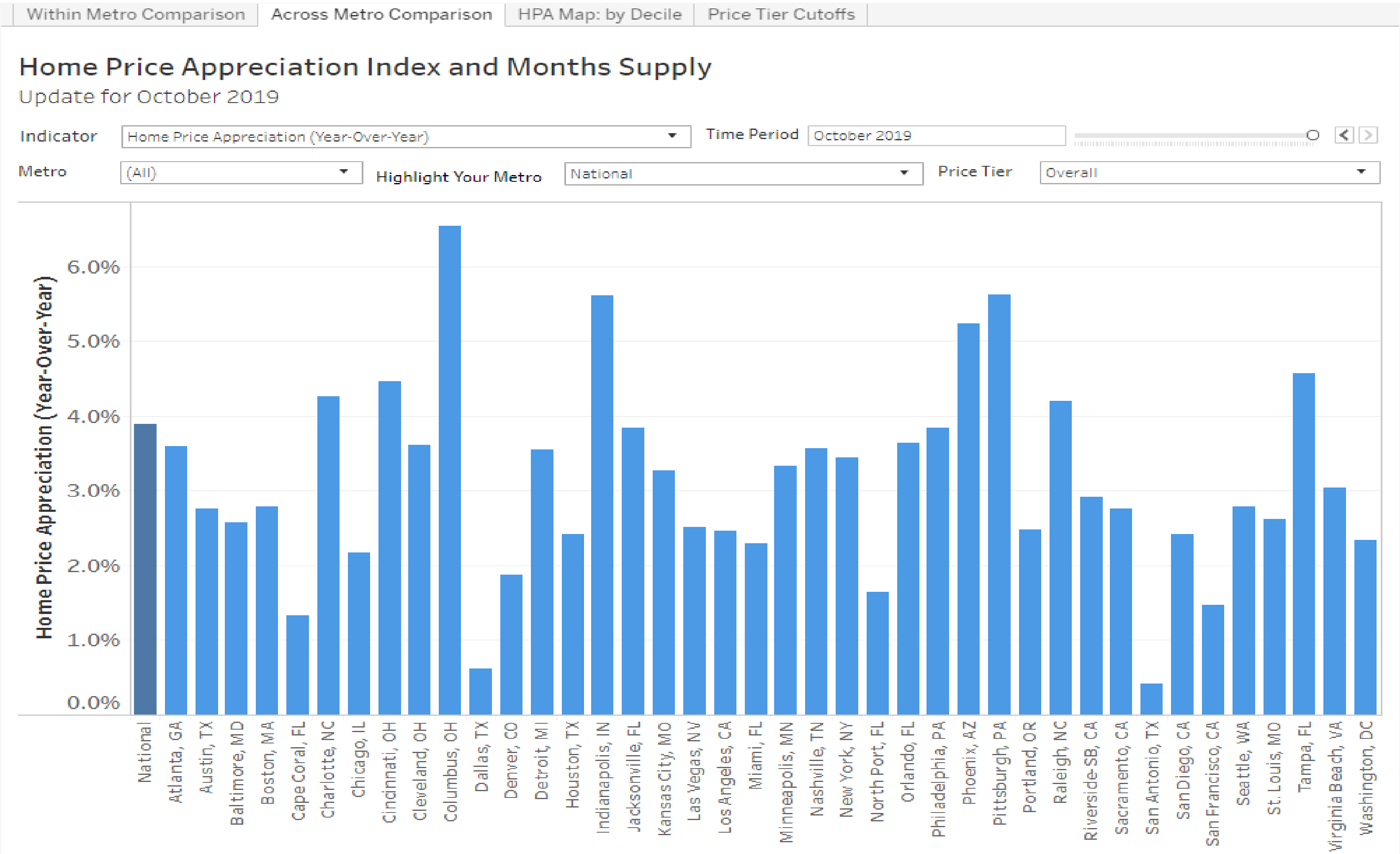
Year-over-Year Home Price Appreciation by Price Tier



Note: Data for October 2019 are preliminary. Price tiers are set at the metro level and are defined as follows: Low: all sales at or below the 40th percentile of FHA sales prices; Low-Medium: all sales at or below the 80th percentile of FHA sales prices; Medium-High: all sales at or below the 125% of the GSE loan limit; and High: all other sales. HPAs are smoothed around the times of FHFA loan limit changes.
Source: AEI Housing Center, www.AEI.org/housing.

House Price Appreciation (HPA): Largest 40 Metros

Our [new online tool](#) that goes along with our monthly releases on home price appreciation and months' supply data will be available later this week on our website. It will feature monthly data on HPA and months' supply for the nation and the 40 largest metros.



Source: AEI Housing Center, www.AEI.org/housing.

Briefing Dates for 2020

- Next briefing on Monday, January 6, 2020.
- The upcoming briefings for 2020 are listed below:

Monday	January 6, 2020
Monday	January 27
Monday	March 2
Monday	March 30
Monday	April 27
Monday	June 1
Monday	June 29
Monday	July 27
	No briefing in August
Wednesday	September 30
Monday	October 26
Monday	November 23
Tuesday	January 5, 2021

All briefings take place at 11 AM ET.

National Mortgage Risk Index (NMRI): A Quick Primer

- Overall goal:
  - Monitor market stability through accurate, real-time tracking of leverage that, if left unchecked, would result in destructive housing booms/busts.

- Principles behind the NMRI
  - NMRI is a stress test, similar to a car crash safety rating or hurricane rating for buildings.
  - The NMRI's stress event is the financial crisis from 2007.

- Basics of index construction
  - The NMRI is a standardized quantitative index for mortgage risk (leverage)
  - Places loans in risk buckets and assesses default risk based on the performance of the 2007 vintage loans with similar characteristics

- Advantages of the NMRI
  - Near-complete census of gov't-guaranteed loans,
  - Accurate, timely, and in-depth coverage of purchase mortgage trends
  - NMRI provides significant signals of market trends without the noise of other indices

- What does an increasing or decreasing NMRI mean?
  - Increasing NMRI = increasing leverage = looser lending
  - Decreasing NMRI = decreasing leverage = tighter lending

Stressed Default Rates, Home Purchase Loans

Risk Bucket	Credit Score	CLTV	Total DTI	Default Rate
Very Low	≥ 770	61-70%	≤ 33%	0.8%
Low	720-769	76-80%	34-38%	4.2%
Medium	690-719	81-85%	39-43%	9.3%
High	660-689	91-95%	44-50%	22.7%
Very High	620-639	> 95%	> 50%	45.8%

Note: Default rates represent cumulative defaults through year-end 2012 for Freddie Mac's 2007 vintage of acquired loans. The loans included in the calculation are all primary owner-occupied, 30-year fixed-rate, fully amortizing, fully documented, home purchase loans.

- Takeaway: Huge spread of default rates across risk buckets
- All 320 risk buckets for home purchase loans are shown at Periodic Table – Purchase
- Analogous tables for cash-out and no-cash-out refi loans are at Periodic Tables – Refinance
- Additional loan risk factors are applied to VA loans and to ARMs, investor loans, second homes, 15 year terms, and 20 year terms

Price Tier Methodology

- Goal: create leverage-based price tiers.
- Rationale: segmenting the market by price tier is important because housing policies, new construction activity, and access to leverage vary by these price tier. Thus, these factors can create very different home price appreciation trends depending on the price tier.
- 4 Price Tiers:
  - Low: all sales below the 40^{th} percentile of FHA sales prices
  - Low-medium: all sales at or below the 80^{th} percentile of FHA sales prices
  - Medium-high: all sales at or below 125% of the GSE loan limit
  - High: all other sales
- Data Inputs:
  - Public Records (near-real time with latency and coverage problems).
  - FHA Snapshot (monthly dataset of all FHA endorsements; released around mid-month with a one month lag).
  - FHFA loan limits at the county level.
- Assumptions and Construction:
  - On average, the difference between loan origination and endorsement is one month (we have confirmed this on aggregate by comparing monthly FHA Snapshot to NMRI counts).
  - Price Tiers are set quarterly at the metro level. When there are fewer than 50 FHA loans in a quarter, we pool all FHA loans at the non-metro state level.
  - For the demarcation between medium-high and high tier, we multiply a perspective's county loan limit by 1.25 to account for an 80% LTV, which is the median LTV of loans taken out at the loan limit.
- Result:

2018	Price Tier				Overall
	Low	Low-Med	Med-High	High	
Mortgage Risk Index	16.0%	14.6%	8.8%	3.2%	11.2%
Market Share*	26%	28%	38%	7%	100%

*For institutionally financed sales. May not add to 100% due to rounding.

House Price Appreciation (HPA) Index: A Quick Primer

- Overall goal:
  - Monitor market stability through accurate, real-time tracking of house prices.
- Basics of index construction
  - Most HPA Indices are repeat sales (i.e. Case Shiller or FHFA) or hedonic (Zillow) indices.
  - AEI's HPA widely known is a "quasi" repeat sales index with a hedonic element.
  - Index measures HPA by constructing an artificial sales pair consisting of one actual sale and one "artificial" sale as measured by the property's Automated Valuation Model (AVM).
  - The AVM approximates a property's sale price at a given point in time. The AVM used for AEI's HPA Index is unbiased and accurate.
- Advantages of AEI's HPA Index
  - Combines the best of repeat and hedonic models.
  - Unlike a true repeat sales index, which is limited to repeat sales and may therefore be biased, AEI's index includes the entire universe of sales.
  - Unlike a true hedonic index, which incorporates every property (even unsold ones), it reduces the amount of errors since at least one sale of the transaction pair actually occurred.
  - Allows for an index construction by price tier and fine geographic levels (down to census tract).
- Data for the HPA index
  - National Public Records data and AVM for Dec-2018 come from First American via DataTree.com.
  - Uses virtually all institutionally financed sales back to January 2012.
  - Data are weighted at the county level to make them representative.
  - HPAs for the medium-high and high price tiers are spliced around the time of loan limit changes.
- AEI House Price Appreciation Indexes are published nationally and by price tier
  - The four tiers are set at the metro level and adjusted quarterly (see: Price Tier Methodology slide) .
  - HPAs are smoothed around the times of FHFA loan limit changes.

Home Sales Methodology

- Data Inputs
  - Public Records (near-real time with latency and coverage problems).
  - HMDA (annual dataset of institutionally financed sales (IFS); covers around 99% of loans; released with lag).
  - FHA Snapshot (monthly dataset of all FHA endorsements; released around mid-month with a one month lag).
  - National Mortgage Risk Index (NMRI) (covers 99% of Agency loans; two months lag).
- Assumptions
  - Recorder offices process transactions in random order; latency in reporting applies equally across all sales types.
  - FHA loans are properly recorded (stamp on mortgage document).
  - On average, the difference between loan origination and endorsement is one month (we have confirmed this on aggregate by comparing monthly FHA Snapshot to NMRI counts).
  - Conventional loans have same seasonal pattern as GSE loans.
- Construction
  - Aggregation from the county level up.
  - Use FHA Snapshot for all FHA sales.
  - <u>When HMDA is available</u>: Use HMDA for remaining IFS when available:
    - Impute cash and other financed sales as a percentage of IFS (assume state average for counties with latency problems);
    - Impute seasonal pattern from either public records or NMRI.
  - <u>When HMDA is not yet available</u>: Use Public records with adjustments:
    - Limited to ~ 700 counties that account for ~80% of sales (remove counties with insufficient FHA counts or breaks in series);
    - Gross up all sales in that county by the ratio of FHA Public Records loans to FHA Snapshot loans;
    - Assume same rate of change for ~2400 counties with ~20% of sales -> *still working on improving this assumption.*
    - As a robustness check of this, we compare state VA and RHS totals to the NMRI and adjust totals.

New Construction Identification (NC) Methodology (still refining)

- Data Inputs
  - Public Records (Deed & Assessor files)
  - Zillow API and/or Listings data
- Identification of NC
  - Year Built in Assessor data
  - If Year Built is missing:
    - Seller name (we have assembled a list of over 400 builders with their subsidiaries and key words to identify smaller builders.) If a seller is a builder and the Year Built is missing, then it is most likely a new construction that has not yet been assessed.
    - Ping Zillow API for Year Built and Use Code. Data not perfect, along with other data helps determine status.
    - Sellers with multiple sales that are not individuals/gov't/lender/other corporation are most likely builders (relatively small number).
  - Count only first sale of home as a new construction.
- Verification – Quality Control, Quality Control, Quality Control
  - Random sampling and checking of new constructions and existing homes using Zillow data, Google street view/satellite images.
  - Find 2% false positives and 1% false negatives.
  - Builder example: AEI NC found 93% of DR Horton sales (unweighted) and 105% (weighted)
- Final dataset allows us to:
  - Monitor new constructions at the property level,
  - Accurately estimate new home sales at fine geographic levels when combined with Home Sales #s,
  - Estimate additions to the existing housing stock when combined with Assessor data,
  - Estimate sales by builder and track builder, and
  - Combine new construction numbers with Months' Supply and house price appreciation.
- Other considerations
  - Lag in data; originally estimated at ~4 quarters; with more data processed, looks like 1-2 months.
  - Hard to identify owner-built homes without a long lag.

List of Abbreviations

Term	Description
MRI	The **Mortgage Risk Index** (MRI) measures how the loans originated in a given month would perform if subjected to the same stress as loans originated in 2007, which experienced the highest default rates as a result of the Great Recession.
NMRI	The **National Mortgage Risk Index** (NMRI) currently covers home purchase and refinance loans (except for VA refinances) that have been (1) acquired and securitized by Fannie Mae or Freddie Mac or (2) insured or guaranteed by the Federal Housing Administration (FHA), the Department of Veterans Affairs (VA), or the Rural Housing Service (RHS).
SMRI	The **State-level Mortgage Risk Index** (SMRI) measures mortgage risk on a state level. It employs exactly the same stress-test methodology as the national index.
FBMSI	The **First-time Buyer Mortgage Share Index** (FBMSI) equals the number of loans made to first-time buyers divided by the number of all home purchase loans excluding those made to investors and second home buyers for any given month (see first-time buyer (FTB) definition below). The agency FBMSI covers government-guaranteed loans, while the combined FBMSI covers both government-guaranteed and private-sector loans. The agency loans are from the same database used for the NMRI, while the private-sector component of the combined FBMSI come from AEI's National Housing Market Index (NHMI) and assumptions believed to be reasonable.
FBMRI	The **First-time Buyer Mortgage Risk Index** (FBMRI) is calculated using the same methodology as for the NMRI. The only difference is that the set of included loans is restricted to first-time buyers.
FTB	AEI uses the federal government's definition of a **first-time homebuyer** (FTB). A FTB is an individual borrower who (1) is purchasing the mortgaged property, (2) will reside in the mortgaged property as a primary residence, and (3) had no ownership interest (sole or joint) in a residential property during the three-year period preceding the date of the purchase of the mortgaged property. Investment properties, second homes, and refinance transactions are not eligible to be considered first-time homebuyer transactions. Other organizations such as the National Association of Realtors (NAR) use a different definition of FTB based on self-identification.
RB	Repeat Buyers (RB) are all home buyers that are not first-time buyers.

List of Abbreviations (cont'd)

Term	Description
GSE	A **Government-Sponsored Enterprise** (GSE) is an entity created by Congress that operates under a government-defined mission and charter. There are two housing-related GSEs: Freddie Mac and Fannie Mae. They purchase mortgages on the secondary market and subsequently pool them into mortgage-backed securities (MBS), which are purchased by government and private investors.
Fannie Mae	The **Federal National Mortgage Association** (FNMA), known as Fannie Mae, was founded in 1938 as part of the New Deal legislation.
Freddie Mac	The **Federal Home Loan Mortgage Corporation** (FHLMC), known as Freddie Mac, was created in 1970 to complement Fannie Mae.
Ginnie Mae	The **Government National Mortgage Association** (Ginnie Mae) is a federal government corporation that aims to promote homeownership for low- and moderate-income families. It ensures the timely payment of principal and interest on mortgage-backed securities formed from mortgages that are guaranteed or insured by FHA, VA, RHS, or smaller programs for Native Americans. Ginnie Mae was created in 1968. Prior to 1968 its role was performed by Fannie Mae.
FHA	The **Federal Housing Administration** (FHA), founded in 1934, is a federal agency that today provides mortgage insurance for residential loans made to high-risk borrowers. The borrower pays an upfront mortgage insurance premium as well as monthly insurance premiums for the service. In return, FHA covers 100% of the lender's loss in case of the borrower's default.
RHS	The **Rural Housing Service** (RHS) is a program within the U.S. Department of Agriculture that guarantees mortgages in rural areas. The borrower pays an upfront annual fee for the service. In return, RHS covers 100% of lender's loss in case of the borrower's default.
VA	The **Department of Veterans Affairs** (VA) guarantees mortgages to eligible veterans and generally pays 25% of lender's loss in case of the borrower's default. The borrower pays an upfront annual fee for the service.
HUD	FHA has been overseen by the **Department of Housing and Urban Development** (HUD) since its creation in 1965.

List of Abbreviations (cont'd)

Term	Description
FICO®	The **FICO Credit Score** is a statistical credit evaluation score developed by Fair, Isaac and Co. The FICO score attempts to measure a borrower's risk of default through his or her personal financial history. FICO scores range from a high default-risk score of 300 to a low default-risk score of 850. The term "credit score" is used to connote a generic score.
LTV / CLTV	The **Loan-to-Value Ratio** (LTV) is the ratio of the 1st lien loan amount to the property's value. Since the down payment on a purchase transaction is the property's value minus the loan amount, the LTV is inversely related to the down payment. The **Combined Loan-to-Value** (CLTV) is the ratio of all loan amounts at 1st lien origination to the property's value. Both ratios are a measure of a borrower's skin in the game.
DTI	The total **Debt-to-Income Ratio** (DTI) gauges the ability of a borrower to repay a mortgage by measuring the amount of income consumed for repayment of all outstanding debts of the borrower.
ARM	An **Adjustable-Rate Mortgage** (ARM) is a mortgage whose interest rate varies over the lifetime of the loan based on market conditions. ARMs have on average a higher default risk than FRMs.
FRM	A **Fixed Rate Mortgage** (FRM) maintains the interest rate at origination throughout the lifetime of the loan.
MSA	A **Metropolitan Statistical Area** (MSA) is a geographical region with a population of at least 50,000 inhabitants at its core and close economic ties throughout the region.
PCE price index	The **Personal Consumption Expenditure** (PCE) price index measures the prices of goods and services purchased by consumers in the U.S. economy. It is published monthly by the Bureau of Economic Analysis in the Department of Commerce. The PCE price index is the measure of inflation targeted by the Federal Reserve.
SLOOS	The **Senior Loan Officer Opinion Survey on Bank Lending Practices** (SLOOS) is a survey of lending conditions conducted quarterly by the Federal Reserve among roughly eighty large domestic banks and twenty-five U.S. branches and agencies of foreign banks.

List of Abbreviations (cont'd)

Term	Description
QM/QRM	The **Qualified Mortgage** (QM) and the **Qualified Residential Mortgage** (QRM) are mortgage terms created under the Dodd-Frank Act. A mortgage that meets the QM requirements provides legal protection for lenders against a claim that the loan was made without due consideration of the borrower's ability to repay. The QRM designation relates to the securitization of mortgages. If the loans in a mortgage-backed security are QRMs, the securitizing agent is not required to retain any risk position in the security. Although the initial proposed QRM definition was relatively strict, the final definition was watered down to be equivalent to the looser QM definition. The five guarantee agencies (Fannie Mae, Freddie Mac, FHA, VA, and RHS are exempt from substantial portions of the QM rules and entirely from the QRM rules. (For Fannie and Freddie, this exemption applies only while they are in conservatorship).
MIP	The **Mortgage Insurance Premium** (MIP) is a payment to compensate for the risk of default on the mortgage. As noted above, FHA mortgages carry both upfront and monthly MIP payments. Fannie Mae and Freddie Mac generally require mortgage insurance for loans they guarantee with LTVs above 80%; borrowers with these GSE-guaranteed loans may make monthly MIP payments depending on the premium plan.
TRID	The **TILA-RESPA Integrated Disclosure (TRID)** rule – commonly also known as Know Before You Owe – requires lenders to summarize and more prominently display the loan terms on the mortgage form. It also institutes a three-day waiting period before closing to allow borrowers time to review the contract. The form change is currently suppressing sales volume as it is delaying loan closings by creating additional burdens on lenders. TRID was mandated by the Consumer Financial Protection Bureau (CFPB) and applies to mortgage applications filed on or after October 3, 2015.
APOR	The average prime offer rate (APOR) is a weekly survey-based estimate of the Annual Percentage Rates (APRs) of "best quality," 80% LTV, first-lien loans. The APOR is available for (1) 30-year fixed-rate; (2) 15-year fixed-rate; (3) five-year variable-rate; and (4) one-year variable-rate loan products.