

# The Virginia Tech – U.S. Forest Service July 2019

## Housing Commentary: Section I



**Urs Buehlmann**

Department of Sustainable Biomaterials  
College of Natural Resources & Environment

Virginia Tech  
Blacksburg, VA

540.231.9759

[buehlmann@gmail.com](mailto:buehlmann@gmail.com)

**Delton Alderman**

Forest Products Marketing Unit  
Forest Products Laboratory

U.S. Forest Service  
Madison, WI

304.431.2734

[dalderman@fs.fed.us](mailto:dalderman@fs.fed.us)



2019

Virginia Polytechnic Institute and State University

VCE-CNRE 71NP

Virginia Cooperative Extension programs and employment are open to all, regardless of age, color, disability, gender, gender identity, gender expression, national origin, political affiliation, race, religion, sexual orientation, genetic information, veteran status, or any other basis protected by law. An equal opportunity/affirmative action employer. Issued in furtherance of Cooperative Extension work, Virginia Polytechnic Institute and State University, Virginia State University, and the U.S. Department of Agriculture cooperating. Edwin J. Jones, Director, Virginia Cooperative Extension, Virginia Tech, Blacksburg; M. Ray McKinnie, Administrator, 1890 Extension Program, Virginia State University, Petersburg.

# Table of Contents

Slide 3: <a href="#">Opening Remarks</a>	Slide 49: <a href="#">Region SF House Sales &amp; Price</a>
Slide 4: <a href="#">Housing Scorecard</a>	Slide 57: <a href="#">New SF Sales-Population Ratio</a>
Slide 5: <a href="#">Wood Use in Construction</a>	Slide 67: <a href="#">Construction Spending</a>
Slide 8: <a href="#">New Housing Starts</a>	Slide 70: <a href="#">Construction Spending Shares</a>
Slide 12: <a href="#">Regional Housing Starts</a>	Slide 80: <a href="#">Remodeling</a>
Slide 22: <a href="#">New Housing Permits</a>	Slide 83: <a href="#">Existing House Sales</a>
Slide 26: <a href="#">Regional New Housing Permits</a>	Slide 86: <a href="#">U.S. Housing Prices</a>
Slide 32: <a href="#">Housing Under Construction</a>	Slide 89: <a href="#">First-Time Purchasers</a>
Slide 34: <a href="#">Regional Under Construction</a>	Slide 90: <a href="#">Affordability</a>
Slide 39: <a href="#">Housing Completions</a>	Slide 95: <a href="#">Summary</a>
Slide 42: <a href="#">Regional Housing Completions</a>	Slide 96: <a href="#">Virginia Tech Disclaimer</a>
Slide 46: <a href="#">New Single-Family House Sales</a>	Slide 97: <a href="#">USDA Disclaimer</a>

This report is a free monthly service of Virginia Tech. Past issues are available at:  
<http://woodproducts.sbio.vt.edu/housing-report>.

To request the commentary, please email: [buehlmann@gmail.com](mailto:buehlmann@gmail.com) or [Delton.R.Alderman@usda.gov](mailto:Delton.R.Alderman@usda.gov)

# Opening Remarks

July 2019 United States housing data indicated slight improvement; yet, most categories remain well less than historical averages. Single-family permits, starts, and completions were all positive month-over-month. Notably, single-family construction spending continued a year-over-year decline. Total housing permits and construction spending were positive. New single-family sales, total housing starts, and total plus single-family housing under construction were negative month-over-month. The September 13th Atlanta Fed GDPNow™ model estimate for September 2019 projects an aggregate 2.8% increase for residential investment spending. New private permanent site expenditures were projected at an 1.6% decrease; the improvement spending forecast was a 5.3% increase; and the manufactured/mobile housing projection was an 8.9% decrease (all: quarterly log change and seasonally adjusted annual rate).<sup>1</sup>

“After adjusting for inflation over time, the future of the American Dream seems rather gloomy: Median home prices increased 121% nationwide since 1960, but median household income only increased 29%. Home buyers aren’t the only ones struggling. Median gross rent increased by 72% since the 1960s, more than twice the growth seen by adjusted incomes, making renting costlier than ever and saving for a future home difficult.”<sup>2</sup> – Eylul Tekin, Summer Associate, Real Estate Research Department, Clever Real Estate

This month’s commentary contains applicable housing data. Section I contains data and commentary. Section II includes regional Federal Reserve analysis, private indicators, and demographic and economic analysis.

Sources: <sup>1</sup> [www.frbatlanta.org/cqer/research/gdpnow.aspx](http://www.frbatlanta.org/cqer/research/gdpnow.aspx); 9/13/19;

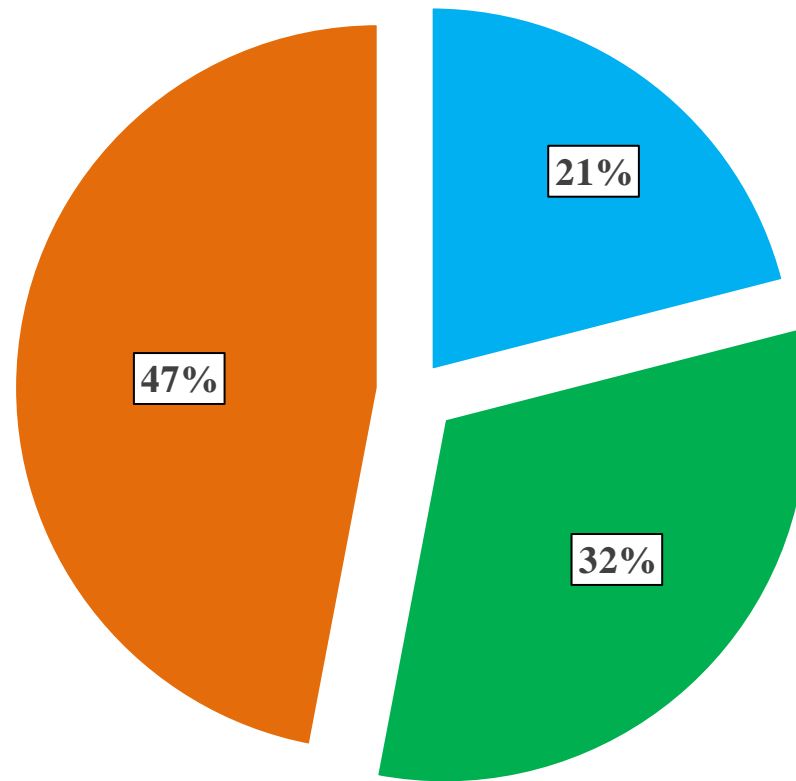
<sup>2</sup> <https://listwithclever.com/real-estate-blog/home-price-v-income-historical-study/>; 7/10/19

# July 2019 Housing Scorecard

		M/M		Y/Y
Housing Starts	▼	4.0%	▲	0.6%
Single-Family (SF) Starts	▲	1.3%	▲	1.9%
Housing Permits	▲	8.4%	▲	1.5%
SF Permits	▲	1.8%	▼	3.8%
Housing Under Construction	▼	0.5%	▲	1.2%
SF Under Construction	▼	0.6%	▼	1.3%
Housing Completions	▲	7.2%	▲	6.3%
SF Completions	▲	4.3%	▲	12.2%
New SF House Sales	▼	12.8%	▲	4.3%
Private Residential Construction Spending	▲	0.6%	▼	6.6%
SF Construction Spending	▲	1.4%	▼	8.5%
Existing House Sales <sup>1</sup>	▲	2.5%	▲	0.6%

M/M = month-over-month; Y/Y = year-over-year; NC = no change

# New Construction's Percentage of Wood Products Consumption

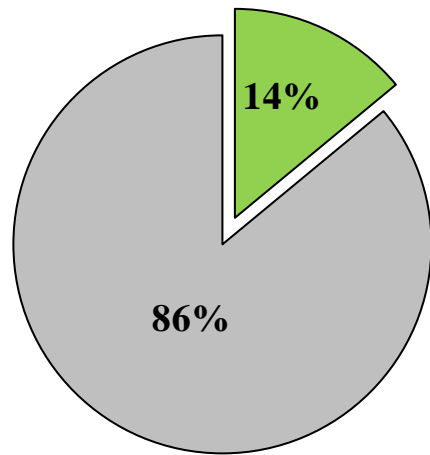


■ Non-structural panels

■ Total Sawnwood

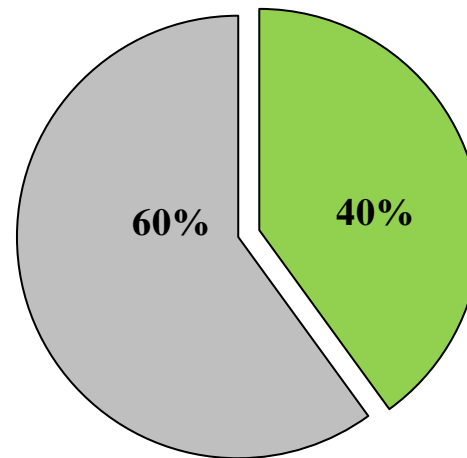
■ Structural panels

# New SF Construction Percentage of Wood Products Consumption



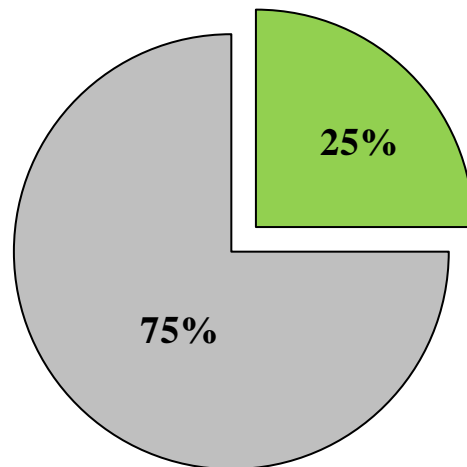
■ Non-structural panels:  
New Housing

■ Other markets



■ Structural panels:  
New housing

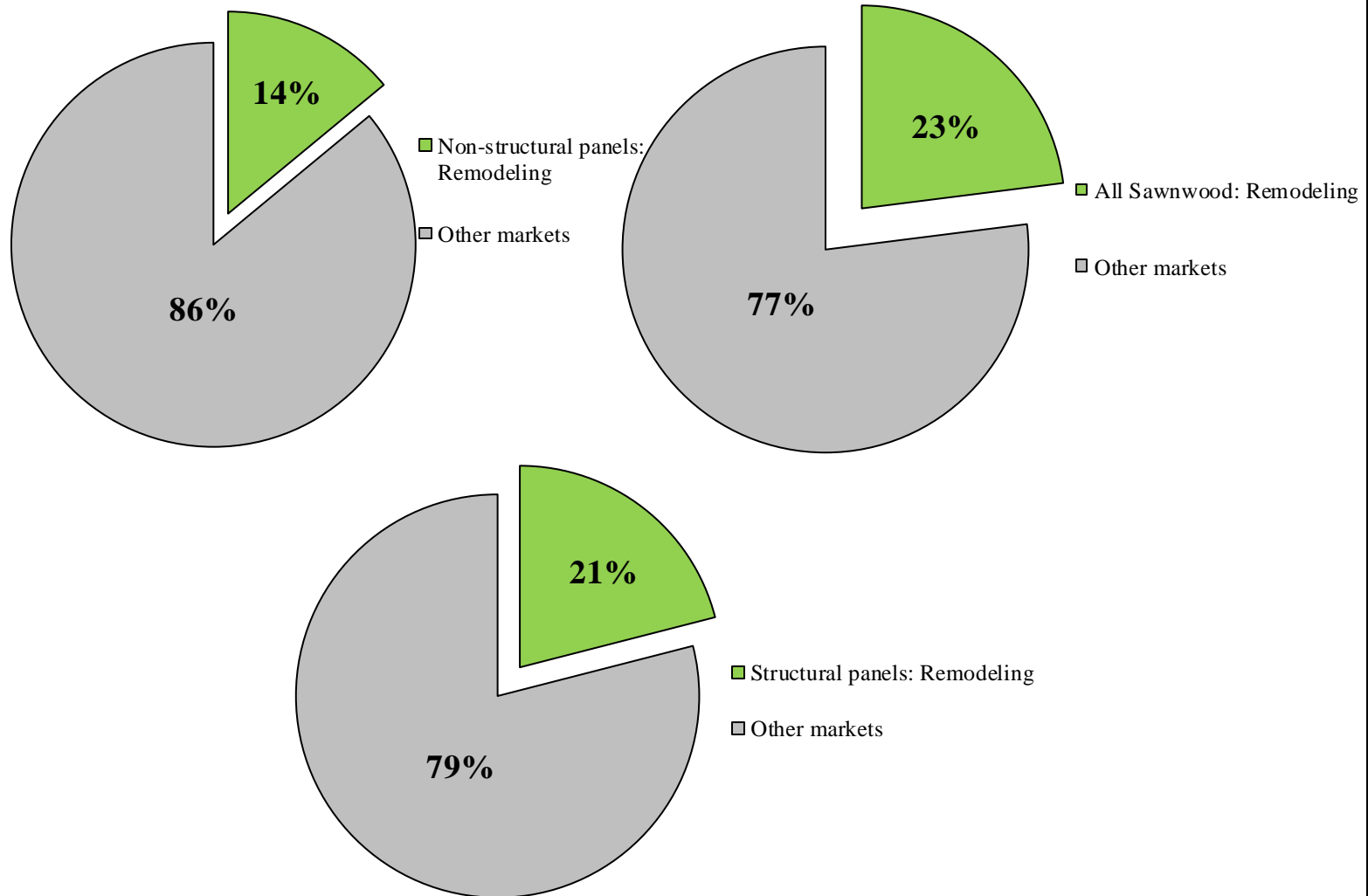
■ Other markets



■ All Sawnwood: New housing

■ Other markets

# Repair and Remodeling's Percentage of Wood Products Consumption



# New Housing Starts

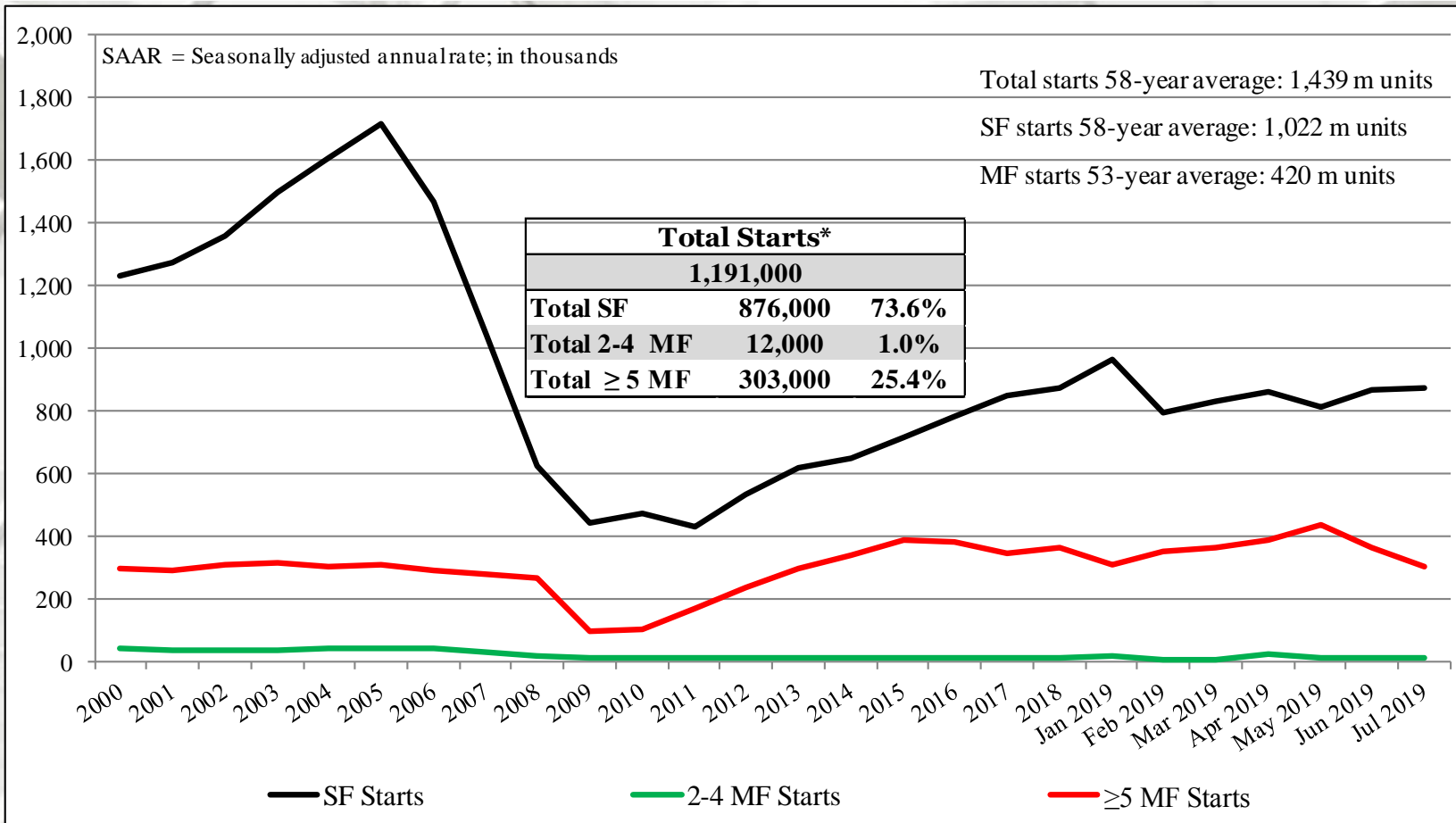
	Total Starts*	SF Starts	MF 2-4 Starts**	MF ≥5 Starts
July	1,191,000	876,000	12,000	303,000
June	1,241,000	865,000	10,000	366,000
2018	1,184,000	860,000	6,000	318,000
M/M change	-4.0	1.3	20.0	-17.2
Y/Y change	0.6	1.9	100.0	-4.7

\* All start data are presented at a seasonally adjusted annual rate (SAAR).

\*\* US DOC does not report 2 to 4 multifamily starts directly, this is an estimation ((Total starts – (SF + 5 unit MF)).



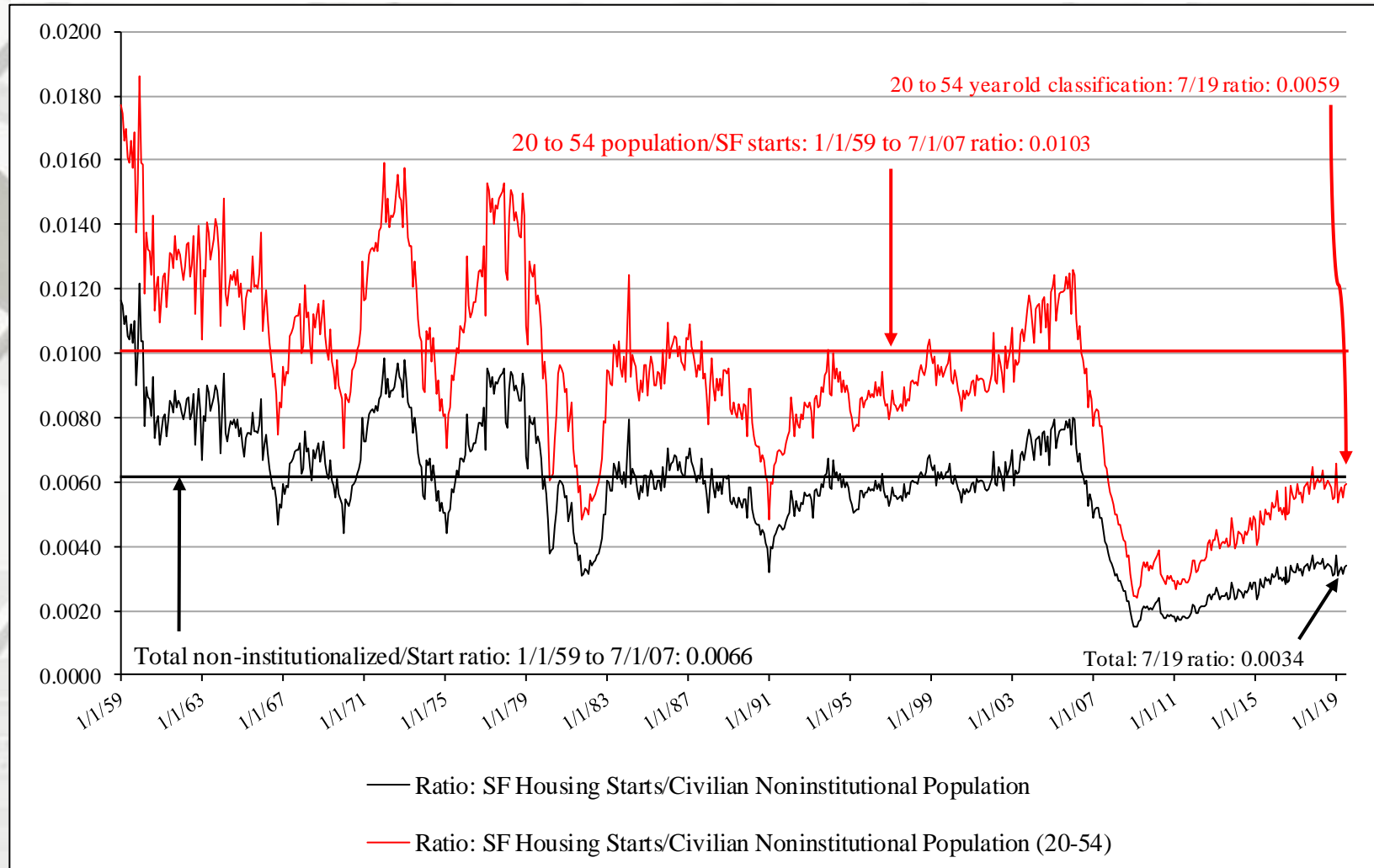
# Total Housing Starts



US DOC does not report 2 to 4 multifamily starts directly, this is an estimation: ((Total starts – (SF + ≥ MF)).

\* Percentage of total starts.

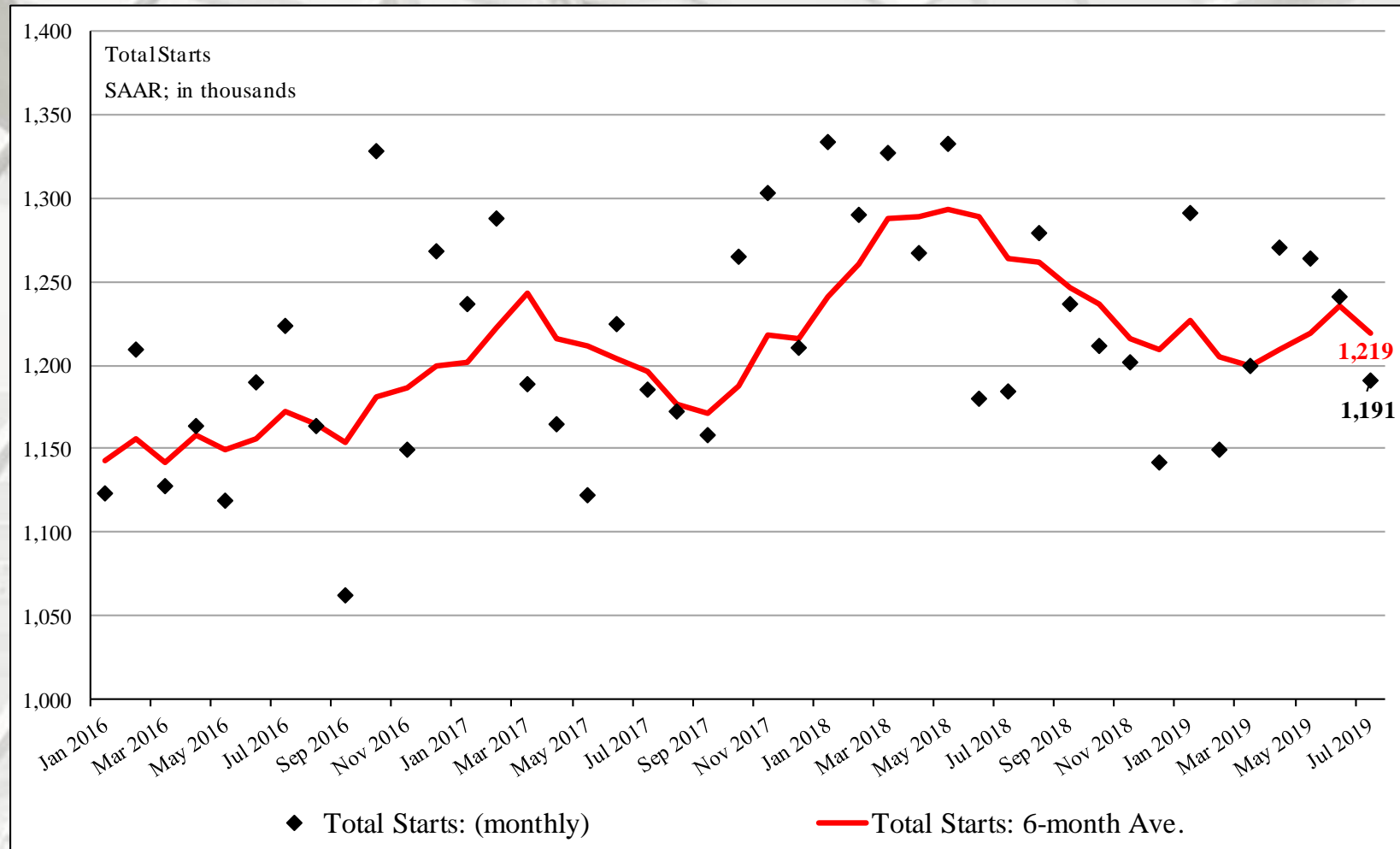
# New SF Starts



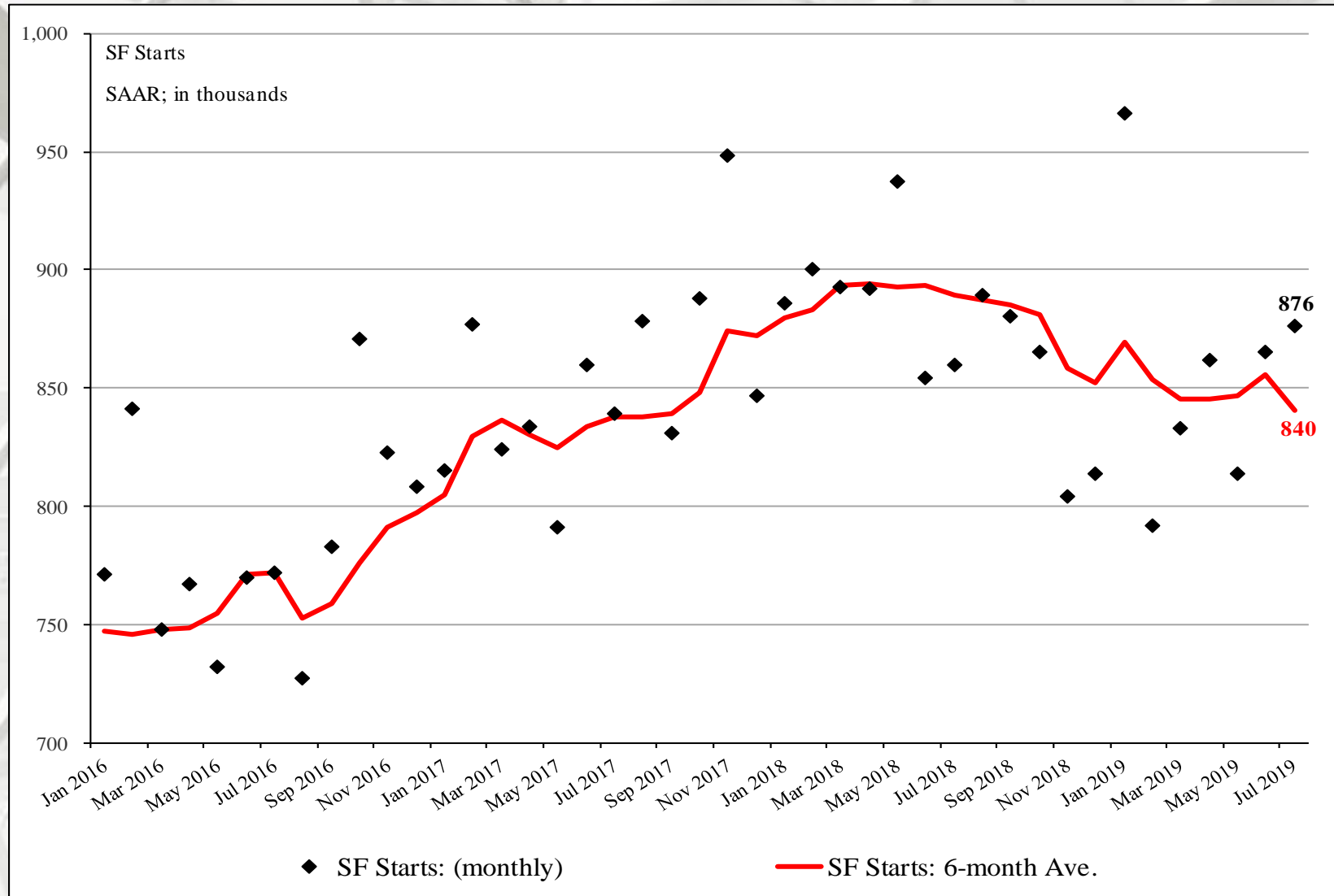
## New SF starts adjusted for the US population

From July 1959 to July 2007, the long-term ratio of new SF starts to the total US non-institutionalized population was 0.0066; in July 2019 it was 0.0034 – an increase from June (0.0033). The long-term ratio of non-institutionalized population, aged 20 to 54 is 0.0103; in July 2019 was 0.0059 – also an increase from May (0.0059). From a population worldview, new SF construction is less than what is necessary for changes in population (i.e., under-building).

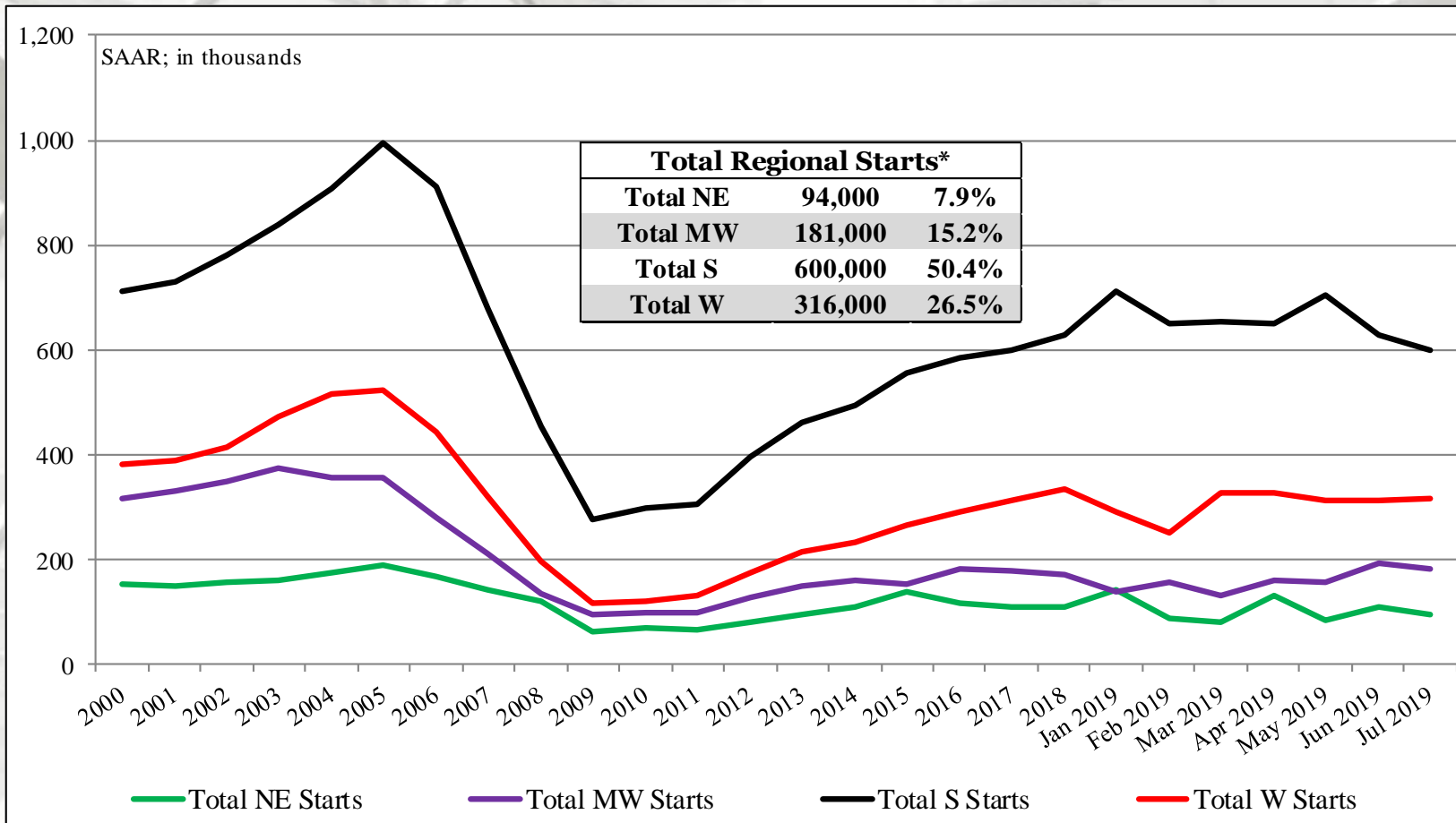
# Total Housing Starts: Six-Month Average



# SF Housing Starts: Six-Month Average



# New Housing Starts by Region



NE = Northeast, MW = Midwest, S = South, W = West

US DOC does not report 2 to 4 multi-family starts directly, this is an estimation (Total starts - (SF + ≥ 5 MF starts)).

\* Percentage of total starts.

# New Housing Starts by Region

	<b>NE Total</b>	<b>NE SF</b>	<b>NE MF**</b>
July	94,000	59,000	35,000
June	109,000	48,000	61,000
2018	103,000	66,000	37,000
M/M change	-13.8	22.9	-42.6
Y/Y change	-8.7	-10.6	-5.4
	<b>MW Total</b>	<b>MW SF</b>	<b>MW MF</b>
July	181,000	126,000	55,000
June	193,000	124,000	69,000
2018	178,000	135,000	43,000
M/M change	-6.2	1.6	-20.3
Y/Y change	1.7	-6.7	27.9

All data are SAAR; NE = Northeast and MW = Midwest.

\*\* US DOC does not report multifamily starts directly, this is an estimation (Total starts – SF starts).

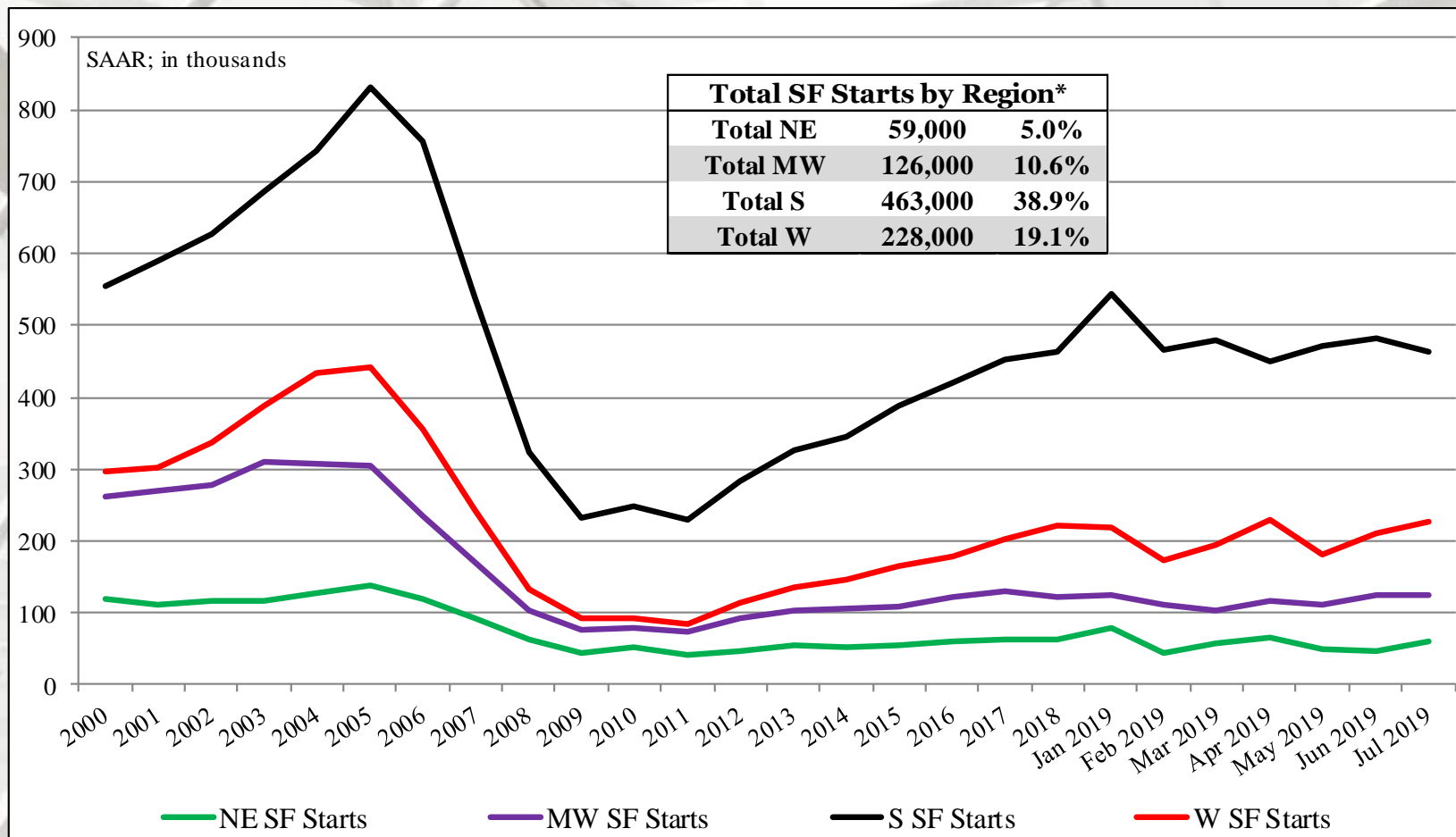
# New Housing Starts by Region

	<b>S Total</b>	<b>S SF</b>	<b>S MF**</b>
July	600,000	463,000	137,000
June	627,000	482,000	145,000
2017	625,000	457,000	168,000
M/M change	-4.3	-3.9	-5.5
Y/Y change	-4.0	1.3	-18.5
	<b>W Total</b>	<b>W SF</b>	<b>W MF</b>
July	316,000	228,000	88,000
June	312,000	211,000	101,000
2018	278,000	202,000	76,000
M/M change	1.3	8.1	-12.9
Y/Y change	13.7	12.9	15.8

All data are SAAR; S = South and W = West.

\*\* US DOC does not report multifamily starts directly, this is an estimation (Total starts – SF starts).

# Total SF Housing Starts by Region



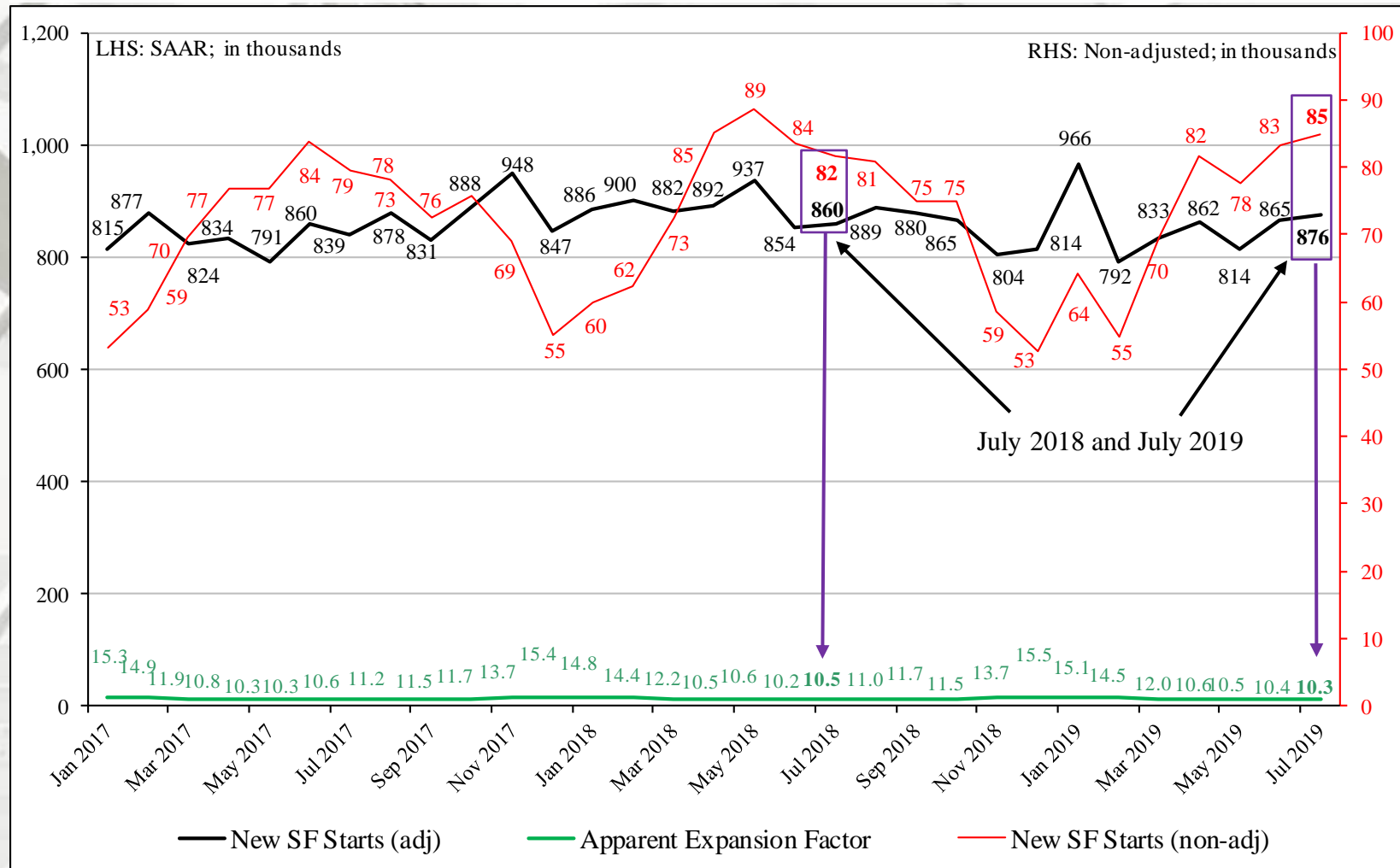
NE = Northeast, MW = Midwest, S = South, W = West

US DOC does not report 2 to 4 multi-family starts directly, this is an estimation (Total starts - (SF + ≥ 5 MF starts)).

\* Percentage of total starts.



# Nominal & SAAR SF Starts

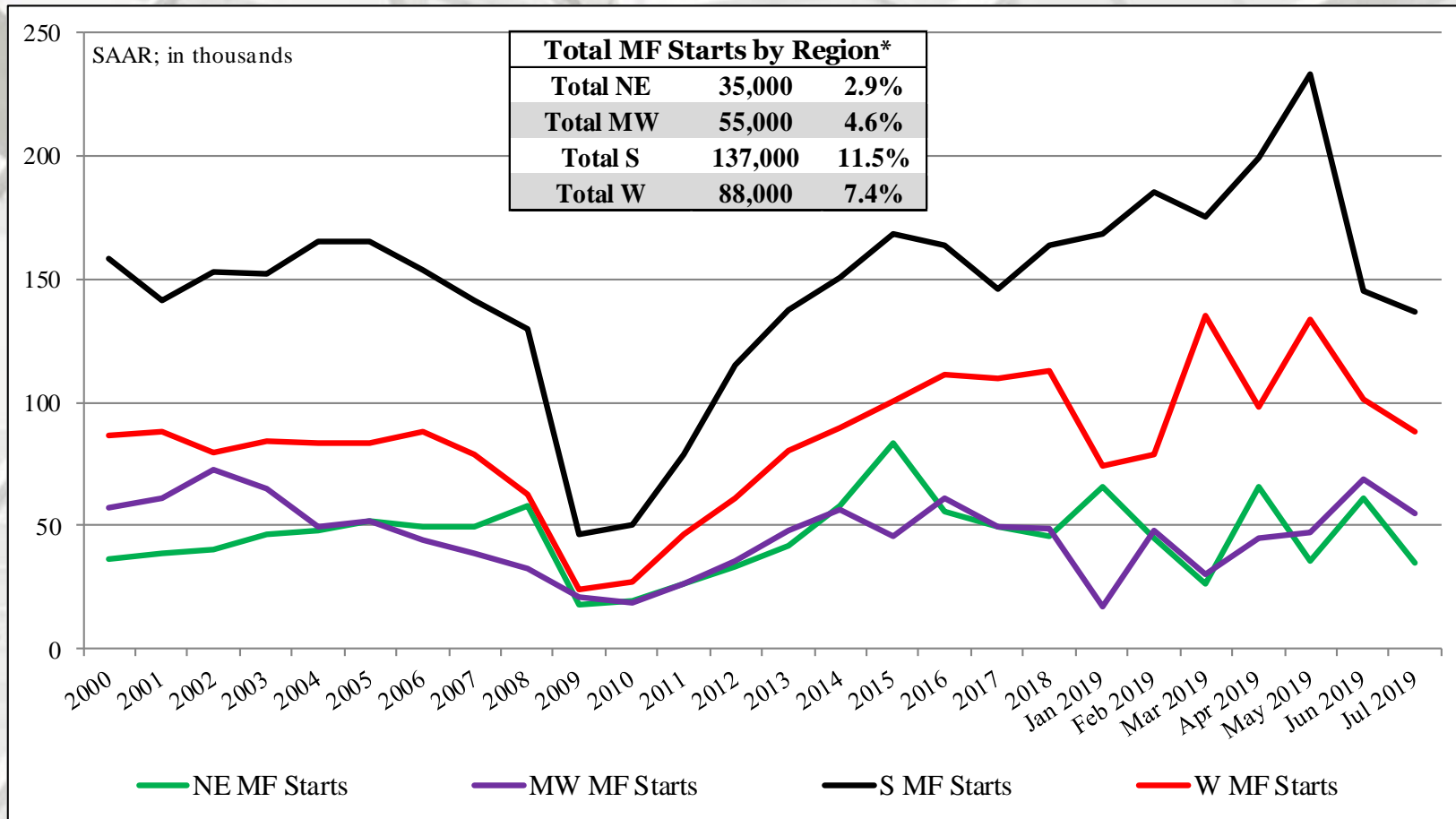


## Nominal and Adjusted New SF Monthly Starts

Presented above is nominal (non-adjusted) new SF start data contrasted against SAAR data.

The apparent expansion factor "... is the ratio of the unadjusted number of houses started in the US to the seasonally adjusted number of houses started in the US (i.e., to the sum of the seasonally adjusted values for the four regions)." – U.S. DOC-Construction

# MF Housing Starts by Region

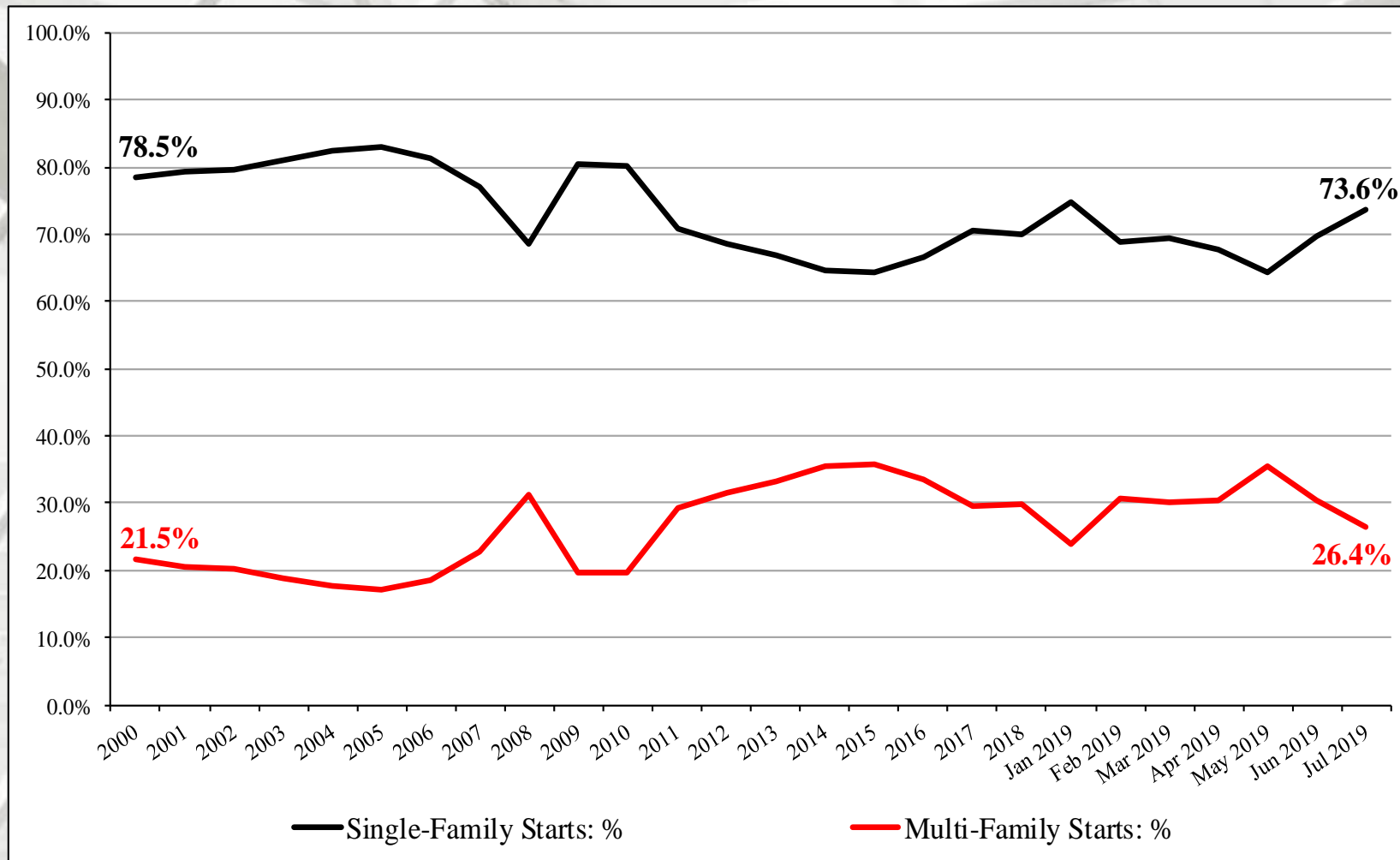


NE = Northeast, MW = Midwest, S = South, W = West

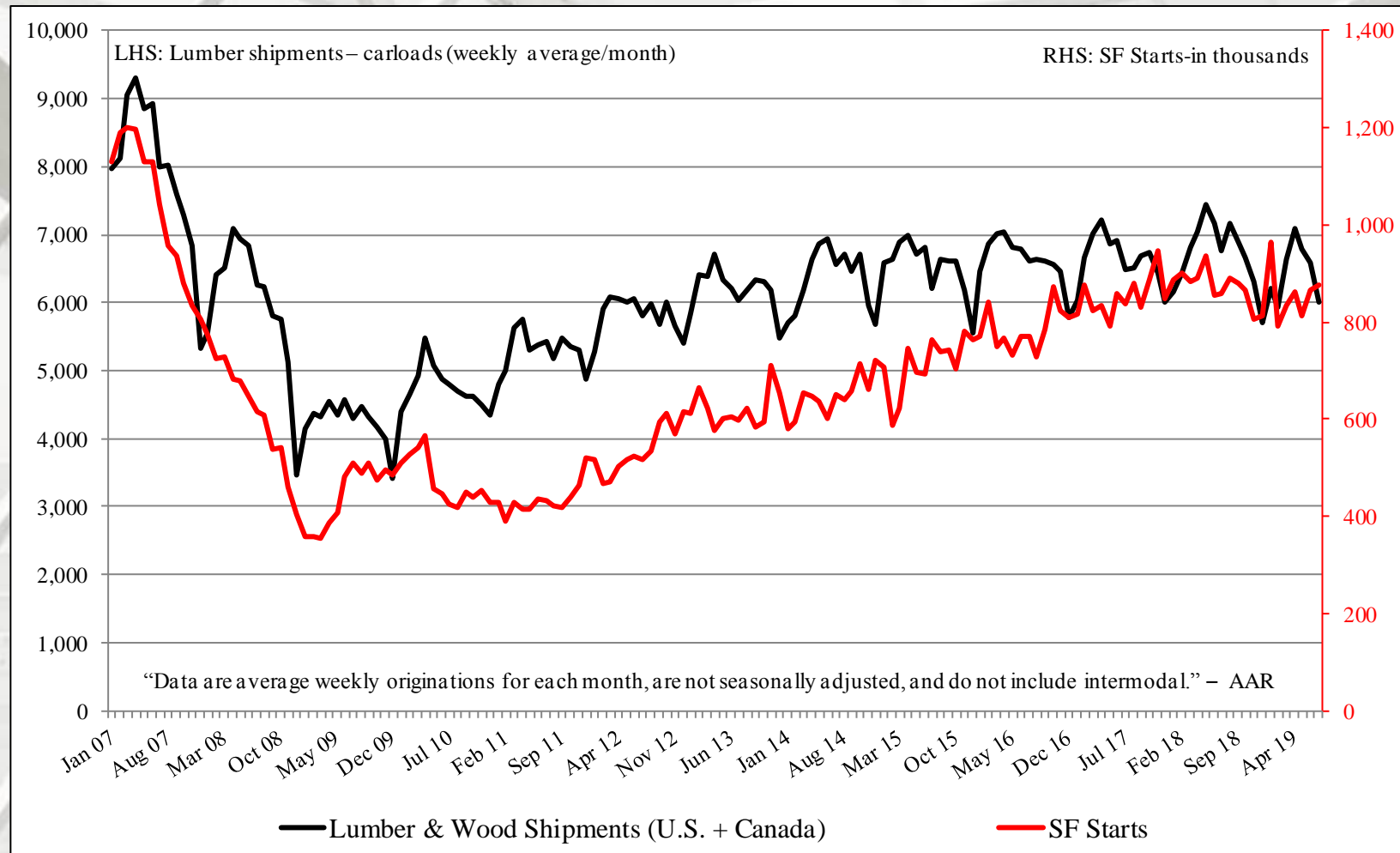
US DOC does not report 2 to 4 multi-family starts directly, this is an estimation (Total starts - (SF + ≥ 5 MF starts)).

\* Percentage of total starts.

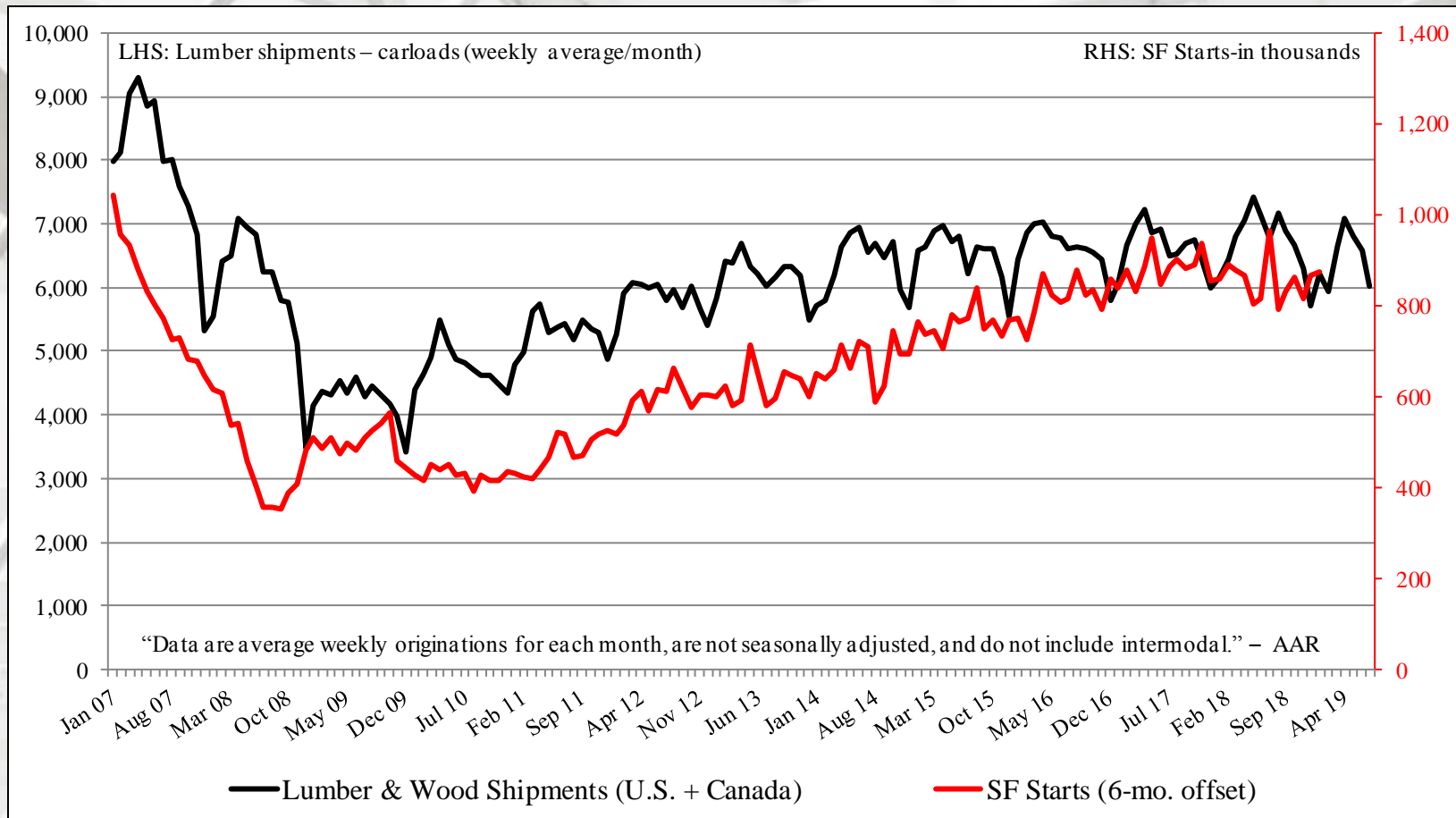
# SF vs. MF Housing Starts (%)



# Railroad Lumber & Wood Shipments vs. U.S. SF Housing Starts



# Railroad Lumber & Wood Shipments vs. U.S. SF Housing Starts: 6-month Offset



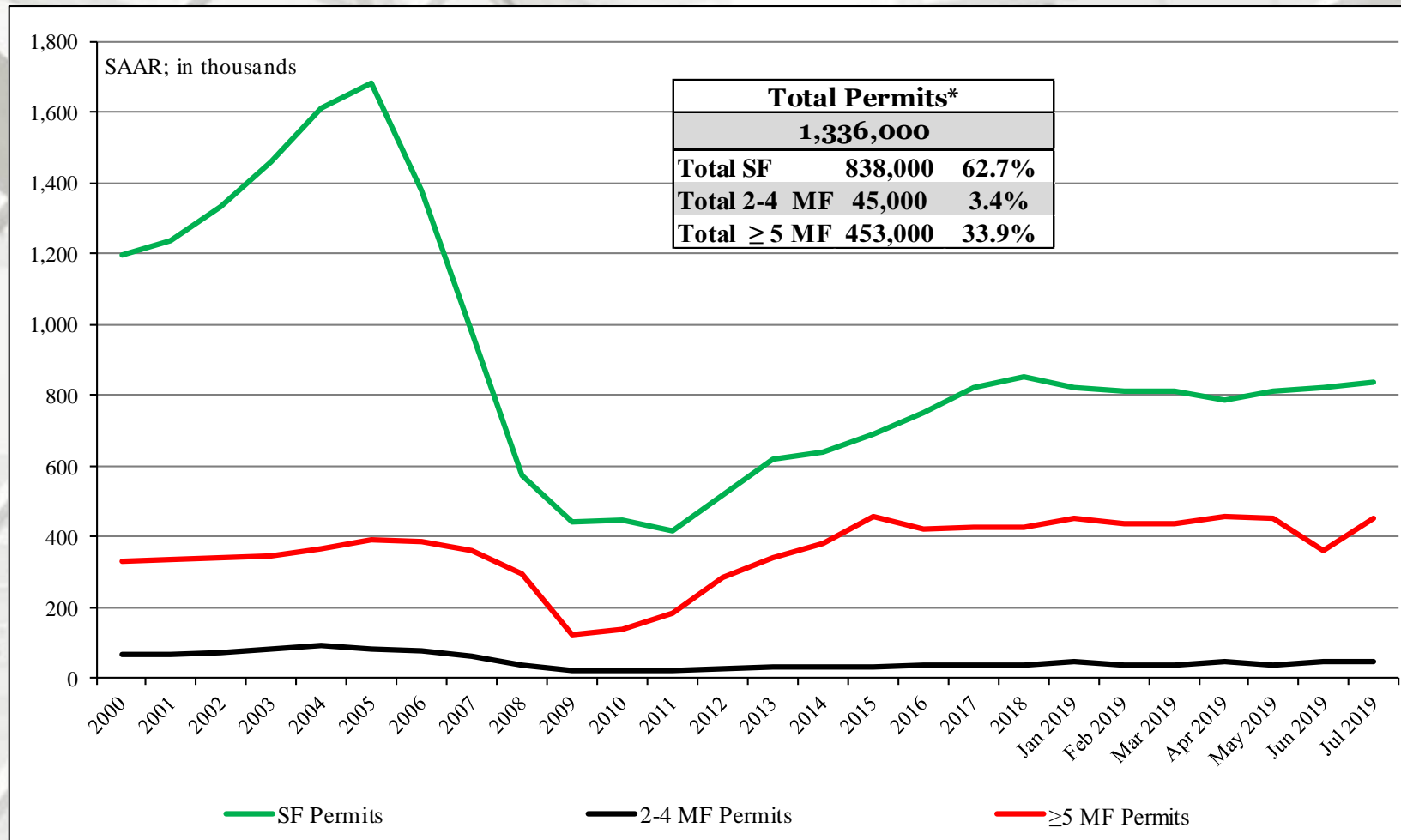
In this graph, July 2007 lumber shipments are contrasted with July 2007 SF starts, and continuing through July 2019 SF starts. The purpose is to discover if lumber shipments relate to future single-family starts. Also, it is realized that lumber and wood products are trucked; however, to our knowledge comprehensive trucking data is not available.

# New Housing Permits

	Total Permits*	SF Permits	MF 2-4 unit Permits	MF ≥ 5 unit Permits
July	1,336,000	838,000	45,000	453,000
June	1,232,000	823,000	46,000	363,000
2018	1,316,000	871,000	30,000	415,000
M/M change	8.4	1.8	-2.2	24.8
Y/Y change	1.5	-3.8	50.0	9.2

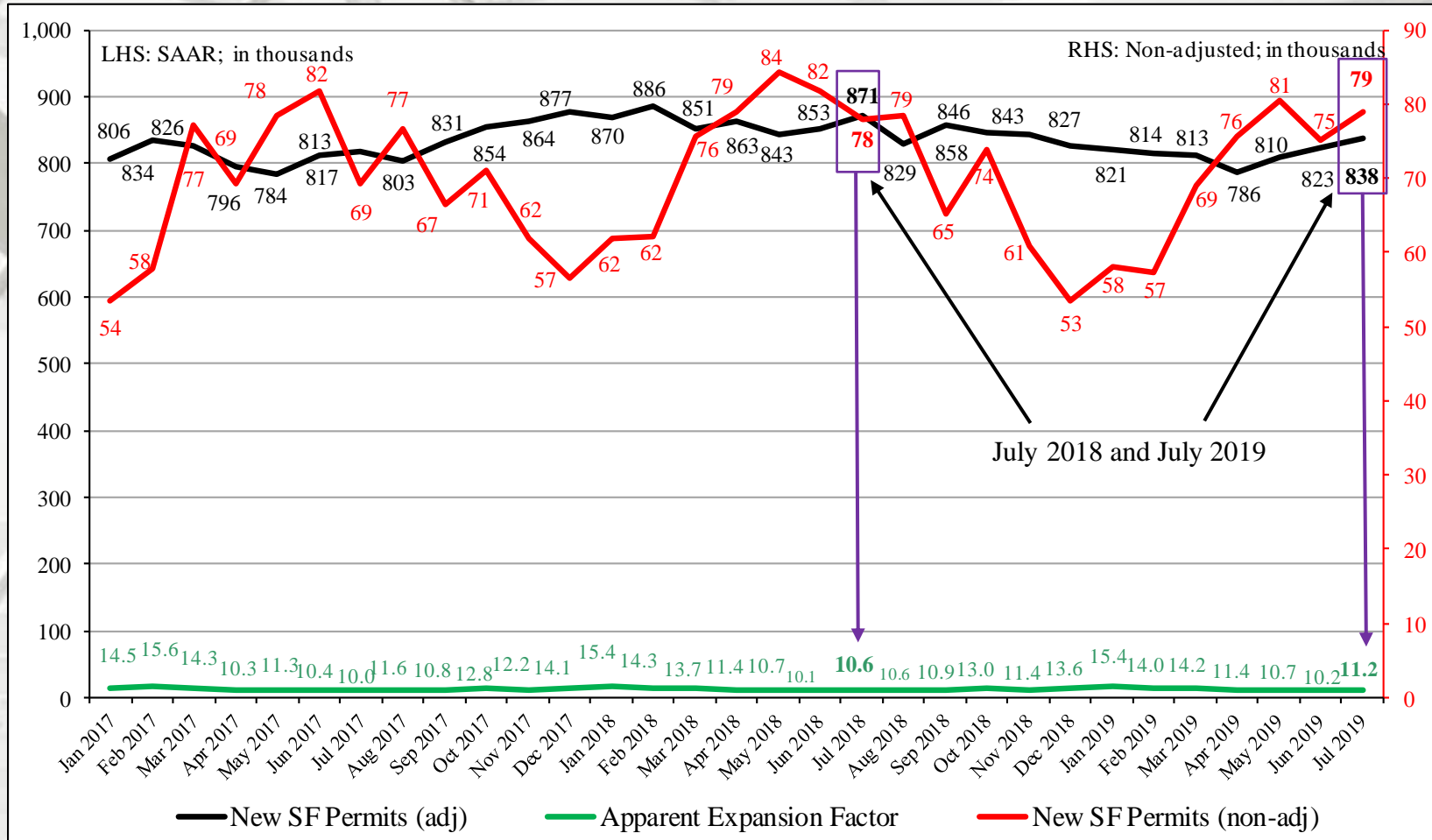
\* All permit data are presented at a seasonally adjusted annual rate (SAAR).

# Total New Housing Permits



\* Percentage of total permits.

# Nominal & SAAR SF Permits



## Nominal and Adjusted New SF Monthly Permits

Presented above is nominal (non-adjusted) new SF start data contrasted against SAAR data.

The apparent expansion factor "...is the ratio of the unadjusted number of houses started in the US to the seasonally adjusted number of houses started in the US (i.e., to the sum of the seasonally adjusted values for the four regions)." – U.S. DOC-Construction



# New Housing Permits by Region

	<b>NE Total*</b>	<b>NE SF</b>	<b>NE MF**</b>
July	117,000	53,000	64,000
June	121,000	52,000	69,000
2018	130,000	54,000	76,000
M/M change	-3.3	1.9	-7.2
Y/Y change	-10.0	-1.9	-15.8
	<b>MW Total*</b>	<b>MW SF</b>	<b>MW MF**</b>
July	169,000	109,000	60,000
June	171,000	117,000	54,000
2018	181,000	116,000	65,000
M/M change	-1.2	-6.8	11.1
Y/Y change	-6.6	-6.0	-7.7

NE = Northeast; ME = Midwest

\* All data are SAAR

\*\* US DOC does not report multifamily permits directly, this is an estimation (Total permits – SF permits).

# New Housing Permits by Region

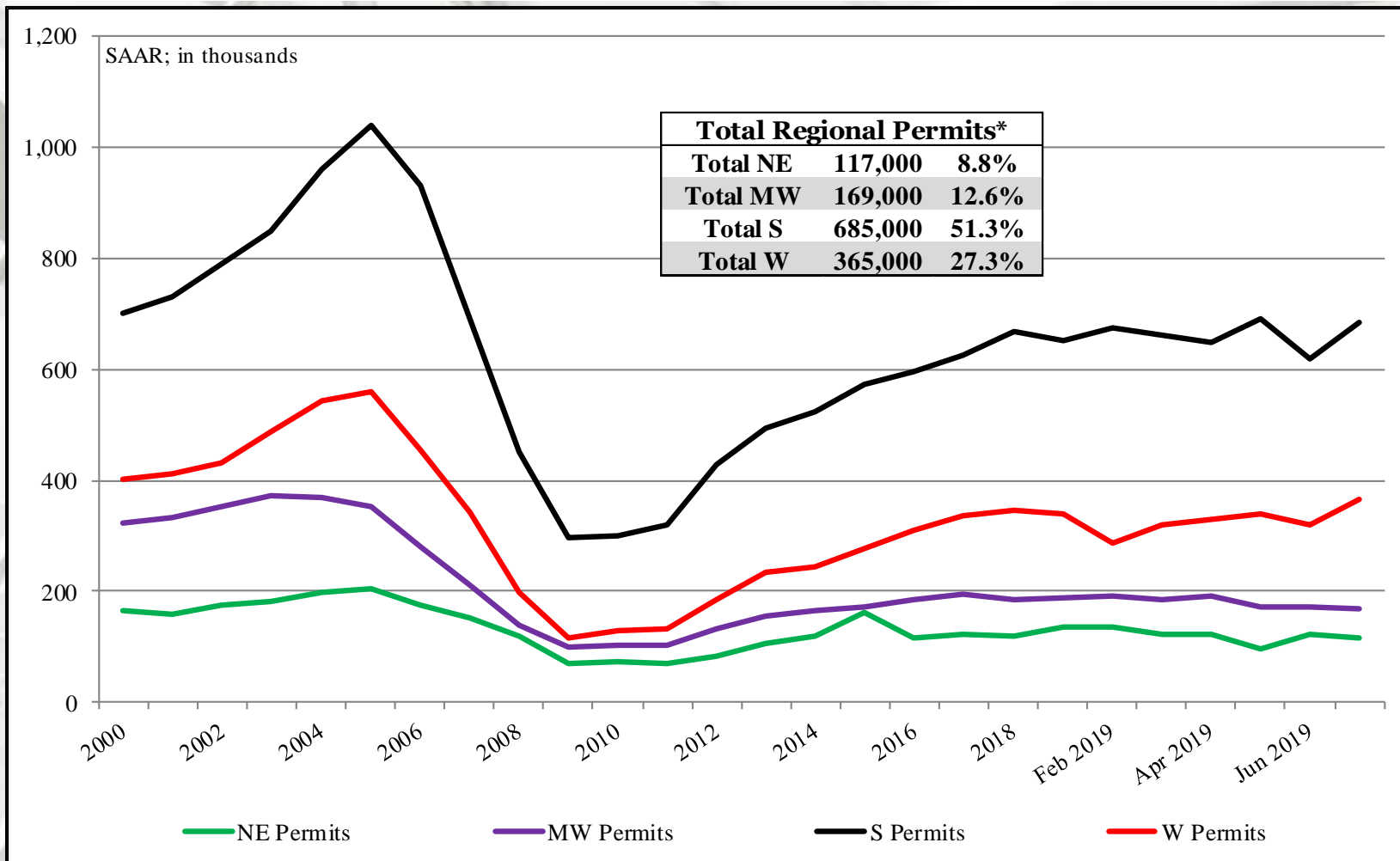
	<b>S Total*</b>	<b>S SF</b>	<b>S MF**</b>
July	685,000	463,000	222,000
June	619,000	455,000	164,000
2018	681,000	490,000	191,000
M/M change	10.7	1.8	35.4
Y/Y change	0.6	-5.5	16.2
	<b>W Total*</b>	<b>W SF</b>	<b>W MF**</b>
July	365,000	213,000	152,000
June	321,000	199,000	122,000
2018	324,000	211,000	113,000
M/M change	13.7	7.0	24.6
Y/Y change	12.7	0.9	34.5

S = South; W = West

\* All data are SAAR

\*\* US DOC does not report multifamily permits directly, this is an estimation (Total permits – SF permits).

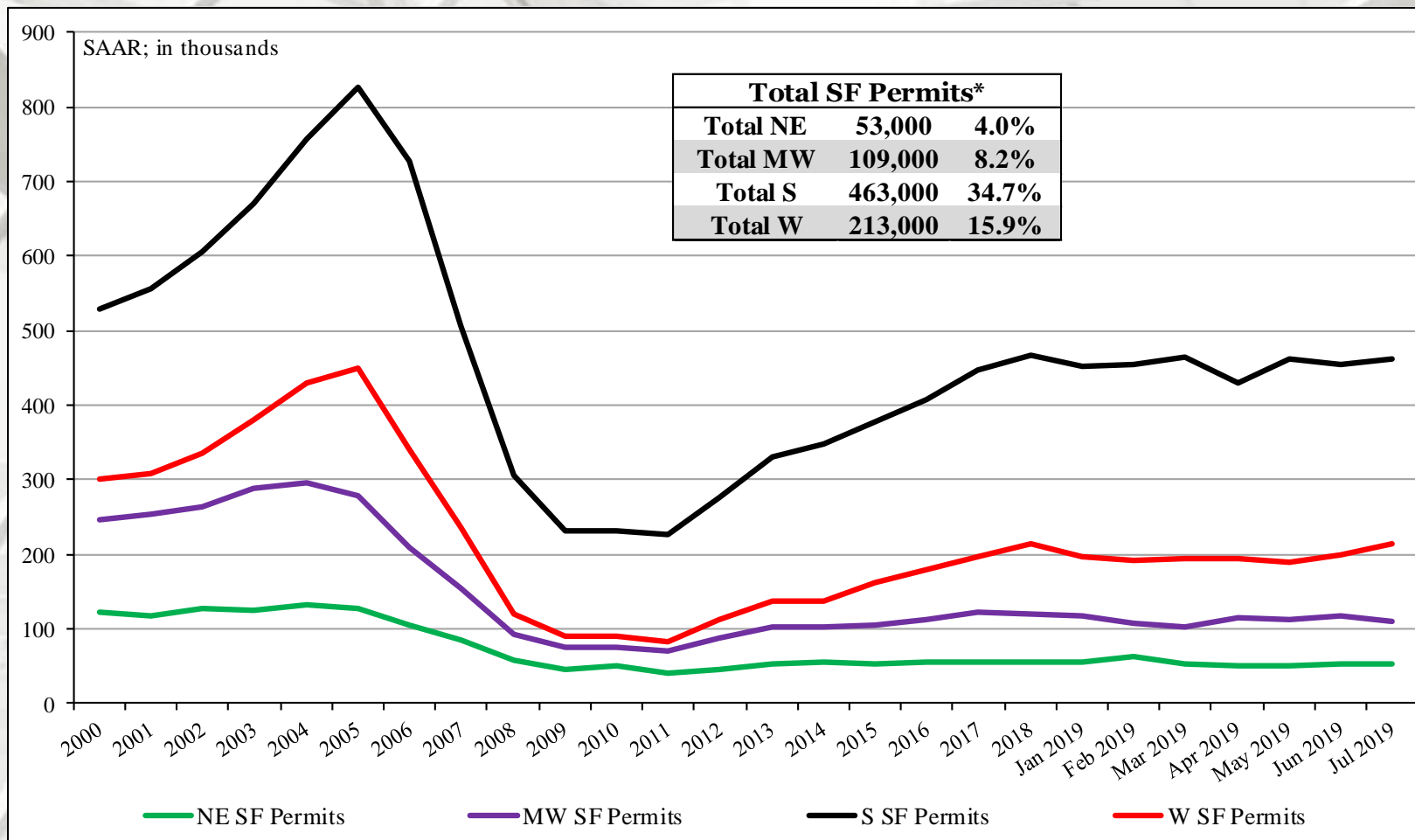
# Total Housing Permits by Region



NE = Northeast, MW = Midwest, S = South, W = West

\* Percentage of total permits.

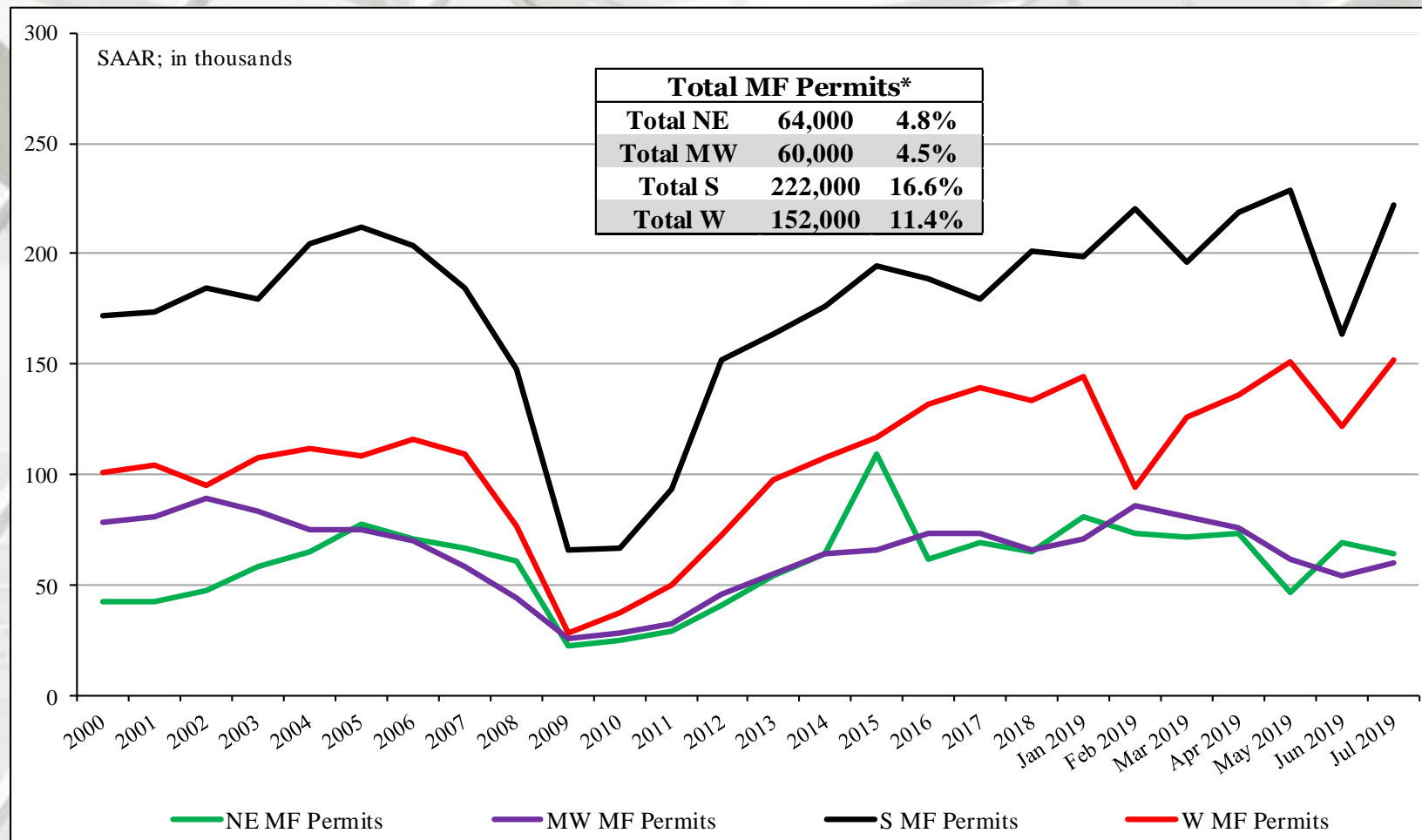
# SF Housing Permits by Region



NE = Northeast, MW = Midwest, S = South, W = West

\* Percentage of total permits.

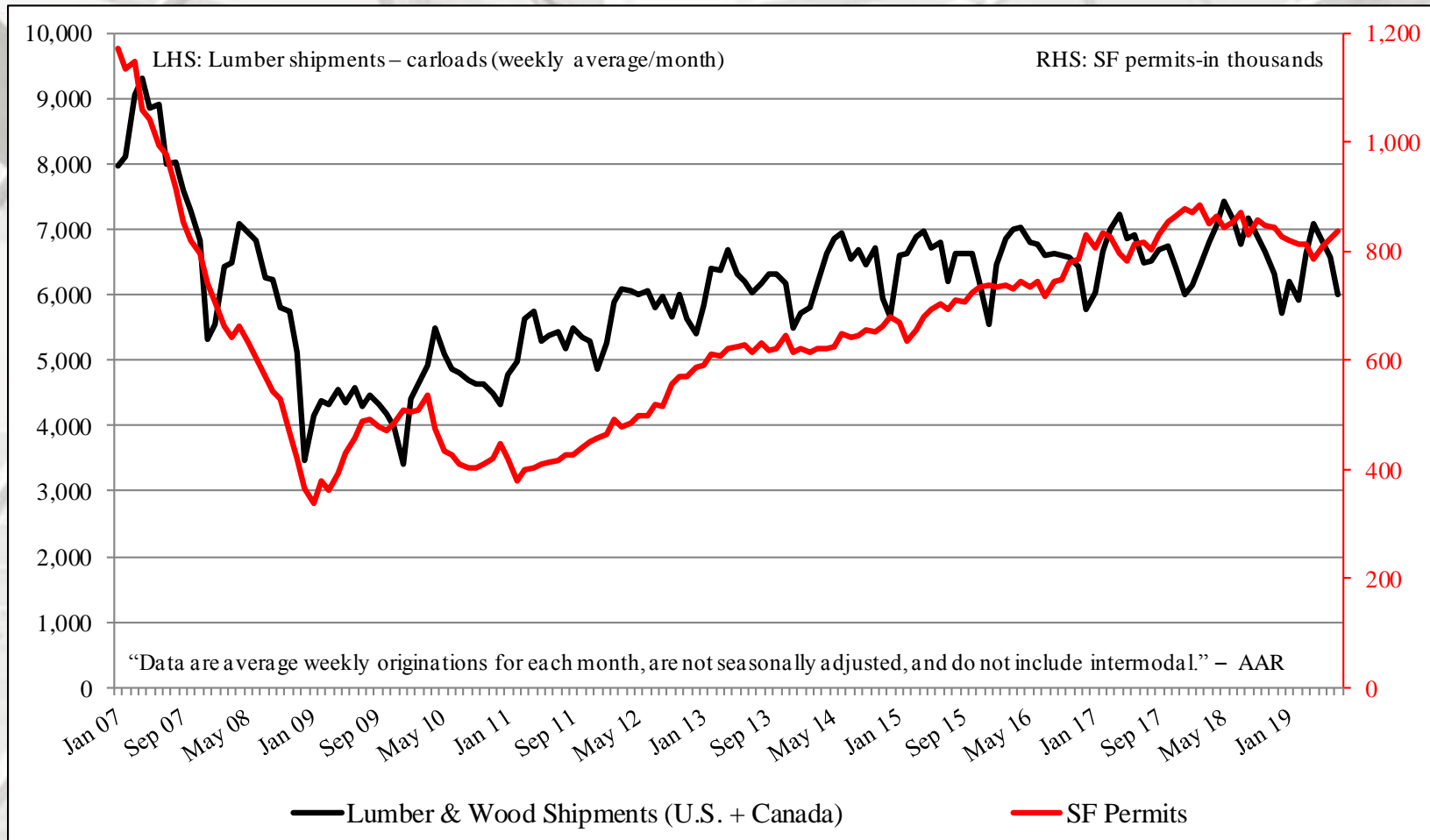
# MF Housing Permits by Region



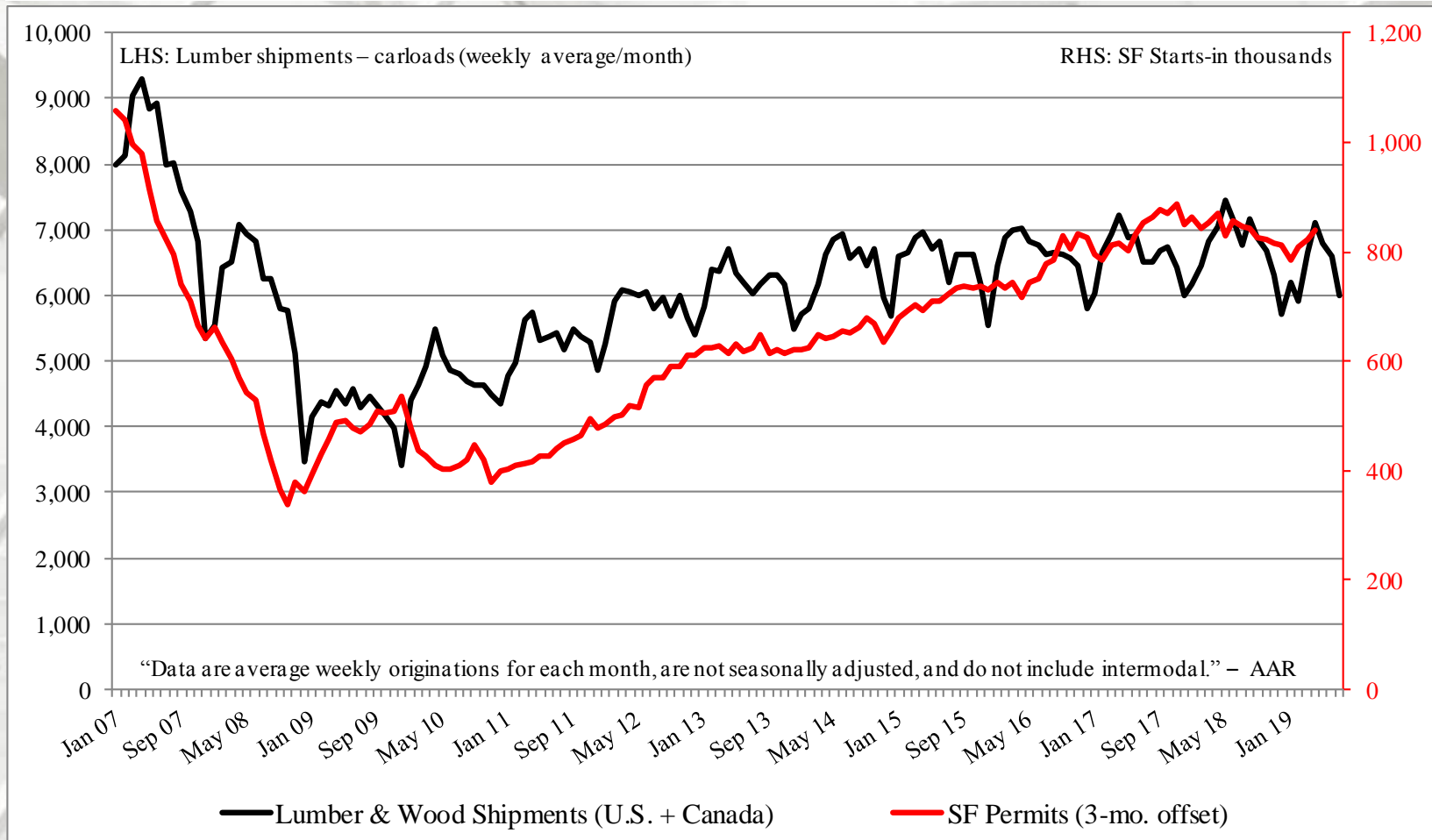
NE = Northeast, MW = Midwest, S = South, W = West

\* Percentage of total permits.

# Railroad Lumber & Wood Shipments vs. U.S. SF Housing Permits



# Railroad Lumber & Wood Shipments vs. U.S. SF Housing Permits: 3-month Offset



In this graph, July 2007 lumber shipments are contrasted with July 2007 SF permits, continuing through July 2019. The purpose is to discover if lumber shipments relate to future single-family permits. Also, it is realized that lumber and wood products are trucked; however, to our knowledge comprehensive trucking data is not available.

# New Housing Under Construction (HUC)

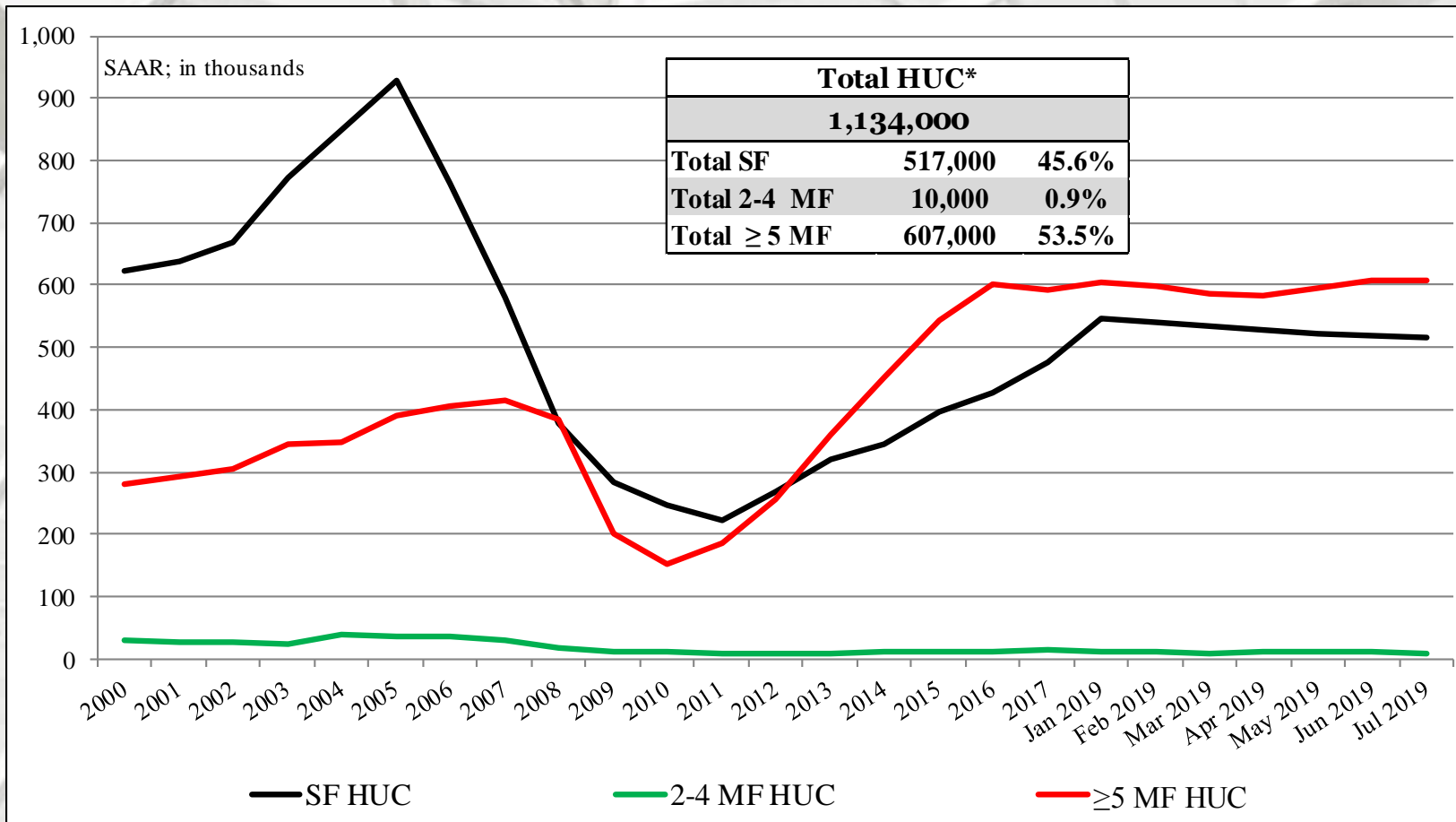
	Total Under Construction*	SF Under Construction	MF 2-4 unit** Under Construction	MF ≥ 5 unit Under Construction
July	1,134,000	517,000	10,000	607,000
June	1,140,000	520,000	11,000	609,000
2018	1,121,000	524,000	12,000	585,000
M/M change	-0.5	-0.6	-9.1	-0.3
Y/Y change	1.2	-1.3	-16.7	3.8

All housing under construction data are presented at a seasonally adjusted annual rate (SAAR).

\*\* US DOC does not report 2-4 multifamily units under construction directly, this is an estimation ((Total under construction – (SF + 5 unit MF)).



# Total Housing Under Construction



US DOC does not report 2 to 4 multi-family under construction directly, this is an estimation (Total under constructions – (SF + ≥ 5 MF under construction)).

\* Percentage of total housing under construction units.

# New Housing Under Construction by Region

	<b>NE Total</b>	<b>NE SF</b>	<b>NE MF**</b>
July	181,000	60,000	121,000
June	183,000	61,000	122,000
2018	188,000	59,000	129,000
M/M change	-1.1	-1.6	-0.8
Y/Y change	-3.7	1.7	-6.2
	<b>MW Total</b>	<b>MW SF</b>	<b>MW MF</b>
July	140,000	74,000	66,000
June	144,000	75,000	69,000
2018	154,000	83,000	71,000
M/M change	-2.8	-1.3	-4.3
Y/Y change	-9.1	-10.8	-7.0

All data are SAAR; NE = Northeast and MW = Midwest.

\*\* US DOC does not report multifamily units under construction directly, this is an estimation  
(Total under construction – SF under construction).

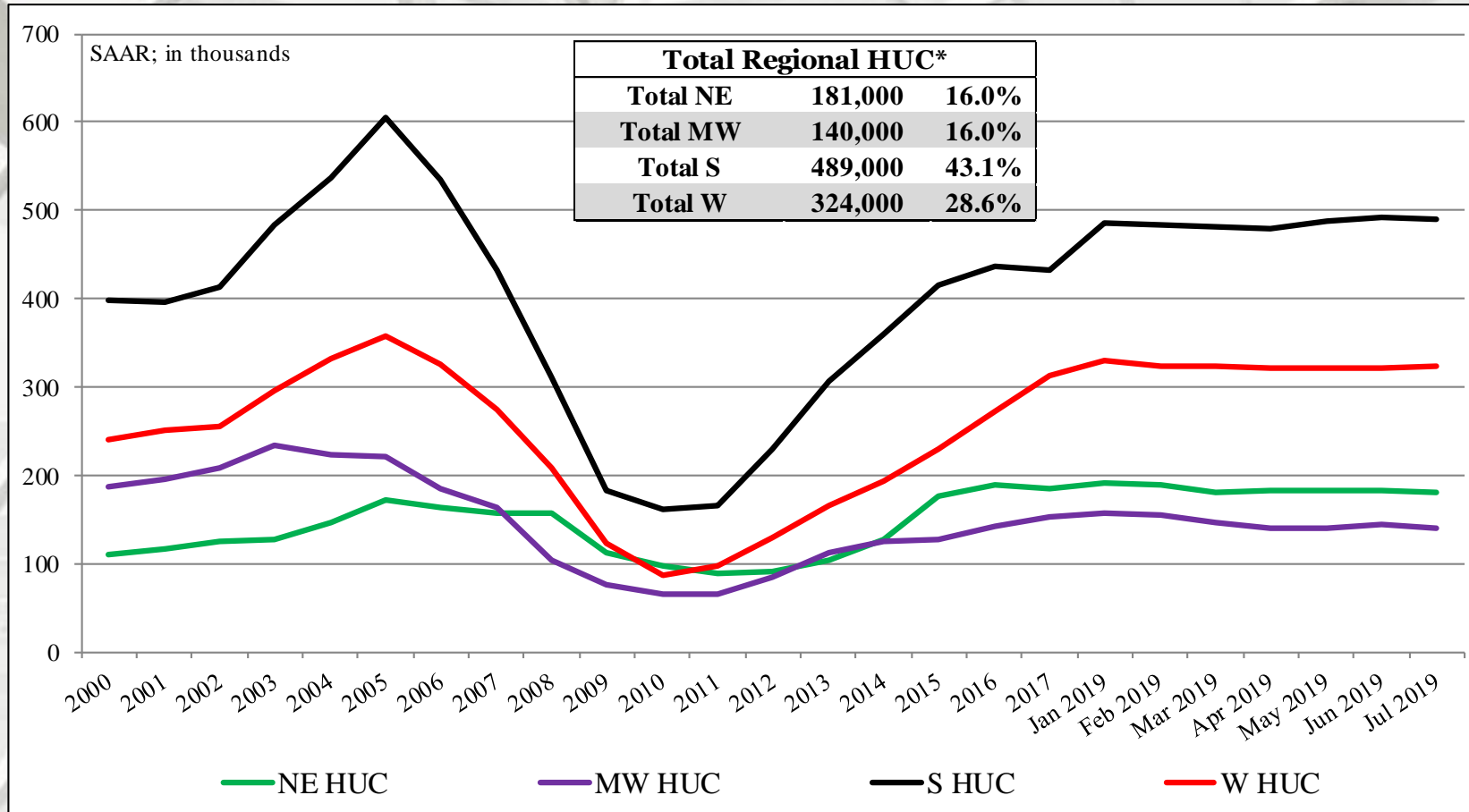
# New Housing Under Construction by Region

	<b>S Total</b>	<b>S SF</b>	<b>S MF**</b>
July	489,000	248,000	241,000
June	491,000	251,000	240,000
2018	451,000	243,000	208,000
M/M change	-0.4	-1.2	0.4
Y/Y change	8.4	2.1	15.9
	<b>W Total</b>	<b>W SF</b>	<b>W MF</b>
July	324,000	135,000	189,000
June	322,000	133,000	189,000
2018	328,000	139,000	189,000
M/M change	0.6	1.5	0.0
Y/Y change	-1.2	-2.9	0.0

All data are SAAR; S = South and W = West.

\*\* US DOC does not report multifamily units under construction directly, this is an estimation  
(Total under construction – SF under construction).

# Total Housing Under Construction by Region

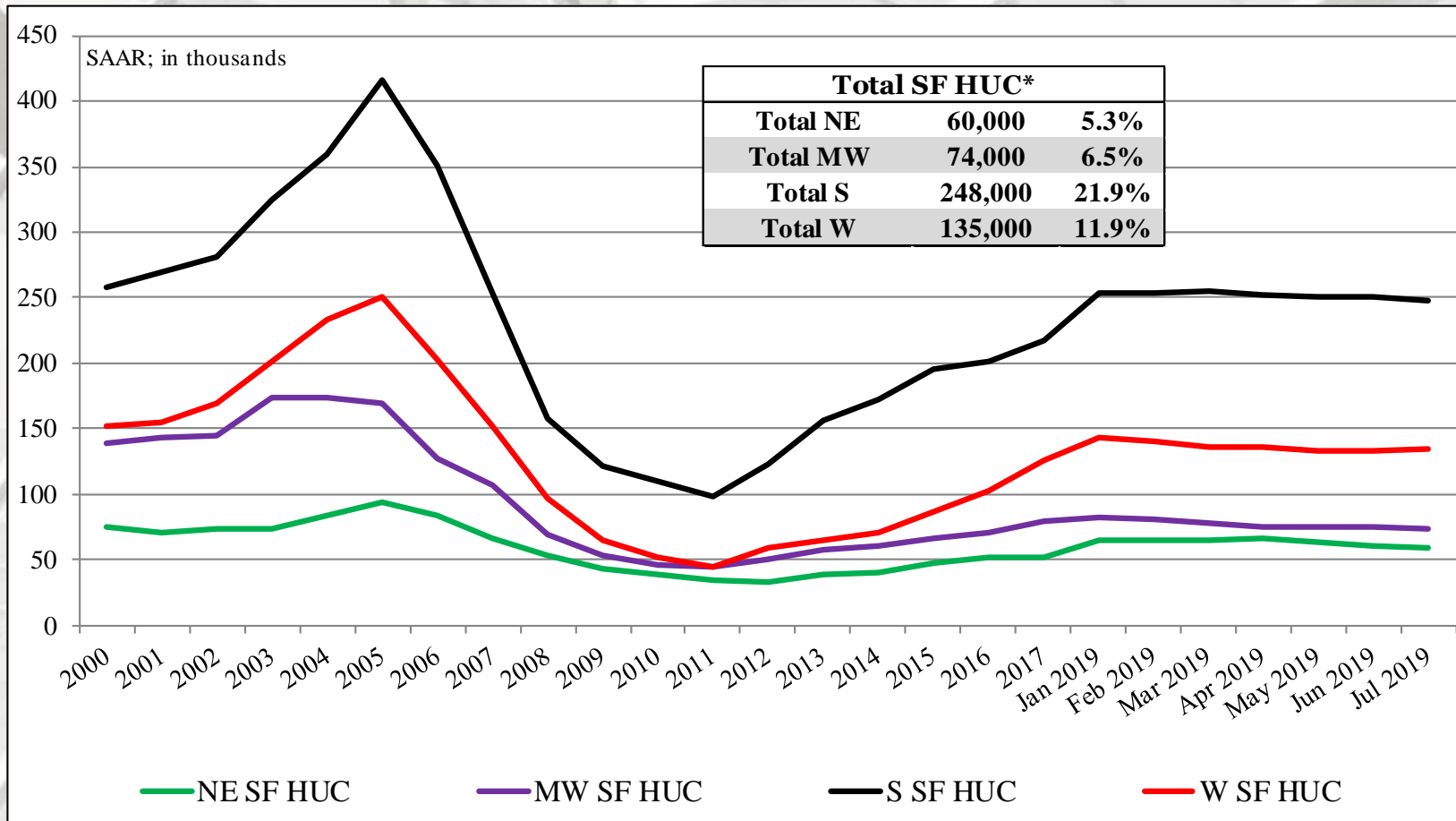


NE = Northeast, MW = Midwest, S = South, W = West

US DOC does not report 2 to 4 multi-family under construction directly, this is an estimation (Total under constructions – (SF + ≥ 5 MF under construction)).

\* Percentage of total housing under construction units.

# SF Housing Under Construction by Region

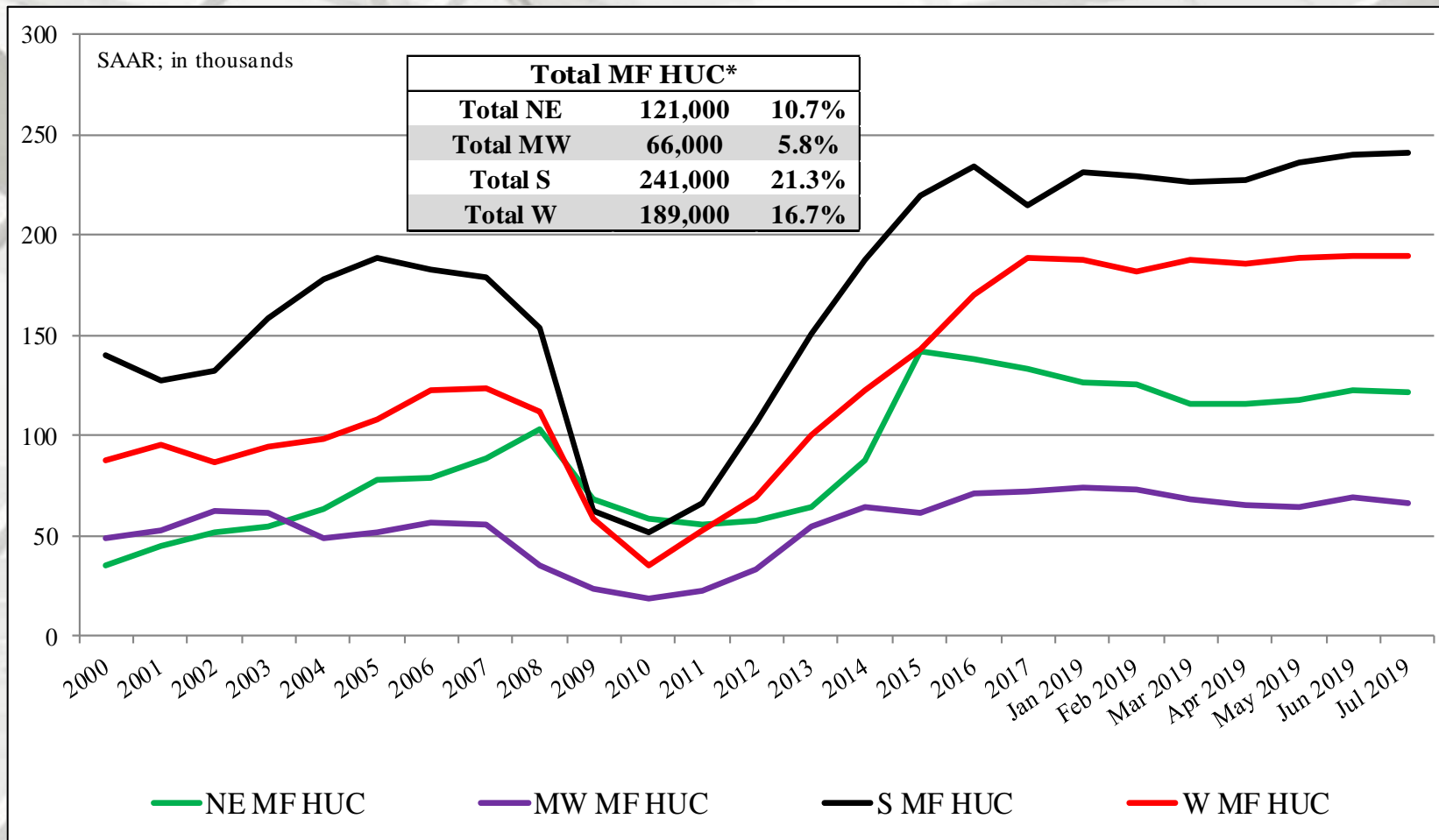


NE = Northeast, MW = Midwest, S = South, W = West.

US DOC does not report 2 to 4 multi-family under construction directly, this is an estimation (Total under constructions – (SF + ≥ 5 MF under construction)).

\* Percentage of total housing under construction units.

# MF Housing Under Construction by Region



NE = Northeast, MW = Midwest, S = South, W = West

US DOC does not report 2 to 4 multi-family under construction directly, this is an estimation (Total under constructions – (SF + ≥ 5 MF under construction)).

\* Percentage of total housing under construction units.

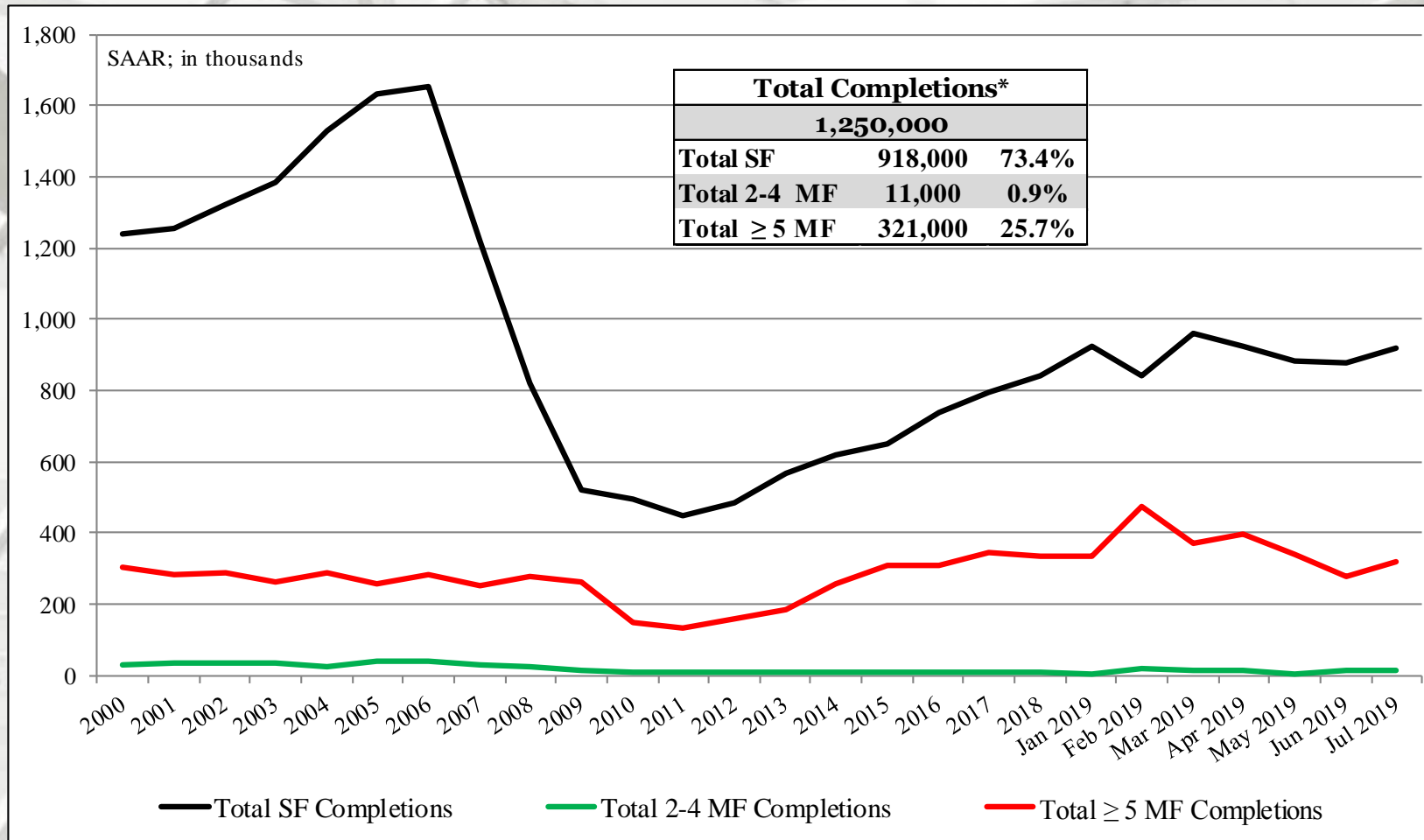
# New Housing Completions

	Total Completions*	SF Completions	MF 2-4 unit**	MF ≥ 5 unit Completions
July	1,250,000	918,000	11,000	321,000
June	1,166,000	880,000	11,000	275,000
2018	1,176,000	818,000	5,000	353,000
M/M change	7.2%	4.3%	0.0%	16.7%
Y/Y change	6.3%	12.2%	120.0%	-9.1%

\* All completion data are presented at a seasonally adjusted annual rate (SAAR).

\*\* US DOC does not report multifamily completions directly, this is an estimation ((Total completions – (SF + ≥ 5 unit MF)).

# Total Housing Completions



\*\* US DOC does not report multifamily completions directly, this is an estimation ((Total completions – (SF + ≥ 5 unit MF)).

\* Percentage of total housing completions



# New Housing Completions by Region

	<b>NE Total</b>	<b>NE SF</b>	<b>NE MF**</b>
July	103,000	71,000	32,000
June	115,000	72,000	43,000
2018	105,000	47,000	58,000
M/M change	-10.4%	-1.4%	-25.6%
Y/Y change	-1.9%	51.1%	-44.8%
	<b>MW Total</b>	<b>MW SF</b>	<b>MW MF</b>
July	190,000	130,000	60,000
June	146,000	130,000	16,000
2018	180,000	128,000	52,000
M/M change	30.1%	0.0%	275.0%
Y/Y change	5.6%	1.6%	15.4%

All data are SAAR; NE = Northeast and MW = Midwest.

\*\* US DOC does not report multifamily units completions directly, this is an estimation  
(Total completions – SF completions).

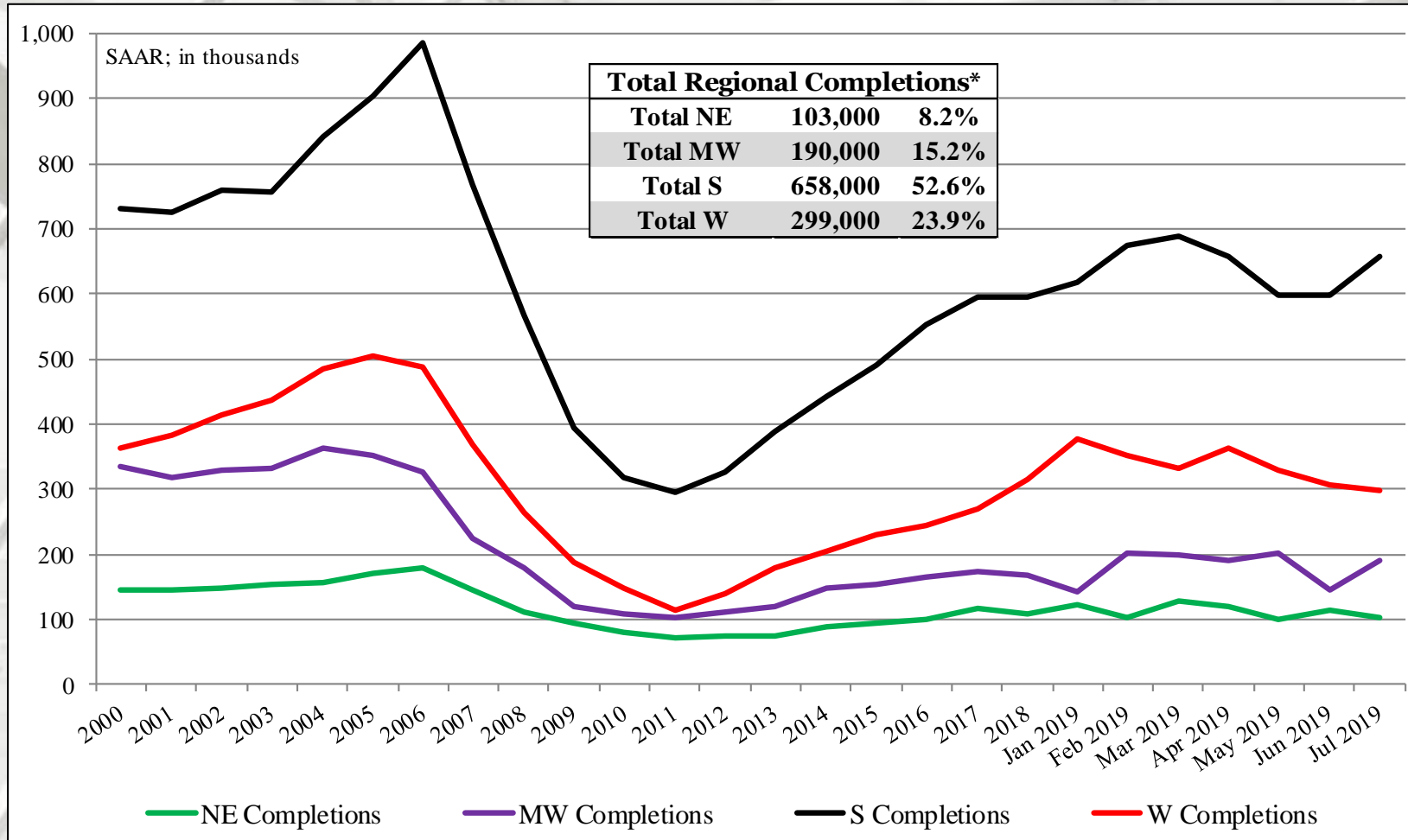
# New Housing Completions by Region

	<b>S Total</b>	<b>S SF</b>	<b>S MF**</b>
July	658,000	517,000	141,000
June	598,000	471,000	127,000
2018	584,000	445,000	139,000
M/M change	10.0%	9.8%	11.0%
Y/Y change	12.7%	16.2%	1.4%
	<b>W Total</b>	<b>W SF</b>	<b>W MF</b>
July	299,000	200,000	99,000
June	307,000	207,000	100,000
2018	307,000	198,000	109,000
M/M change	-2.6%	-3.4%	-1.0%
Y/Y change	-2.6%	1.0%	-9.2%

All data are SAAR; S = South and W = West.

\*\* US DOC does not report multifamily units completions directly, this is an estimation  
(Total completions – SF completions).

# Total Housing Completions by Region

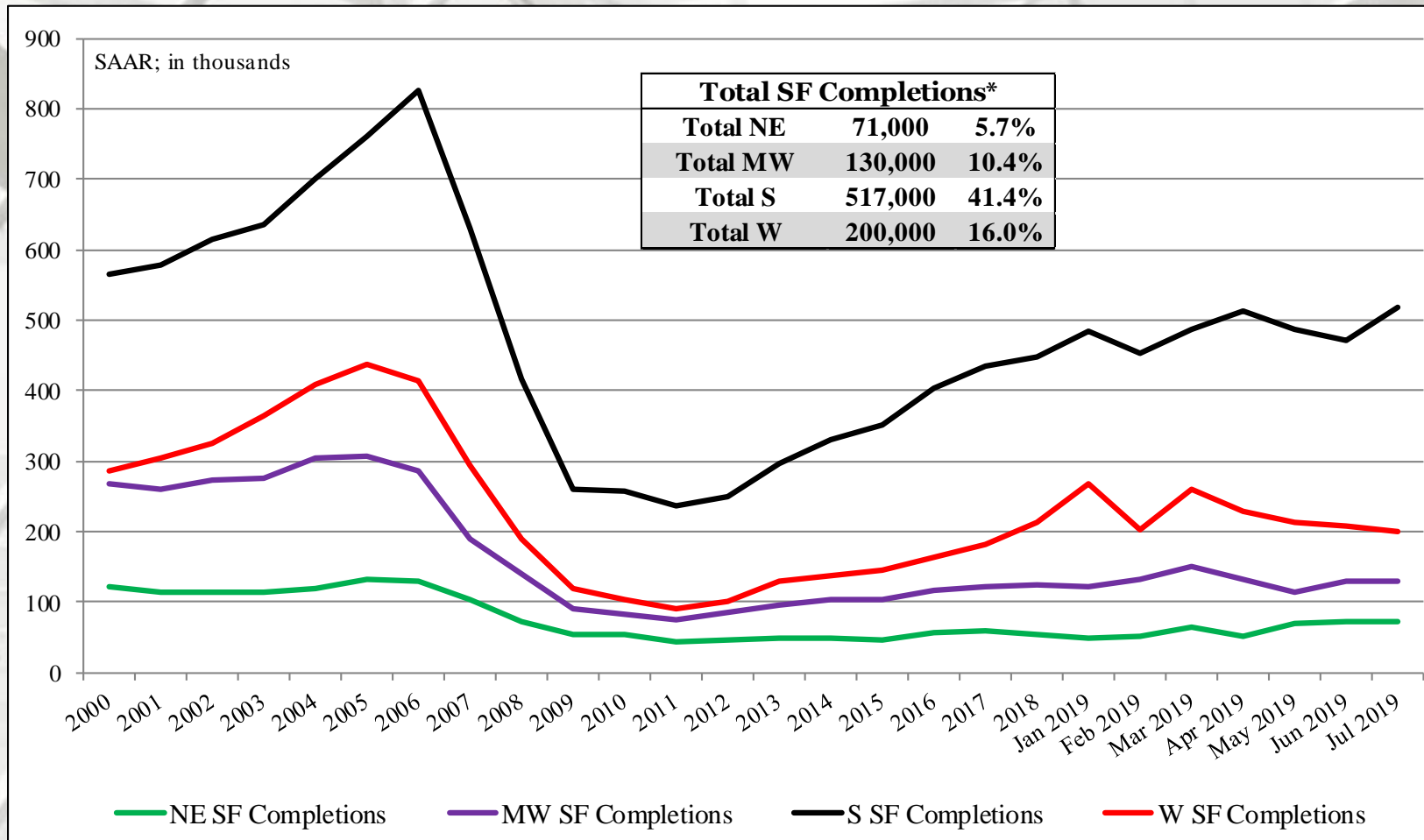


NE = Northeast, MW = Midwest, S = South, W = West

US DOC does not report 2 to 4 multi-family completions directly, this is an estimation (Total completions – SF completions).

\* Percentage of total housing completions

# SF Housing Completions by Region

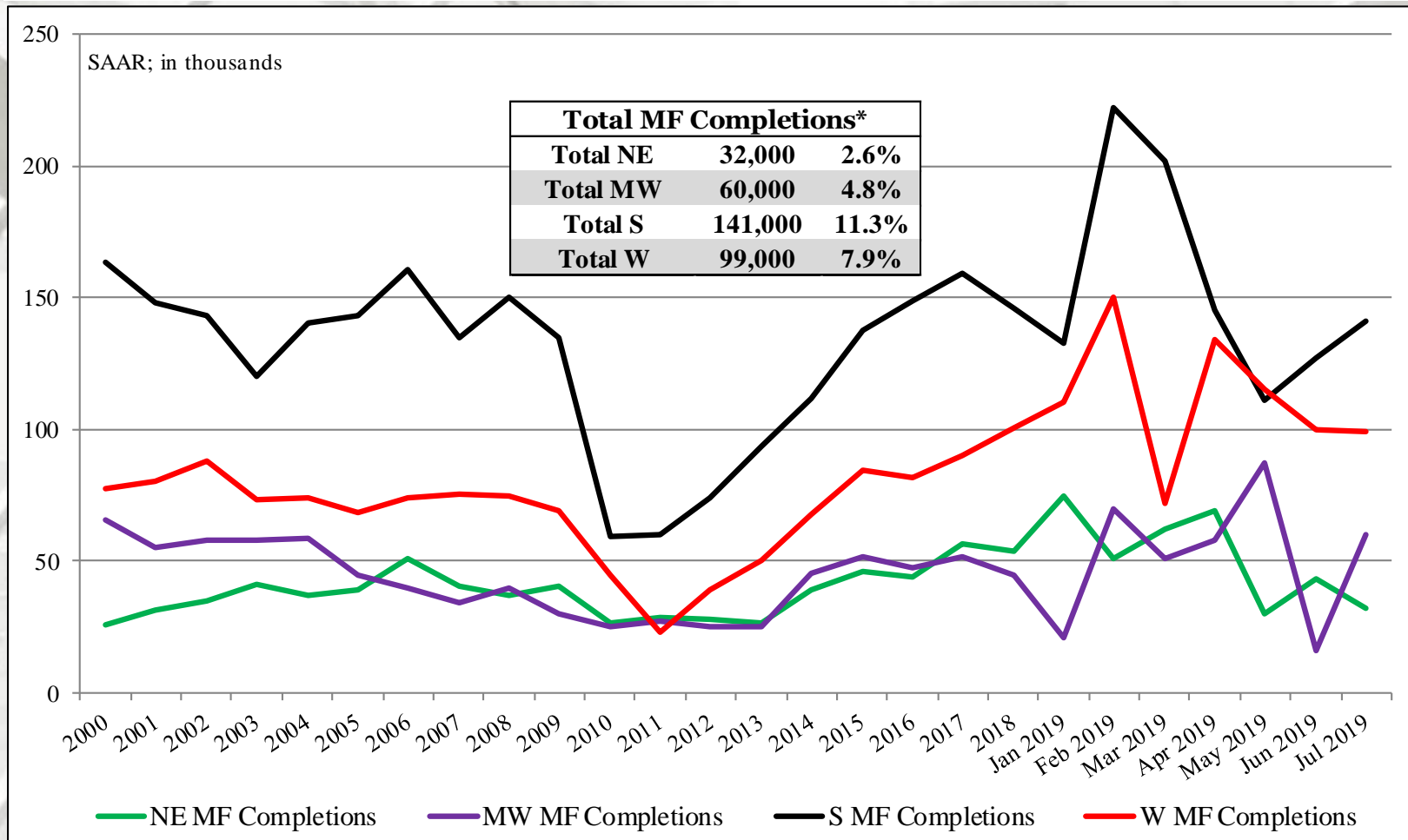


NE = Northeast, MW = Midwest, S = South, W = West

US DOC does not report 2 to 4 multi-family completions directly, this is an estimation (Total completions – SF completions).

\* Percentage of total housing completions

# MF Housing Completions by Region



NE = Northeast, MW = Midwest, S = South, W = West

US DOC does not report 2 to 4 multi-family completions directly, this is an estimation (Total completions – SF completions).

\* Percentage of total housing completions

# New Single-Family House Sales

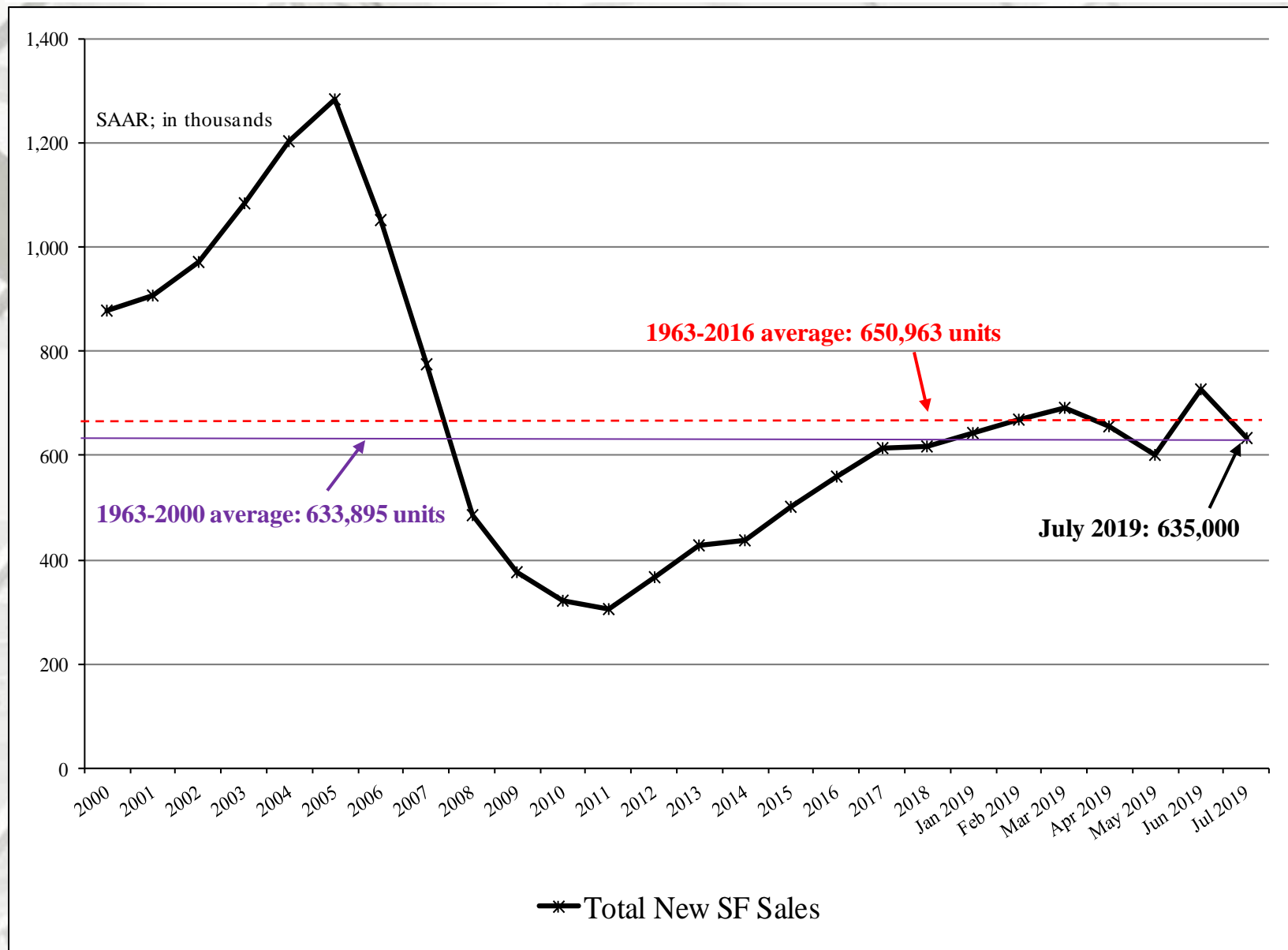
	New SF Sales*	Median Price	Mean Price	Month's Supply
July	635,000	\$312,800	\$388,000	6.4
June	728,000	\$306,000	\$354,500	5.5
2018	609,000	\$327,500	\$392,300	6.2
M/M change	-12.8%	2.2%	9.4%	16.4%
Y/Y change	4.3%	-4.5%	-1.1%	3.2%

\* All new sales data are presented at a seasonally adjusted annual rate (SAAR)<sup>1</sup> and housing prices are adjusted at irregular intervals<sup>2</sup>.

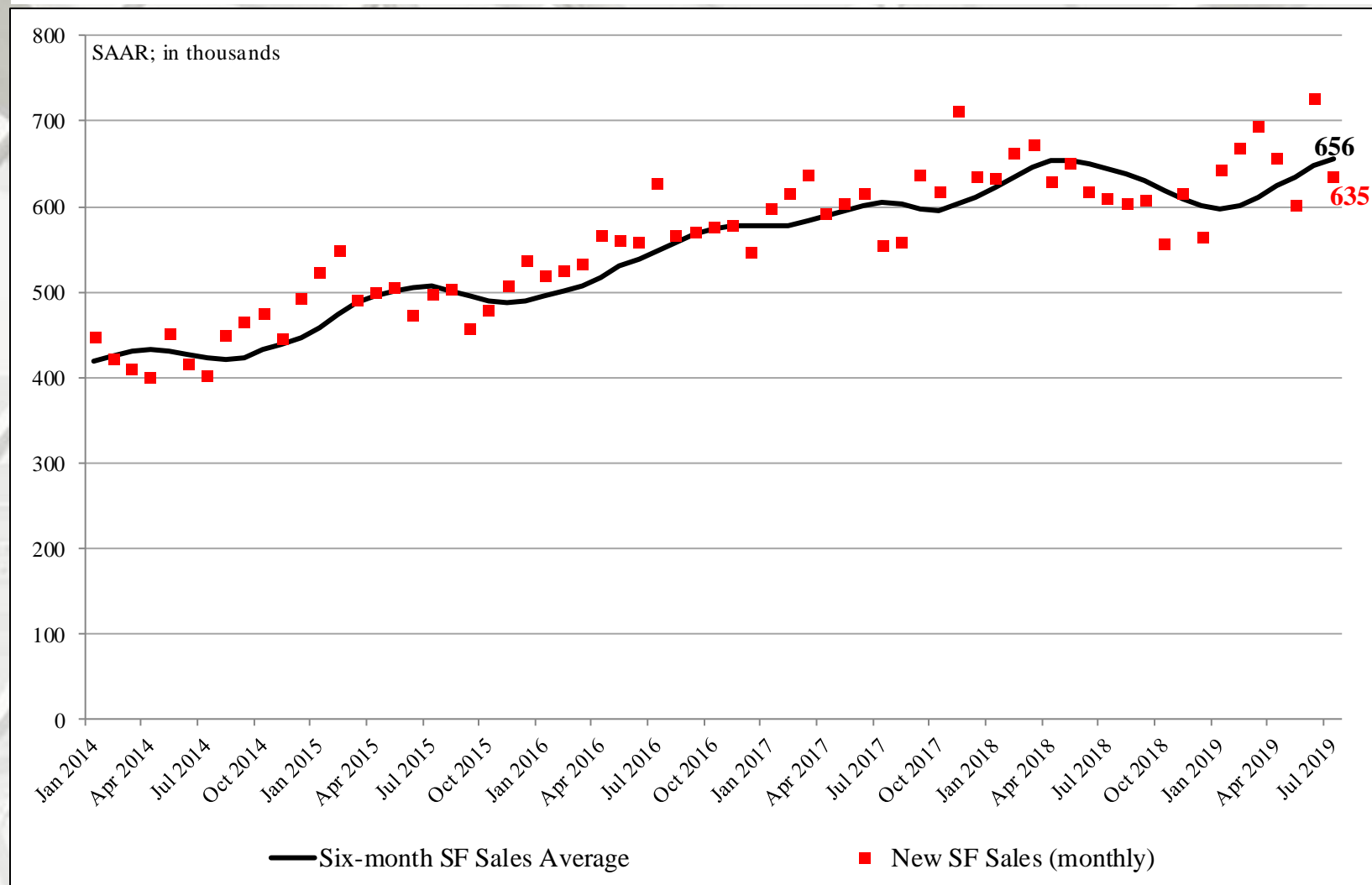
New SF sales were less than the consensus forecast<sup>3</sup> of 645 m (range: 630 m to 675 m). The past three month's new SF sales data also were revised:

April initial: 673 m revised to 656 m;  
 May initial: 626 m revised to 602 m;  
 June initial: 646 m revised to 728 m.

# New SF House Sales



# New SF Housing Sales: Six-month average & monthly





## New SF House Sales by Region and Price Category

	NE	MW	S	W			
July	39,000	56,000	359,000	181,000			
June	26,000	63,000	428,000	211,000			
2018	25,000	69,000	348,000	167,000			
M/M change	50.0%	-11.1%	-16.1%	-14.2%			
Y/Y change	56.0%	-18.8%	3.2%	8.4%			
	≤ \$150m	\$150 - \$199.9m	\$200 - \$299.9m	\$300 - \$399.9m	\$400 - \$499.9m	\$500 - \$749.9m	≥ \$750m
July <sup>1,2,3,4</sup>	Z <sup>5</sup>	6,000	16,000	14,000	5,000	6,000	4,000
June	1,000	6,000	24,000	18,000	8,000	5,000	3,000
2018	2,000	4,000	15,000	15,000	7,000	6,000	4,000
M/M change	Z <sup>5</sup>	0.0%	-33.3%	-22.2%	-37.5%	20.0%	33.3%
Y/Y change	Z <sup>5</sup>	50.0%	6.7%	-6.7%	-28.6%	0.0%	0.0%
New SF sales: %	Z <sup>5</sup>	11.3%	30.2%	26.4%	9.4%	11.3%	7.5%

NE = Northeast; MW = Midwest; S = South; W = West

<sup>1</sup> All data are SAAR

<sup>2</sup> Houses for which sales price were not reported have been distributed proportionally to those for which sales price was reported;

<sup>3</sup> Detail July not add to total because of rounding.

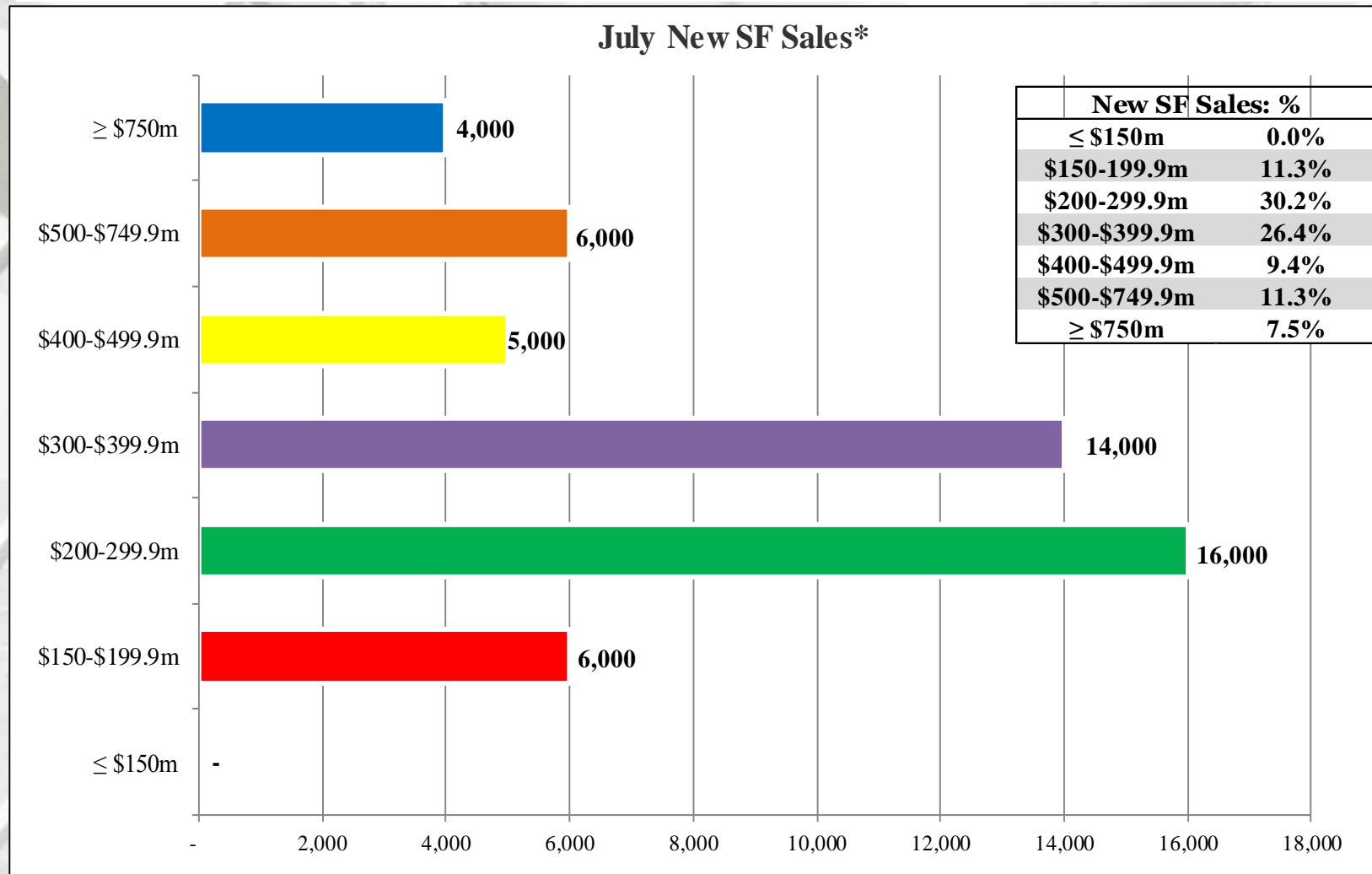
<sup>4</sup> Housing prices are adjusted at irregular intervals.

<sup>5</sup> Z = Less than 500 units or less than 0.5 percent

Sources: <sup>1,2,3</sup> <https://www.census.gov/construction/nrs/index.html>; 8/23/19;

<sup>4</sup> [https://www.census.gov/construction/cpi/pdf/descpi\\_sold.pdf](https://www.census.gov/construction/cpi/pdf/descpi_sold.pdf)

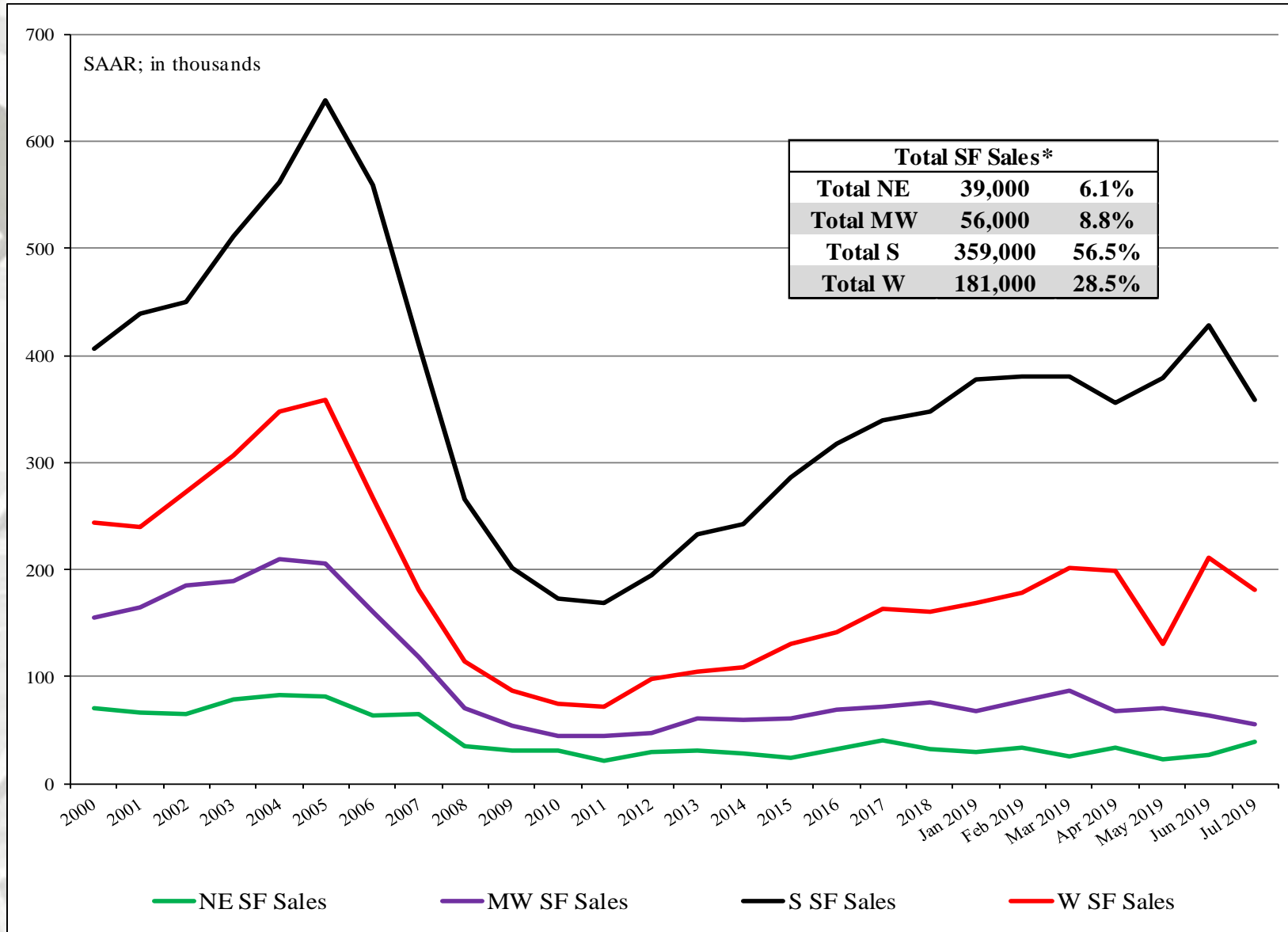
# New SF House Sales



- Total new sales by price category and percent.

Note July sales do not total to 100 percent due to insufficient data in the less than \$150,000 category.

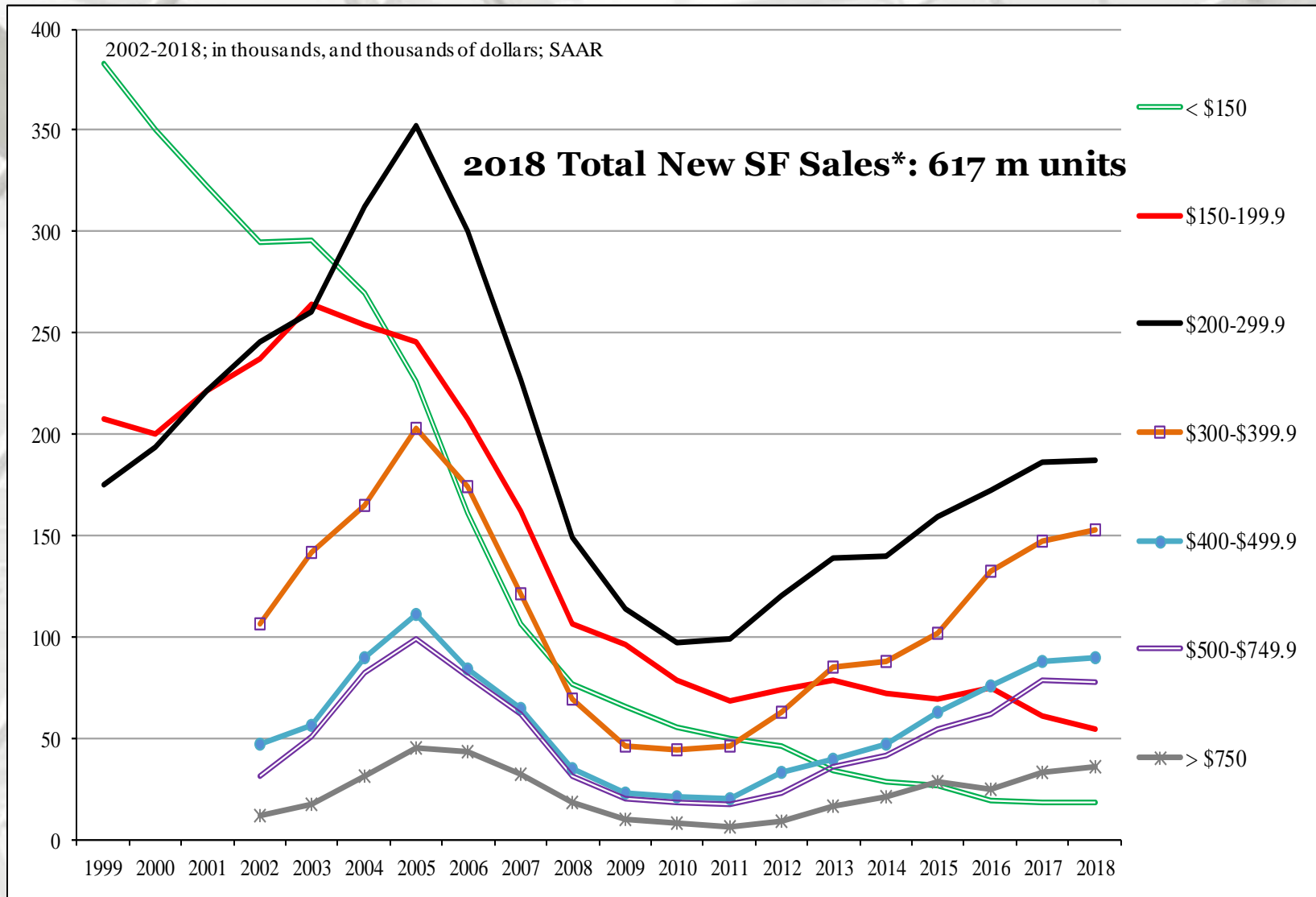
# New SF House Sales by Region



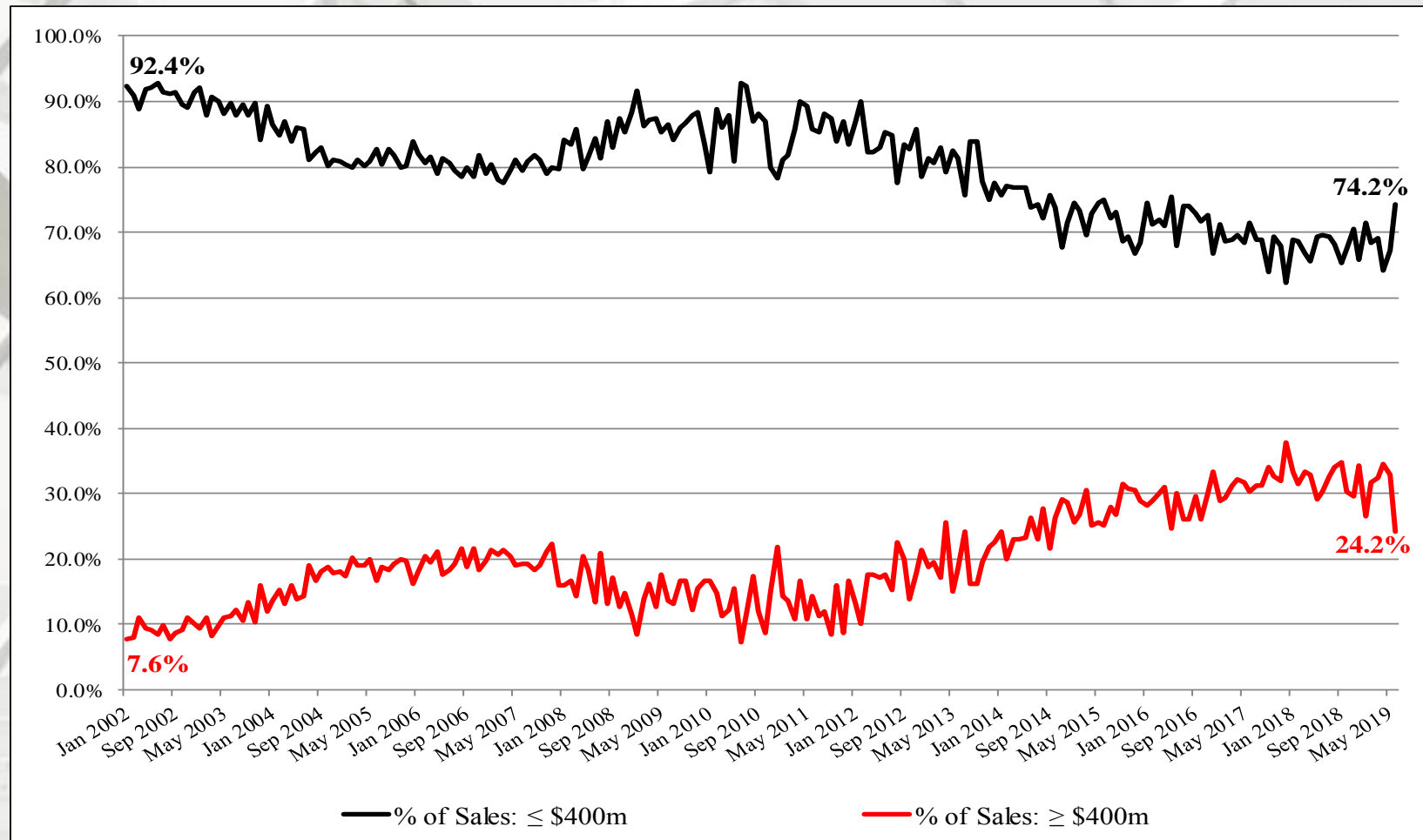
NE = Northeast; MW = Midwest; S = South; W = West

\* Percentage of total new sales.

# New SF House Sales by Price Category



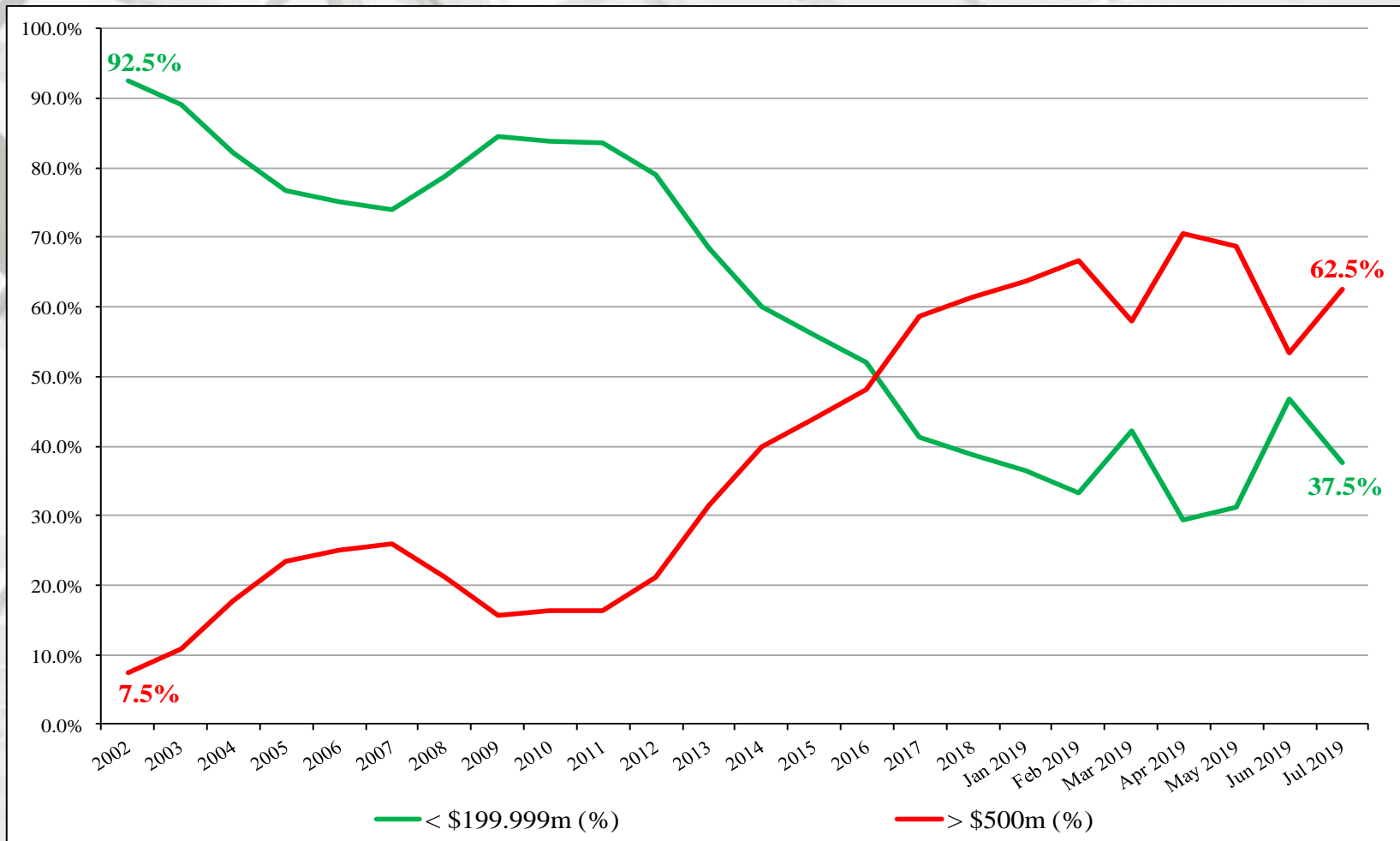
# New SF House Sales



## New SF Sales \$400m houses: 2002 – July 2019

The sales share of \$400 thousand plus SF houses is presented above<sup>1,2</sup>. Since the beginning of 2012, the upper priced houses have and are garnering a greater percentage of sales. A decreasing spread indicates that more high-end luxury homes are being sold. Several reasons are offered by industry analysts; 1) builders can realize a profit on higher priced houses; 2) historically low interest rates have indirectly resulted in increasing house prices; and 3) purchasers of upper end houses fared better financially coming out of the Great Recession.

# New SF House Sales

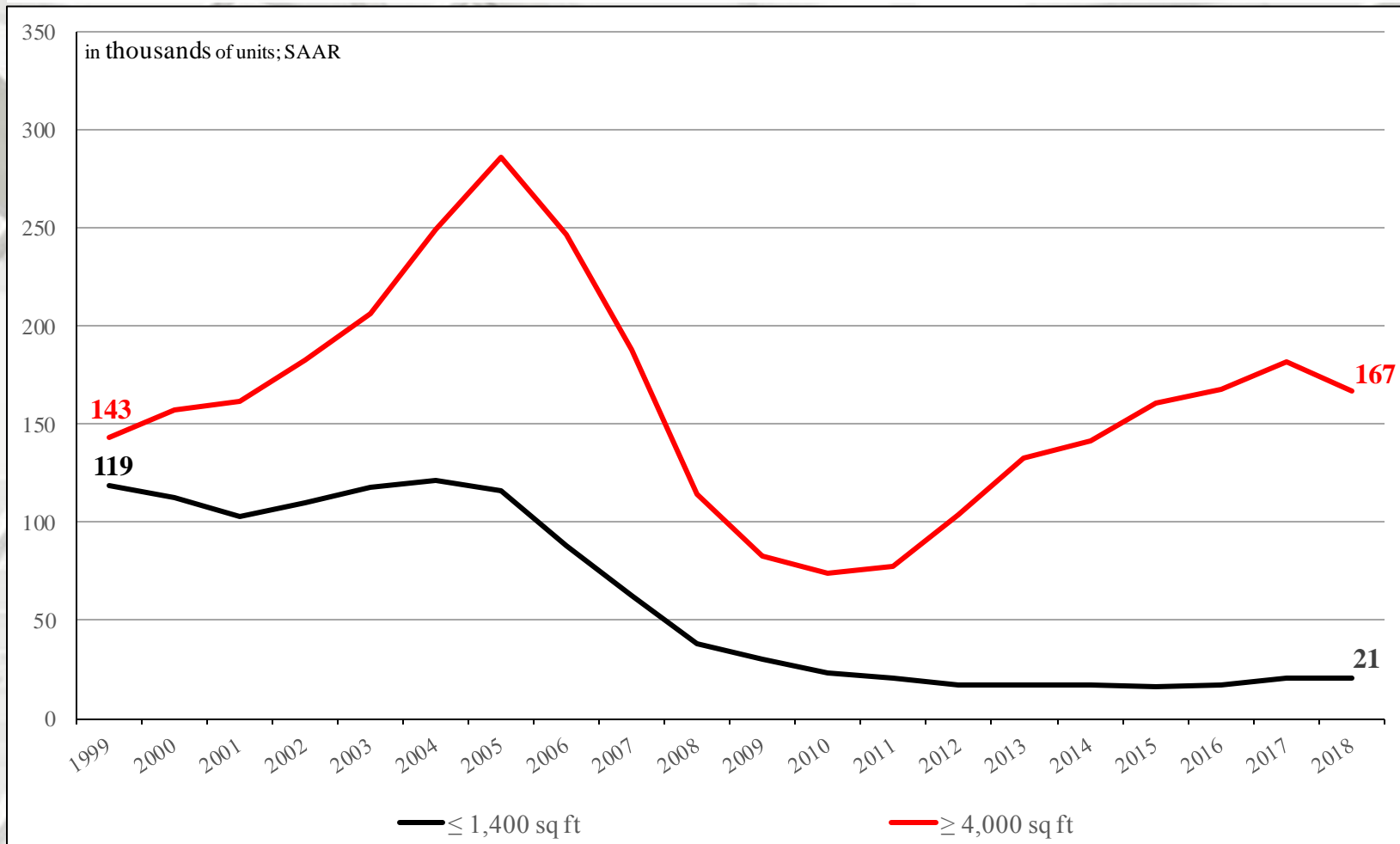


## New SF Sales: ≤ \$ 200m and ≥ \$500m: 2002 to July 2019

The number of ≤ \$200 thousand plus SF houses has declined dramatically since 2002<sup>1,2</sup>. Subsequently, from 2012 onward, the ≥ \$500 thousand class has soared (on a percentage basis) in contrast to the ≤ \$200m class. One of the most oft mentioned reasons for this occurrence is builder net margins.

Note: Sales values are not adjusted for inflation.

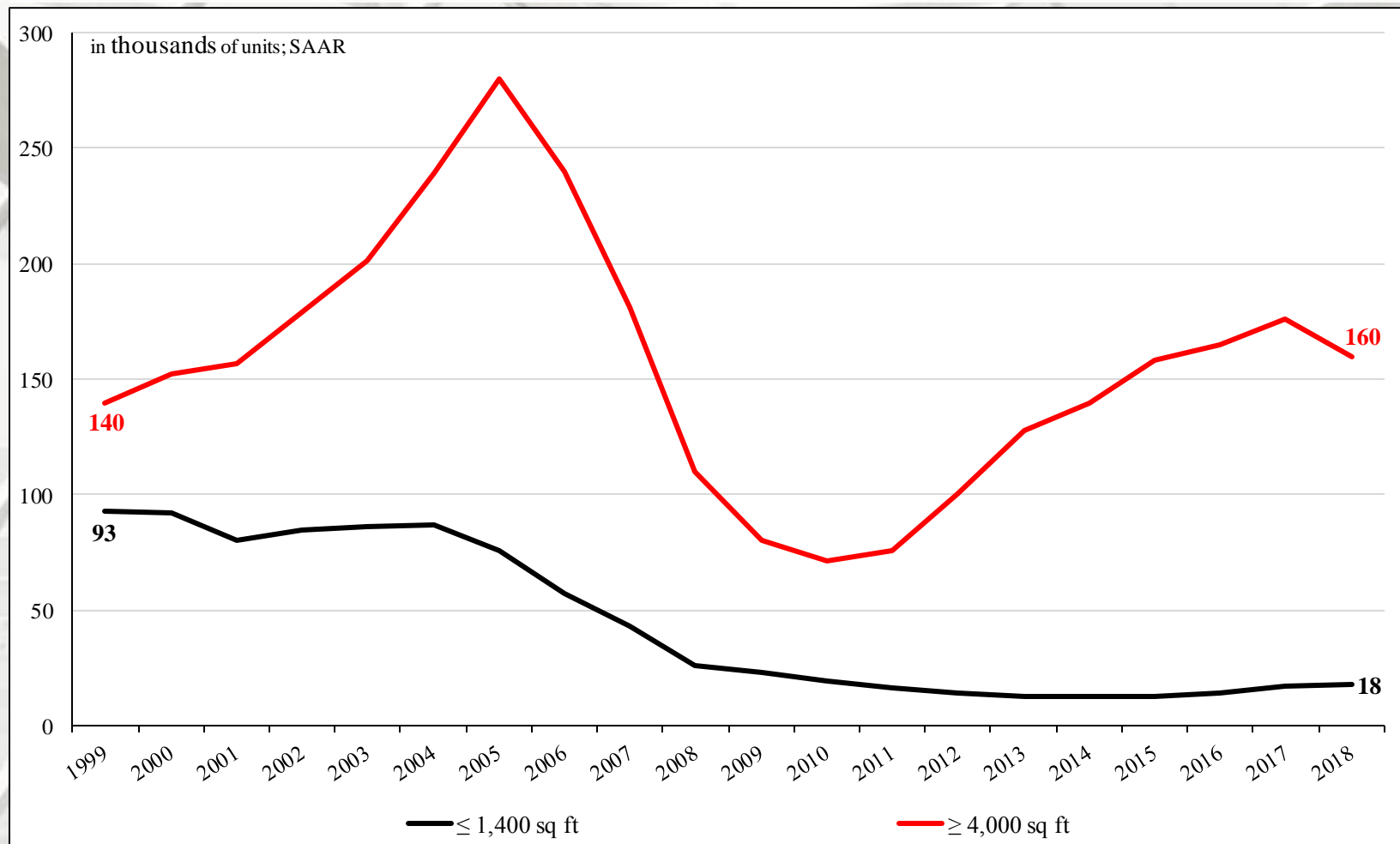
# Total New SF House Sales by Square Feet of Floor Area



## Total new SF Sales: ≤ 1,400 square feet and ≥ 4,000 square feet: 1999 to 2018

The number of SF houses sold ( $\geq 4,000$  sq ft) has risen dramatically since 2010 in comparison to the  $\leq 1,400$  sq ft houses. Some of the most oft mentioned reasons for this is builder net margins and regulation.

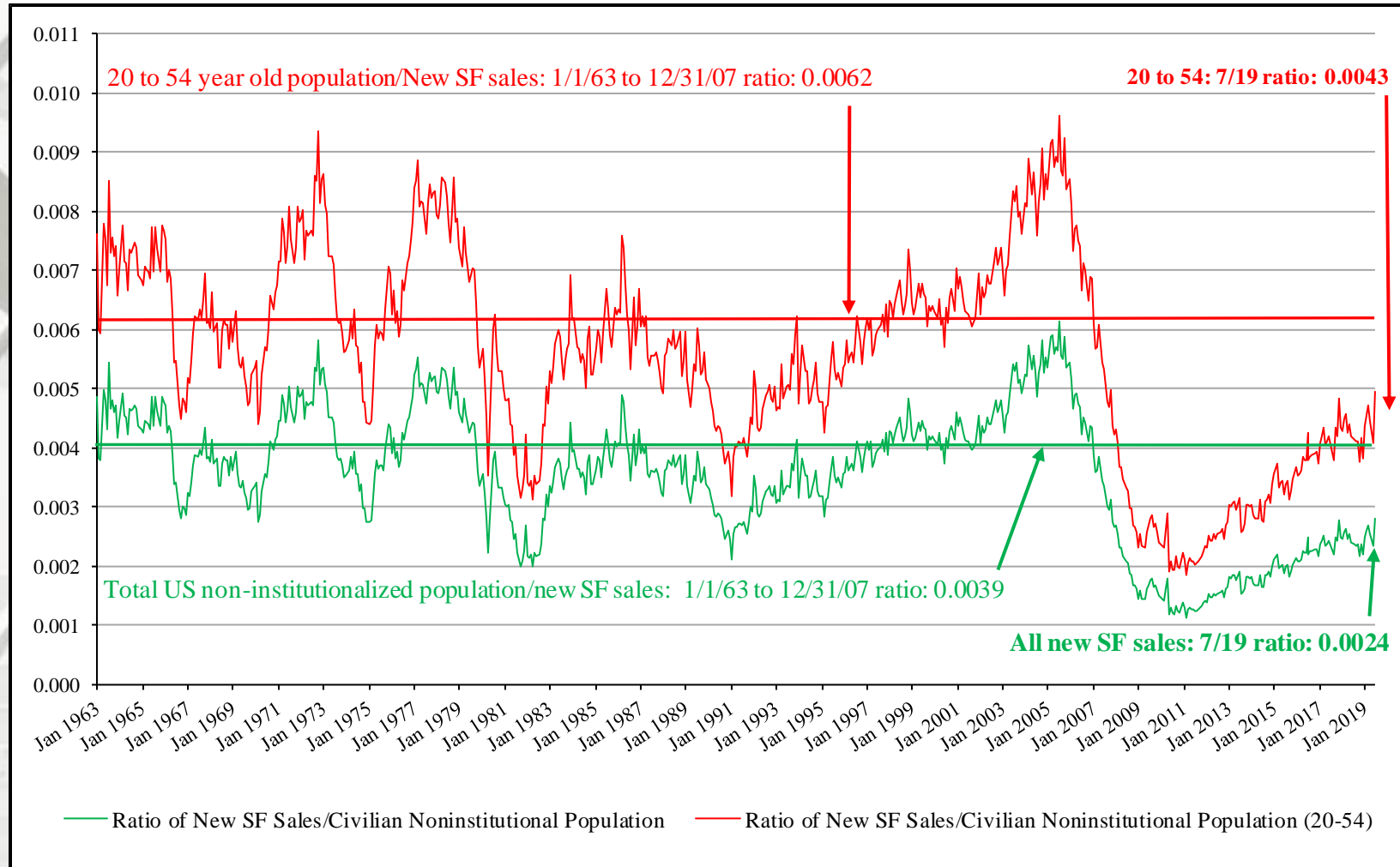
# New Detached SF House Sales by Square Feet of Floor Area



**New Detached SF Sales: ≤ 1,400 square feet and ≥ 4,000 square feet: 1999 to 2018**



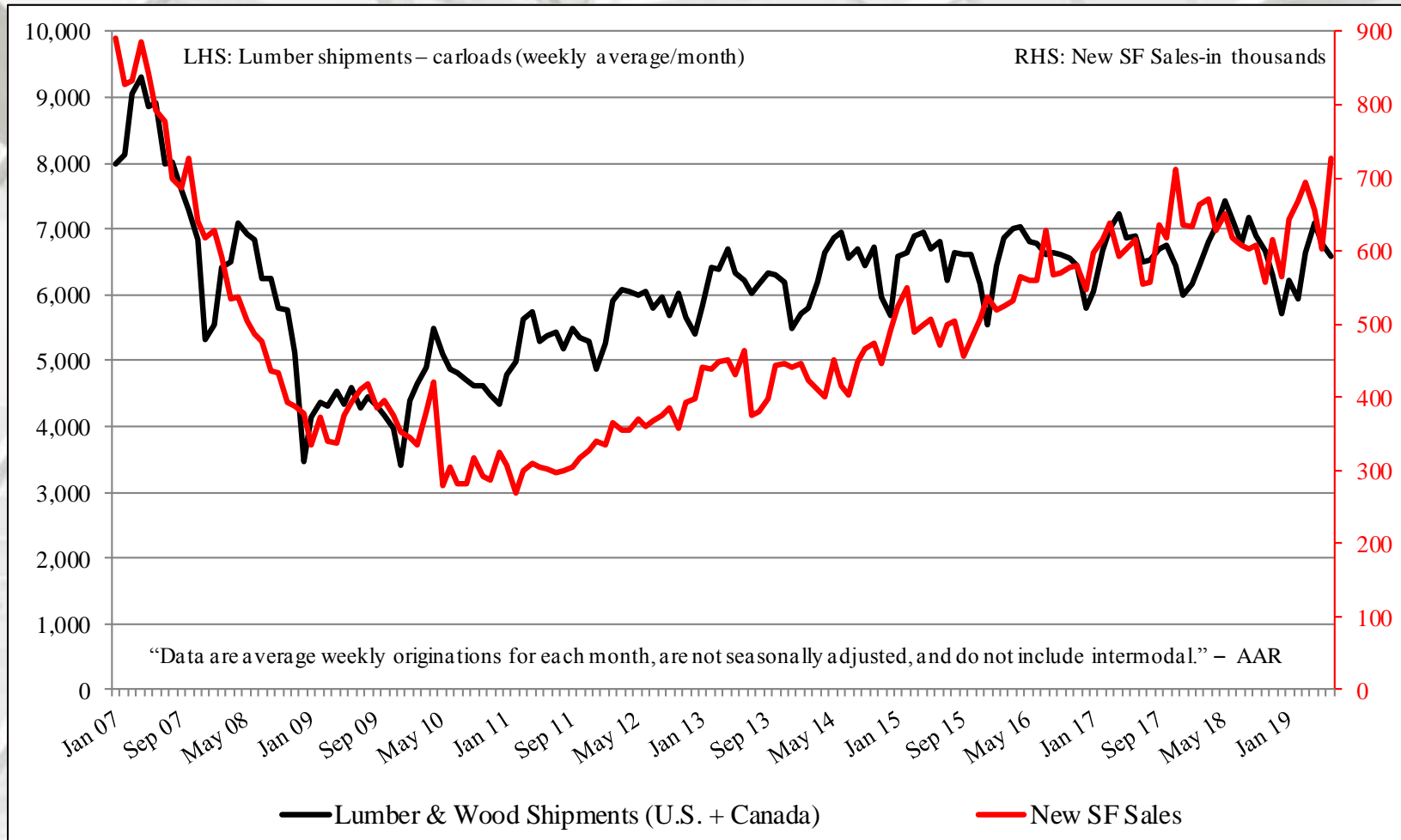
# New SF House Sales



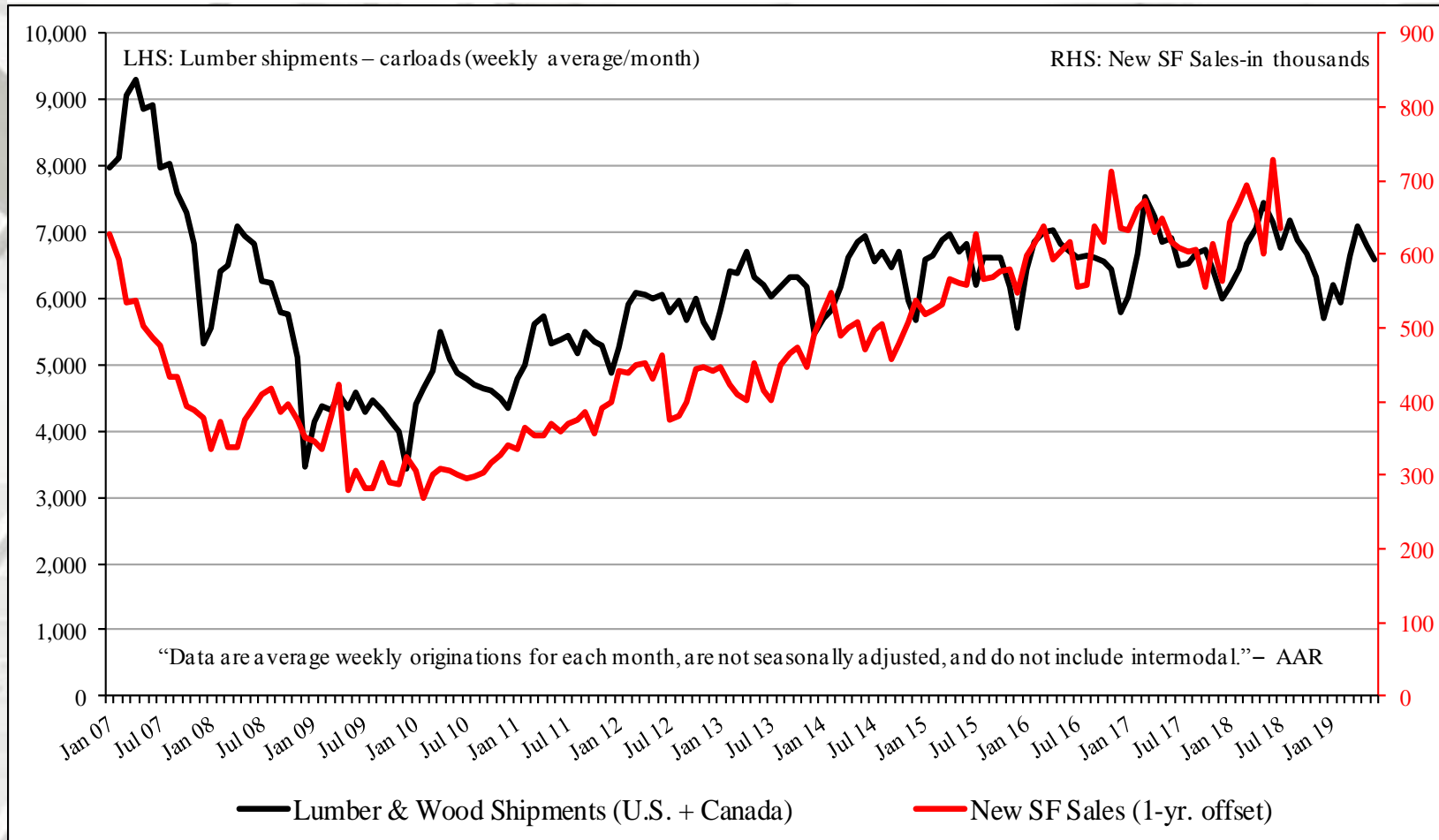
## New SF sales adjusted for the US population

From July 1963 to July 2007, the long-term ratio of new house sales to the total US non-institutionalized population was 0.0039; in July 2019 it was 0.0024 – a decrease from June (0.0028). The non-institutionalized population, aged 20 to 54 long-term ratio is 0.0062; in July 2019 it was 0.0043 – a decrease from June (0.0049). All are non-adjusted data. From a population viewpoint, construction is less than what is necessary for changes in the population (i.e., under-building).

# Railroad Lumber & Wood Shipments vs. U.S. SF House Sales

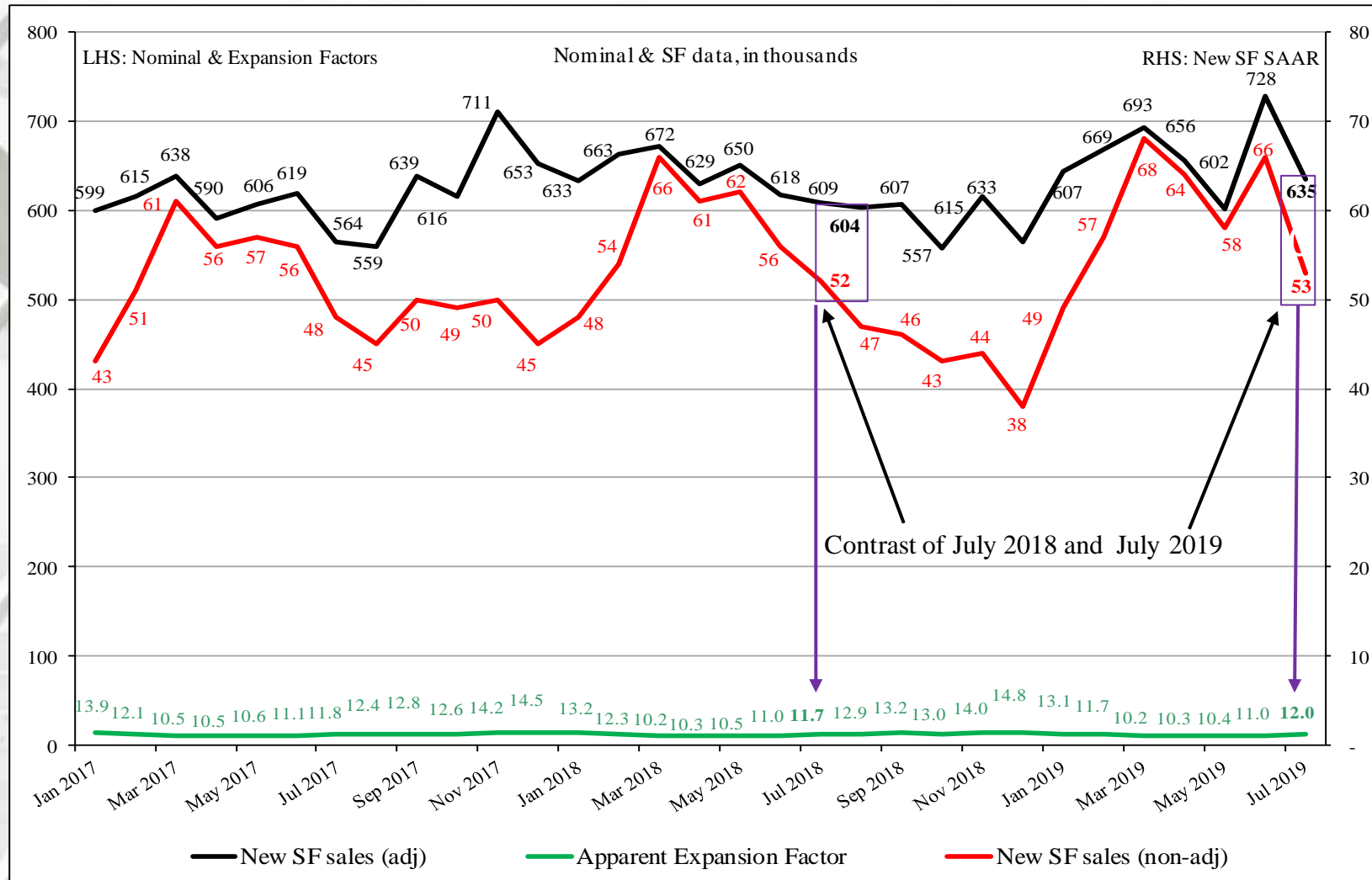


# Railroad Lumber & Wood Shipments vs. U.S. SF Housing Sales: 1-year Offset



In this graph, July 2007 lumber shipments are contrasted with July 2008 SF sales, and continuing through July 2019. The purpose is to discover if lumber shipments relate to future single-family sales. Also, it is realized that lumber and wood products are trucked; however, to our knowledge comprehensive trucking data is not available.

# Nominal vs. SAAR New SF House Sales



## Nominal and Adjusted New SF Monthly Sales

Presented above is nominal (non-adjusted) new SF sales data contrasted against SAAR data. The apparent expansion factor "...is the ratio of the unadjusted number of houses sold in the US to the seasonally adjusted number of houses sold in the US (i.e., to the sum of the seasonally adjusted values for the four regions)." – U.S. DOC-Construction

# New SF House Sales

## New SF Houses Sold During Period

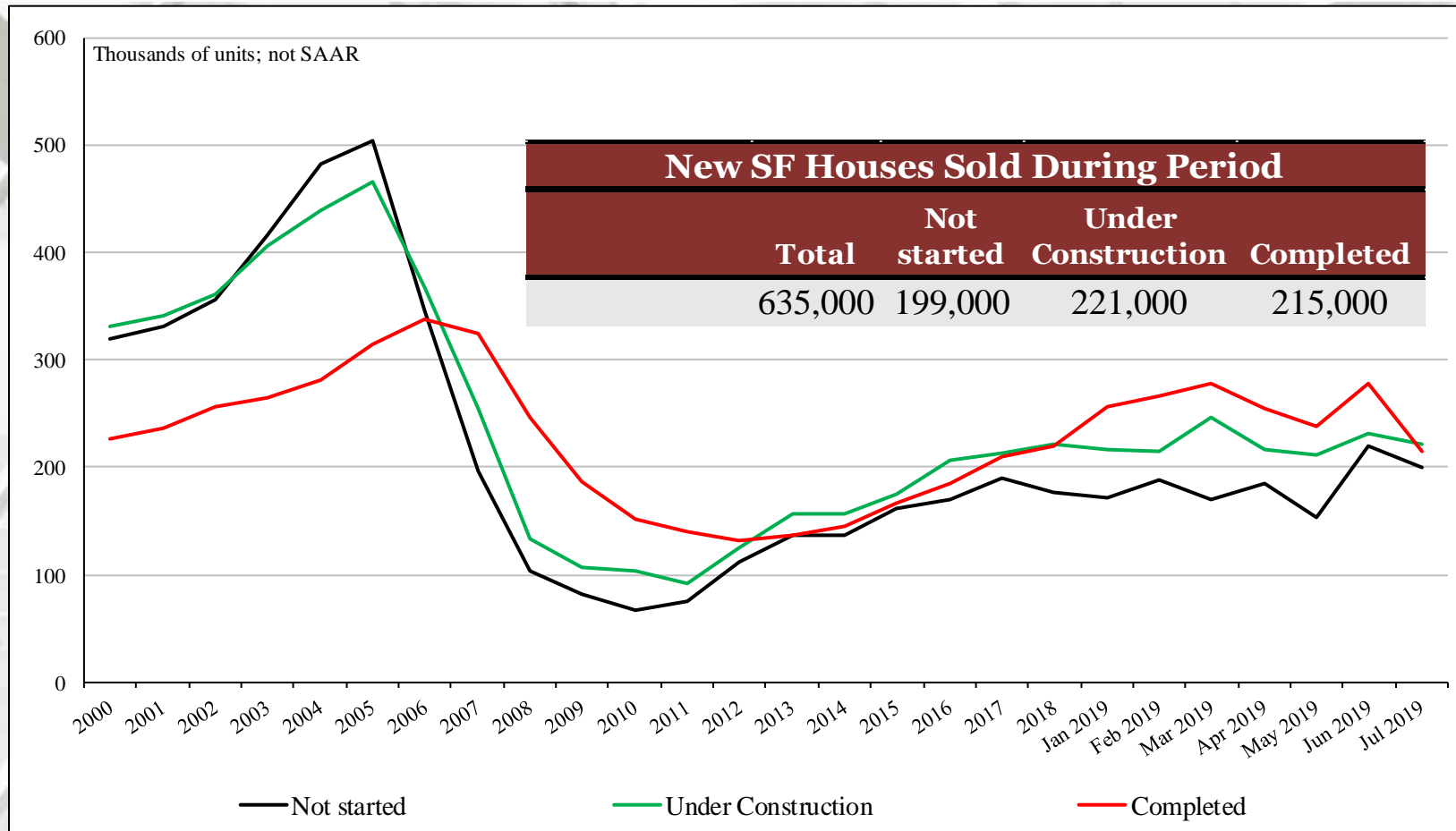
	Total	Not started	Under Construction	Completed
July	635,000	199,000	221,000	215,000
June	728,000	219,000	231,000	278,000
2018	609,000	190,000	229,000	190,000
M/M change	-12.8%	-9.1%	-4.3%	-22.7%
Y/Y change	4.3%	4.7%	-3.5%	13.2%
Total percentage		31.3%	34.8%	33.9%

## New SF Houses Sold During Period

In July 2018, a substantial portion of new sales, 31.3% – have not been started; a decrease from June.

Not SAAR

# New SF House Sales: Sold During Period



Not SAAR

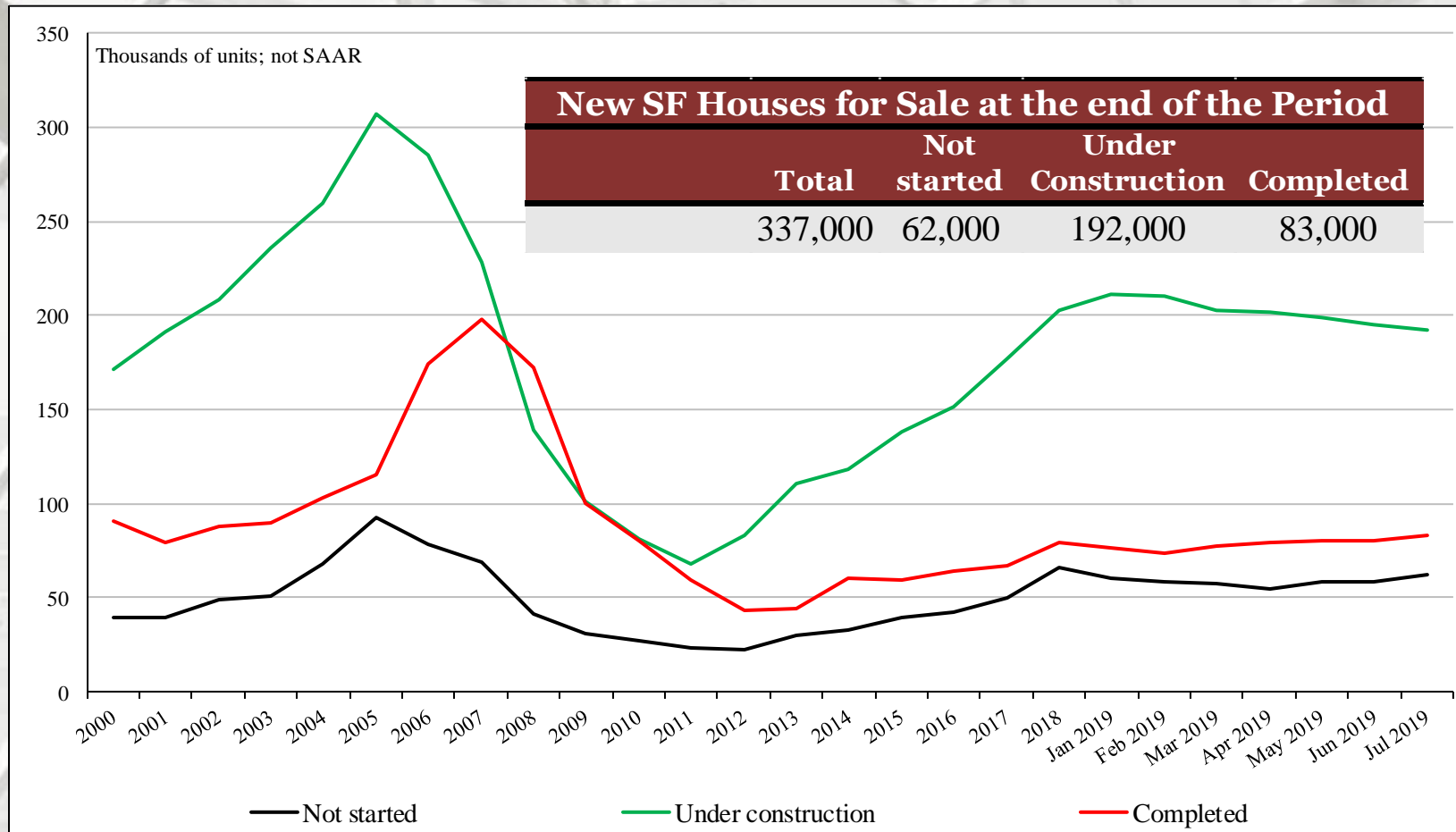
# New SF House Sales

## New SF Houses for Sale at the end of the Period

	Total	Not started	Under Construction	Completed
July	337,000	62,000	192,000	83,000
June	333,000	58,000	195,000	80,000
2018	314,000	56,000	192,000	66,000
M/M change	1.2%	6.9%	-1.5%	3.8%
Y/Y change	7.3%	10.7%	0.0%	25.8%
Total percentage		18.4%	57.0%	24.6%

Not SAAR

# New SF House Sales: For Sale at End of Period



Not SAAR



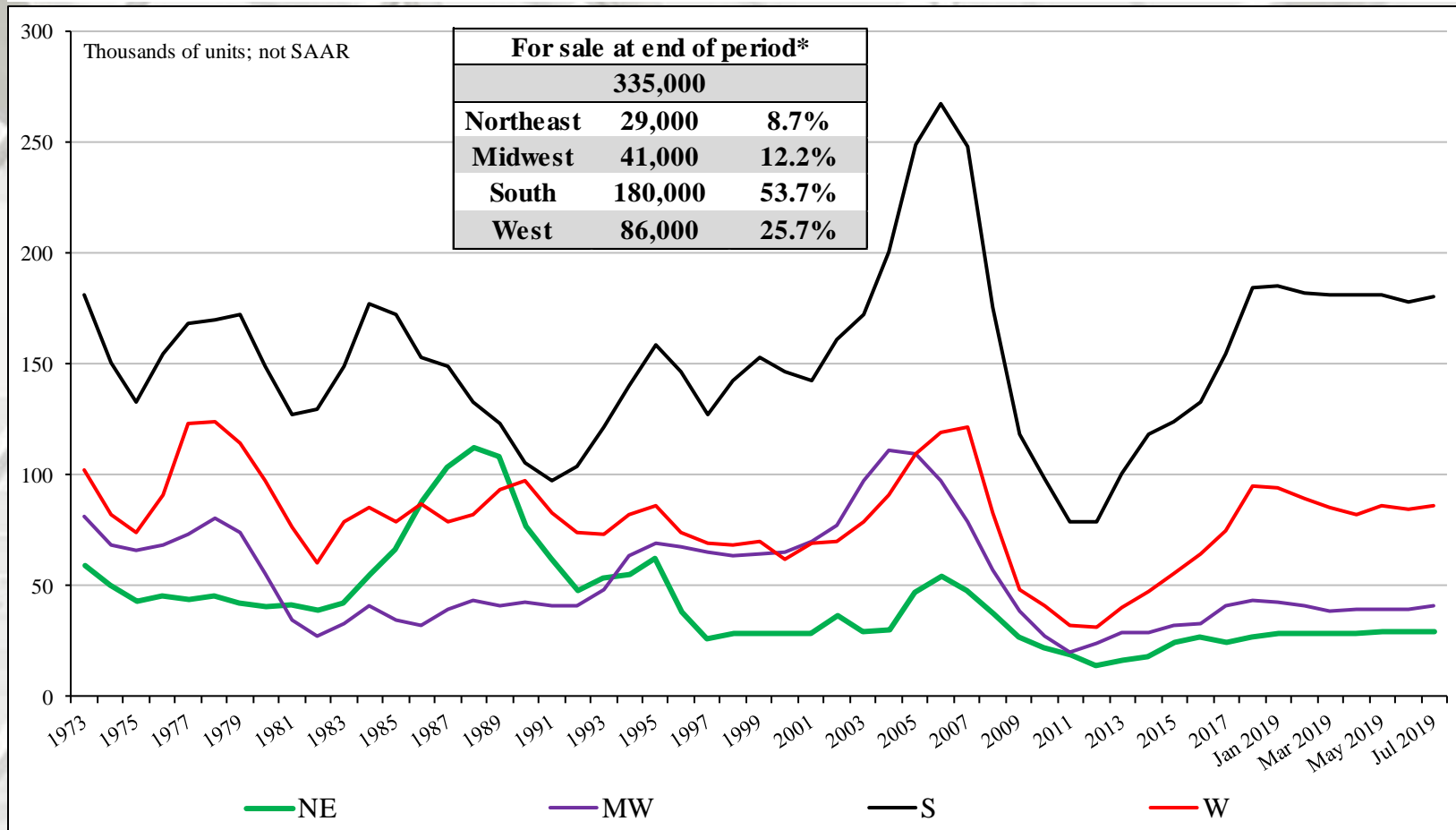
# New SF House Sales

## New SF Houses for Sale at the end of the Period by Region\*

	Total	NE	MW	S	W
July	335,000	29,000	41,000	180,000	86,000
June	334,000	29,000	39,000	181,000	86,000
2018	313,000	27,000	40,000	164,000	83,000
M/M change	0.3%	0.0%	5.1%	-0.6%	0.0%
Y/Y change	7.0%	7.4%	2.5%	9.8%	3.6%

NE = Northeast; MW = Midwest; S = South; W = West  
Not SAAR

# New SF Houses Sale at End of Period by Region



NE = Northeast; MW = Midwest; S = South; W = West

\* Percentage of new SF sales.

# July 2019 Construction Spending

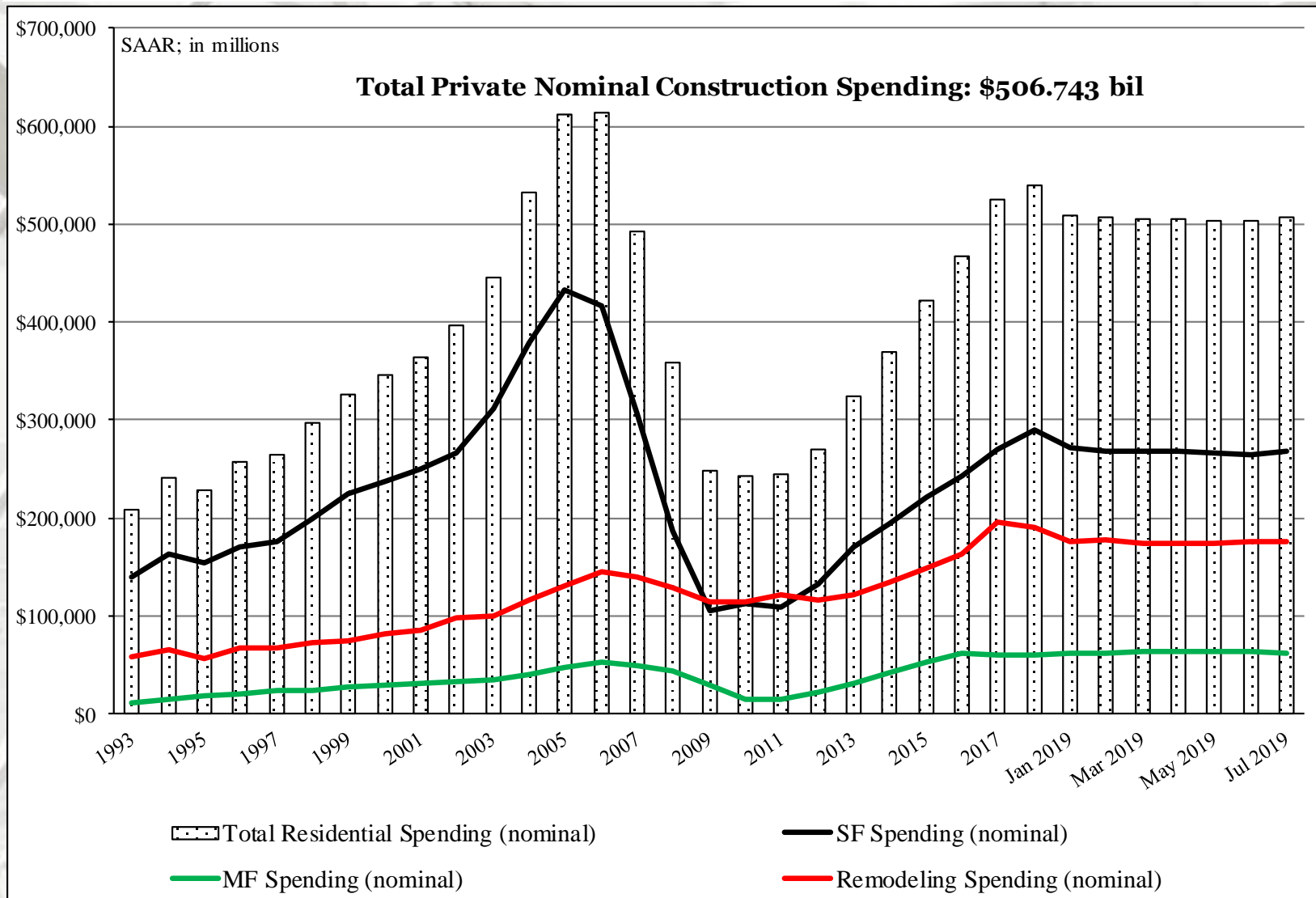
	Total Private Residential*	SF	MF	Improvement**
July	\$506,743	\$268,138	\$62,458	\$176,147
June	\$503,515	\$264,537	\$63,151	\$175,827
2018	\$542,307	\$293,051	\$59,067	\$190,189
M/M change	0.6%	1.4%	-1.1%	0.2%
Y/Y change	-6.6%	-8.5%	5.7%	-7.4%

\* billion.

\*\* The US DOC does not report improvement spending directly, this is a monthly estimation:  
((Total Private Spending – (SF spending + MF spending)).

All data are SAARs and reported in nominal US\$.

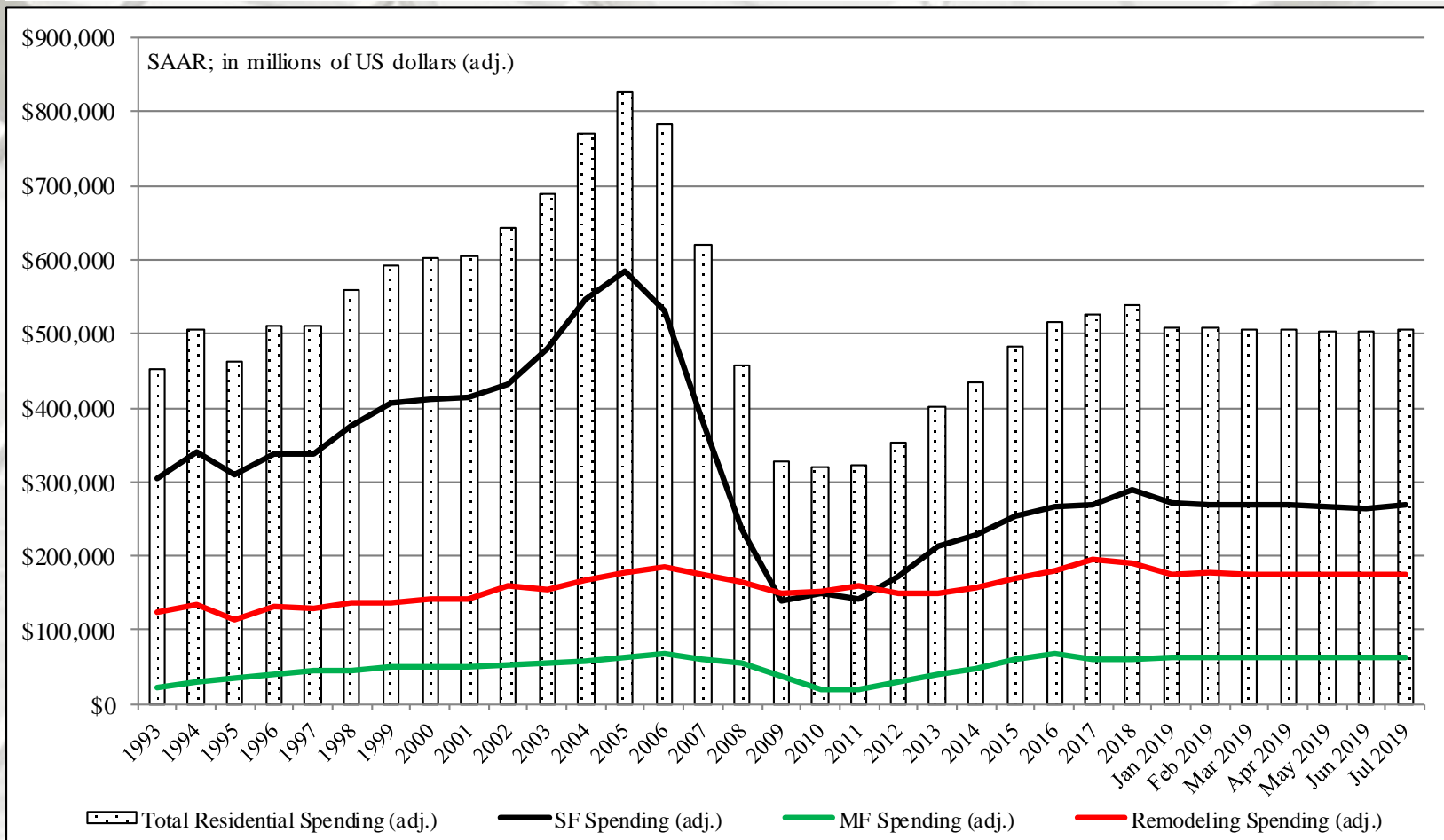
# Total Construction Spending (nominal): 1993 – July 2019



Reported in nominal US\$.

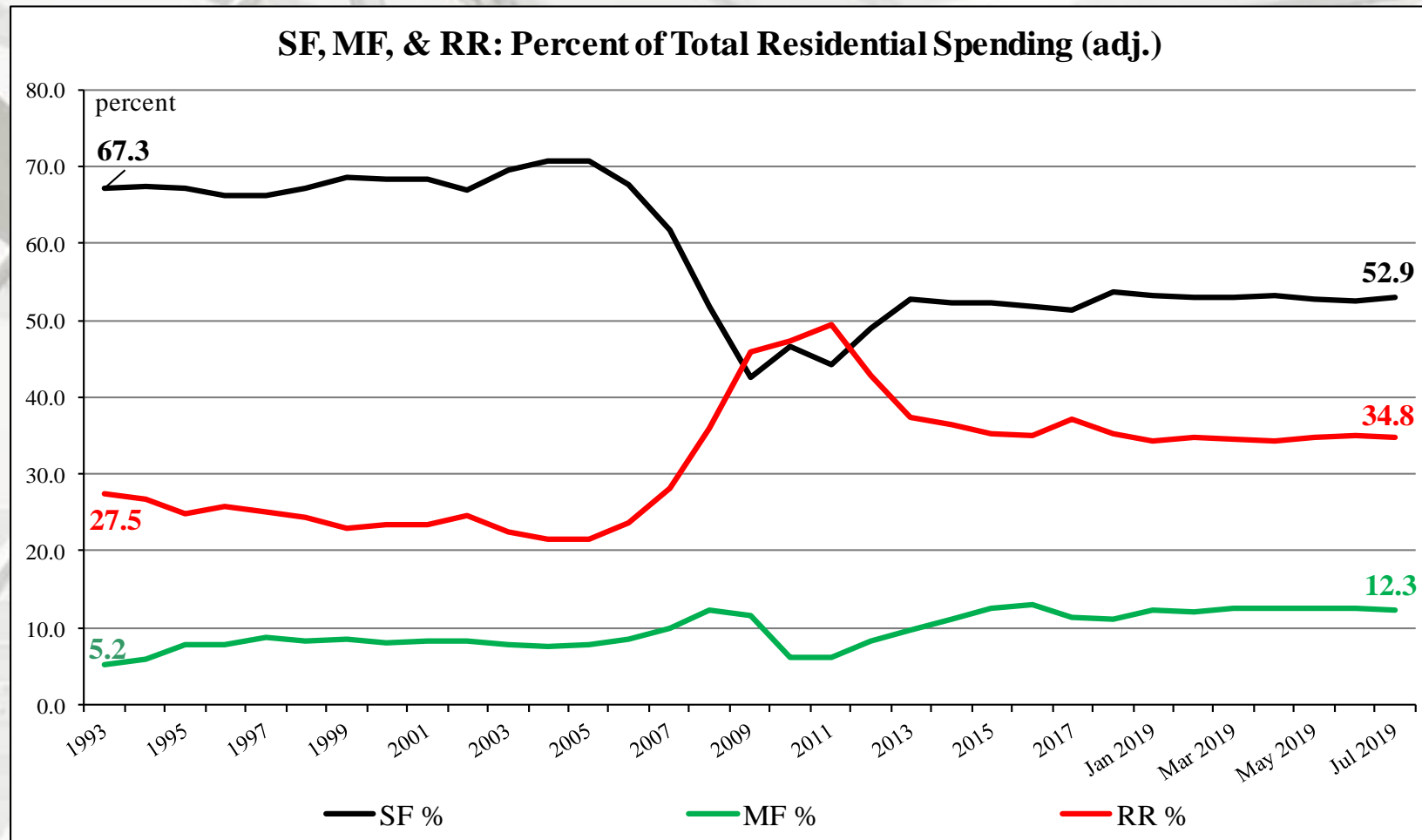
The US DOC does not report improvement spending directly, this is a monthly estimation for 2019.

# Total Construction Spending (adjusted): 1993-2019\*



Reported in adjusted US\$: 1993 – 2018 (adjusted for inflation, BEA Table 1.1.9); \*January to July 2019 reported in nominal US\$.

# Construction Spending Shares: 1993 to July 2019



## Total Residential Spending: 1993 through 2006

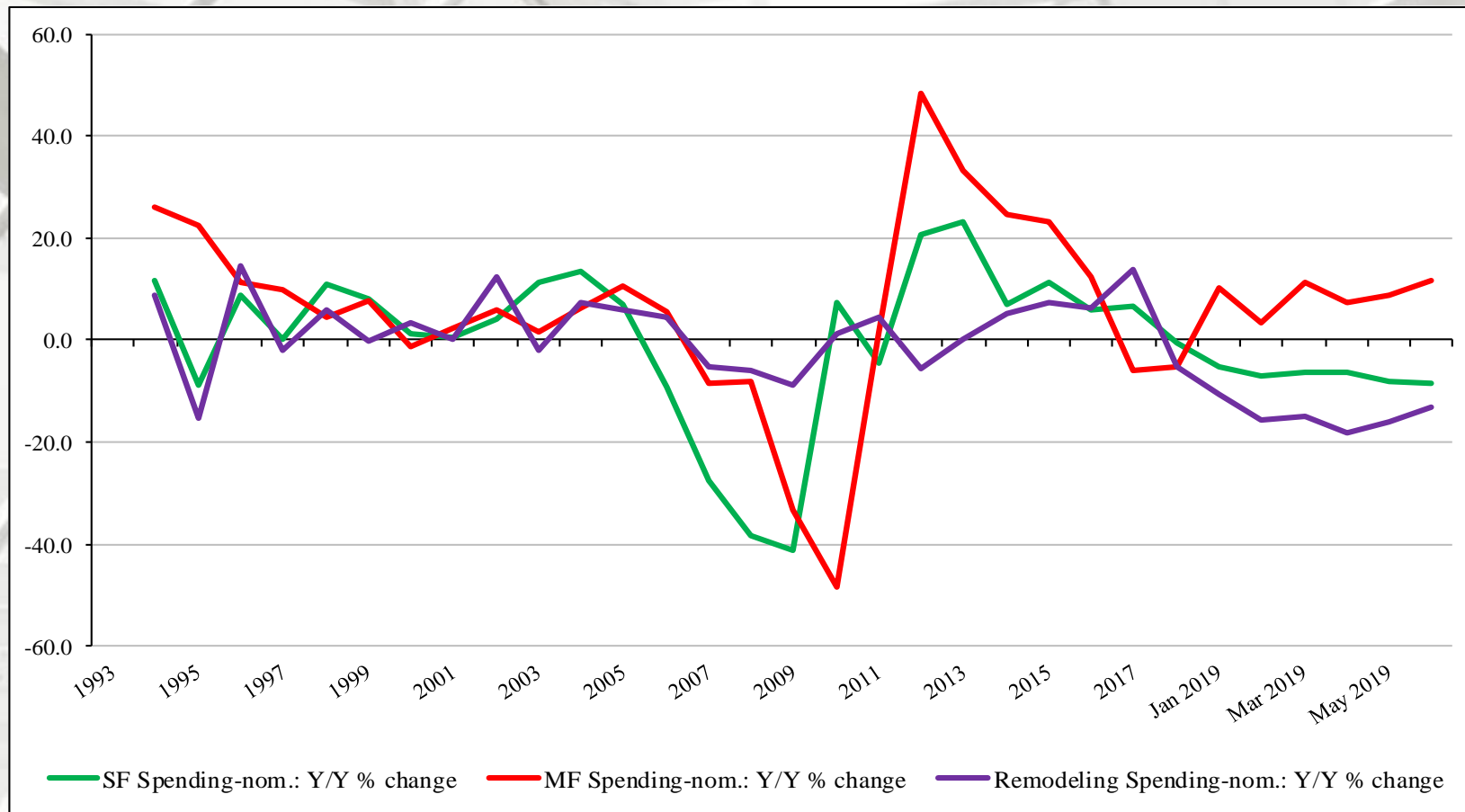
SF spending average: 69.2%

MF spending average: 7.5%

Residential remodeling (RR) spending average: 23.3% (SAAR).

Note: 1993 to 2017 (adjusted for inflation, BEA Table 1.1.9); Jan-July 2018 reported in nominal US\$.

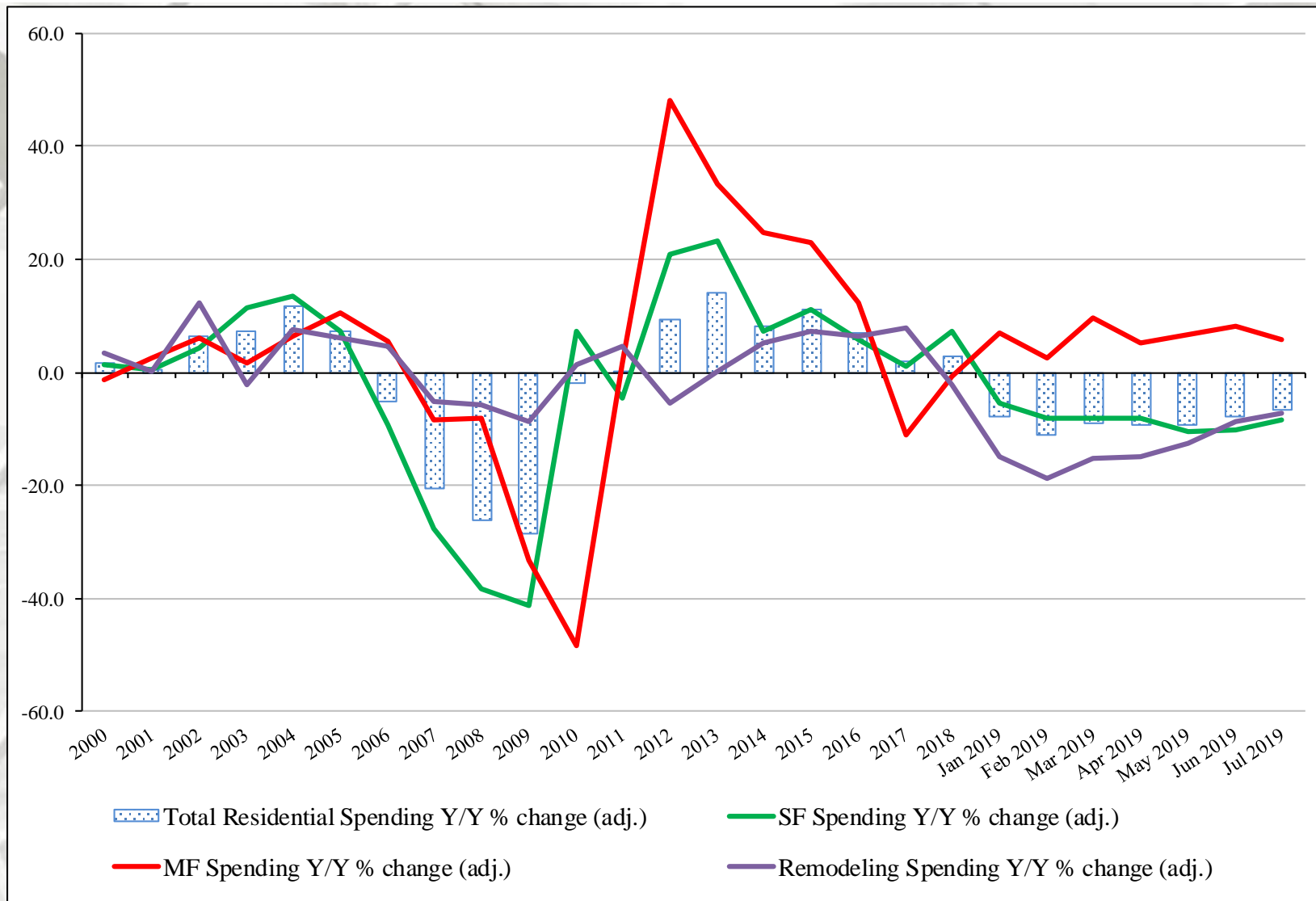
# Adjusted Construction Spending: Y/Y Percentage Change, 1993 to July 2019



## Nominal Residential Construction Spending: Y/Y percentage change, 1993 to July 2019

Presented above is the percentage change of inflation adjusted Y/Y construction spending. Only MF expenditures were positive on a percentage basis, year-over-year. 2019 data reported in nominal dollars.

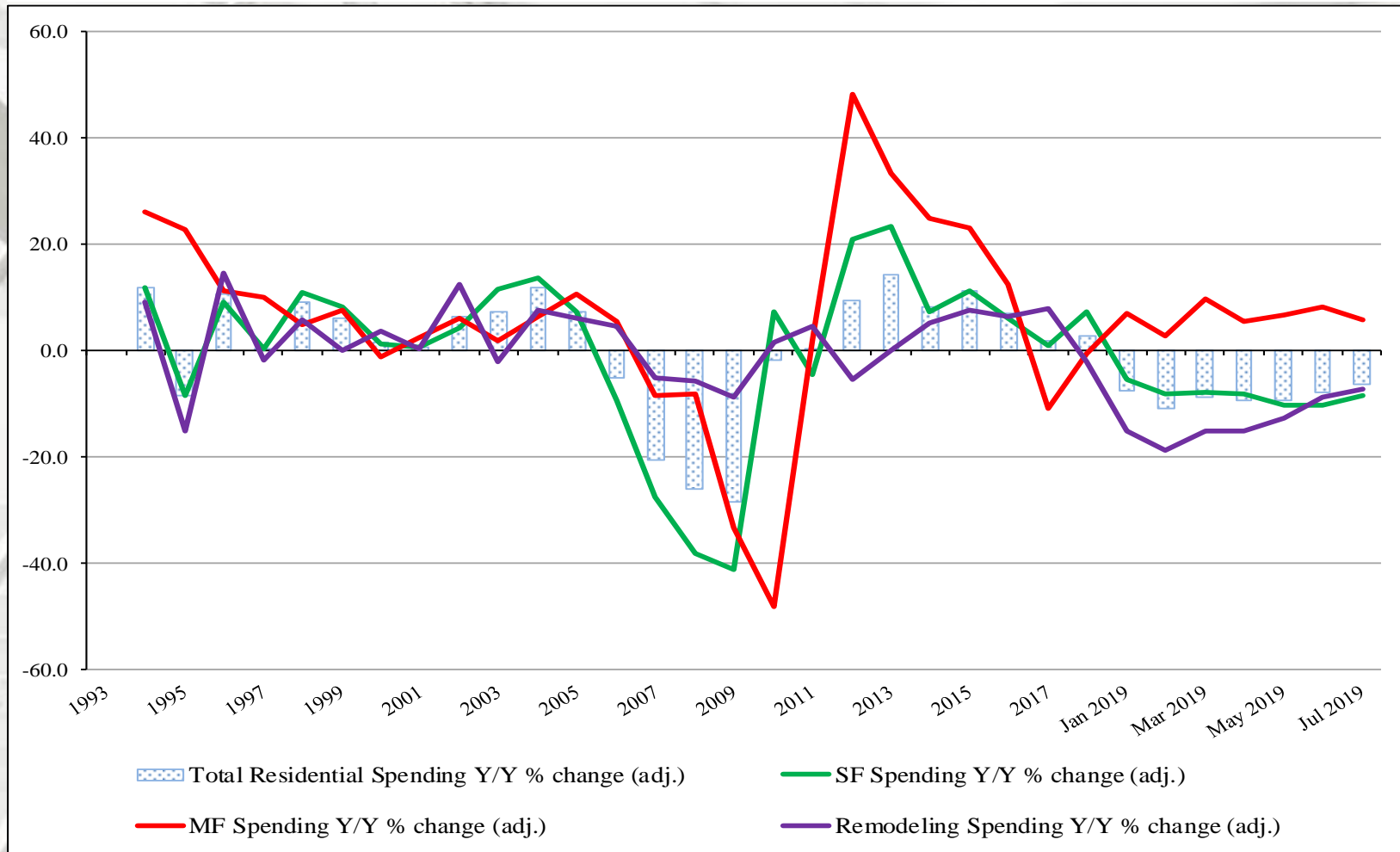
# Adjusted Construction Spending: Y/Y Percentage Change, 2000 to July 2019



Adjusted dollar values; except 2019 data – reported in nominal dollars.



# Total Adjusted Construction Spending: Y/Y Percentage Change, 1993 to July 2019



## Inflation Adjusted Residential Construction Spending:

### Y/Y percentage change, 1993 to July 2019

Only MF expenditures was positive in July, all others were negative; 2019 data reported in nominal dollars.

# Construction Spending

## FMI

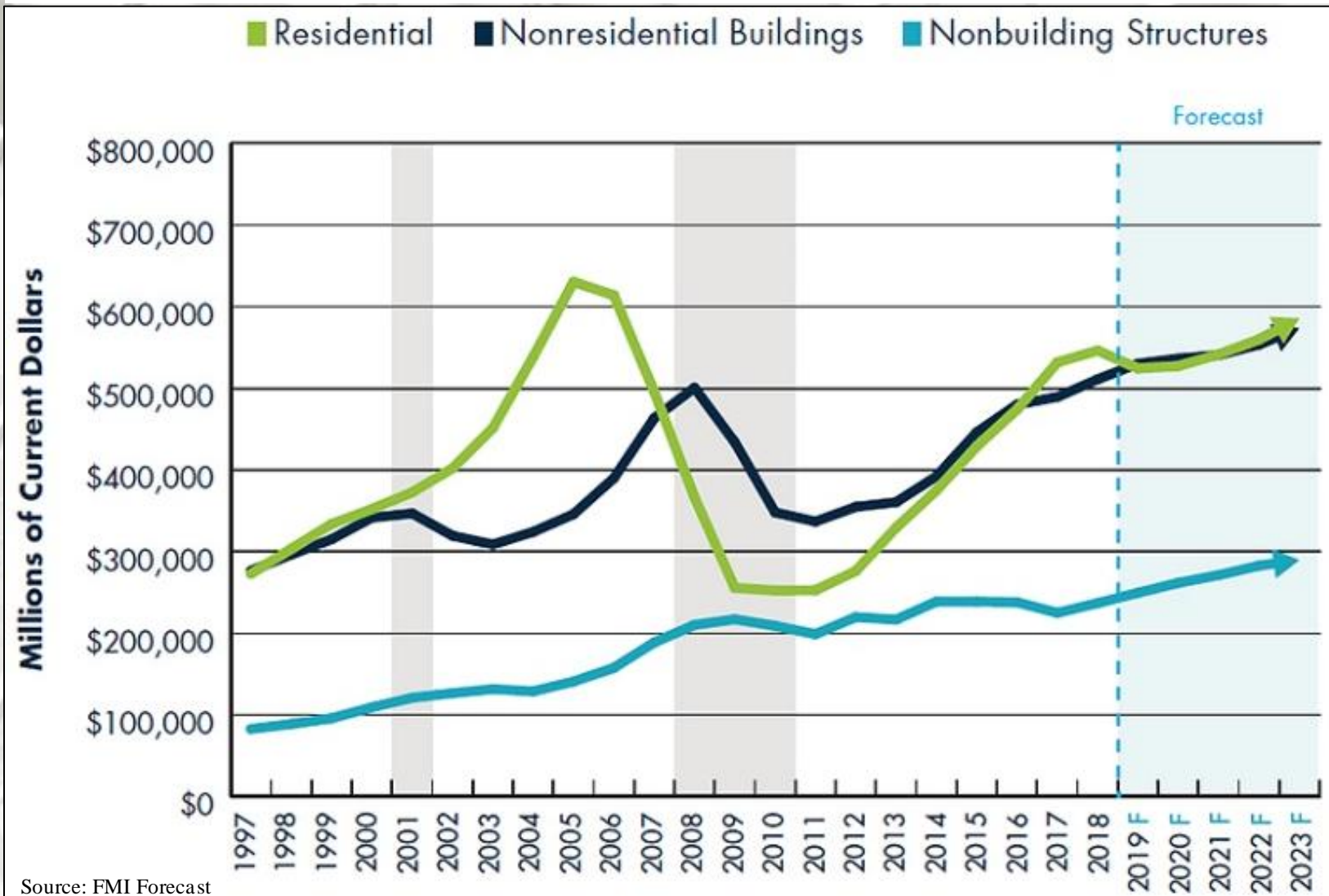
### **FMI's North American Construction Outlook Second Quarter 2019 Report**

“Total engineering and construction spending for the U.S. is forecast to end up 1 percent in 2019, compared to up 4 percent in 2018. Spending growth in 2019 is expected to be led by public investment across both nonresidential buildings and nonresidential structures. Current top-performing segments forecast in 2019 include conservation and development (+9 percent), transportation (+8 percent), water supply (+8 percent), public safety (+7 percent), office (+6 percent), and highway and street (+6 percent). Forecast bottom performing segments in 2019 include religious (-6 percent), single-family residential (-5 percent) and residential improvements (-4 percent).

Only one segment, sewage and waste disposal, was upgraded into our growth category through the second half of 2019. Conversely, educational and manufacturing have both been downgraded from growth to stable. Last, both single family residential and residential improvements have now been downgraded from stable to down. All three residential segments are now expected to end this year lower than 2018 spending levels.” -- Jay Bowman, Managing Director, FMI

# Construction Spending

## FMI Total Construction Put in Place Estimated for the U.S.



Source: FMI Forecast

# Construction Spending

## FMI

### Residential Construction Put in Place

#### “Single-Family Residential

- Rising home prices, debt levels and slow wage growth have resulted in significant affordability concerns
- Homebuyers are weary of the current economic climate, with mortgage rates expected to continue a slow decline
- Employment growth has slowed, but remains positive

Drivers: Unemployment rate, core CPI, income, mortgage rate, home prices, housing starts, housing permits.

#### Multifamily Residential

- New construction activity across several major urban markets appears to have cooled
- Prices continue to rise, but remain mostly attractive and attainable relative to affordability constraints in single-family homes
- Millennial buying practices and urbanization trends continue to drive long-term opportunities

Drivers: Unemployment rate, core CPI, income, mortgage rate, home prices, housing starts, housing permits.” -- Jay Bowman, Managing Director, FMI

# Construction Spending

## Single-Family Residential

Drivers: Unemployment rate, core CPI, income, mortgage rate, home prices, housing starts, housing permits

**DWN** 5%

\$270 Billion

2019/2018 Comparison



- Rising home prices, debt levels and slow wage growth have resulted in significant affordability concerns
- Homebuyers are weary of the current economic climate, with mortgage rates expected to continue a slow decline
- Employment growth has slowed, but remains positive

2019 **DWN** 5%

\$270 Billion

2020 **STA** 1%

\$272 Billion

2021 **STA** 3%

\$280 Billion

2022 **STA** 3%

\$290 Billion

2023 **UP** 5%

\$304 Billion

## Multifamily Residential

Drivers: Unemployment rate, core CPI, income, mortgage rate, home prices, housing starts, housing permits

**DWN** 1%

\$66 Billion

2019/2018 Comparison



- New construction activity across several major urban markets appears to have cooled
- Prices continue to rise, but remain mostly attractive and attainable relative to affordability constraints in single-family homes
- Millennial buying practices and urbanization trends continue to drive long-term opportunities

2019 **DWN** 1%

\$66 Billion

2020 **STA** 1%

\$66 Billion

2021 **STA** 3%

\$68 Billion

2022 **STA** 4%

\$71 Billion

2023 **UP** 6%

\$75 Billion

# Construction Spending

## Improvements

Drivers: Unemployment rate, core CPI, income, mortgage rate, home prices, housing starts, housing permits

**DWN** 4%

\$188 Billion

2019/2018 Comparison



- Stalled moving activity expected through 2020
- Labor constraints remain paramount while material price escalation has become mixed
- Rising home prices and wages continue to fuel demand, balanced, however, by higher real estate taxes

2019 **DWN** 4%  
\$188 Billion

2020 **STA** 0%  
\$189 Billion

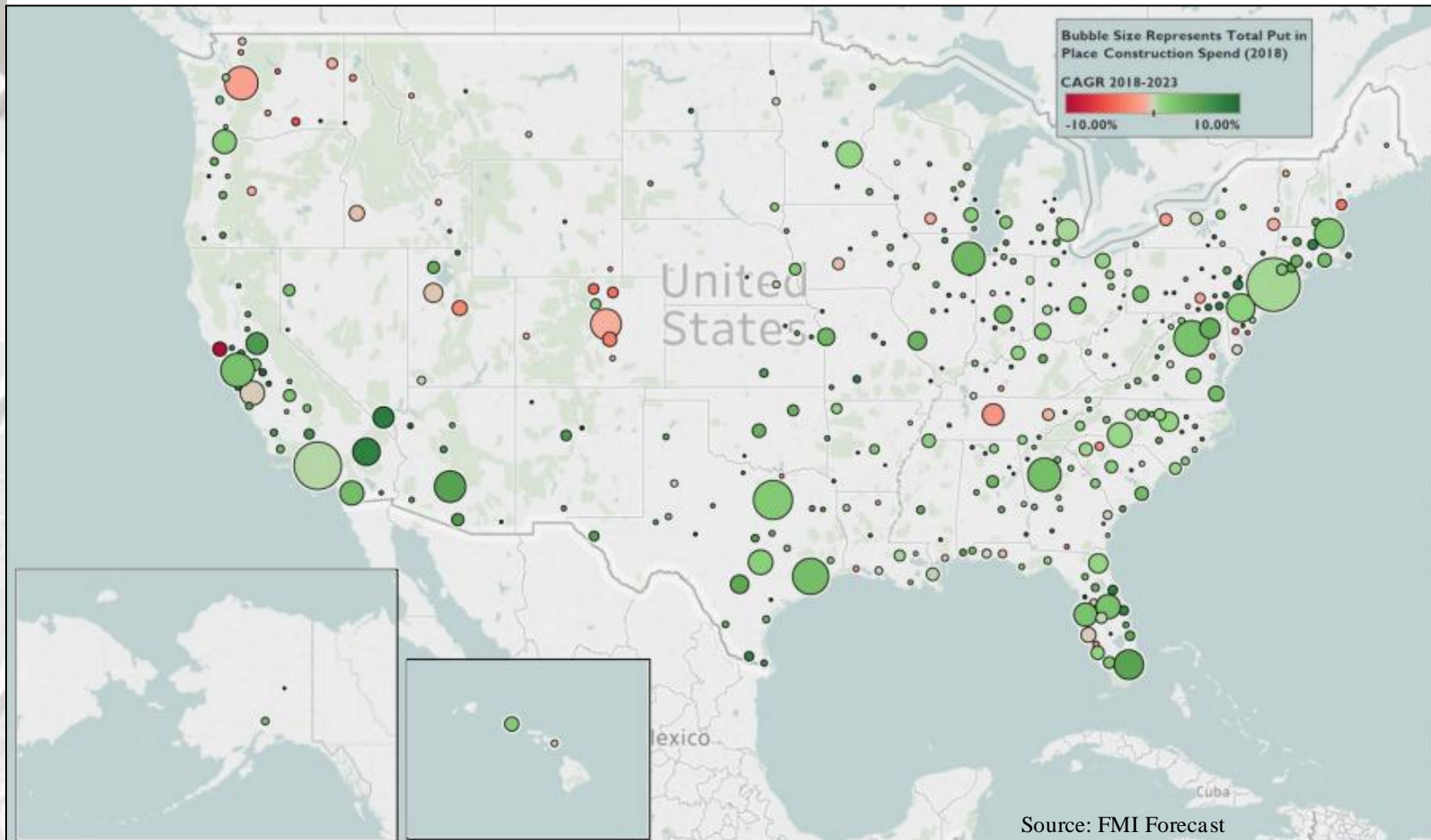
2021 **STA** 2%  
\$193 Billion

2022 **STA** 3%  
\$199 Billion

2023 **STA** 4%  
\$206 Billion

# Construction Spending

## Total Construction Spending Put in Place 2018 and Forecast Growth (2018-2023 CAGR) by Metropolitan Statistical Area



# Remodeling

## Metrostudy

### **Remodeling Outlook Remains Positive Despite Expectations of Tight Housing Market, RRI Finds**

The index posts YOY growth for the 29th consecutive quarter, but forecasts more moderate growth in 2020.

“Big-ticket remodeling activity nationwide increased 3.4% year over year (YOY) in the second quarter of 2019, Metrostudy announced in its release of the latest [Residential Remodeling Index](#) (RRI). The index climbed to a new high of 118.3 in the second quarter, a 0.7% increase from the first quarter RRI.

The RRI values means that economic conditions known to influence remodeling activity are 18.3% better than the old peak in early 2007, just before the Great Recession. The positive growth in the RRI marks the 29th consecutive quarter of YOY gains since remodeling activity bottomed in 2011.

While Metrostudy calls for continued gains over the next few years in the remodeling industry, growth is expected at slower rates. The RRI is expected to average YOY increases of 3.2% in 2019, 2.0% in 2020, and 2.4% in 2021. The projected gains in 2020 and 2021 are both lower than projections from the first quarter RRI. The moderate gains are expected to be related to lower housing turnover via the low levels of new home construction, according to Metrostudy.” – Vincent Salandro, Assistant Editor, Remodeling



# Remodeling

## Metrostudy

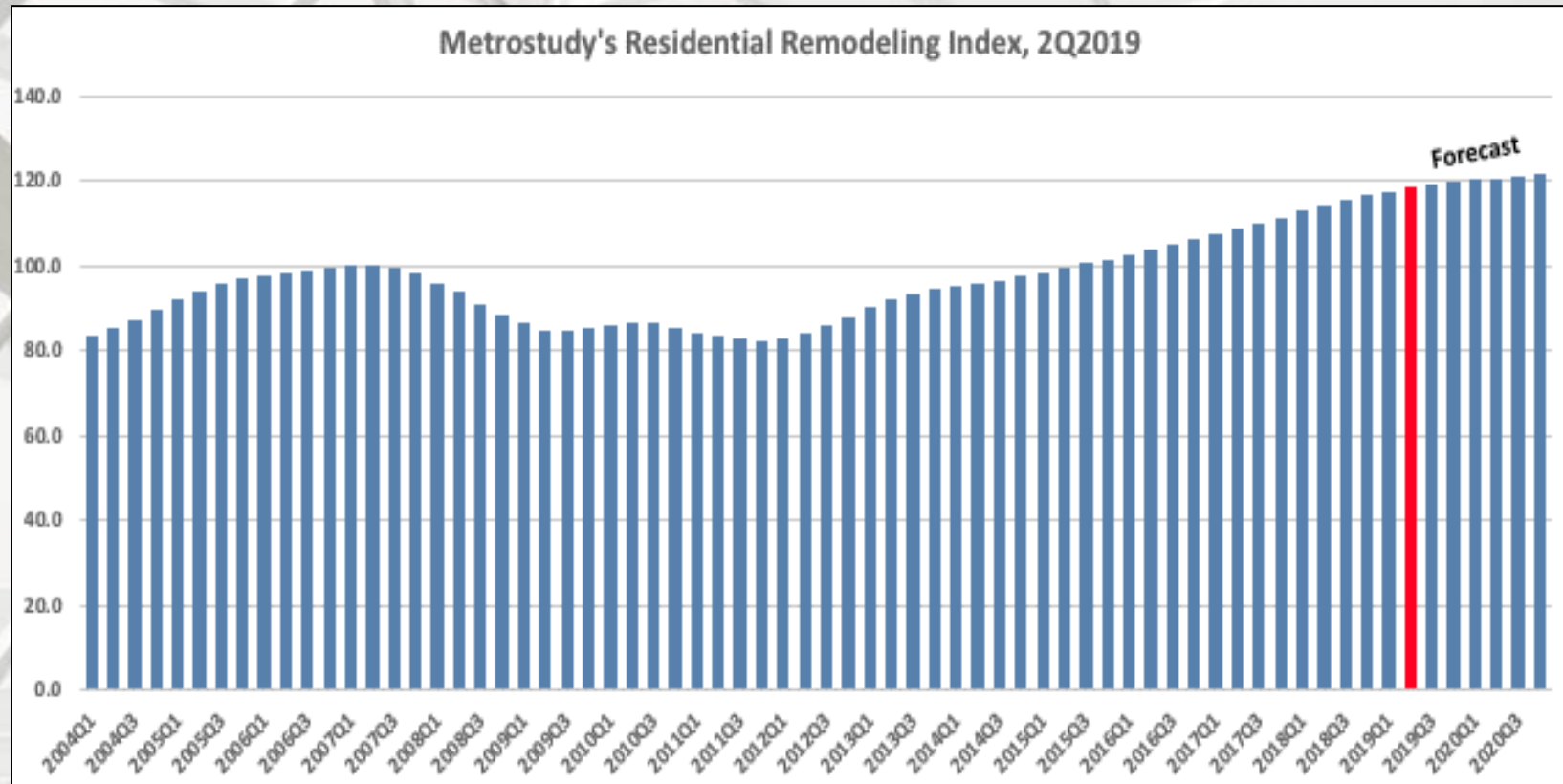
““At current levels, the job market is generating more than sufficient demand to feed the housing and remodeling markets. Existing home sales in July posted their first year-over-year increase in seventeen months due to the recent drop in mortgage rates,” Mark Boud, chief economist at Metrostudy said. “While the uptick in sales is reassuring, supply decreased 1.6% year-over-year and remains tight, which means sustained increases in future sales will be a challenge.”

Boud said the continued trend of Americans staying put and upgrading their homes will likely buoy and fuel future remodeling growth. Boud noted that Metrostudy expects continued increases in remodeling activity in the short term, just at slower rates compared to the past few years.

The RRI is based on a statistical model that takes into account data such as household level remodeling permits and consumer-reported remodeling and replacement projects. It uses a model to predict the number and dollar volume of home improvement and replacement projects nationwide worth at least \$1,000 in 381 metropolitan statistical areas and nationwide.

Metrostudy projects the number of remodeling projects worth \$1,000 or more will rise to 12.9 million, a 3.2% increase YOY. Big-ticket flooring and exterior projects are expected to have the biggest increases in 2019, while big-ticket pool, siding, and window projects will have the smallest YOY increases. The inflation-adjusted value of big-ticket remodeling projects in 2019 is predicted to increase 4.7% to \$203.7 billion.” – Vincent Salandro, Assistant Editor, Remodeling

# Remodeling



## Metrostudy

“According to Metrostudy, all but one metro area — Bismark, N.D. — will see growth in 2019 and these markets will experience an average growth rate of 3.1%.” – Vincent Salandro, Assistant Editor, Remodeling

# Existing House Sales

**National Association of Realtors**

**July 2019 sales: 5.420 thousand**

	<b>Existing Sales</b>	<b>Median Price</b>	<b>Mean Price</b>	<b>Month's Supply</b>
June	5,420,000	\$280,800	\$317,100	4.2
May	5,290,000	\$285,300	\$321,400	4.4
2018	5,390,000	\$269,300	\$307,600	4.3
M/M change	2.5%	-1.6%	-1.3%	-4.5%
Y/Y change	0.6%	4.3%	3.1%	-2.3%

All sales data: SAAR

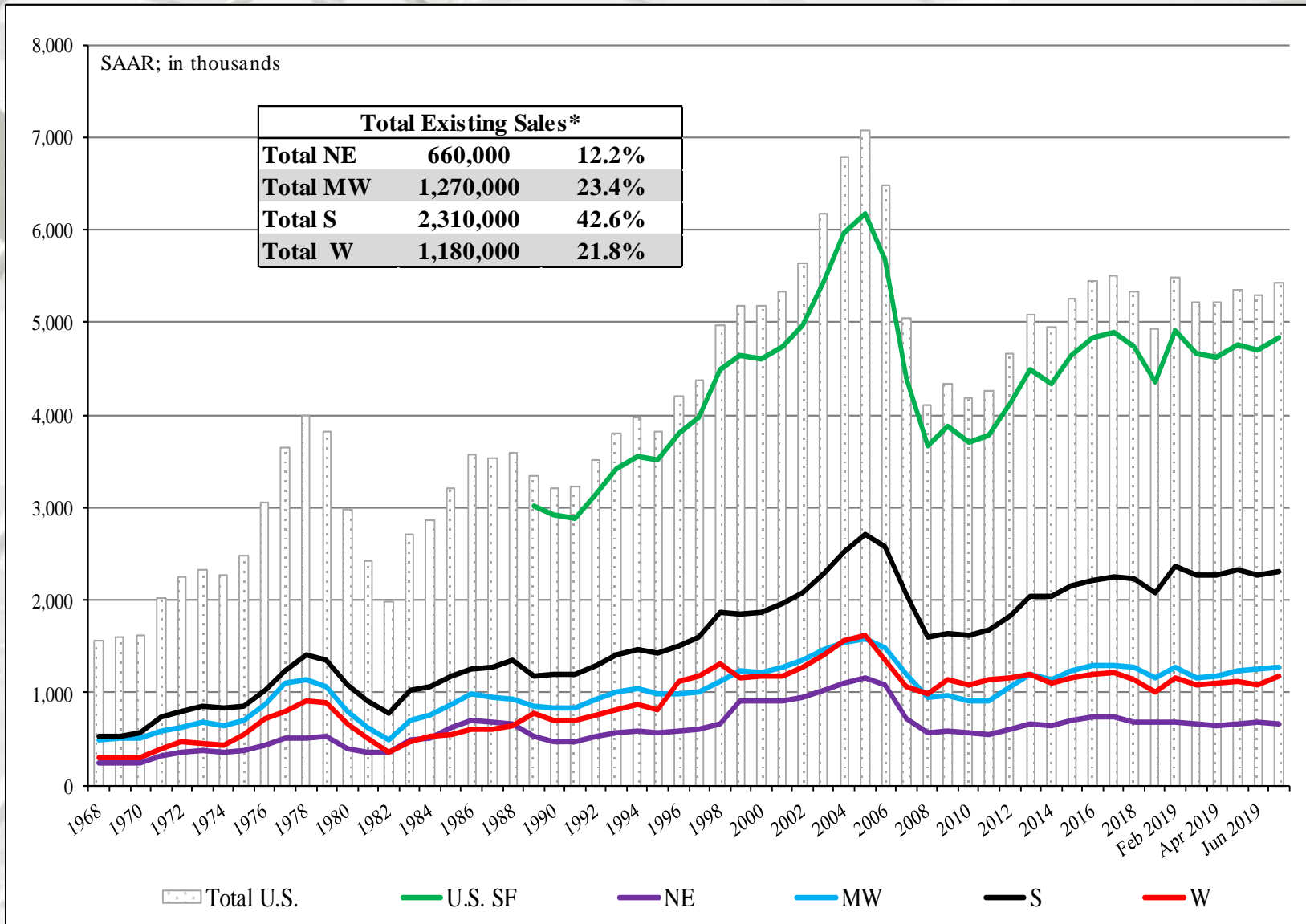
# Existing House Sales

	Existing SF Sales	SF Median Price	SF Mean Price
June	4,840,000	284,000	319,100
May	4,710,000	288,500	323,500
2018	4,790,000	271,900	309,200
M/M change	2.8%	-1.6%	-1.4%
Y/Y change	1.0%	4.5%	3.2%

	NE	MW	S	W
June	660,000	1,270,000	2,310,000	1,180,000
May	680,000	1,250,000	2,270,000	1,090,000
2018	690,000	1,260,000	2,250,000	1,190,000
M/M change	-2.9%	1.6%	1.8%	8.3%
Y/Y change	-4.3%	0.8%	2.7%	-0.8%

All sales data: SAAR.

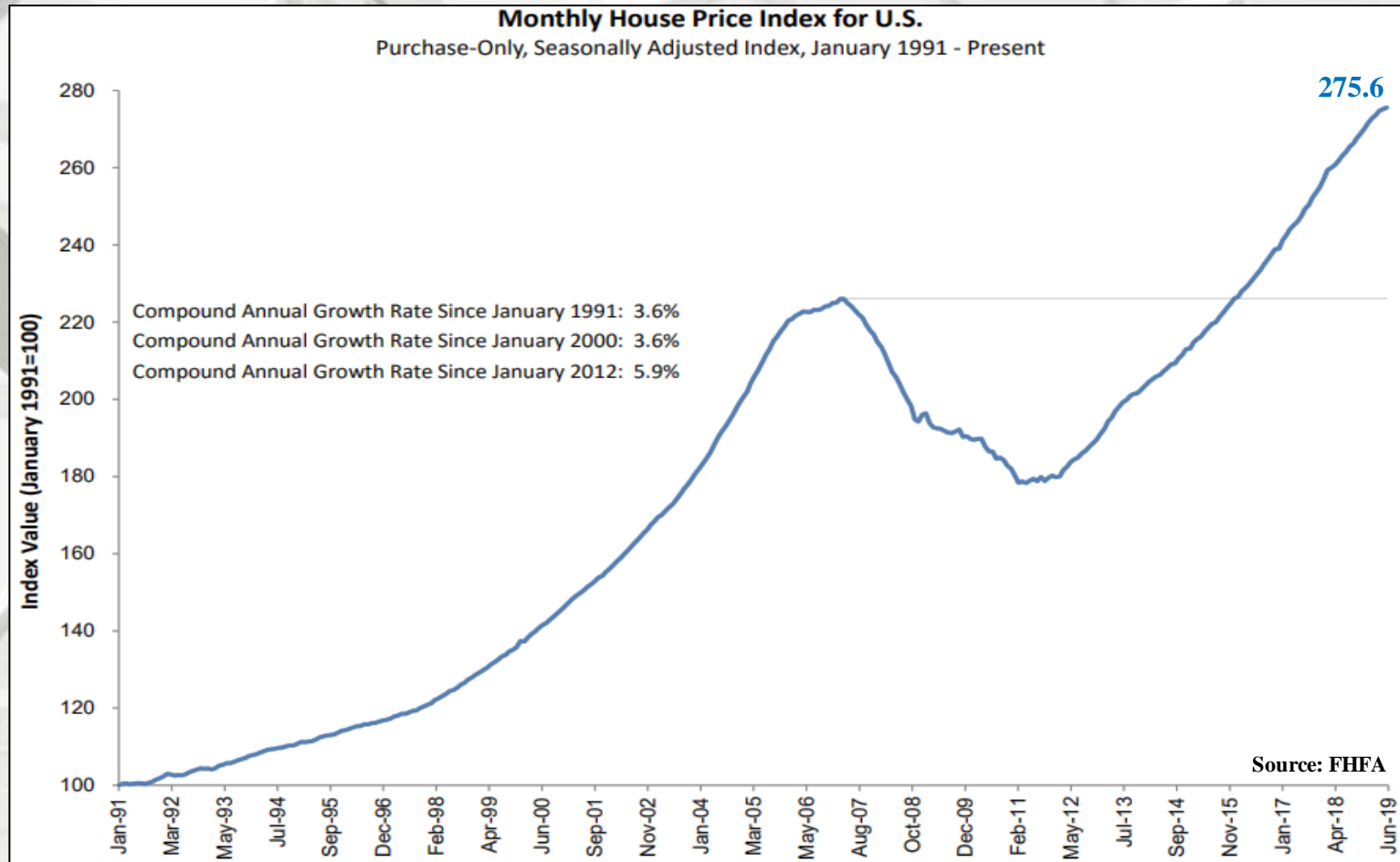
# Existing House Sales



NE = Northeast; MW = Midwest; S = South; W = West

\* Percentage of existing sales.

# U.S. Housing Prices



## U.S. House Prices Rise 1.0 Percent in Second Quarter; Up 5.0 Percent from Last Year

“U.S. house prices rose in the second quarter of 2019, up **1.0 percent** according to the Federal Housing Finance Agency (FHFA) House Price Index (HPI). House prices rose **5.0 percent** from the second quarter of 2018 to the second quarter of 2019. FHFA's seasonally adjusted monthly index for June was up **0.2 percent** from May.” – Corinne Russell and Stefanie Johnson, FHFA

# U.S. Housing Prices

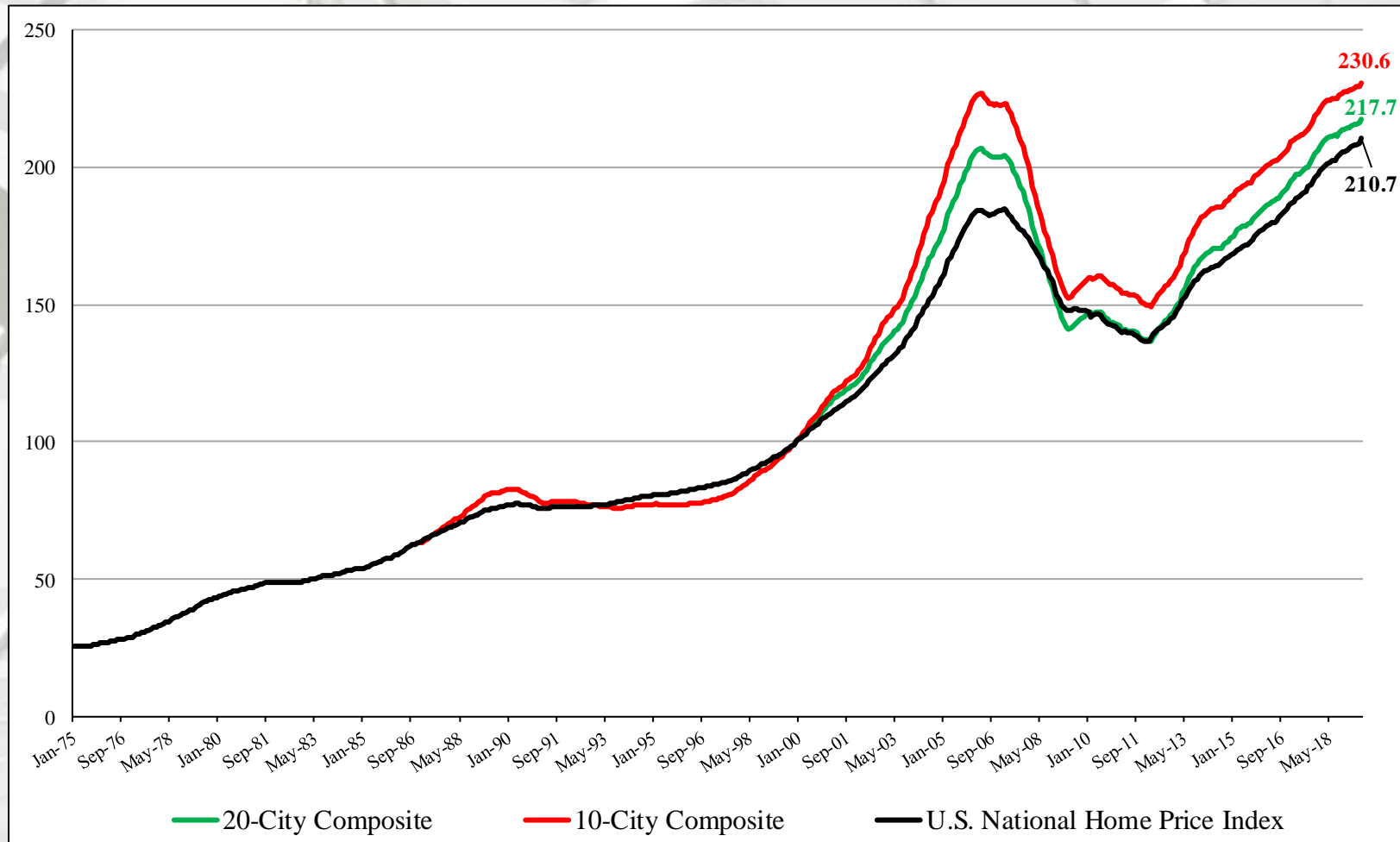
“The S&P CoreLogic Case-Shiller U.S. National Home Price NSA Index, covering all nine U.S. census divisions, reported a 3.1% annual gain in June, down from 3.3% in the previous month. The 10-City Composite annual increase came in at 1.8%, down from 2.2% in the previous month. The 20-City Composite posted a 2.1% year-over-year gain, down from 2.4% in the previous month.

## **Phoenix Replaces Las Vegas As Top City In Annual Gains According To S&P CoreLogic Case-Shiller Index**

“Home price gains continue to trend down, but may be leveling off to a sustainable level. The average YOY gain declined to 3.0% in June, down from 3.1% the prior month. However, fewer cities (12) experienced lower YOY price gains than in May (13).

The southwest (Phoenix and Las Vegas) remains the regional leader in home price gains, followed by the southeast (Tampa and Charlotte). With three of the bottom five cities (Seattle, San Francisco, and San Diego), much of the west coast is challenged to sustain YOY gains. For the second month in a row, however, only Seattle experienced outright decline with YOY price change of -1.3%. The U.S. National Home Price NSA Index YOY price change in June 2019 of 3.1% is exactly half of what it was in June 2018. While housing has clearly cooled off from 2018, home price gains in most cities remain positive in low single digits. Therefore, it is likely that current rates of change will generally be sustained barring an economic downturn.” – Philip Murphy, Managing Director and Global Head of Index Governance, S&P Dow Jones Indices

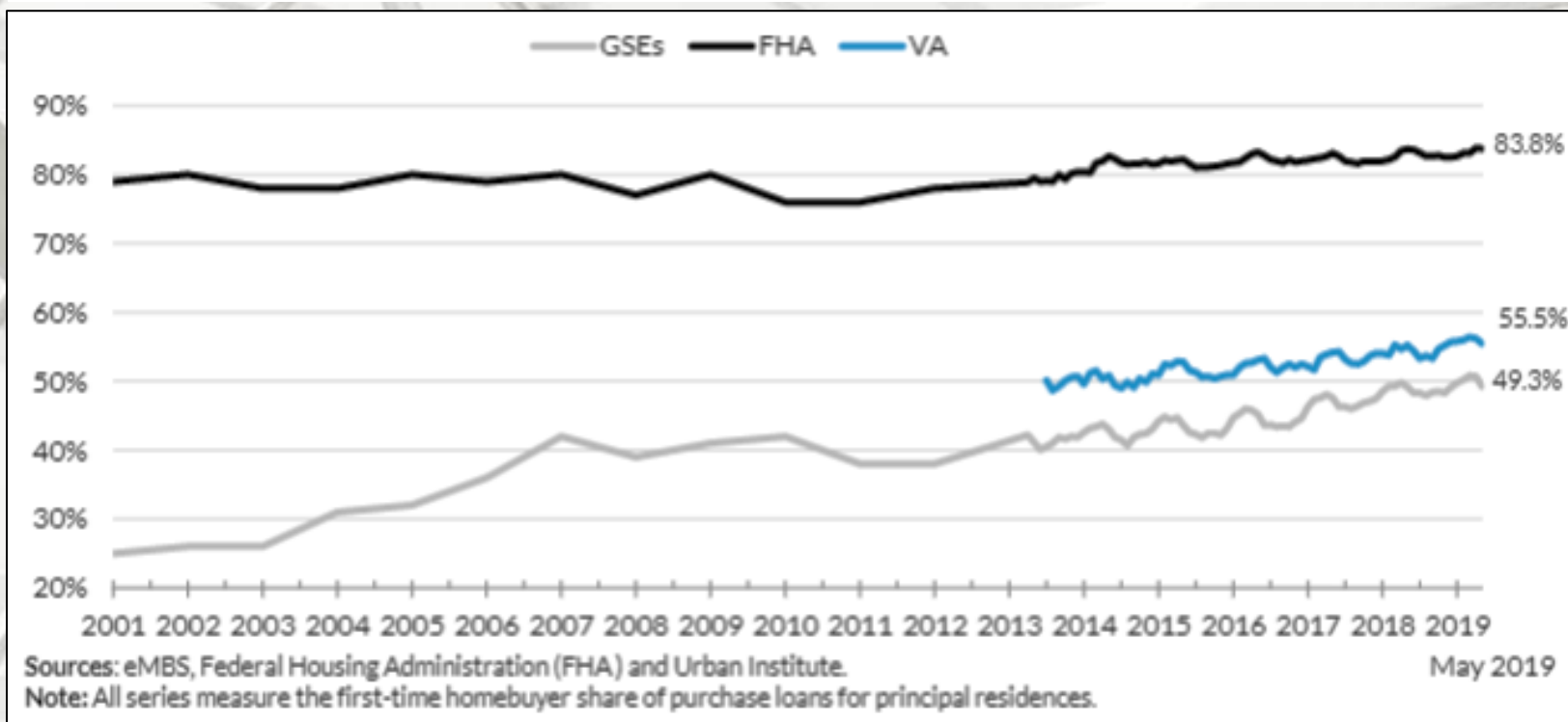
# S&P/Case-Shiller Home Price Indices



“Phoenix, Las Vegas and Tampa reported the highest year-over-year gains among the 20 cities. In June, Phoenix led the way with a 5.8% year-over-year price increase, followed by Las Vegas with a 5.5% increase, and Tampa with a 4.7% increase. Six of the 20 cities reported greater price increases in the year ending June 2019 versus the year ending May 2019.” – Soogyung Jordan, Global Head of Communications, S&P CoreLogic



# First-Time House Buyers

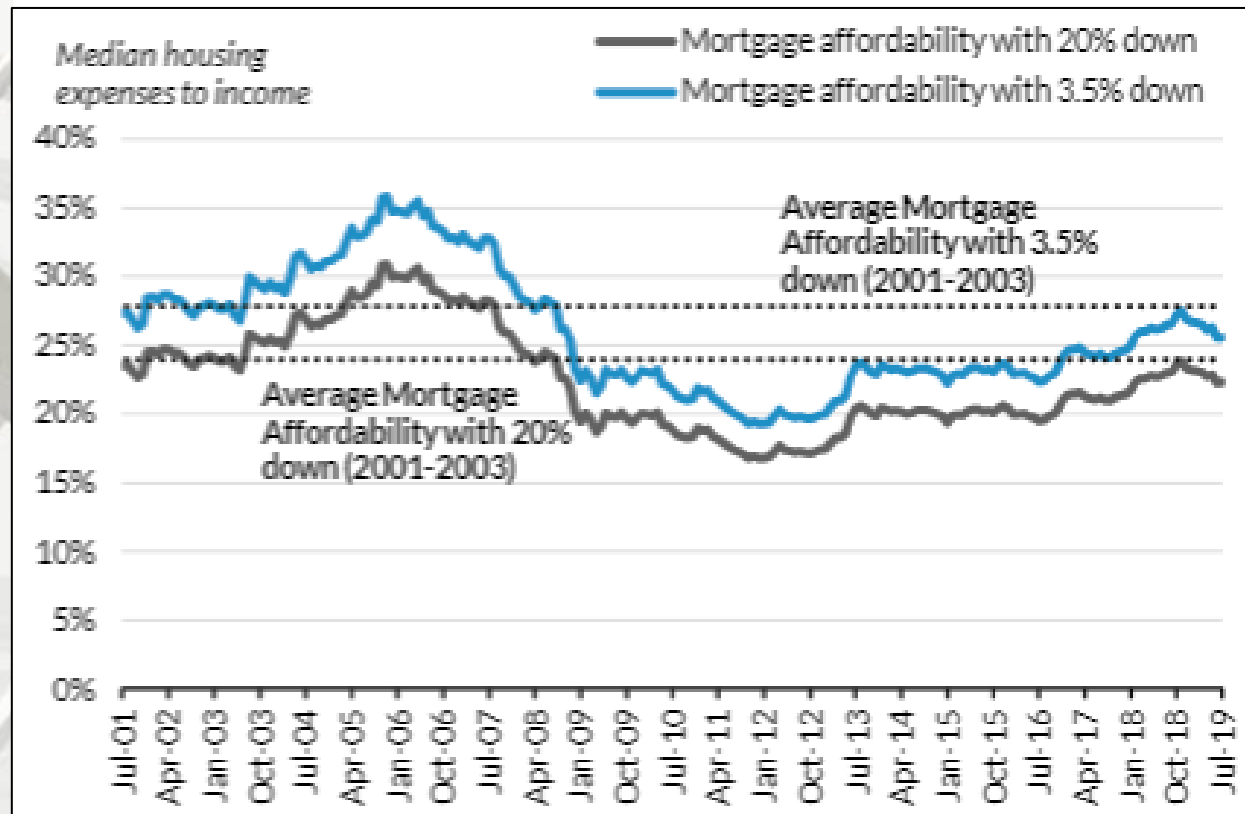


## Urban Institute

“In May 2019, the FTHB share for FHA, which has always been more focused on first time homebuyers, fell very slightly to 83.8 percent in May 2019. The FTHB share of VA lending also fell in May, to 55.5 percent. The GSE FTHB share in May was 49.3 percent. The bottom table shows that based on mortgages originated in April 2019, the average FTHB was more likely than an average repeat buyer to take out a smaller loan, have a lower credit score, and higher LTV and higher DTI, thus paying a higher interest rate.” – Bing Lai, Research Associate, Housing Finance Policy Center

# Housing Affordability

## National Housing Affordability Over Time



## Urban Institute

“Home prices remain affordable by historic standards, despite price increases over the last 7 years, as interest rates remain relatively low in an historic context. As of July 2019, with a 20 percent down payment, the share of median income needed for the monthly mortgage payment stood at 22.3 percent; with 3.5 down, it is 25.6 percent. Since February, the median housing expenses to income ratio has been slightly lower than the 2001-2003 average. ...”

– Laurie Goodman, VP, Housing Finance Policy Center

# Mortgage Credit Availability

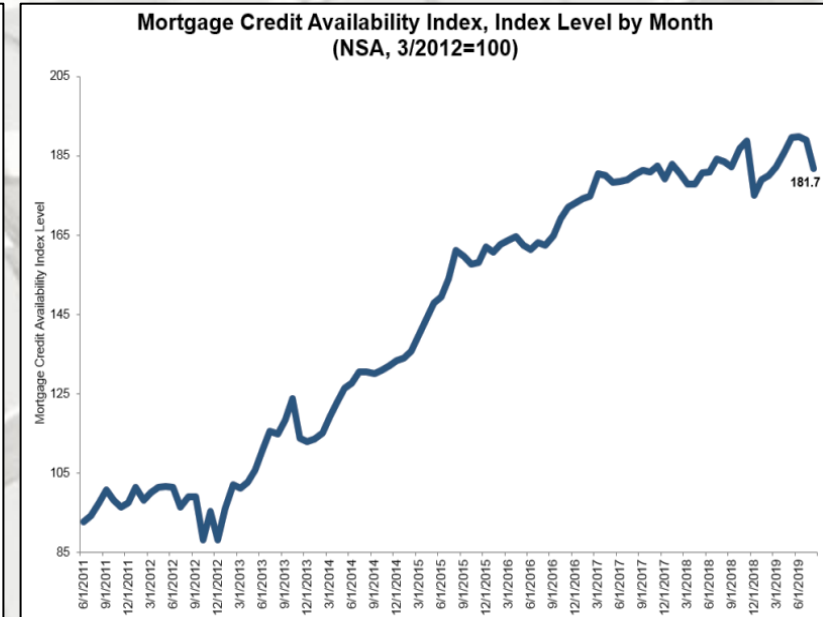
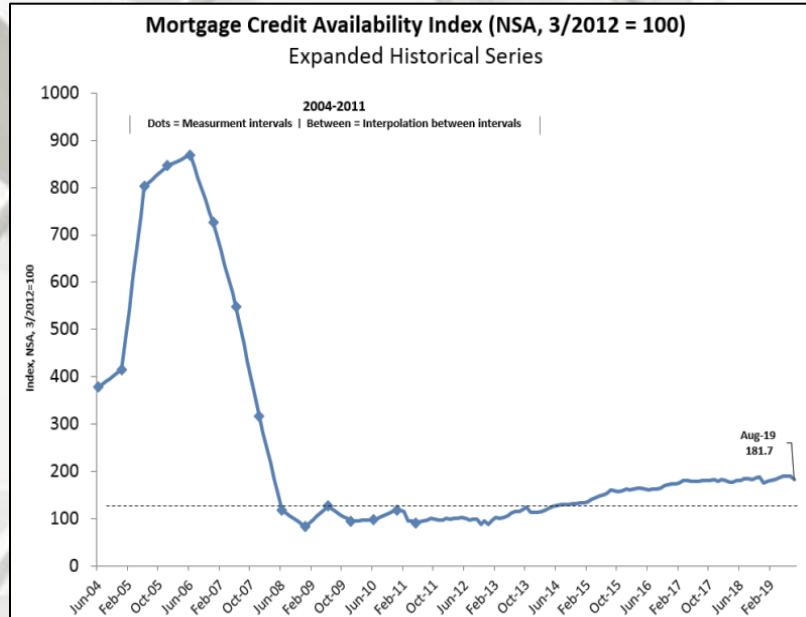
## Mortgage Credit Availability Decreased in August

“Mortgage credit availability decreased in August according to the Mortgage Credit Availability Index (MCAI), a report from the Mortgage Bankers Association (MBA) which analyzes data from Ellie Mae's AllRegs® Market Clarity® business information tool.

The MCAI fell by 3.9 percent to 181.7 in August. A decline in the MCAI indicates that lending standards are tightening, while increases in the index are indicative of loosening credit. The index was benchmarked to 100 in March 2012. The Conventional MCAI decreased 3.6 percent, while the Government MCAI decreased by 4.1 percent. Of the component indices of the Conventional MCAI, the Jumbo MCAI decreased by 3.2 percent, and the Conforming MCAI fell by 4.3 percent.

Credit supply declined across the board in August, even as mortgage rates fell and application activity picked up, particularly for refinances. Last month's decrease was the largest since December 2018, and also the first tightening we have seen for conventional loans all year. We anticipate some weakening of the job market in the year ahead as economic growth cools. It's possible some lenders may be tightening credit in expectation of a slowdown.” – Joel Kan, Associate Vice President of Economic and Industry Forecasting, MBA

# Mortgage Credit Availability



Source: *Mortgage Bankers Association; Powered by Ellie Mae's AllRegs® Market Clarity®*

# United States Housing Market

## The Z Report™

### As Cyclical Recovery Continues, Entry-Level Single-Family Inventory Exploding

“In 2012, according to the Census Bureau unsold single-family homes under construction hit the lowest level on record at 146,000 units and was 57% lower than the 336,000 unit average from 1975- 2005. Since that time, the U.S. housing market continues to recover alongside the economy and now has 337,000 speculative units for sale as of 1H19, climbing 130% from the 2012 bottom. While there have been fits and starts for single-family demand over the last six-plus years, we believe that the expansion of supply has been warranted and still believe that additional inventory would be justified, at the right price point.

One limitation of the government data is a lack of detail about the type of speculative inventory accumulated across the industry. To augment this data, once a quarter we analyze homes available for sale across 25 of the largest production home builders in the country. In the second quarter, our sample of more than 28,000 homes equated to approximately 9% of the national total, providing a solid proxy of national dynamics. Within our analysis, we detail the size and attributes of available inventory to assess supply by price point.

For instance, in 2Q19, 20% of for-sale new construction inventory was less than 1,800 square feet in size, up a robust 540 basis points year over year. Additionally, homes sized 1,800-2,249 square feet accounted for 27% of the total versus less than 20% when we began our analysis in 1Q15. In fact, gains have been accelerating of late as builders have become more comfortable pursuing affordable submarkets targeted at the entry-level price point and entry-level demand has proven to be very strong.” – Ivy Zelman, CEO, Zelman & Associates

# United States Housing Market

## The Z Report™

### As Cyclical Recovery Continues, Entry-Level Single-Family Inventory Exploding

“These share gains have come at the expense of higher-end, larger homes where demand is healthy, but not nearly as robust as it is for the entry-level. To best frame the dramatic transition, we overlay our square footage segmentation onto the Census Bureau’s measure of total speculative inventory. From 2Q15 through 2Q19, the national total increased 59%, or an annual increase of 12%. Meanwhile, homes with less than 1,800 square feet skyrocketed 165%, or 28% per year, followed by homes 1,800-2,249 square feet up 122% in total and 22% per year. On the other end of the spectrum, homes with at least 2,500 square feet are only 8% higher than four years ago, equating to a moderate 2% annual gain.

More recently, as the industry’s substantial shift to entry-level product has been more visible, we have fielded more questions as to whether a continued supply push is warranted. Like any cyclical industry, the safe assumption is that eventually overproduction will occur. However, we believe that the runway for above-average demand growth at the entry-level price point is quite clear over the next two years, at least, justifying the current path of supply.” – Ivy Zelman, CEO, Zelman & Associates

# Summary

## **In conclusion:**

July 2019 United States housing data indicated slight improvement; yet, most categories remain well less than historical averages. Single-family permits, starts, and completions were all positive month-over-month. Notably, single-family construction spending continued a year-over-year decline. Total housing permits and construction spending were positive. New single-family sales, total housing starts, and total plus single-family housing under construction were negative month-over-month.

Housing, in the majority of categories, remains substantially less than their respective historical averages. The new SF housing construction sector is where the majority of value-added forest products are utilized and this housing sector has ample room for improvement.

## **Pros:**

- 1) Historically low interest rates are still in place;
- 2) Select builders are beginning to focus on entry-level houses.

## **Cons:**

- 1) Housing affordability shows minimal improvement;
- 2) Lot availability and building regulations (according to several sources);
- 3) Laborer shortages;
- 4) Household formations still lag historical averages;
- 5) Changing attitudes towards SF ownership;
- 6) Job creation is improving and consistent but some economists question the quantity and types of jobs being created;
- 7) Debt: Corporate, personal, government – United States and globally;
- 8) Other global uncertainties.

# Virginia Tech Disclaimer

## **Disclaimer of Non-endorsement**

Reference herein to any specific commercial products, process, or service by trade name, trademark, manufacturer, or otherwise, does not constitute or imply its endorsement, recommendation, or favoring by Virginia Tech. The views and opinions of authors expressed herein do not necessarily state or reflect those of Virginia Tech, and shall not be used for advertising or product endorsement purposes.

## **Disclaimer of Liability**

With respect to documents sent out or made available from this server, neither Virginia Tech nor any of its employees, makes any warranty, expressed or implied, including the warranties of merchantability and fitness for a particular purpose, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights.

## **Disclaimer for External Links**

The appearance of external hyperlinks does not constitute endorsement by Virginia Tech of the linked web sites, or the information, products or services contained therein. Unless otherwise specified, Virginia Tech does not exercise any editorial control over the information you July find at these locations. All links are provided with the intent of meeting the mission of Virginia Tech's web site. Please let us know about existing external links you believe are inappropriate and about specific additional external links you believe ought to be included.

## **Nondiscrimination Notice**

Virginia Tech prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact the author. Virginia Tech is an equal opportunity provider and employer.



# **U.S. Department of Agriculture Disclaimer**

## **Disclaimer of Non-endorsement**

Reference herein to any specific commercial products, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government, and shall not be used for advertising or product endorsement purposes.

## **Disclaimer of Liability**

With respect to documents available from this server, neither the United States Government nor any of its employees, makes any warranty, express or implied, including the warranties of merchantability and fitness for a particular purpose, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights.

## **Disclaimer for External Links**

The appearance of external hyperlinks does not constitute endorsement by the U.S. Department of Agriculture of the linked web sites, or the information, products or services contained therein. Unless otherwise specified, the Department does not exercise any editorial control over the information you find at these locations. All links are provided with the intent of meeting the mission of the Department and the Forest Service web site. Please let us know about existing external links you believe are inappropriate and about specific additional external links you believe ought to be included.

## **Nondiscrimination Notice**

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202.720.2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call 800.795.3272 (voice) or 202.720.6382 (TDD). The USDA is an equal opportunity provider and employer.