RISKSPAN

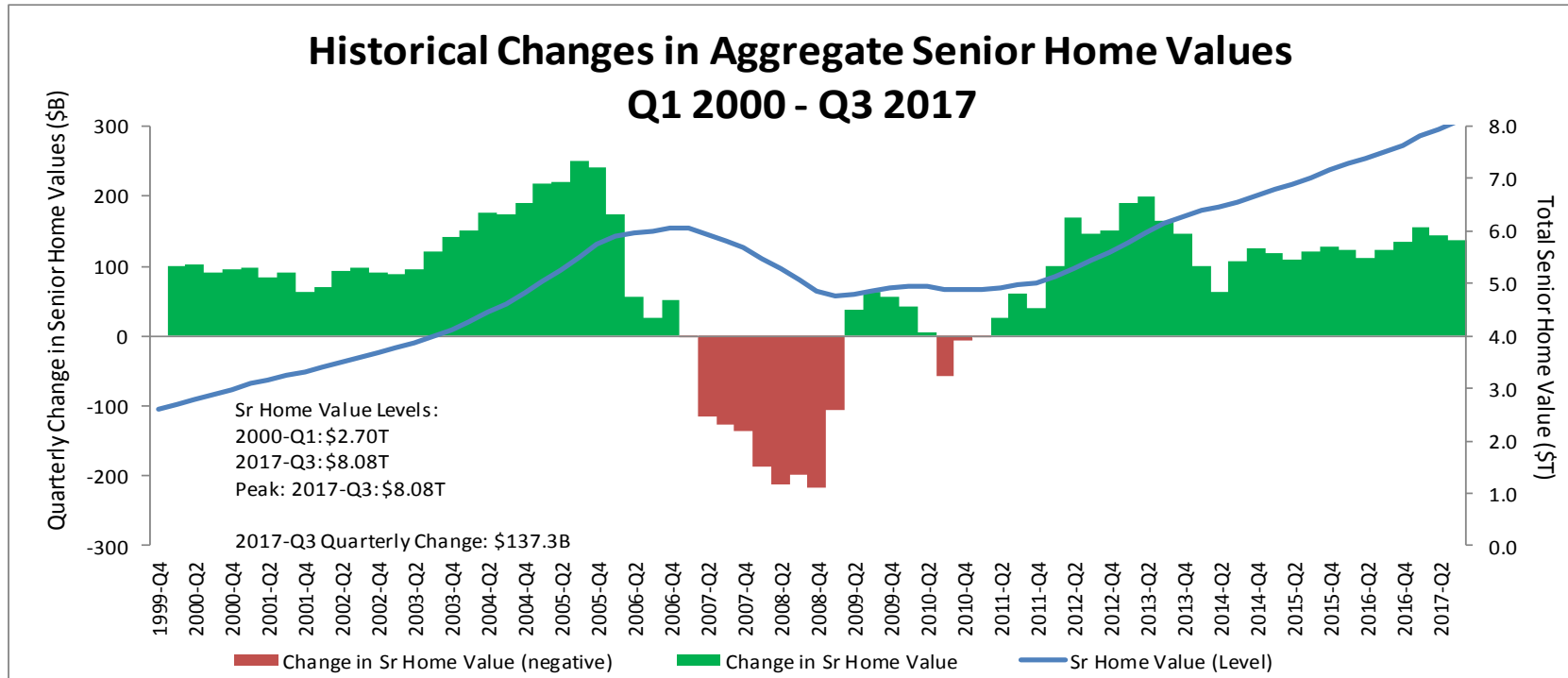# Reverse Mortgage Market Index (Q3 2017 RMMI)

NRMLA/RiskSpan

December 18, 2017

data made beautiful

Presentation Outline

- Trends in Senior Housing

  - Aggregate Home Values (Q1 2000 – Q3 2017)

  - Aggregate Mortgage Debt Levels (Q1 2000 – Q3 2017)

  - Aggregate Equity (Q1 2000 – Q3 2017)

  - Reverse Mortgage Market Index (RMMI) (Q1 2000 – Q3 2017)

  - Historical Summary of key RMMI components (Q1 2010 – Q3 2017)

- Overview of RMMI Data Sources and Calculation Steps

- Detailed Steps for RMMI Calculation
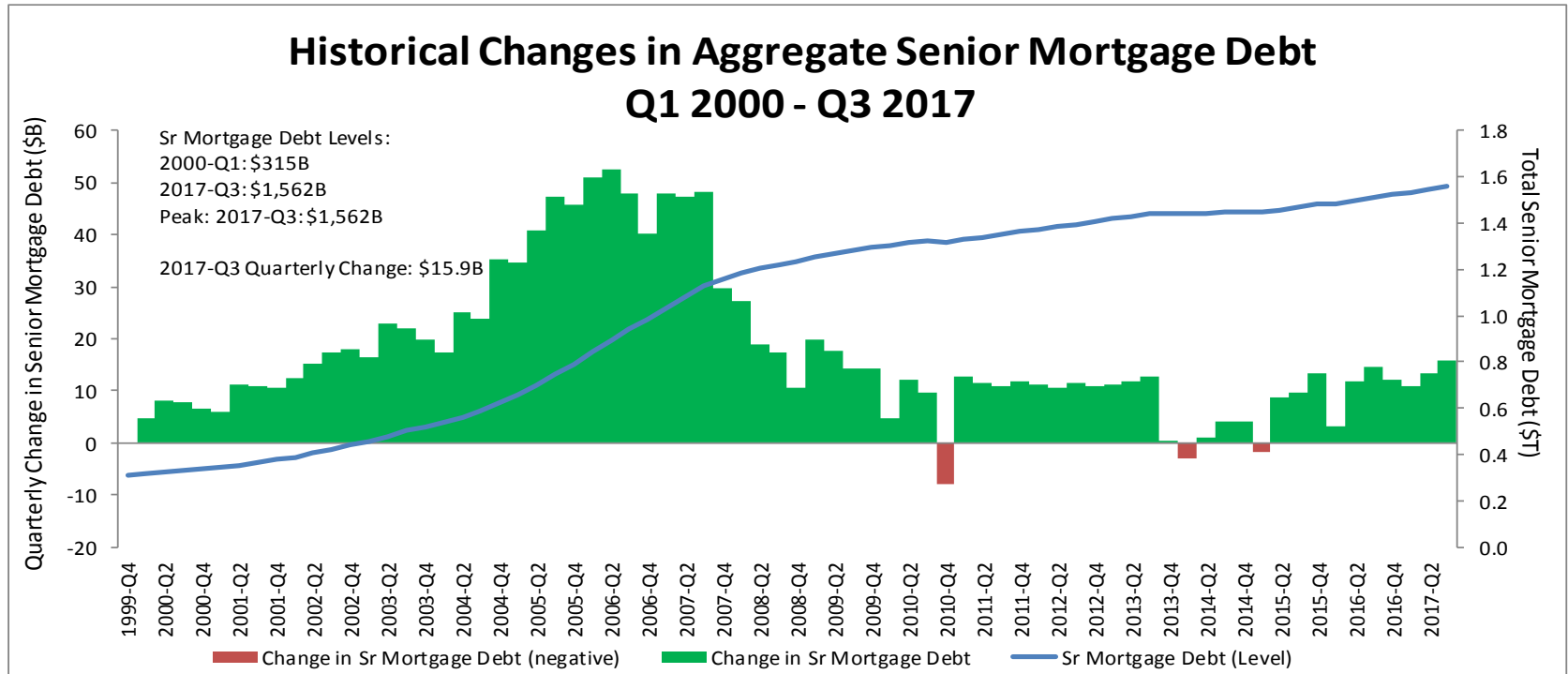
- Overview of new methodology

Quarter Over Quarter Changes in Senior Home Values

Historical Changes in Aggregate Senior Home Values
Q1 2000 - Q3 2017

Sr Home Value Levels:
2000-Q1: $2.70T
2017-Q3: $8.08T
Peak: 2017-Q3: $8.08T

2017-Q3 Quarterly Change: $137.3B

Legend:
- Change in Sr Home Value (negative)
- Change in Sr Home Value
- Sr Home Value (Level)

Y-axis (left): Quarterly Change in Senior Home Values ($B)
Y-axis (right): Total Senior Home Value ($T)

Prepared by RiskSpan, Inc.
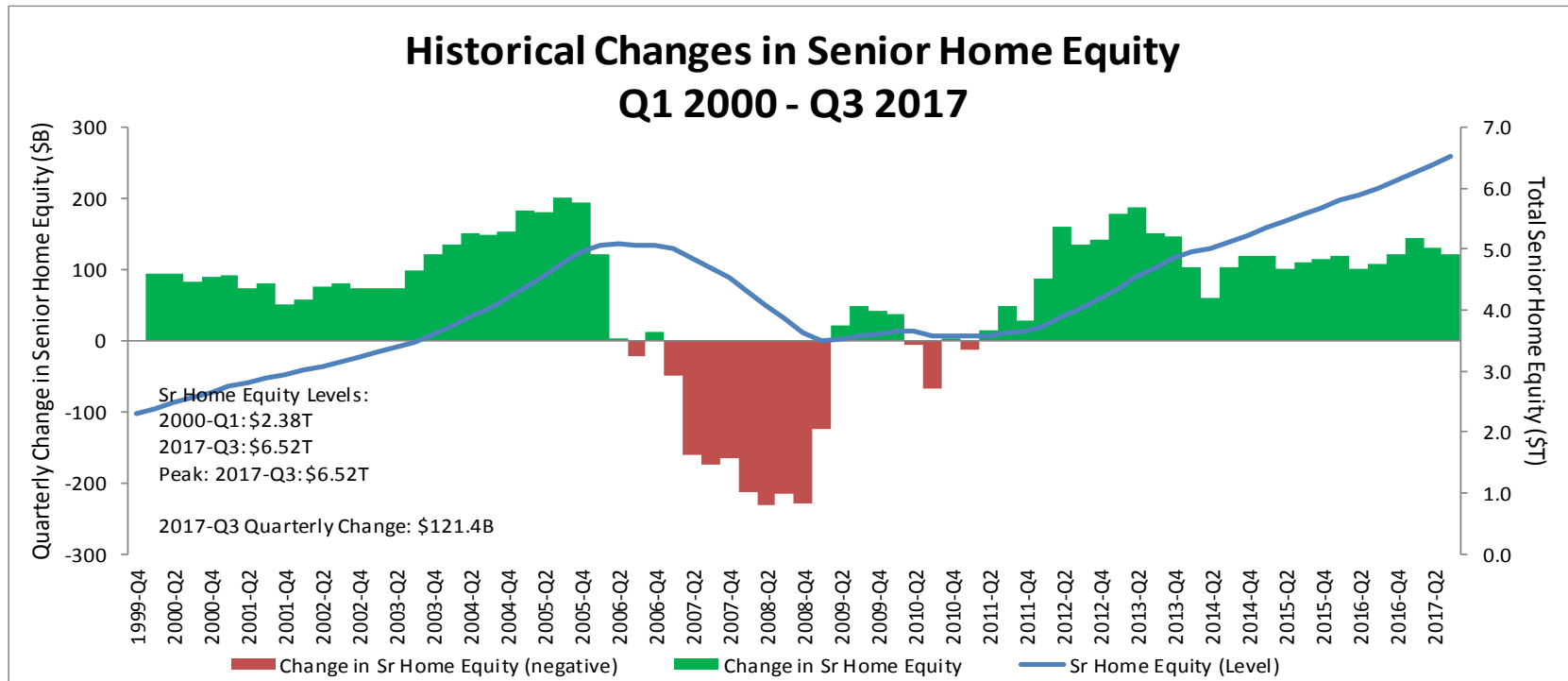Data sources: American Community Survey, Census, FHFA, Federal Reserve Z.1 Release

Quarter Over Quarter Changes in Mortgage Debt Levels

Historical Changes in Aggregate Senior Mortgage Debt
Q1 2000 - Q3 2017

Sr Mortgage Debt Levels:
2000-Q1: $315B
2017-Q3: $1,562B
Peak: 2017-Q3: $1,562B

2017-Q3 Quarterly Change: $15.9B

Legend:
- Change in Sr Mortgage Debt (negative)
- Change in Sr Mortgage Debt
- Sr Mortgage Debt (Level)

Y-axis (left): Quarterly Change in Senior Mortgage Debt ($B)
Y-axis (right): Total Senior Mortgage Debt ($T)

Prepared by RiskSpan, Inc.
Data sources: American Community Survey, Federal Reserve Survey of Consumer Finances

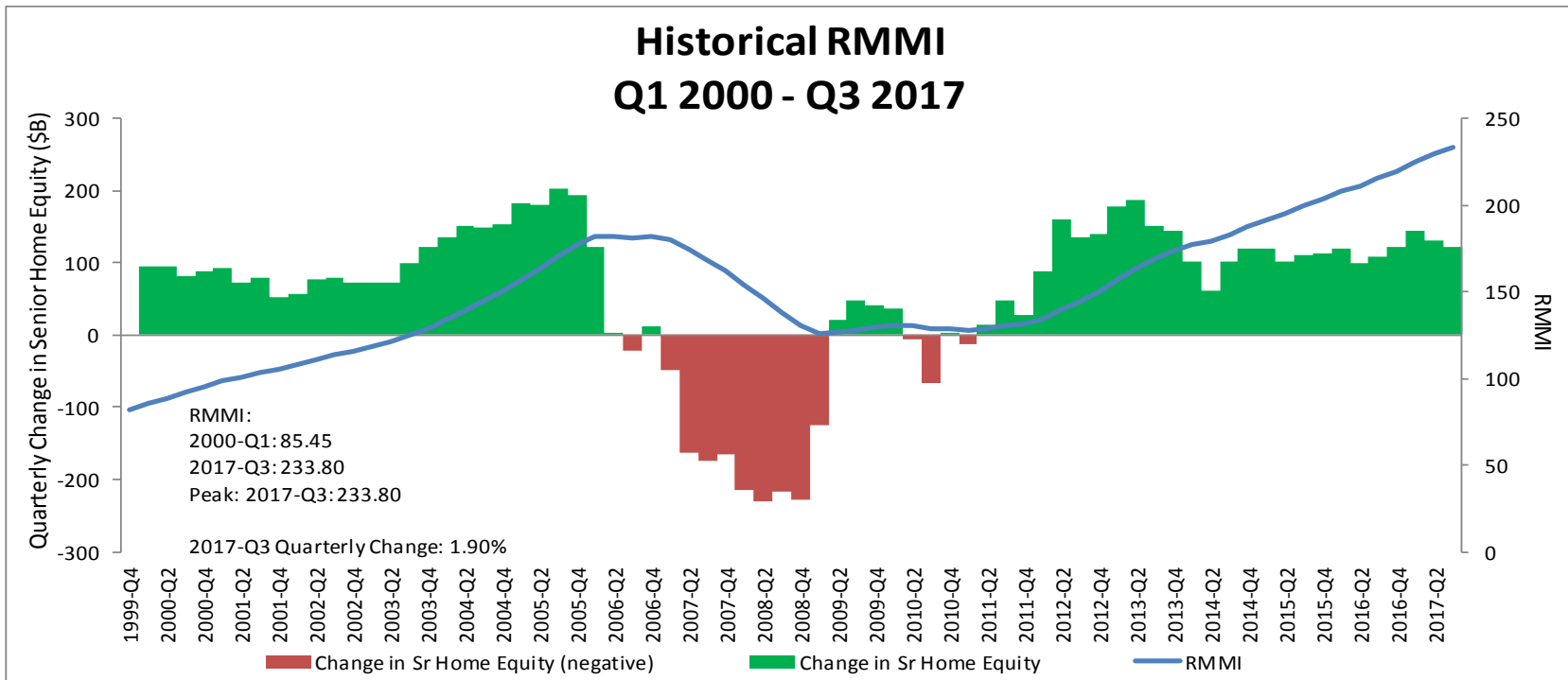# Quarter Over Quarter Changes in Senior Home Equity

Historical Changes in Senior Home Equity
Q1 2000 - Q3 2017

Sr Home Equity Levels:
2000-Q1: $2.38T
2017-Q3: $6.52T
Peak: 2017-Q3: $6.52T

2017-Q3 Quarterly Change: $121.4B

Legend:
- Change in Sr Home Equity (negative)
- Change in Sr Home Equity
- Sr Home Equity (Level)

Prepared by RiskSpan, Inc.
Data sources: American Community Survey, Census, FHFA, Federal Reserve

Quarter Over Quarter Changes in RMMI

Historical RMMI
Q1 2000 - Q3 2017

RMMI:
2000-Q1: 85.45
2017-Q3: 233.80
Peak: 2017-Q3: 233.80

2017-Q3 Quarterly Change: 1.90%

Legend: Change in Sr Home Equity (negative) | Change in Sr Home Equity | RMMI

Prepared by RiskSpan, Inc.
Data sources: American Community Survey, Census, FHFA, Federal Reserve

See Detailed Steps for Calculation of RMMI on Page 9

Historical RMMI

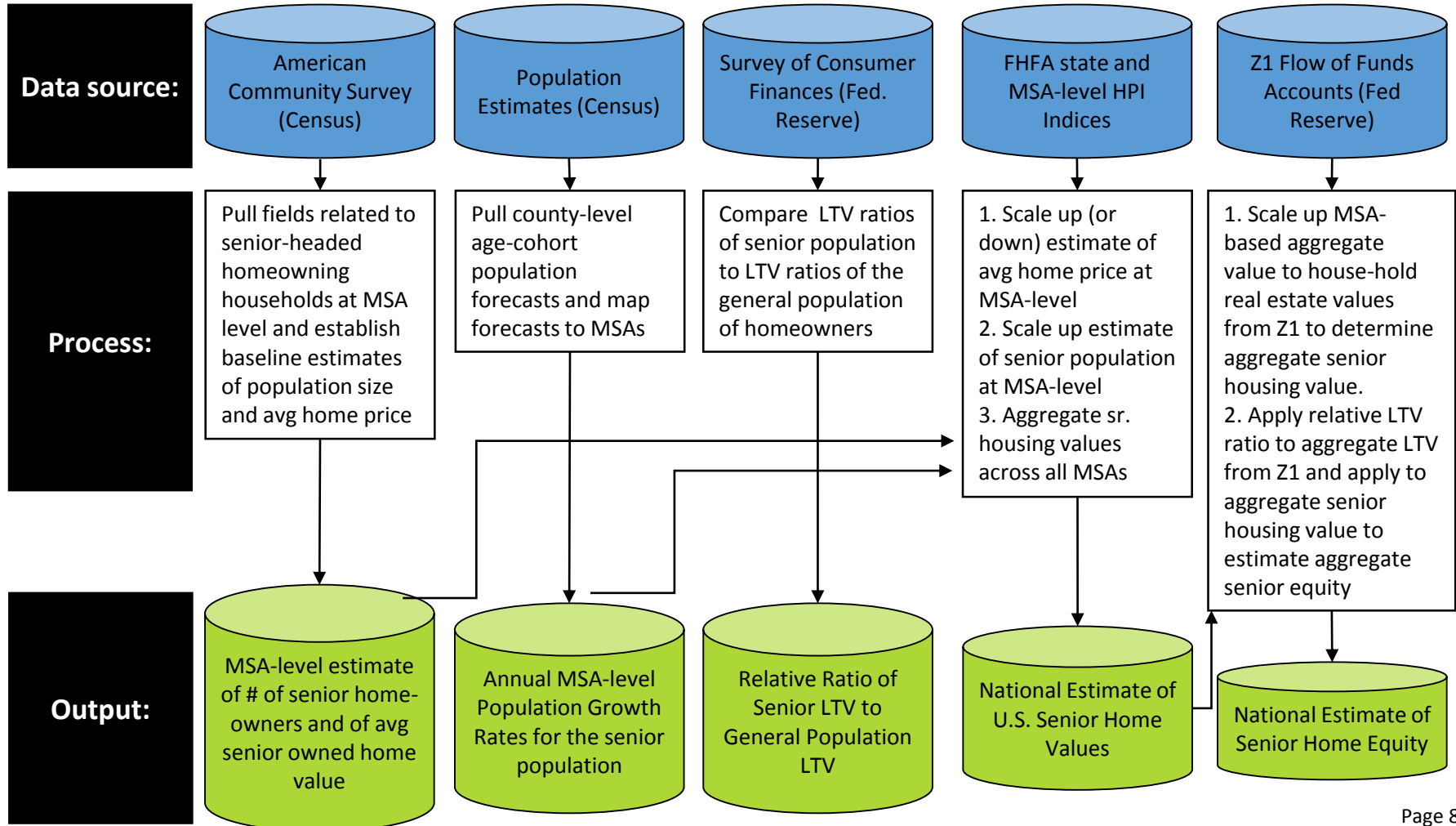| Quarter	Sr. home Value ($T)	Senior Mortgage Debt ($T)	Sr. home Equity ($T)	RMMI	Quarterly Change
2015-Q2	6.91	1.46	5.45	195.42	1.90%
2015-Q3	7.03	1.47	5.56	199.37	2.02%
2015-Q4	7.15	1.48	5.68	203.45	2.05%
2016-Q1	7.28	1.48	5.79	207.75	2.11%
2016-Q2	7.39	1.49	5.89	211.33	1.72%
2016-Q3	7.51	1.51	6.00	215.23	1.84%
2016-Q4	7.65	1.52	6.13	219.59	2.03%
2017-Q1	7.80	1.53	6.27	224.78	2.36%
2017-Q2	7.95	1.55	6.40	229.45	2.08%
2017-Q3	8.08	1.56	6.52	233.80	1.90%

Prepared by RiskSpan, Inc.
Data sources: American Community Survey, Census, FHFA, Federal Reserve

Overview of RMMI Data Sources and Calculation Steps

	One Time Setup			Quarterly Process	
Data source:	American Community Survey (Census)	Population Estimates (Census)	Survey of Consumer Finances (Fed. Reserve)	FHFA state and MSA-level HPI Indices	Z1 Flow of Funds Accounts (Fed Reserve)
Process:	Pull fields related to senior-headed homeowning households at MSA level and establish baseline estimates of population size and avg home price	Pull county-level age-cohort population forecasts and map forecasts to MSAs	Compare LTV ratios of senior population to LTV ratios of the general population of homeowners	1. Scale up (or down) estimate of avg home price at MSA-level 2. Scale up estimate of senior population at MSA-level 3. Aggregate sr. housing values across all MSAs	1. Scale up MSA-based aggregate value to house-hold real estate values from Z1 to determine aggregate senior housing value. 2. Apply relative LTV ratio to aggregate LTV from Z1 and apply to aggregate senior housing value to estimate aggregate senior equity
Output:	MSA-level estimate of # of senior home-owners and of avg senior owned home value	Annual MSA-level Population Growth Rates for the senior population	Relative Ratio of Senior LTV to General Population LTV	National Estimate of U.S. Senior Home Values	National Estimate of Senior Home Equity

Detailed Steps for Calculation of RMMI

Step 1: Use 2013 Survey of Consumer Finances (SCF) to calculate LTV ratios for senior population and general population

	Value	Source:
1) % of home-owning senior households with mortgage	42.5%	SCF (every 3 years)
2) Median LTV for senior households with mortgage	48.0%	SCF (every 3 years)
3) LTV for senior home-owners	20.4%	calculation: (1) * (2)
4) % of home-owning all households with mortgage	65.9%	SCF (every 3 years)
5) Median LTV for all households with mortgage	66.5%	SCF (every 3 years)
6) LTV for all home-owners	43.8%	calculation: (4) * (5)
7) Relative LTV ratio (Senior to General Population)	46.6%	calculation: (3) / (6)

Step 2: Use Fed's Z1's total household mortgage debt estimate to estimate the LTV ratio for the general population (Q3 2017)

	Value	Source:
8) Total mortgage debt ($T)	$10.01	Z1 (quarterly)
9) Total Population Home Value ($T)	$24.15	Z1 (quarterly)
10) LTV (General Population)	41.5%	calculation: (8) / (9)

Step 3: Use relative LTV ratio and current general population LTV ratio to estimate Senior LTV ratio and Senior home equity (Q3 2017)

	Value	Source:
11) Home Value-Senior Population ($T)	$8.08	RS Estimate (quarterly)
12) Senior LTV ratio	19.3%	calculation: (7) * (10)
13) Senior Home Debt ($T)	$1.56	calculation: (11) * (12)
14) Senior Home Equity ($T)	$6.52	calculation: (11) - (13)

Step 4: Calculate Q3 2017 Reverse Mortgage Market Index (RMMI)

	Value	Source:
15) Estimate Senior Home Equity Level in Base Period (Q1 2000) ($T)	$2.38	RS Calculation (Senior House Value - Senior Debt Level)
16) Re-Indexing Factor	0.85	
17) RMMI = Q3 2015 / Q1 2000 Sr Home Equity Level * Index Factor * 100	**233.80**	calculation: (14) / (15) * (16) * 100

Notes on data and methodology:

1) The data sources and methodology to estimate the senior home equity were updated in Q3 2015 as summarized below:

    a) The data source for estimating MSA-level of senior homeowner population and senior housing values was updated using 2013 American Community Survey (ACS).

    b) The data source for estimating the senior LTV was updated using 2013 Survey of Consumer Finances.

    c) A new step was introduced to estimate national senior housing value at both MSA and non-MSA levels. This was accomplished by scaling up the aggregate MSA housing values from ACS to Fed's Z1 housing values of the general population.

    d) As the result from the changes above, the senior home equity was adjusted from $4.20T using original data and methodology, to $5.55T in Q3 2015.

    e) A re-indexing factor of 0.85 was applied to set the Q2 2015 index using the new methodology equal to the Q2 RMMI level (195.42) using the original methodology.

    f) See Q3 2015 RMMI report for more details.

2) Same methodology has been applied since Q4 2015.

Schedule of RMMI Release Dates

The reverse mortgage market index is updated quarterly, about two and a half months after the close of the quarter. This timing is based on scheduled releases of public data used by RiskSpan to update the different components of the index.

The quarterly updates of the index are based on three components: changes in senior population (at the local MSA level); changes in house prices (at the MSA and national level); changes in total mortgage debt (at the national level). The quarterly population change estimates are based on forecasts made by the Census bureau based on the last Census. Updates for this component are thus not dependent on release by an external source. House price change estimates are based on the FHFA indices released quarterly (about 7 weeks after the close of the quarter). Changes in national mortgage debt levels are based on the Federal Reserve's Z1 Flow of Funds Accounts released quarterly (about 9 weeks after the close of the quarter).

- Upcoming HPI Release Dates:
    - http://www.fhfa.gov/DataTools/Downloads/Pages/House-Price-Index.aspx#ReleaseDates
        - Q4 2017: February 27, 2018
        - Q1 2018: May 24, 2018
- Federal Reserve Z1 Flow of Funds Report Release Dates:
    - http://www.federalreserve.gov/releases/z1/
        - These data are typically released during the second week of March, June, and December, and the third week of September.

TYSONS CORNER, VA - Headquarters

RiskSpan, Inc.

8150 Leesburg Pike, Suite 740

Vienna, VA 22182

(703) 956-5200

rs-info@riskspan.com

STAMFORD, CT - Tech Innovation Lab

RiskSpan, Inc.

281 Tresser Blvd, Suite 1203

Stamford, CT 06901

(203) 355-1510

rs-info@riskspan.com

CHARLESTON, SC - Production Analytics

RiskSpan, Inc.

49 Immigration St., Suite 203

Charleston, SC 29403

(843) 466-8300

rs-info@riskspan.com