The Contribution of Multifamily Housing to the U.S. Economy

NMHC NATIONAL MULTIFAMILY HOUSING COUNCIL

NAA NATIONAL APARTMENT ASSOCIATION

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EXECUTIVE SUMMARY

This report summarizes the methods and findings of a study that was conducted by Hoyt Advisory Services on behalf of the National Apartment Association (NAA) and the National Multifamily Housing Council (NMHC). The study explored the impact the apartment industry had on the US economy in 2013 and 2016.

Four different types of industry expenditure (activity) were identified and separately analyzed in order to fully capture industry impacts. They are:

A. Construction of new rental units;
B. Expansion, renovation and repair of existing properties;
C. Property operations and maintenance activities; and
D. Spending by renting households

Key Findings - US

The apartment industry has a large and growing impact on the US economy.

- In 2016, it generated over ***$3.4 trillion of national economic output and supported 17.5 million US jobs.*** This represents almost ***19% of total GDP*** (in nominal dollars) ***and 12% of the employment growth for that year***, up from 17% and 11% shares, respectively, in 2013.

- ***Over 88% of total industry impacts*** -- $3.0 billion of economic activity and 16 million jobs -- ***were generated by renter household spending*** (Segment D).
  Impacts directly attributable to the apartment industry (Segments A through C) ***totaled $394 billion and 1.43 million jobs.***

- ***All four industry segments posted very strong growth*** over the 3 years studied, led by resurgent construction activity: the impacts from new apartment construction almost doubled between 2013 and 2016. In aggregate, economic impacts from all 4 segments expanded by 21% and employment impacts by 16%.

- ***Six economic and demographic factors were important drivers of impact growth*** across the 4 industry segments: population and employment growth, rental share of the total housing stock (tenure split), size and growth of the rental stock's 5+unit segment, renter household income gains, and average effective rent growth.

State and Metro Results

Subsequent rounds of analysis were conducted for the 50 states and the District of Columbia as well as for 50 major metropolitan areas. Results at each geographic level exhibited the same pattern, i.e., significant economic and job impacts with robust growth over the 3-year study period.

- In all, ***the 50 states+DC (Sum of States, or SOS) generated $2.95 trillion of economic impacts and 14.2 million jobs in 2016.*** SOS impacts increased by 21% ($518 billion in output) and 15% (1.86 million jobs) between 2013 and 2016.

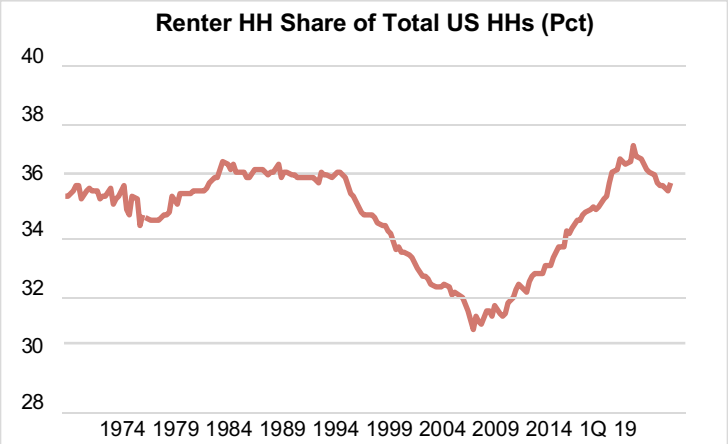
- ***Our 50-metro cohort contributed $2.05 trillion and 9.2 million jobs in 2016*** – up 19% ($329 billion) and 12% (949 thousand jobs), respectively, from 2013. The sum of metro (SOM) totals represent ***more than 60% of total US impacts*** for both categories.

- The performance of individual states and metros was tied to the six impact growth drivers that we identified for the US as a whole. In general, the largest states and metros dominated impacts in absolute terms but – with a few exceptions – posted average or below-average growth relative to their peers. On a percentage growth basis, several mid-sized states and metros that have attracted an outsized share of post-recession population and economic gains top their group rankings.

A description of the study methodology and data sources is provided in the following pages, followed by a discussion of study findings at the national, state, and metro levels. The states and metros are also ranked for their performance in generating apartment industry impacts. Their performance is also analyzed in the context of the demographic and economic variables that drive industry impact growth.

INTRODUCTION

Nearly 40% of all US households live in rental units, which play a crucial role in the nation's residential infrastructure. After decades of relative stability, the rental share declined steadily between 1995 and 2004 as a rapidly expanding secondary mortgage market and aggressive lending produced a surge in homeownership. Rising delinquencies and higher mortgage rates began to stem this trend in the mid-2000's. The Great Financial Crisis brought declining ownership and increasing renter-ship which persisted until mid-2016. Most recently, the rental share has begun to decline again. Government, academics, and industry leaders are paying greater attention to the rental half of the housing market to understand whether a new national renter / owner equilibrium may be emerging.



Source: Census Bureau Housing Vacancy Survey

This study was conducted on behalf of the National Apartment Association (NAA) and the National Multifamily Housing Council (NMHC) to better understand the role and the importance of the apartment industry in the United States. Specifically, ***the project was designed to identify the data sources and develop the tools and techniques that would permit a comprehensive quantitative estimate of the industry's impact on the US economy.*** Estimates of economic impacts were also prepared for the 50 states and District of Columbia and for 50 major metropolitan areas.

Our analysis estimates and compares industry impacts for two years, 2013 and 2016. The industry is defined for study purposes as rental properties containing 5 or more (5+) occupied units. As of 2016, this comprised approximately 20% of the total occupied US housing stock and 52% of all occupied US rental stock.

I. Study Methodology

We employed input: output analysis for the study to separately estimate the direct, indirect, and induced multipliers for four identified apartment industry segments. The resulting multipliers were then used to calculate the total economic and employment impacts of spending in each segment, or category, for the two study years. These four segments are:

a. Construction
b. Renovation & Repair
c. Facilities Marketing & Operations/Management
d. Renter Household Spending Calculation of Multipliers

Calculation of Multipliers

The input-output approach involves the construction of relatively detailed representations of the flows of goods and services among industries. It is particularly useful when estimating the importance to the economy of specific activities, as purchases made in the pursuit of these activities reverberate through all industries.

National input-output tables computed and published by the US Bureau of Economic Analysis (BEA) provided the data needed to compute multipliers for apartment sector activity. This "follow-the-money" approach offers a rich perspective on the total contribution a single industry provides to the US economy as a whole.

The starting point for input-output analysis is an estimate of the total "output" of an industry segment. These were generated separately for our 4 categories of activity in 2013 and 2016. For each category, or segment, we calculated an estimate of the purchases it makes from every industry listed in an input-output table. Once identified, computing the relevant estimate for the influence of the industry on the economy involves estimating three varieties of impacts: direct, indirect, and induced. The total economic multiplier for each segment is the sum of the direct, indirect and induced impacts from its annual expenditures

A final multiplier, the employment multiplier, converts the economic impact in dollar terms to an equivalent employment impact. Employment multipliers range widely (from less than 1 to over 80) depending on the contribution of labor to industry output and on the industry's compensation per employee. The employment multiplier for the lodging sector, for example, is very large, reflecting that industry's service orientation and its reliance on low-skill employees for housekeeping services. On the other hand, the financial services industry, with many high-skill and highly paid employees, has a low employment multiplier. After computing economic impacts by industry, we applied the individual industry employment multipliers and summed them to obtain the total employment impact multiplier for that industry.

Multipliers were then prepared for:

- All 50 states + the District of Columbia and
- 50 primary US metropolitan areas

Calculation of regional multipliers for the 50 states + DC and for 50 selected metro areas involved modifying the national BEA table for differences in the selected geography's industry mix. Each state and metro multiplier is unique, reflecting its industry mix, local compensation rates, and the extent to which it fulfills local demand for goods and services internally or relies on imports. The national input-output models were adjusted for the 2013 and 2016 study years using a process modelled after BEA's RIMSII system[1]; these were then used to estimate individual state- and metro-level multipliers for each year.

[1] Bureau of Economic Analysis, Regional Input-Output Modelling System: Estimation, Evaluation and Application of a Disaggregated Regional Impact Model – RIMS II, NTIS, April 1981.

Estimation of Impacts

The US government provides a wealth of detail about economic activity at the national level. Coverage of regional statistics is narrower, however, so one important change in the methodology for subnational work involves sourcing data inputs that permit development of impact estimates for each apartment industry segment. We conducted a search to identify data sources that (1) accurately captured revenues and expenditures for all four segments, (2) covered the desired time interval, and (3) included all of the desired geographies, with the additional caveat that all metro-level data used consistent definitions of each metro's geographic extent.

The data and analyses ultimately employed are outlined in Appendix C; Appendix D lists the study data sources more fully.

A Note on Tax Impact Calculations.

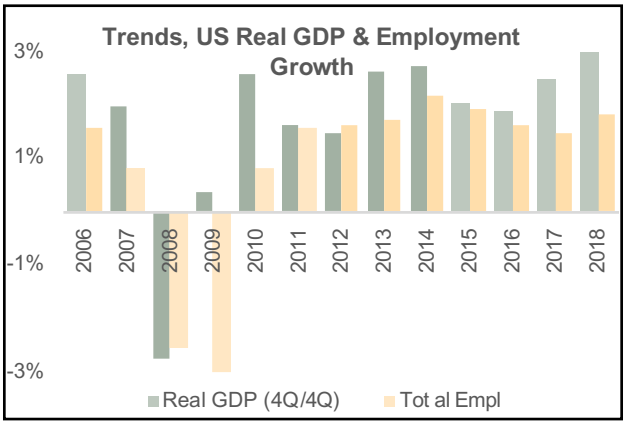
This study includes the use of direct, indirect and induced multipliers to estimate the impact of tax revenue from apartment op ex and from renter spending. However, precise calculation of the appropriate multipliers would require estimates for the unique tax rates applicable to each of the 71 input-output industries used in multiplier calculation for every geography included in this study. Such an effort is beyond the scope of this work. Instead of developing tax multipliers at each geographic level, we assume that the tax rates applicable to the apartment industry that were derived from NAA survey responses (Category C) and from the BEA Consumer Expenditure Survey (Category D) are representative of the average tax rate paid by all industries and all residents within that geography (state or metro). We believe this assumption provides a better estimate of total tax revenue impacts arising from apartment operations and from renting households than would applying no multiplier at all.

II. Findings

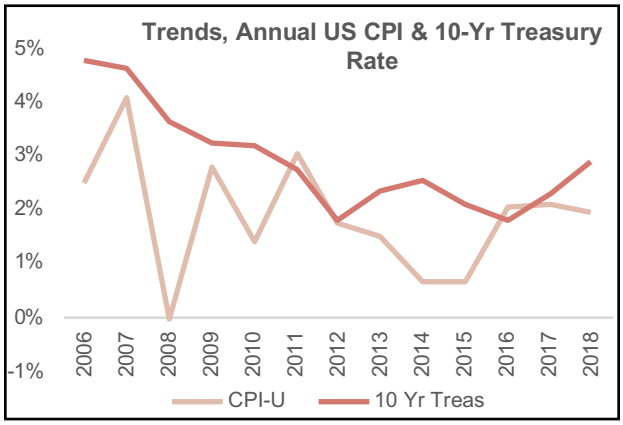
Economic Backdrop

The economic backdrop of our 3-year study period (2013-2016) provides an important context for understanding the results of our apartment impact analysis. The United States suffered a severe, housing-focused recession in 2008-09. Often called the Great Financial Crisis (or GFC), it was the country's worst downturn since the Great Depression of 1929. Unlike past recessions, all regions and all industries were affected. The global economy turned down as well.

In all, real GDP fell by -4.0% and the economy lost more than 8.6 million jobs. The Federal Reserve adopted a series of highly accommodative and in many cases unprecedented monetary policies in order to stabilize then restore growth. These included slashing the federal funds rate to zero and undertaking three rounds of quantitative easing.



Source: US BEA, US BLS



Source: US BLS, Federal Reserve

US GDP resumed growth in July 2009, but job growth did not turn positive until early 2010, exhibiting its typical pattern of lagging GDP trends by several months. Both have continued to expand over the intervening decade. If the recovery extends beyond June of this year, it will become the longest expansion in US history. Unlike the GFC, however, recovery has been unevenly distributed, with certain industries – primarily energy and tech -- and regions leading the way.

The composition of this ~10-year upcycle has been unusual, combining

- Modest and uneven GDP growth, averaging only 2.3% per annum – about half the rate of the typical post-WWII recovery -- yet
- Strong, sustained employment gains exceeding 2.0 million new jobs per year.

The national unemployment rate has fallen from a recessionary peak of 10.0% to almost 3.5% today (a 50-year low), and employers have more openings than there are job seekers to fill them. Despite very strong labor market conditions, average wage growth has been moderate, inflation remains tame, and interest rates continue to be low.

Our analysis compares the contribution that the apartment industry made to the US, state, and 50 major metro economies in 2013 and 2016. 2013 was relatively early in the recovery, with some regions not yet registering improvement. By 2016, however, virtually all states and metros were participating in the expansion. Results for these two years reflect the shift in conditions that was taking place. Impact Drivers.

Impact Drivers

Our analysis has shown that several economic and demographic factors determine the size and drive the growth of apartment industry impacts.

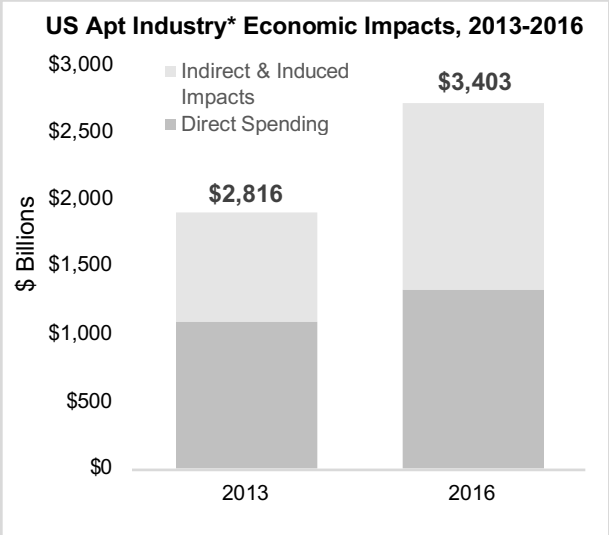
They include:

- Population size and growth
- Size and growth of the employment base
- Housing tenure split (owner/renter) and changes over time
- Size and growth of the 5+unit segment of the rental stock
- Level and growth of the median income of renting households
- Level and growth of average per unit effective rent for 5+unit properties

Although all of these factors contribute to the results, we found that some are more important than others for individual industry segments and/or geographies (i.e., state versus metro). These relationships may shift over the course of an economic cycle. The following discussion of findings for individual segments incorporates some perspectives on those variables which made key contributions over our 2013-2016 study period.

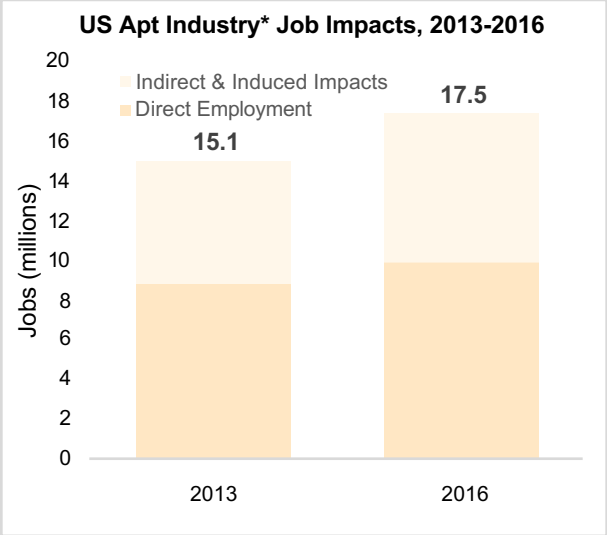
1. Impacts at the National Level

In 2016, the US apartment industry contributed a total of $3.4 trillion to US GDP and generated 17.5 million jobs, gains of 21% and 16%, respectively, from 2013.



Source: HAS Estimates

** Occupied rental units in 5+ unit properties*



Source: HAS Estimates

** Occupied rental units in 5+ unit properties*

The industry contributed 18.6% of total GDP in 2016, up from a 16.6% share in 2013 (measured in nominal dollars). Its employment impacts comprised 11% of total US jobs in 2013, edging up to 12% by 2016.

Because of robust 2013-2016 gains, the industry increased its share of both output and employment between 2013 and 2016, supporting 45% of US GDP growth and 29% of total job growth over this 3-year period.

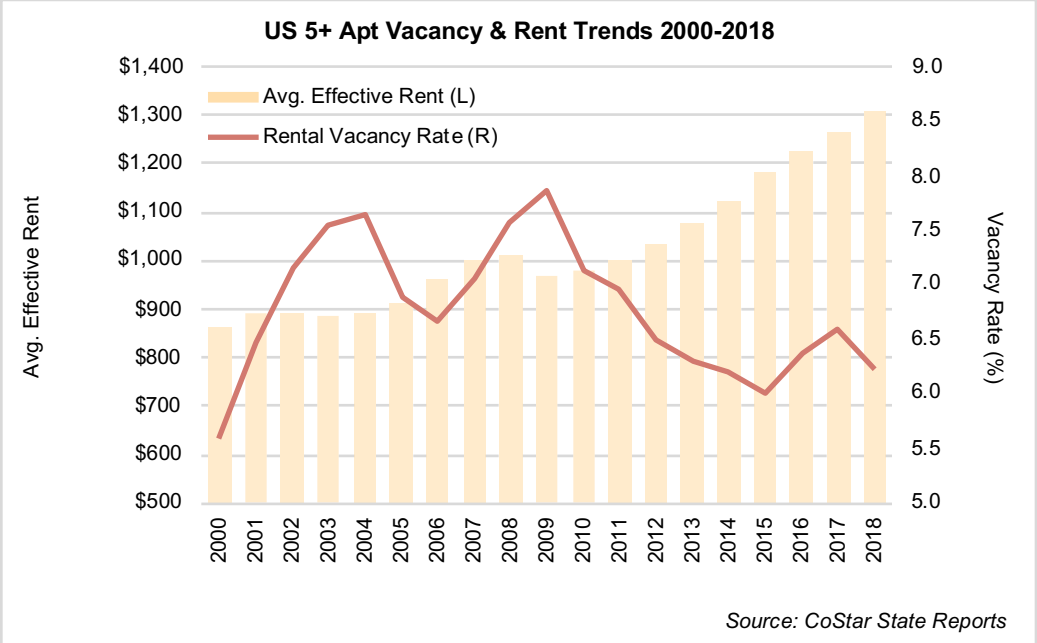
Summary of Economic/Employment Impacts -- U.S.
by Industry Segment/5+ Unit Apartment Properties
2013 & 2016

SEGMENT IMPACT	**2013**		**2016**	
Industry Segment	**Economic Impact (Bil of US$)**	**Employment Impact (No. of Jobs)**	**Economic Impact (Bil of US$)**	**Employment Impact (No. of Jobs)**
a Construction	$85.11	441,440	$150.13	752,362
b *Renovations & Repair (RAR)*	*$44.06*	*223,270*	*$54.19*	*267,708*
Cap Ex, NAA Universe	*$48.46*	*245,535*	*$83.47*	*412,342*
Average of RAR, Cap Ex	$46.26	234,403	$68.83	340,025
c Op Ex, NAA Universe	$142.55	291,459	$175.23	340,986
a-c Sum of Impacts	**$273.92**	**967,302**	**$394.20**	**1,433,372**
d Renter Household Spending	**$2,542.33**	**14,147,746**	**$3,008.75**	**16,046,312**
TOTAL IMPACT, ALL SEGMENTS	**$2,816.25**	**15,115,048**	**$3,402.94**	**17,479,684**
c Tax Portion of Op Ex	**$42.51**	**86,918**	**$58.04**	**112,943**
% of Category Impact	29.8%	29.8%	33.1%	33.1%
d Tax Portion of Renter Spending	**$165.09**	**918,711**	**$350.84**	**1,871,115**
% of Category Impact	6.5%	6.5%	11.7%	11.7%

In both years, renter spending (Segment D) dominated the economic and employment impacts in absolute terms. Although much smaller, the new construction segment (A) posted the strongest 3-year rate of growth of the 4 segments analyzed.

US 2013 - 2016 trends for our 6 impact drivers are:

1. A 7.0 million total gain (+2.2%) in population, forming 2.6 million new households
2. Notably, employment growth exceeded population gains: the economy added almost 8.0 million new jobs, an increase of 5.8%, supporting new household formation and boosting rental demand
3. While total occupied rental stock posted only 3.3% growth between 2013 and 2016, the number of occupied 5+unit rentals rose 6.7% -- twice as fast -- over this period. This implies a market shift in favor of larger, professionally-managed rentals.
4. This 3-year gain of 1.45 million occupied 5+ unit rentals translates into a 70 basis-point increase (+0.7%) in the segment's market share, magnifying the impact of its growth.
5. Median annual income for all renting households in the US increased 8.4%, to $35,200, during the 3-year study period, almost double the 4.3% growth reported for the "all household" median. This combination of above-average gains in the number and the incomes of 5+ unit renter households translated into 19% growth in their expenditures.
6. Average effective rent for 5+unit properties in the US appreciated by 13.6%, to $15,168 per annum, underpinning healthy revenue growth for the industry in the wake of flat to declining rents during the GFC (2008-2009). Although rental gains were well above inflation once the recovery gained traction, average growth for the 10-year period ending in 2016 was a moderate 2.5% per annum.

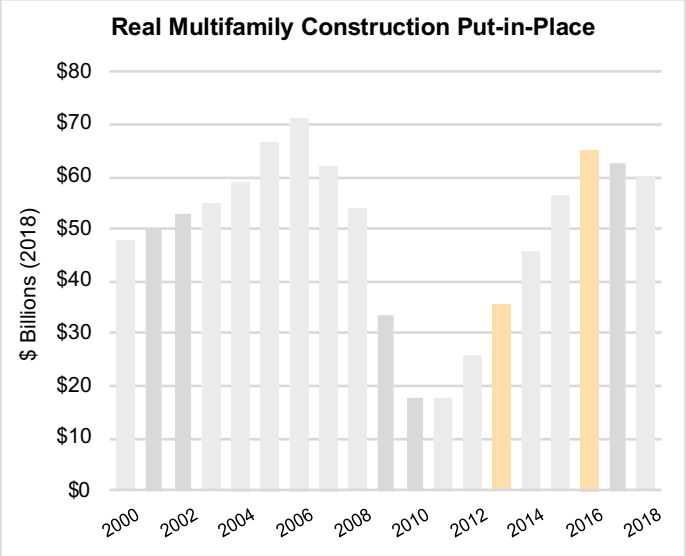


The importance of the individual variables differs by industry segment, and provides a framework for understanding the patterns of growth for each segment over time. The national level statistics also provide benchmarks against which the performance of individual states can be measured. The market context for apartment construction approaching 2013 was rapid, steady recovery, while the context in 2016 was peak activity consistent with its high sensitivity to the economic cycle.

A New Construction

Our 3-year study period marks the early years of the current economic recovery. Prior to the Great Recession (1998 - 2006), annual starts of buildings with 5 or more (5+) units fluctuated narrowly between 293,000 and 315,000 units. Completions ranged between 263,000 and 305,000 units while the number of units under construction steadily increased. The recession prompted starts to drop to ~100,000 units in 2006 and 2007, and completions bottomed at 130,000 units in 2011. Spending on new multifamily construction plummeted, reaching a low of $14.7 billion by 2010. In real (inflation-adjusted) dollars, construction activity fell by 75% between 2006 and 2010.

Activity stabilized in 2011, then accelerated rapidly over the next five years. It peaked in 2016 close to the elevated level that prevailed just before the GFC.



Construction of buildings with 5+ units intended for the rental market comprises the lion's share of multifamily activity. Our estimate, based on Census Bureau data, is that 5+rentals comprised an 88% and 89% share of total multifamily construction in 2013 and 2016[1]. In real terms, the pace of activity by 2016 was 82% above 2013's early-recovery level. Multifamily construction has tapered slightly since then.

The economic impact calculated for the new construction segment grew by an outsized 104% between 2013 and 2016, to $106 billion -- the strongest gain in percentage terms among the 4 industry segments. Despite its out-performance, new construction remains third largest of the 4 segments with a <5% share of total impacts.

The labor-intensive construction segment also posted the strongest growth in employment impacts. ***The total number of jobs supported by spending on new rental construction rose from 0.26 million in 2013 to 0.50 million in 2016 – an outsized 94% gain.*** Construction's contribution might have been even stronger; labor shortages have plagued the industry since early in the recovery, constraining its growth.

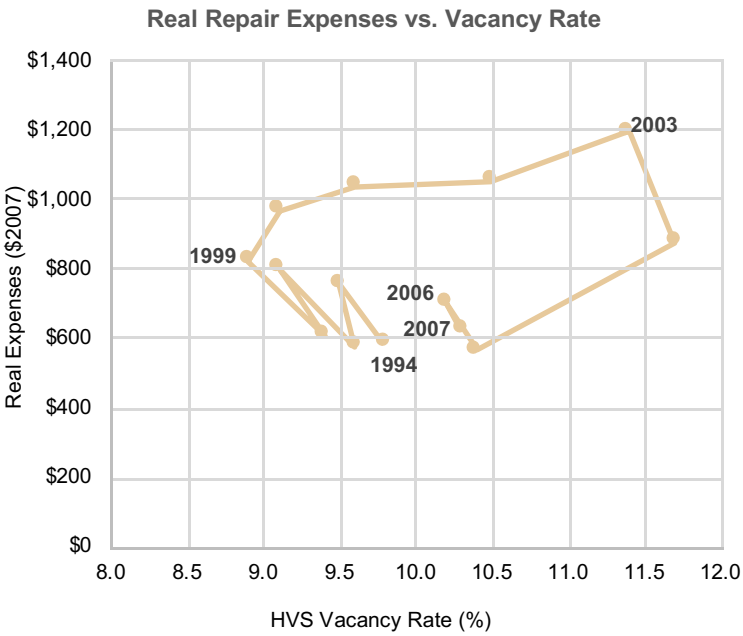
Most of the cyclical variation in spending traces to buildings with 20+ units that are intended to be rental properties. Direct spending in this subcategory doubled between 2013 and 2016, from $19.3 billion to $39.5 billion. Construction of smaller multifamily structures in buildings with 5 - 19 units rose by 42%, to $22.5 billion.

Construction spending per unit has been relatively stable since 2012, at about $8,500 per month, while the average project construction period has been 10 - 12 months over the past 5 years. Spending declined in the late 2000's, bottoming in 2010 at $7,000 per unit per month. Many development projects slowed or suspended activity due to the recession, stretching the average construction period to 12 - 15 months. Relatively stable construction wages account for much of the variability in construction costs during this time. The lack of strong wage growth in the early years of the recovery figure importantly in this stability.

Three of the 6 impact drivers were most significant for the 3-year performance of the new construction segment. They are, in order of importance, growth in (1) employment and (2) effective rents for 5+ unit properties, followed by (3) population expansion.

[1] Housing completions: US Census Bureau, New Residential Construction, monthly. Rental proportion of the multifamily housing stock: US Census Bureau, American Housing Survey, bi-annually.

B. Renovations and Improvements / Capital Expenditures (cap ex)



Sources: US Census Bureau, CPS Housing Vacancy Survey, Survey of Residential Improvements and Repairs

Both the economic and employment impacts calculated for the renovations / cap ex segment grew by almost half between 2013 and 2016, to $69 billion in output and 0.34 million jobs. With a 2% share of total industry impacts, B is the smallest of the four segments. Three major factors play a role in driving annual expenditures in this category: growth in the number of 5+ rental units; prevailing vacancy and rent trends; and decisions to advance or delay major capital replacement spending. Our analysis of the expenditure patterns over our 3-year study period reflect the interplay between accelerating supply growth, growing absorption in response to economic expansion, rising rental income, and catch-up capital spending that had been postponed during the recession. Rapid supply growth, especially in 2005 – 2007, led to rising vacancy across the US once the downturn began. Despite this fact, the vacancy rates in many individual markets remained below historic norms. Renovation and repair expenditures during our 3-year study period clearly reflect the impact of supply / demand dynamics. While strong job growth and rising confidence spurred rental demand, new supply continued to come on-line as projects that had broken ground before the recession came onto the market.

During this interval, about half of the state vacancy rates rose for units in buildings with 5 or more units and about half declined. The historical relationship between expenditures and vacancy rates is complex. It seemed to involve hysteresis effects (i.e., a different functional relationship during periods of rising vacancy rates than during periods of falling vacancy rates). We have incorporated this effect into our estimates. Intuitively, rising vacancy rates tend to trigger higher expenditures in this category as owners compete more strongly in local markets and tend to decline during periods of falling vacancy rates as competition for tenants' wanes. On average, the vacancy rate rose by 0.1 percentage points, contributing slightly to increased spending in this category at the aggregated state level (SOS, or Sum of States). We found considerable variation among states, with about half posting vacancy rate declines between 2013 and 2016 and half experiencing increases.

Although capital expenditure spending **(cap ex)** is included in NAA's annual Survey of Income & Expenses, it is a form of property renovation and repair; we therefore incorporate it into our Segment B impact calculations. ***Cap ex escalated significantly between 2013 and 2016.*** Residential housing renovation and repair multipliers (distinct from residential construction multipliers, but similar in action) are employed when calculating capital expenditure (cap ex) impacts, producing an outsized result despite the subcategory's comparatively modest size:

- ***At $58.5 billion, cap ex's 2016 economic impact was 68% above its 2013 level.***
- ***The 0.26 million jobs it supported represents a 55% increase from 2013.***

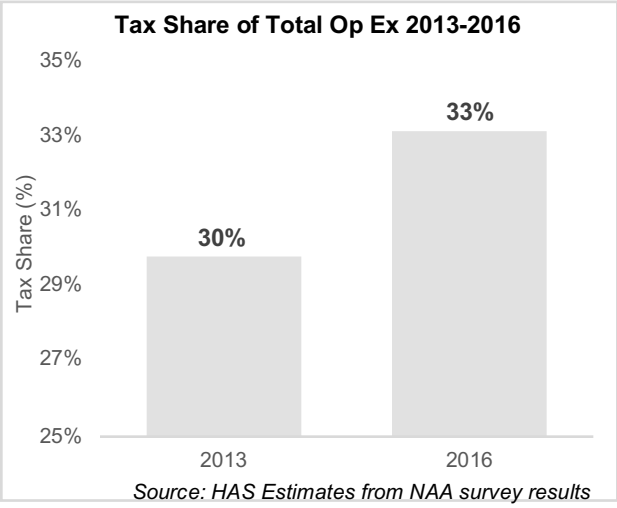
No single measure stood out as a primary driver of growth for the industry's renovations / cap ex segment. However, 4 of the 6 variables demonstrated a moderate correlation with its 2013-2016 impact gains. Growth in 5+ unit inventory, bolstered by gains in the 5+ unit share of the rental market, was most influential, followed by increases in employment and in effective rents for 5+ unit properties.

C. *Industry Operating Expenditures (op ex)*

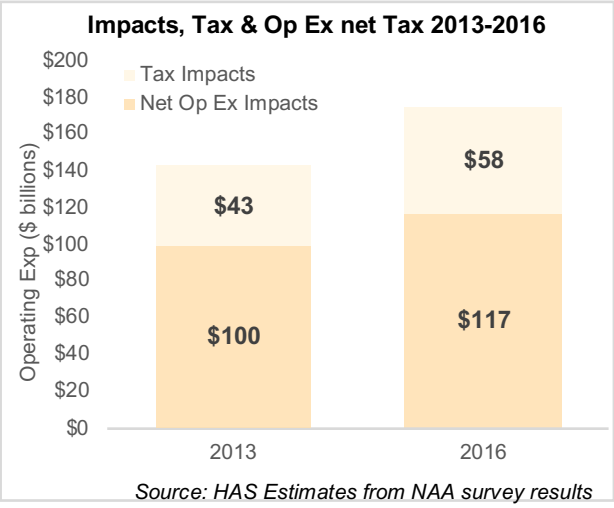
Apartment property operating expenses (op ex) for the nation's 5+ unit market generated $175 billion of economic activity and 0.34 million jobs in 2016 – up 23% and 17%, respectively, from their 2013 levels. Op ex is the second largest generator of economic impacts among the industry's four segments, but ranks third (behind new construction) for employment impacts because of its significantly smaller employment multipliers.

The growth drivers that underpinned the op ex segment's strong performance between 2013 and 2016 were -- in order of importance – effective 5+ unit rent growth, employment gains, and increases in the number of occupied 5+ rental units and in the 5+ share of the overall rental market. As with Segment B, all of these variables' effect on op ex was moderate; there was no dominant driver of impact growth for Segment C.

The **tax expenditure** category within the op ex segment was evaluated separately as part of our analysis. ***Taxes are by far the largest of NAA's 9 op ex categories, comprising 33% of 2016's $348 billion spending total.***



Source: HAS Estimates from NAA survey results



Source: HAS Estimates from NAA survey results

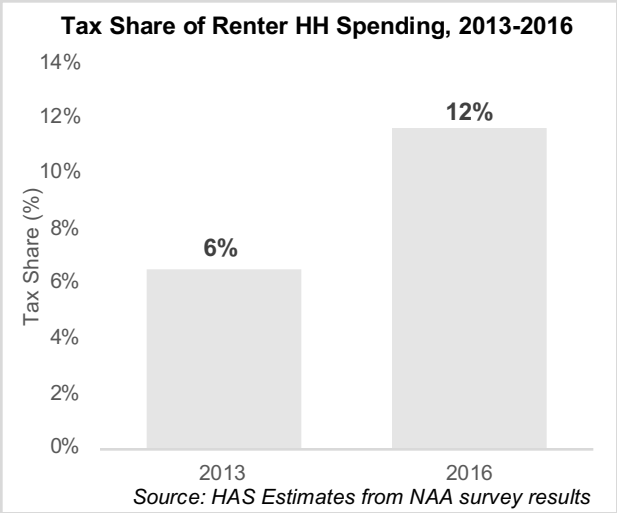
- Tax's share of total spending has risen 330 bps, from almost 30% to 33% of operating expenses, over the last 3 years – likely a reflection of the rapid run-up in apartment property values and the focus on constructing luxury product in city cores during this expansion.
    - ***An estimated $58 billion in total economic activity is attributable to the industry's 2016 tax payments – a 36.5% gain since 2013.***
    - ***Industry tax payments also supported 0.113 million jobs in 2016, 30% more than in 2013.***

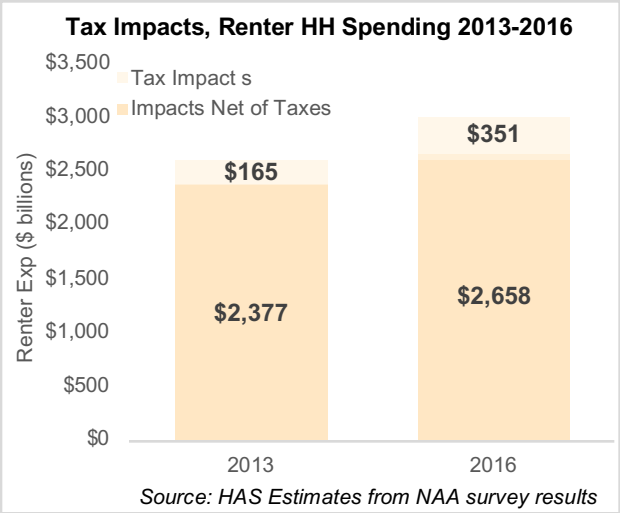
No other op ex category approached these rates of growth over our study period.

D. *Renter Household Spending*

Spending by US households living in 5+ unit apartment properties generated $3.0 trillion of economic activity and 16.0 million jobs in 2016 – up 18% and 13%, respectively, from 2013. Of our four industry segments, renter spending generates by far the greatest economic and employment impacts, with a ~90% share of the all-segment totals.

Primary drivers for Segment D impacts are growth in occupied 5+unit rentals and in the 5+unit share of the overall rental market. These two variables exhibit strong correlations with segment impact gains, of 0.82 and 0.68 respectively. Growth in population and in renter household income are moderate influences. Although segment multipliers for both output and employment declined slightly between 2013 and 2016, an expanded 5+ unit renter pool coupled with robust across-the-board expenditure growth resulted in significantly higher economic impacts from this industry segment despite its large size.



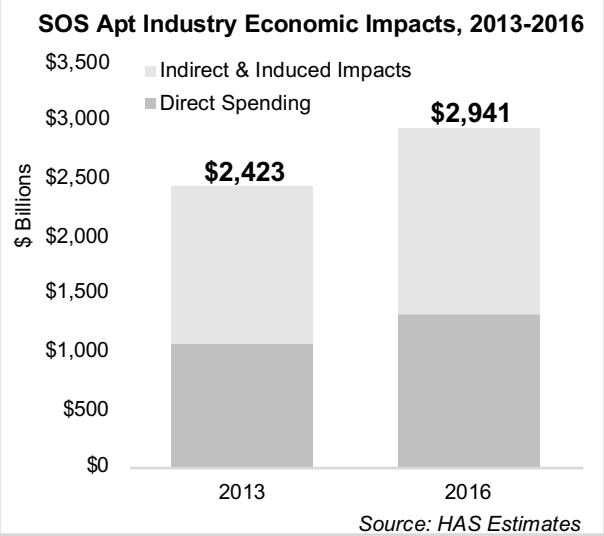


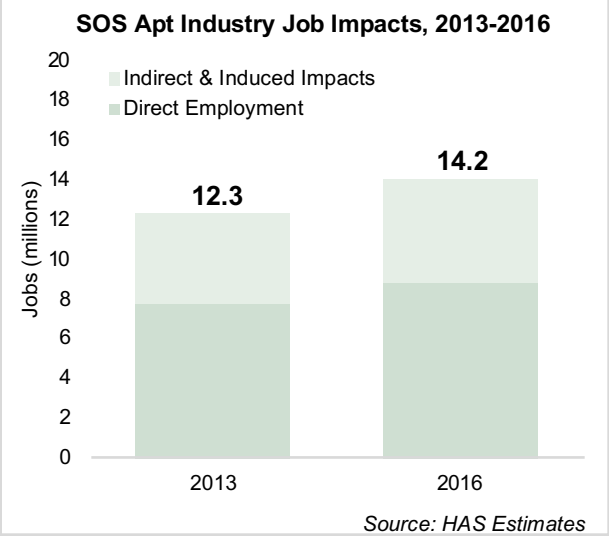
Four categories captured 75% of renter spending in 2016: housing (34%), transportation (16.5%), food (13%), and taxes (12%). Of these, transportation's share declined (from 17.5%) and taxes' share almost doubled (from 6.5%) between 2013 and 2016, while the share of household spending devoted to housing and food were unchanged. Notably, ***$350 billion in economic activity and 1.87 million jobs are attributable to our target population's 2016 federal, state, and local tax payments – more than double their 2013 totals ($165 billion and 0.92 million jobs).***

The next section is devoted to a discussion of apartment industry impacts for the 50 states and District of Columbia. The analysis focuses on the total economic and employment impacts that have been estimated for each state in terms of absolute size and 3-year growth. Consideration is given to the differences in performance of individual states, relative to one another and when compared with the US benchmark, and reasons for these disparate outcomes are explored.

2. Economic/Employment Impacts, 50 States + District of Columbia

In 2016, the 50 states and District of Columbia (SOS, or Sum of States) generated $2.94 trillion in output and 14.2 million jobs. These figures represent increases of 21.5% and 15.0%, respectively, from 2013 levels.



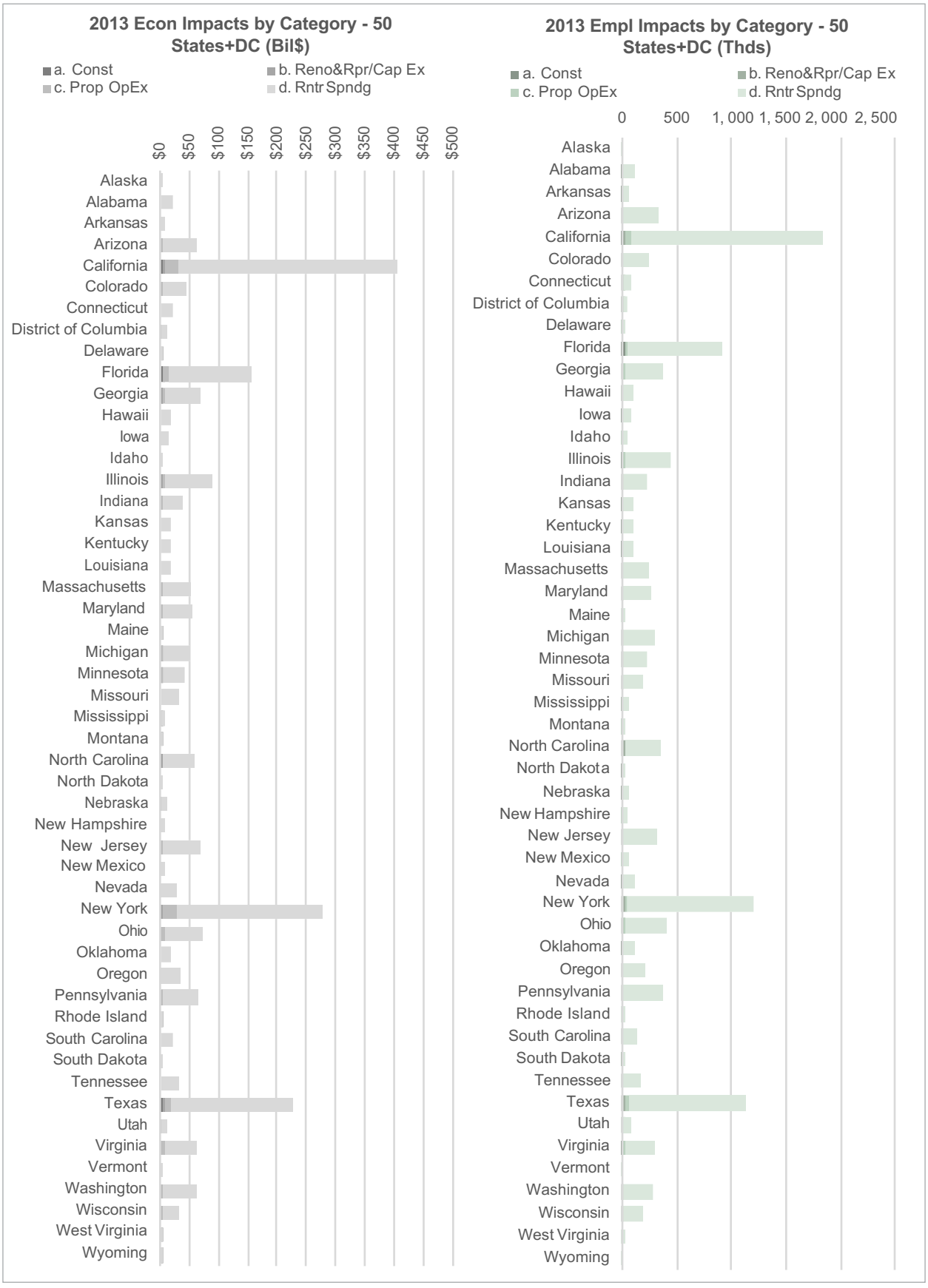


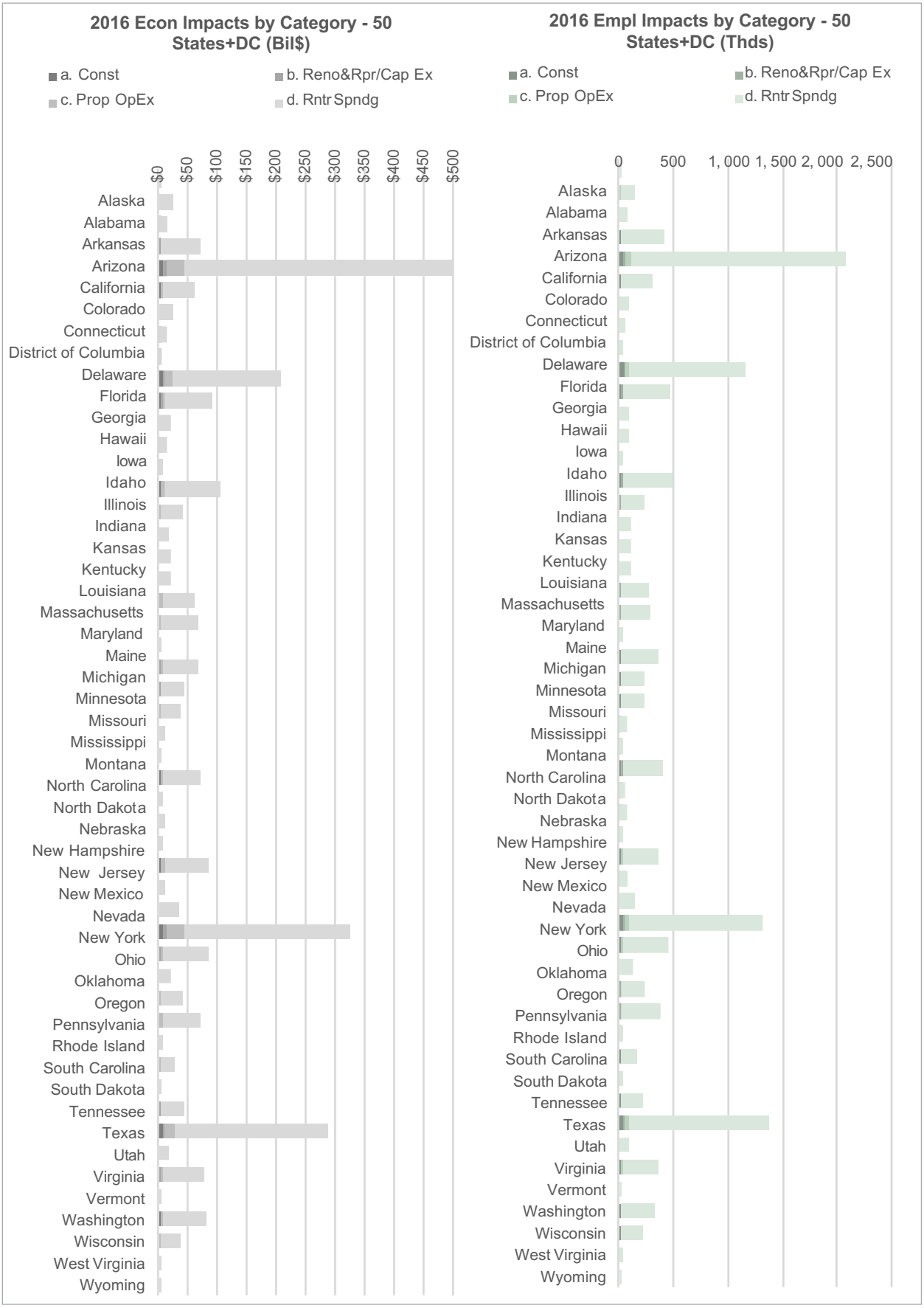
SOS impacts are slightly smaller than their US counterparts (by ~15-20%) because the US benefits from "interstate impacts" that are not allocable to individual states. Hence, US multipliers are slightly larger and calculated impacts higher than the comparable SOS totals.

Economic and employment impacts, by year and by state, are depicted graphically on the two pages that follow; the underlying impact figures are provided for all states plus the District of Columbia, by category and by year, in Appendix A.

Summary of Economic/Employment Impacts -- Sum of States
by Industry Segment/5+ Unit Apartment Properties
2013 & 2016

SEGMENT IMPACT	**2013**		**2016**	
Industry Segment	**Economic Impact (Bil of** US$)	**Employment Impact (No. of** Jobs)	**Economic Impact (Bil of** US$)	**Employment Impact (No. of** Jobs)
a Construction	$52.20	257,850	$106.71	500,792
b Renovations & Repair/Cap ex	$35.88	169,197	$52.27	236,222
c Op Ex	$136.90	247,098	$168.36	286,235
a-c Sum of Impacts	**$224.98**	**674,145**	**$327.34**	**1,023,249**
d Renter Household Spending	$2,198.50	11,639,352	$2,613.81	13,154,451
TOTAL IMPACT, ALL SEGMENTS	**$2,423.48**	**12,313,497**	**$2,941.15**	**14,177,700**
c Tax Portion of Op Ex	**$40.83**	**72,050**	**$55.79**	**93,505**
% of Category Impact	29.8%	29.2%	84.7%	259.8%
d Tax Portion of Renter Spending	**$142.65**	**743,567**	**$304.31**	**1,484,749**
% of Category Impact	6.5%	6.4%	11.6%	11.3%


2013 Econ Impacts by Category - 50 States+DC (Bil$)
a. Const
b. Reno&Rpr/Cap Ex
c. Prop OpEx
d. Rntr Spndg
$0
$50
$100
$150
$200
$250
$300
$350
$400
$450
$500
Alaska
Alabama
Arkansas
Arizona
California
Colorado
Connecticut
District of Columbia
Delaware
Florida
Georgia
Hawaii
Iowa
Idaho
Illinois
Indiana
Kansas
Kentucky
Louisiana
Massachusetts
Maryland
Maine
Michigan
Minnesota
Missouri
Mississippi
Montana
North Carolina
North Dakota
Nebraska
New Hampshire
New Jersey
New Mexico
Nevada
New York
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Virginia
Vermont
Washington
Wisconsin
West Virginia
Wyoming
2013 Empl Impacts by Category - 50 States+DC (Thds)
a. Const
b. Reno&Rpr/Cap Ex
c. Prop OpEx
d. Rntr Spndg
0
500
1, 000
1, 500
2, 000
2, 500
Alaska
Alabama
Arkansas
Arizona
California
Colorado
Connecticut
District of Columbia
Delaware
Florida
Georgia
Hawaii
Iowa
Idaho
Illinois
Indiana
Kansas
Kentucky
Louisiana
Massachusetts
Maryland
Maine
Michigan
Minnesota
Missouri
Mississippi
Montana
North Carolina
North Dakota
Nebraska
New Hampshire
New Jersey
New Mexico
Nevada
New York
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Virginia
Vermont
Washington
Wisconsin
West Virginia
Wyoming


2016 Econ Impacts by Category - 50 States+DC (Bil$)
a. Const
b. Reno&Rpr/Cap Ex
c. Prop OpEx
d. Rntr Spndg
$0
$50
$100
$150
$200
$250
$300
$350
$400
$450
$500
Alaska
Alabama
Arkansas
Arizona
California
Colorado
Connecticut
District of Columbia
Delaware
Florida
Georgia
Hawaii
Iowa
Idaho
Illinois
Indiana
Kansas
Kentucky
Louisiana
Massachusetts
Maryland
Maine
Michigan
Minnesota
Missouri
Mississippi
Montana
North Carolina
North Dakota
Nebraska
New Hampshire
New Jersey
New Mexico
Nevada
New York
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Virginia
Vermont
Washington
Wisconsin
West Virginia
Wyoming
2016 Empl Impacts by Category - 50 States+DC (Thds)
a. Const
b. Reno&Rpr/Cap Ex
c. Prop OpEx
d. Rntr Spndg
0
500
1, 000
1, 500
2, 000
2, 500
Alaska
Alabama
Arkansas
Arizona
California
Colorado
Connecticut
District of Columbia
Delaware
Florida
Georgia
Hawaii
Iowa
Idaho
Illinois
Indiana
Kansas
Kentucky
Louisiana
Massachusetts
Maryland
Maine
Michigan
Minnesota
Missouri
Mississippi
Montana
North Carolina
North Dakota
Nebraska
New Hampshire
New Jersey
New Mexico
Nevada
New York
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Virginia
Vermont
Washington
Wisconsin
West Virginia
Wyoming

The Multiplier Effect.

The economic multipliers calculated for each state capture the total impacts of direct spending by each of the four segments of the industry on all other industries and on households. They depend on many factors including the nature of direct purchases made by a segment, the degree of diversification in the state among all industries and the typical wage level by industry in the state. The combined effects of these factors create unique values for the multipliers.

As multipliers tend to reflect the organization of the entire state economy, they evolve slowly over time. Shifts, when they do occur, arise from changes in the relative prices of products and services, changes in the productive capacity of individual firms and industries within the state, and the entry and exit of establishments. These trends, in turn, depend on the size and depth of demand for local products and services, the price sensitivity of local establishments to local products and services compared with those offered by establishments outside of the state, and the evolution of tastes and preferences by local consumers.

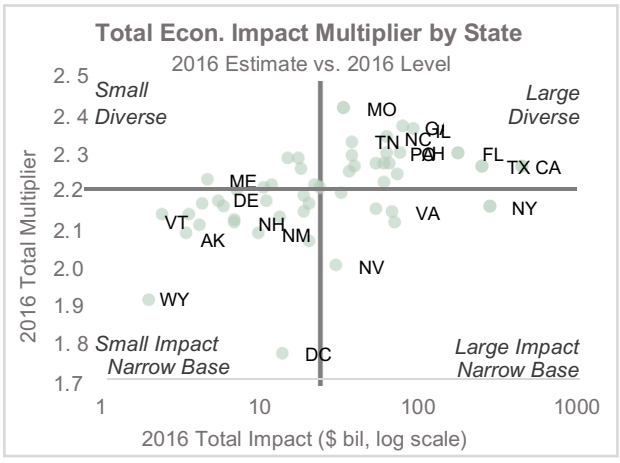
The scatterplots below depict the distribution of implied total apartment industry multipliers for all of the states – i.e., the aggregate effect of each of the four industry segments on the state economy relative to the sum of the impacts generated by each segment.

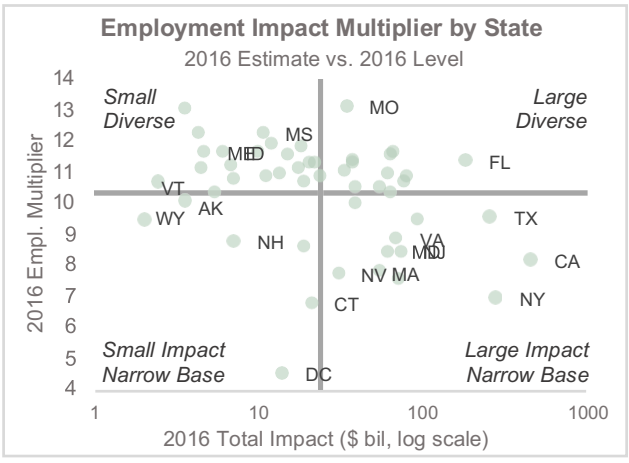
In general terms, state multipliers and associated impacts differ in three major respects:

1) They vary enormously in scale. The total impacts by state for 2016 ranged from a high of $499 billion in California to only $2.2 billion in Wyoming. Hence, the impact of the apartment industry in California is more than 200 times larger than it is in Wyoming.

2) The state economies vary importantly in their degree of diversification across industries. States with highly diversified economies benefit relatively more from the impact created by local activity by supplying locally more of the input goods and services each industry must purchase. These states have larger impact multipliers. Industries and households in less diverse states must import relatively more goods and services because their local industries are insufficient to supply all of the local demand.

3) The relative wage level is important for employment multipliers. States with low wages relative to output or those with more labor-intensive industries (which often leads to lower wages per employee) tend to produce higher employment multipliers. A $10 per hour wage rate employs twice as many workers as a $20 per hour wage rate for the same total expenditure. Low wage rates therefore result in higher employment multipliers.





The above charts provide a comparison of the total dollar economic multipliers (aggregate of the four segments) and the employment multipliers for each state, plotted against their 2016 total dollar impacts. Within each chart, total estimated impacts increase from left to right along the x-axis, while the size of the states' multipliers rises along the y-axis, from bottom to top. Each chart is divided into quadrants with lines placed at the average SOS values for the total impacts (vertical line) and the multipliers (horizontal line).

In the Total Economic Impact Multiplier chart, most states fall in either the upper-right or the lower-left quadrant. This reflects the reality that ***as populations increase, economies can generally provide an increasing proportion of local demand for products and services, requiring fewer imports. These economies benefit most from apartment-industry spending because a larger share of local expenditures remain within the local economy, reverberating throughout its industries and passing along more economic demand locally.*** Smaller states, and those that are less diverse, benefit less from local apartment-industry expenditures as proportionally more of that spending goes to establishments outside of the region. This reduces the multiplier effect of local spending in smaller and less diverse states

States with the largest impacts and the largest multipliers appear in the upper right quadrant. Large states like California, New York, Texas and Florida, largely because of their size, enjoy well-diversified economies and are able to retain a greater share of apartment-industry spending within their borders. Some mid- sized states like Missouri, Georgia and Illinois also enjoy large impact multipliers. All three host important economic "centers" such as Chicago, Atlanta, and St. Louis; these centers support broad-based regional economies that extend beyond state borders. Some smaller states like Utah and Maine also benefit from geographic influences. Because of its remote location, Maine has a relatively self-sufficient economy and Utah, because it hosts the largest metropolitan area between the Sierra Mountains on the west and the inland Rocky Mountains on the east, functions as the regional center for that part of the country.

Very sparsely populated states like Wyoming, Alaska, Vermont and New Mexico rely relatively more than other states on imported goods and services. States that are geographically small but densely populated – examples are Connecticut and the District of Columbia -- lie within a much larger trading region. For such states, both imports and exports tend to be larger in absolute terms; as a result, consumer-focused local industries like the apartment industry tend to have lower multipliers.

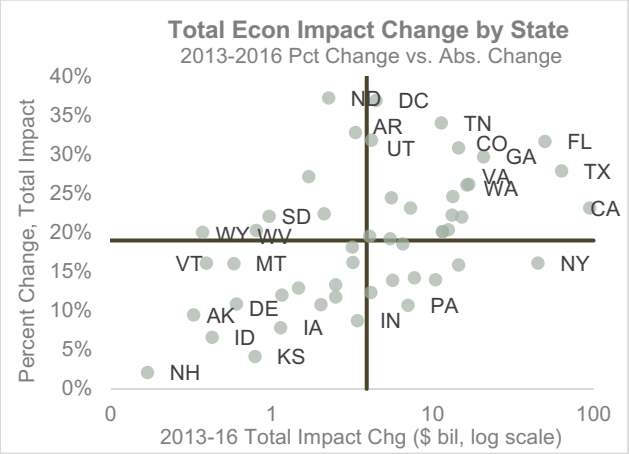
Finally, states with highly specialized economies like Nevada and Washington also tend to have low multipliers. Because a relatively large share of their local workforce focuses on providing exported goods and services (Nevada – lodging and amusements; Washington – aircraft manufacturing and high-tech industries), these economies import relatively more goods and services for their own consumption.

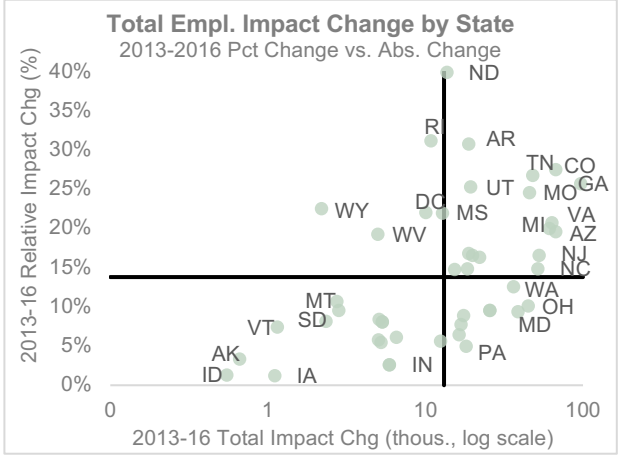
The chart of employment multipliers presents a mirror image of the economic impact chart, with states clustered in the upper left and lower right quadrants. The pattern differs due to variations in the level of compensation per employee in each state. States with high wages, like California and New York, tend to have somewhat lower employment multipliers, while those with low wages, such as West Virginia, Mississippi and Maine, tend to have high multipliers. Florida appears in the upper right in this chart because of its diversified economic base and its relatively low-wage status. Florida hosts several large consumer services industries (tourism, hospitality, and health care) which tends to increase the size of its low wage employment. States appearing in the lower left quadrant of this chart have narrow industry mixes (Hawaii, Wyoming, DC), high wage rates (Connecticut, Alaska), or both (New Hampshire, Delaware). DC's low employment multiplier reflects the relative paucity of low-wage occupations inside District boundaries. Its high average wage rate, combined with its tendency to offer jobs to workers who reside outside of District boundaries, greatly reduces its employment multiplier. Of the states and metros evaluated in this study, DC is unique in having an employment base that exceeds its resident population – by a considerable 15%.

State Impact Analysis

We have ranked the 50 states + District of Columbia based on the absolute and percentage growth of their estimated apartment industry impacts. The following analysis focuses on results from the total (i.e. "All Segment") impact rankings. The performances of individual states are assessed relative to their peers and to the US (= SOS), based on the economic and demographic variables we have identified as drivers of impact growth.

The largest states top the rankings for total economic and employment impacts in both 2013 and 2016. Taken together, California, Texas, New York, Florida, and Illinois represent ~50% of the US apartment industry's total impact on the US economy, well above their 37% share of US population and employment. Over time, faster-growing states should rise in the rankings and begin to supplant large, slower-growing states that currently dominate. There is some evidence of this occurring even over our brief 3-year study period. Candidates for future advancement are more sizable states that outperform on four of the key measures that drive total impact growth.





Source: HAS Estimates

Note: Negative changes, not plotted - KS, ME, NH

These measures are, in order of importance:

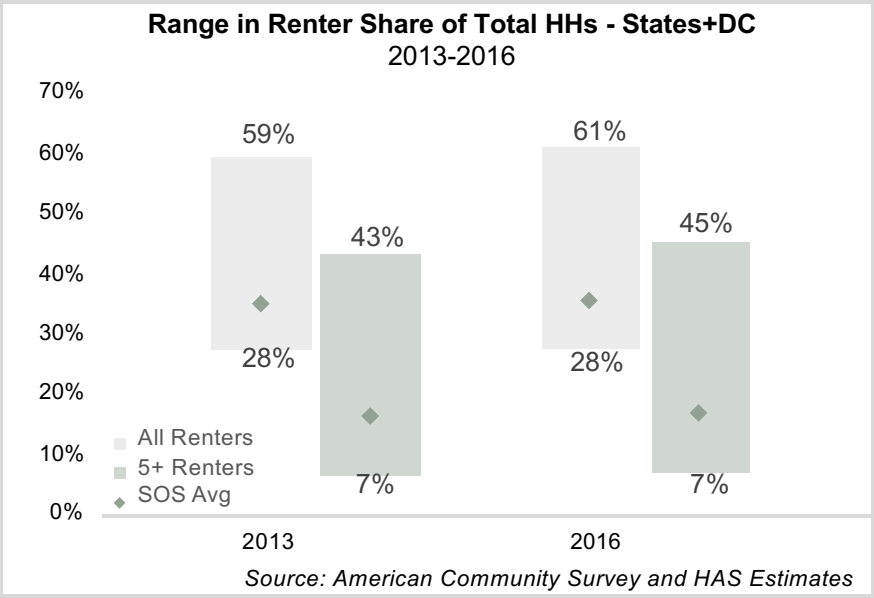
- Growth rate of occupied 5+ rental units. Supply growth was greatest in large states and in high growth states. ***Three states – California, Florida, and Texas – added ~200,000 occupied 5+ units each between 2013 and 2016; taken together, this exceeds 40% of the total US gain of 1.45 million.*** There is a sizable gap between the top three and the next five states (New York, Washington, Georgia, Michigan, and Colorado), each of which gained only 50 - 70,000 units.

  The number of occupied 5+ rental units increased by 6.7% nationwide during our study period. On a percentage growth basis, a few small, relatively stable states (Vermont, Rhode Island, Connecticut) ranked highly along with strong growth states like North Dakota, Idaho, Utah and Washington. Although 5+ rental inventories in Rhode Island, North Dakota, and Utah grew by 18 – 22% between 2013 and 2016, each of these states gained only a modest number of units (12 - 20,000). A focus on large out-performers yields Colorado, Florida, Washington, Michigan, and Texas, with 3-year growth ranging from Colorado's high of 14% to 9.5% in Texas. At the bottom of the list are a handful of states that registered slight net declines in their 5+unit stock due to removal and conversion activity. They are Mississippi, Kansas, Hawaii, Alaska, Nebraska, and Wyoming.

- Increase in the 5+unit share. ***All else equal, a gain in the 5+unit share of the overall occupied rental stock magnifies the economic and employment impacts generated simply by 5+unit growth.*** US/SOS 5+unit rental share grew from 50.7% to 52.4% between 2013 and 2016, a 1.7% increase. When ranked, half of the top ten states are small, with Utah's 5.8% gain earning it the #1 spot. Larger states that outperformed include Colorado (+4.8%), Washington (+4.4%), Arizona (+3.5%), and Florida (+3.3%). Michigan, New Jersey, and Massachusetts (with 3.5% - 2.7% gains) also performed well. Even California edged the US average despite its size and the many supply constraints in its coastal cities. Unlike other impact drivers, highly ranked states for 5+ share appear throughout the country. This is a reflection of the early post-recession return of healthy rental demand and subsequent spread of rental construction activity.

- Population growth. All of the top 10 states for population growth are in the West and South, with gains ranging from a low of 4.4% in Idaho to a high of 5.6% in DC. ***Most significant for impact gains are the states that combine scale with outsized rates of population growth***; these include Texas, Florida, Washington, Arizona, and Colorado. All 5 expanded at least twice as fast as the nation overall (2.2%); Texas and Florida added more than 1.0 million new residents during our short study period.

- Growth of median renter household income. Median annual income for all renting households in the US increased 8.4%, to $35,200, during the 3-year study period. States reporting above-average



2016 renter household income levels and strong income growth during the 3-year study period are Washington, Colorado, and California. Georgia, Tennessee, and South Carolina are Southern states with high median renter incomes that also rank well for recent income gains. North Dakota's appearance at or near the top of the rankings for all three of these measures is attributable to that state's rapidly-expanding, high-salary oil production industry.

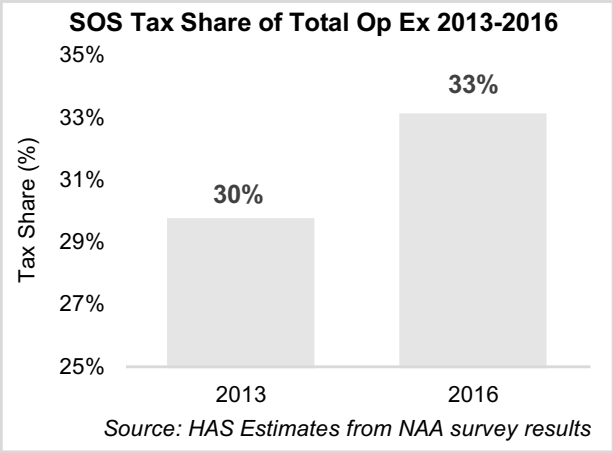
Important factors for the two segments that represent **apartment industry operations** (B and C) include 5+unit effective rent growth and employment expansion. For renovation and overall op ex spending, employment growth tops population as a driver of impact growth.

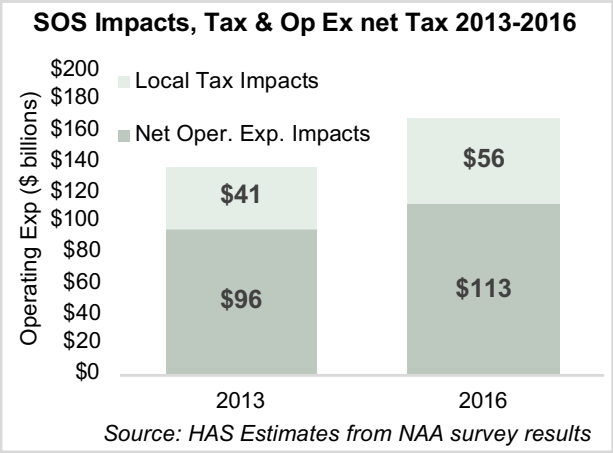
- ***When ranked by effective rent growth, all of the top ten states are located in the West or South regions of the country.*** Led by the Pacific Northwest (Washington and Oregon), these states posted robust rental gains ranging from 17.5% - 24%, well above the US/SOS average of 13.6%.
- The top 10 states for 2013-16 job creation are also clustered in the West and South. Employment growth for these states ranges from a low of 7.5% in Arizona to a high of 11% in Nevada, versus 5.8% for the nation as a whole. Most significant for impact gains are the states that combine large scale and outsized rates of job growth; these include California, Florida, Georgia, Washington, and Colorado.

SOS Tax Impacts

For the SOS, $56 billion in economic activity and 0.094 million jobs are attributable to 2016 apartment industry tax payments (federal, state, and local) – up 37% and 30%, respectively, from 2013 levels ($41 billion and 0.072 million jobs). Unsurprisingly, the top-ranked states for 2016 economic impact are the largest ones -- i.e. New York, Texas, California, Florida – plus New Jersey. Together, these 5 states claimed 68% of the economic and 60% of the employment impact totals. Southern states claim 4 of the top 5 spots when ranked by percentage growth. After top-ranked Nebraska (with a ~100% 3-year increase) are Oklahoma, Louisiana, Alabama, and Virginia, gains for which range from 89% to 65%. Larger out-performers within the top ten include Massachusetts, Georgia, Florida, and Texas, with impact gains of 60% - 51%. Top-ranked states for employment impacts are similar to the list of economic impact out-performers.

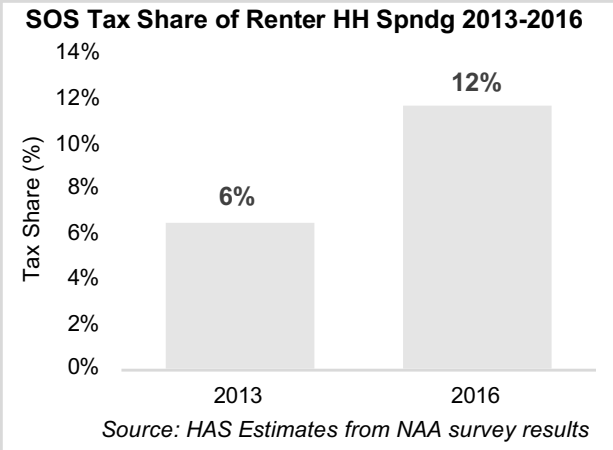
Seven states do not levy income tax and five lack a sales tax. We had expected that industry tax payments in these states would be elevated relative to their peers, as higher rates for other types of tax might be imposed to compensate for the lack of revenue from these sources. However, NAA op ex data does not show such a relationship at the state level, with the possible exception of Texas. In a similar vein, California's Proposition 13 property tax restrictions do not appear to translate into lower industry tax

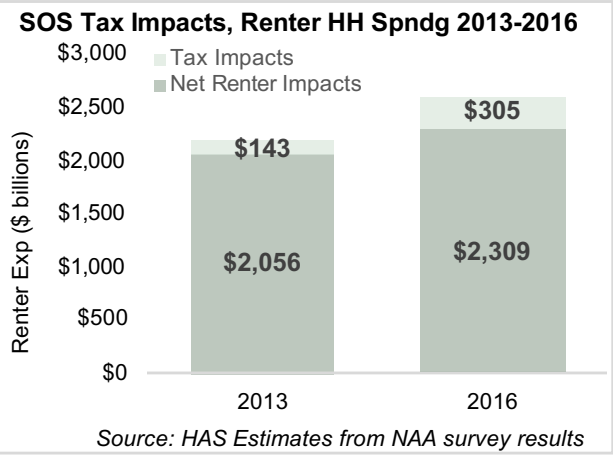




payments as a percentage of apartment revenues. It may be that the data is not sufficiently detailed to permit such a determination.

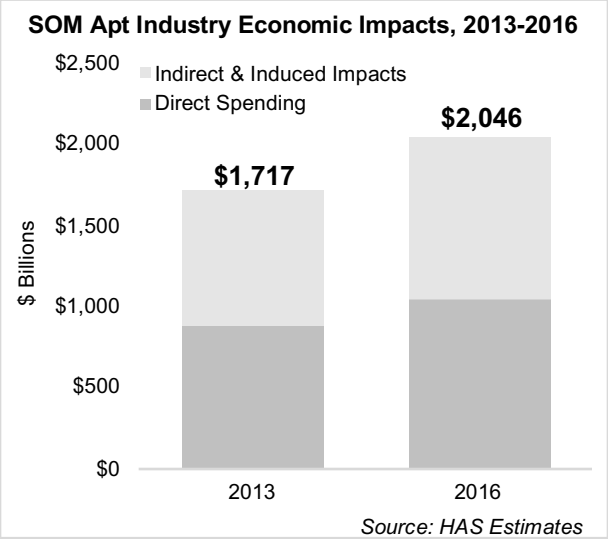
For the SOS, $304 billion in economic activity and 1.48 million jobs are attributable to 2016 federal, state, and local tax payments by 5+ renter households – more than double their 2013 totals ($143 billion and 0.74 million jobs). The top-ranked states for 2016 economic impact include California, New York, Texas, Florida, and New Jersey. Together, these 5 states claimed 56% of the SOS tax impact and >60% of the absolute increase in tax impacts between 2013 and 2016. Unusually, they dominate the state ranking for percentage growth as well. After #1 DC (with a 226% increase) come the tech-heavy states of California (+182%), Washington (+152%), and Virginia (+139%). Colorado, Texas, Florida, and Georgia, with impact gains of 135% - 122%, all fall within the top 10. Although the ranking order differs somewhat, the pattern for employment impacts is comparable.

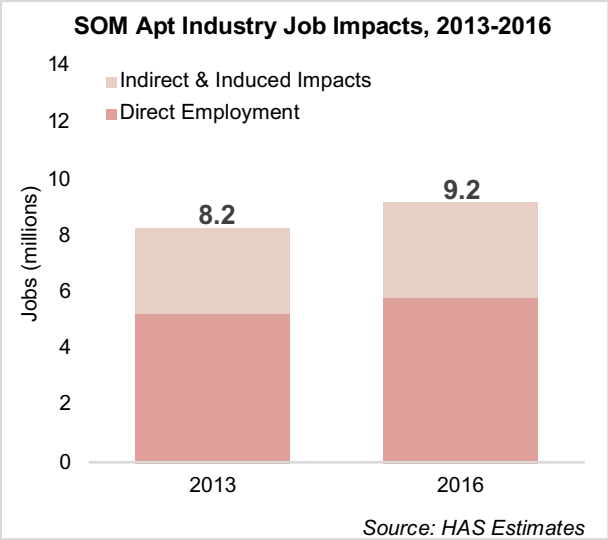




3. Economic/Employment Impacts, 50 Major US Metros

Total economic and employment impacts generated in 2016 by the 50 major US metros covered in this study (SOM, or Sum of Metros) are $2.05 trillion and 9.2 million jobs. These figures represent increases of 19.0% and 11.5%, respectively, from 2013.





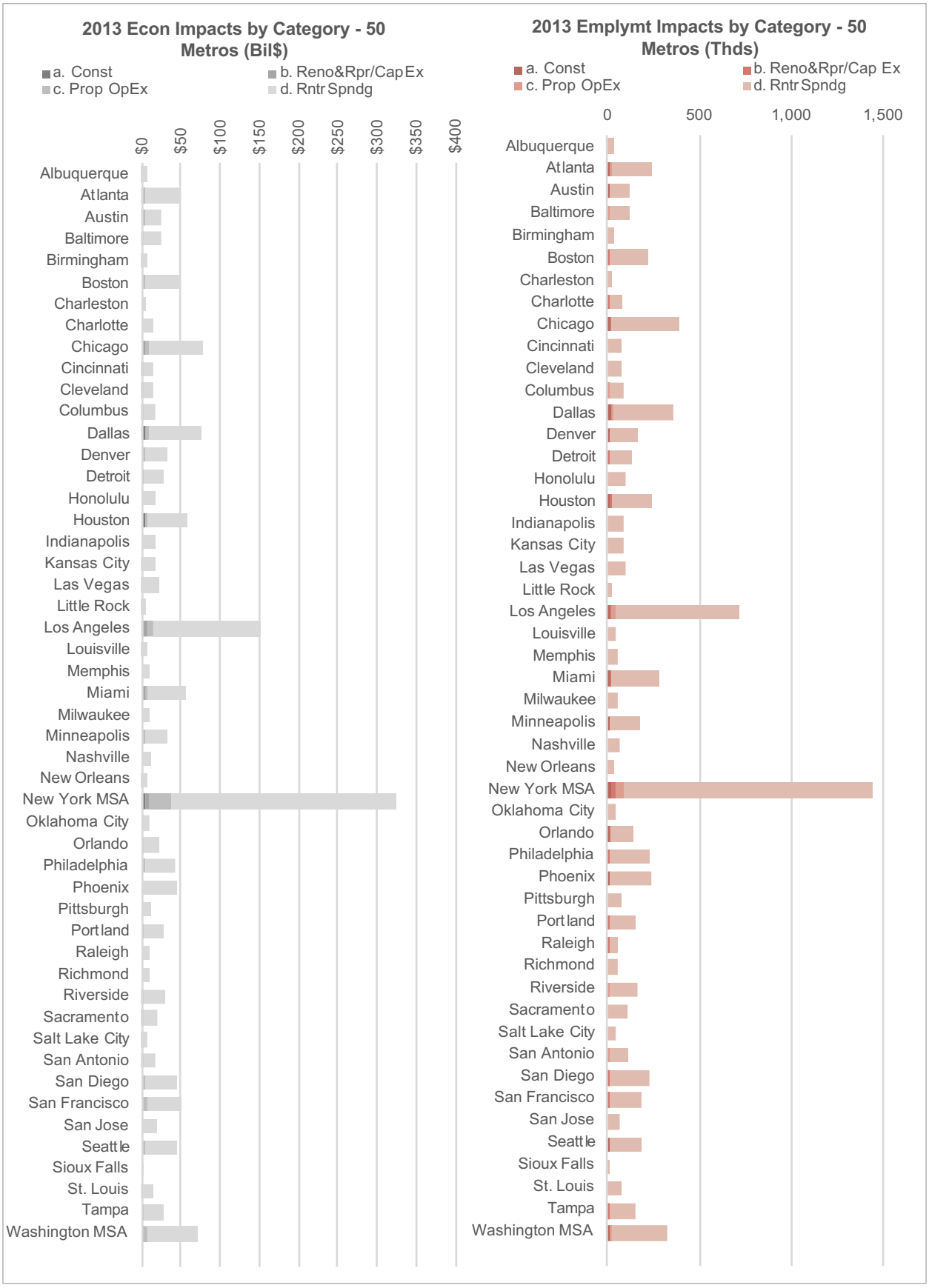
With ~55% of US population and employment, the SOM generated 60% of the economic and 53% of the employment impacts generated by the nation's apartment industry. Over the 3-year study period, growth of SOM impacts slightly lagged that of the US on the output side (by 160 bps), but was quite a bit lower on the employment side (by 420 bps).

Economic and employment impacts, by year and by metro, are depicted graphically on the two pages that follow; the underlying impact figures are provided for all metros, by category and by year, in Appendix A.

Summary of Economic/Employment Impacts -- Sum of Metros
by Industry Segment/5+ Unit Apartment Properties
2013 & 2016

SEGMENT IMPACT	2013		2016	
Industry Segment	**Economic Impact (Bil of** US$)	**Employment Impact (No. of** Jobs)	**Economic Impact (Bil of** US$)	**Employment Impact (No. of** Jobs)
a Construction	$52.38	234,378	$95.37	396,698
b Renovations & Repair/Cap ex	$28.67	122,363	$39.35	159,267
c Op Ex	$104.70	175,346	$130.09	204,200
a-c Sum of Impacts	**$185.76**	**532,087**	**$264.81**	**760,166**
d Renter Household Spending	$1,531.27	7,705,468	$1,781.42	8,426,643
TOTAL IMPACT, ALL SEGMENTS	**$1,717.03**	**8,237,555**	**$2,046.23**	**9,186,809**
c Tax Portion of Op Ex [1]	**$33.01**	**54,644**	**$45.17**	**70,215**
% of Category Impact	31.5%	31.2%	83.8%	266.5%
d Tax Portion of Renter Spending	**$109.07**	**544,269**	**$240.63**	**1,107,265**
% of Category Impact	7.1%	7.1%	13.5%	13.1%

[1] Tax portion of Op Ex figures for 2013 and 2016 are not entirely consistent, as 2013 totals lack data for Oklahoma City, Pittsburgh, and Sioux Falls. An "apples to apples" comparison of the two years should be made using $44.89 Bil for economic and 69,680 for employment impacts in place of the 2016 figures in the table above. This adjustment was made for the percentage changes quoted in the text.


2013 Econ Impacts by Category - 50 Metros (Bil$)
a. Const
b. Reno&Rpr/Cap Ex
c. Prop OpEx
d. Rntr Spndg
$0
$50
$100
$150
$200
$250
$300
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$400
Albuquerque
Atlanta
Austin
Baltimore
Birmingham
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Charlotte
Chicago
Cincinnati
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Columbus
Dallas
Denver
Detroit
Honolulu
Houston
Indianapolis
Kansas City
Las Vegas
Little Rock
Los Angeles
Louisville
Memphis
Miami
Milwaukee
Minneapolis
Nashville
New Orleans
New York MSA
Oklahoma City
Orlando
Philadelphia
Phoenix
Pittsburgh
Portland
Raleigh
Richmond
Riverside
Sacramento
Salt Lake City
San Antonio
San Diego
San Francisco
San Jose
Seattle
Sioux Falls
St. Louis
Tampa
Washington MSA
2013 Emplymt Impacts by Category - 50 Metros (Thds)
a. Const
b. Reno&Rpr/Cap Ex
c. Prop OpEx
d. Rntr Spndg
0
500
1,000
1,500
Albuquerque
Atlanta
Austin
Baltimore
Birmingham
Boston
Charleston
Charlotte
Chicago
Cincinnati
Cleveland
Columbus
Dallas
Denver
Detroit
Honolulu
Houston
Indianapolis
Kansas City
Las Vegas
Little Rock
Los Angeles
Louisville
Memphis
Miami
Milwaukee
Minneapolis
Nashville
New Orleans
New York MSA
Oklahoma City
Orlando
Philadelphia
Phoenix
Pittsburgh
Portland
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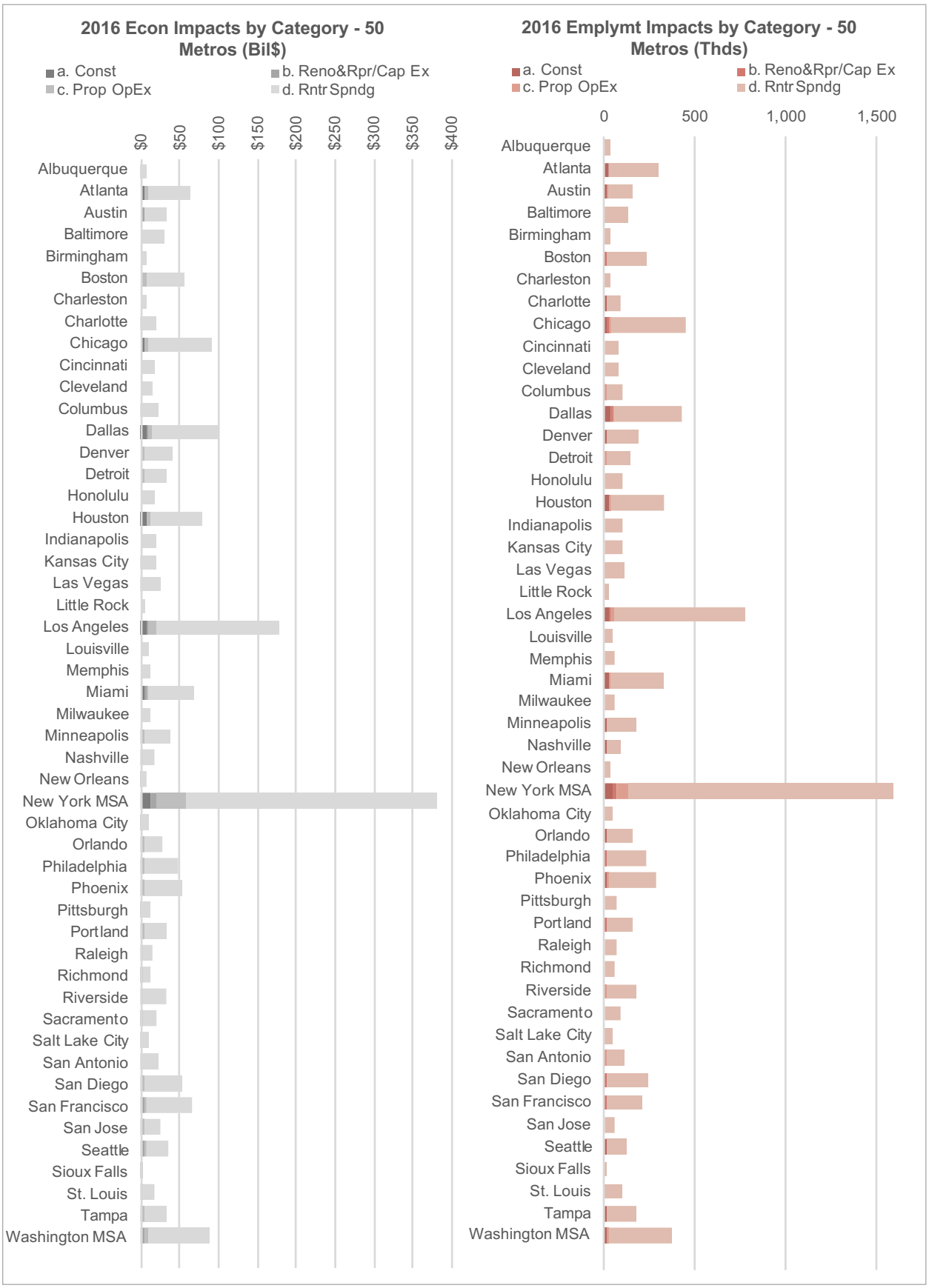
Salt Lake City
San Antonio
San Diego
San Francisco
San Jose
Seattle
Sioux Falls
St. Louis
Tampa
Washington MSA


2016 Econ Impacts by Category - 50 Metros (Bil$)
a. Const
b. Reno&Rpr/Cap Ex
c. Prop OpEx
d. Rntr Spndg
$0
$50
$100
$150
$200
$250
$300
$350
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Austin
Baltimore
Birmingham
Boston
Charleston
Charlotte
Chicago
Cincinnati
Cleveland
Columbus
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Houston
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New York MSA
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Philadelphia
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Pittsburgh
Portland
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Richmond
Riverside
Sacramento
Salt Lake City
San Antonio
San Diego
San Francisco
San Jose
Seattle
Sioux Falls
St. Louis
Tampa
Washington MSA
2016 Emplymt Impacts by Category - 50 Metros (Thds)
a. Const
b. Reno&Rpr/Cap Ex
c. Prop OpEx
d. Rntr Spndg
0
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1,000
1,500
Albuquerque
Atlanta
Austin
Baltimore
Birmingham
Boston
Charleston
Charlotte
Chicago
Cincinnati
Cleveland
Columbus
Dallas
Denver
Detroit
Honolulu
Houston
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Kansas City
Las Vegas
Little Rock
Los Angeles
Louisville
Memphis
Miami
Milwaukee
Minneapolis
Nashville
New Orleans
New York MSA
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Phoenix
Pittsburgh
Portland
Raleigh
Richmond
Riverside
Sacramento
Salt Lake City
San Antonio
San Diego
San Francisco
San Jose
Seattle
Sioux Falls
St. Louis
Tampa
Washington MSA

Metro-Level Multipliers

The explanation presented previously for the characteristic distribution of state multipliers also applies for the distribution of the metro area multipliers estimated for this study.

For total economic impacts, large metropolitan areas such as New York (NEY), Los Angeles, Chicago and Philadelphia (upper-right quadrant) tend to supply a relatively larger share of local demand for consumer-oriented products and services than do smaller metro areas such as Little Rock, Charleston (CHW) and Albuquerque (lower-left quadrant). For Sioux Falls (SIU), small size is offset by distance from other metropolitan areas, resulting in an average impact multiplier. Medium-sized metro areas like St. Louis, Louisville, and New Orleans also cluster near the SOS average.

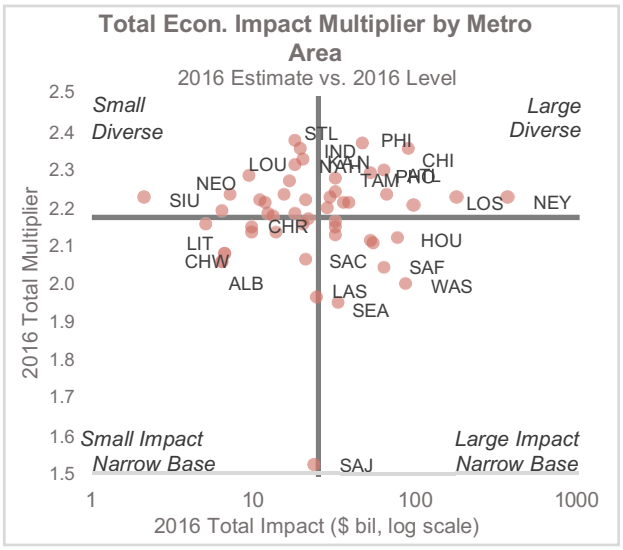
Specialized metropolitan economies tend to have lower impact multipliers. San Jose's extremely low economic multiplier reflects its strong tech industry concentration as well as the readily accessible products and services from the adjacent San Francisco/Oakland metro area. Other specialized metro areas like Las Vegas (tourism), Seattle (aerospace and tech), Washington DC (government and tech) and Houston (energy) generally exhibit below-average impact multipliers.

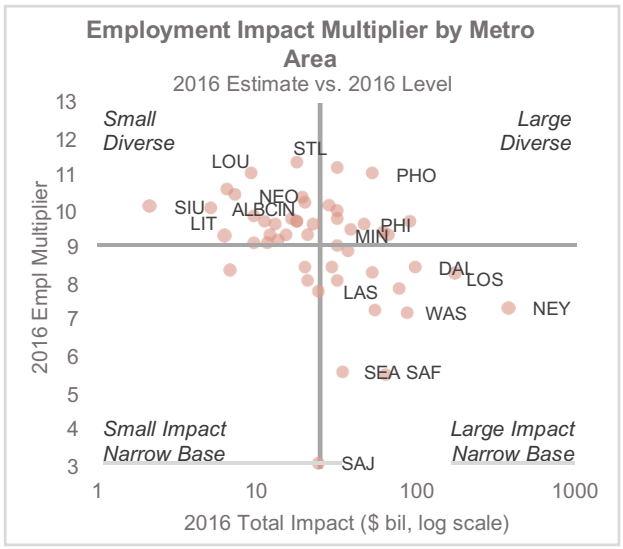
In the right-hand graph, ***very high wage profiles*** in San Jose, San Francisco and Seattle clearly r***educe the employment impact multipliers*** for those metro areas. Even medium-sized metro areas can have relatively low employment multipliers for reasons specific to the metropolitan economy. For example, Sacramento has a relatively narrow employment base of skilled and high-income residents (consider all the attorneys, tax experts, and lobbyists who live and work there because it is the state capitol); this lowers its employment multiplier.

Chicago and Phoenix are examples of metro areas combining diverse economies and relatively average wages, producing relatively high employment multipliers and impacts. St. Louis has high economic and employment multipliers due to an unusual combination of factors: It serves as a business hub for much of the country's center (Kansas, Missouri, parts of Nebraska, Arkansas and Oklahoma), and also has a relatively low- wage profile.

Because of their low-wage structure, several metros in the South (e.g., Louisville, New Orleans, and Little Rock) and the Midwest (Sioux Falls) rank higher for their employment multipliers than they do for their economic impact multipliers.

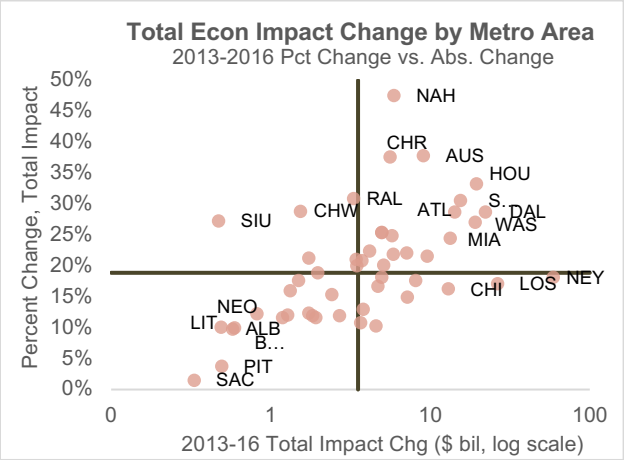
It is interesting that the distribution of employment impact multipliers appears more tightly clustered for the metro areas than it is for the states. The standard deviation of the metro multipliers is ~9% lower than the standard deviation of the state multipliers despite the relatively equal size of the two groups (50 states + DC and 50 metro areas). We interpret this as evidence that urban centers resemble one other more than do states, which can have greater variation in their mixes of urban and rural sub-regions.

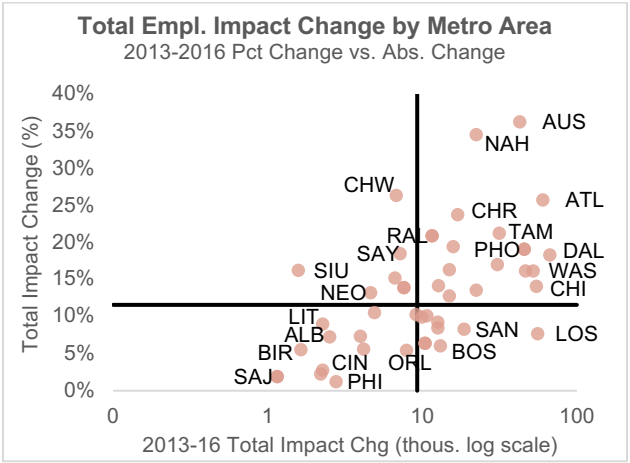




Metro Impact Analysis

The largest metros top the rankings for economic and employment impacts in both 2013 and 2016. Taken together, ***New York, Los Angeles, Dallas, Chicago, and Washington, DC represent ~40% of the US apartment industry's total impact on the US economy, well above their 32% share of US population and employment.***





Source: HAS Estimates

As the period studied lengthens, faster-growing metros should rise in the rankings and begin to supplant large, slower-growing metros that currently dominate. There is some evidence of this occurring even over our brief 3-year study period. Near-term candidates for advancement are the larger metros that are migrating toward the upper right quadrant of the metro impact scatterplots. Over the longer term, mid-size metros that are able to sustain rapid rates of growth will increasingly come to the fore.

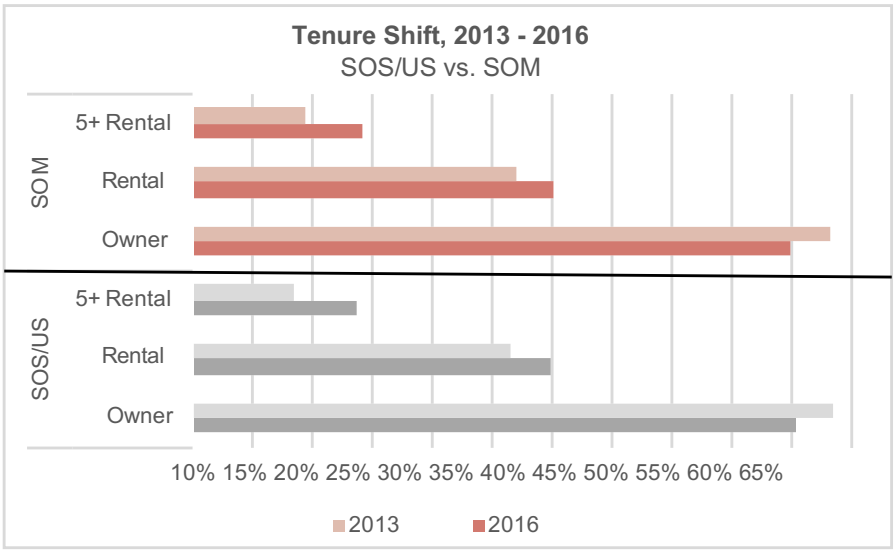
SOM benchmarks, and individual metro performance, for the six drivers of impact growth over the 3-year study period are:

- ***At 3.0%, average SOM population growth is well above the US/SOS increase of 2.2%.*** Population growth statistics present a mixed picture among the metros that ranked highly for total economic impact. Although New York and Los Angeles added a large number of residents, their rates of growth were below-average. Chicago actually suffered a slight loss of population between 2013 and 2016. The balance of our top ten impact metros combined sizable absolute gains in population and above-average rates of growth, from Houston's robust 7.5% gain to the DC MSA at +3.2% -- all comfortably above average

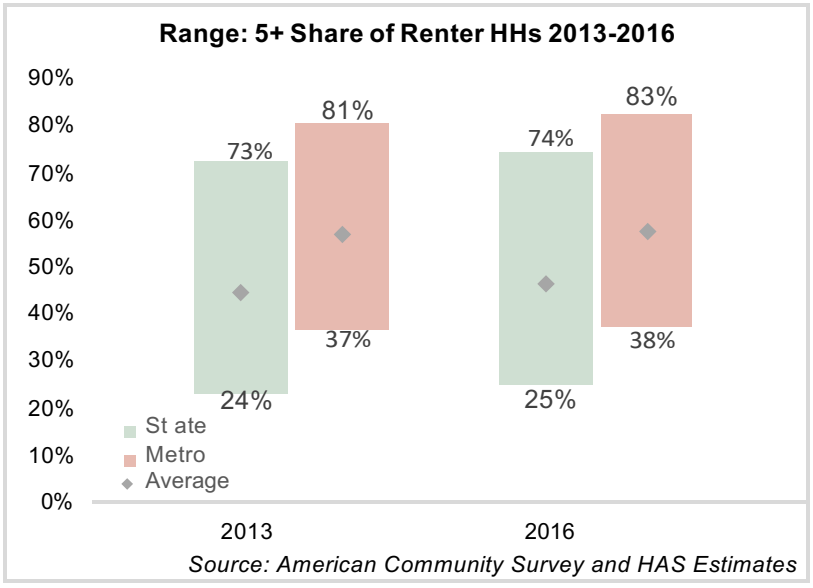
- ***Three-year employment growth for the US was 5.8% and average SOM growth was 7.2%.*** Job gains among the top 10 impact metros reflect variations in the start date and the rate at which each recovered from the GFC. While Dallas's more diversified economy supported above-average job growth (+10.4%), energy industry turmoil that began in mid-2014 limited Houston's 3-year expansion to only 4.2%. DC also posted relatively weak job growth of 5.5%, below the US and SOM benchmarks. Both New York and LA added almost 1.0 million jobs between 2013 and 2016, but these sizable absolute gains translated into only moderate growth rates of 5.7% and 6.9%, respectively, due to their large size. The remaining 5 metros outperformed on both absolute and percentage employment gains. San Francisco's 235,000 increase in jobs – growth of 11% – was driven by its increasingly dominant tech industry.

- ***The number of occupied 5+ rental units grew an average of 4.9% in our SOM between 2013 and 2016, well below US / SOS growth of 6.7%.*** Los Angeles, New York, Miami, Houston and Dallas accounted for about one-third of the SOM's total 680,000-unit net increase in occupied 5+units during this period. Strong out-performers for both absolute and percentage change in occupied 5+ stock include Austin, Seattle, and Orlando. Most metros that top the list for percentage growth are

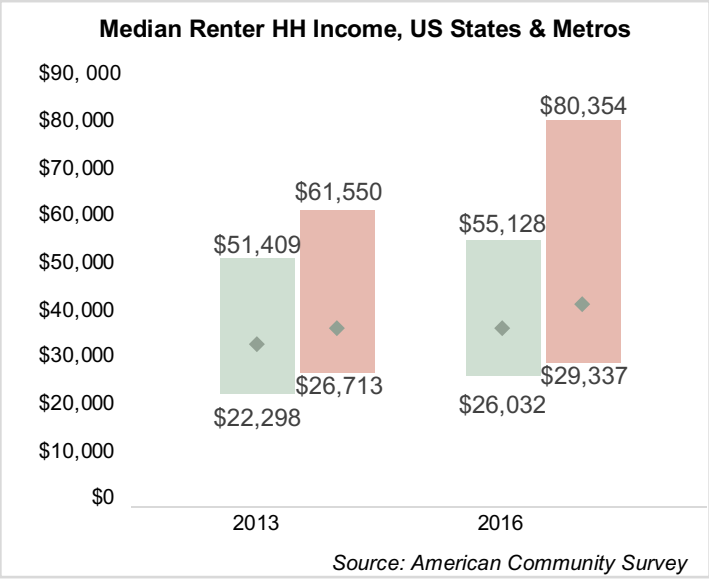
rapidly expanding mid-sized metros in the South and West such as Charlotte, Nashville, and Denver. The 5+unit segment posted decreases in six metros, two of which saw material losses – Honolulu and Birmingham. Condo conversions played a significant role in both. The largest metro affected by a conversion surge was San Antonio, which registered a modest 0.1% decline in rental units over the three-year period.



- Between 2013 and 2016, the 5+ unit share of metro rental stock increased to 24% (+0.4%) across our SOM. ***Mid- to high-rise product tends to generate higher revenues and operating expenses on a per unit basis, magnifying the impacts that such units generate.*** New rental construction in the nation's metro areas generally favors these denser properties. Among our top ten impact metros, the gains in 5+share for DC (+1.2%) and New York (+1.0%) are sizable. The remaining 8 posted below-average growth of 0.1% - 0.3%. Houston offers a contrasting picture with a -0.9% decline in its 5+ rental share. Despite much-mooted downtown high-rise projects, its growth in rental occupancy has favored lower density product. Other high impact metros posting above-average gains are San Antonio, Denver, and Dallas.



Source: American Community Survey and HAS Estimates



- ***Median annual income for all renting households in the US increased 8.4%, to $35,200, between 2013 and 2016. The averaged SOM median for 2016 is $41,227, up 14% from 2013.*** Tech centers are among the top 10 metros for income gains. San Diego (biotech) and San Francisco lead with >30% growth. Austin and San Jose are also on the list, together with several rapid-growth, mid-sized metros (Denver, Charlotte, Portland) in the West and South. The only top 10 metro not from these two regions is Minneapolis at #5 with a 24.5% 3-year gain.
- ***The nation's high tech/biotech centers claim 6 of the top 10 rankings for median renter income levels.*** San Francisco is #1 with an $80,000 median – almost twice the SOM average – and is joined by San Diego, DC, San Jose, Austin, and Boston. Other high-income metros include Tampa, San Antonio, and Denver. Little Rock is tenth with a median renter household income of $46,600.
- ***Weighted average effective rent for 5+ unit rentals increased 13.8% between 2013 and 2016 for the SOM, to $17,818 per unit.*** Although this growth rate is comparable to US / SOS growth of 13.6%, the average US / SOS rent for 2016 is considerably lower, at $15,168 per unit. ***Unlike the US overall, median renter household income growth exceeded effective rent growth (slightly) in the SOM over the study period.***

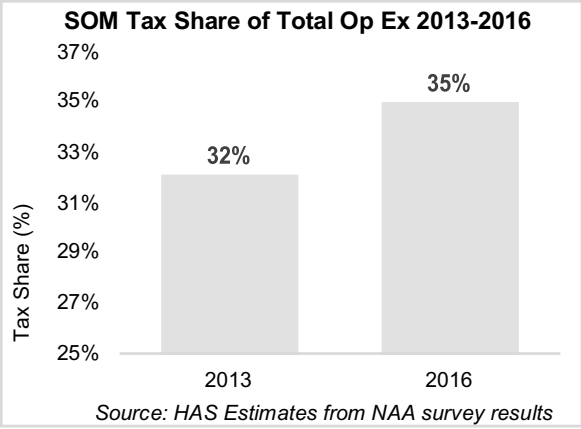
  Although tech markets are well-represented on the top 10 list for high rent levels, only Seattle also appears among the top 10 for recent rent growth.

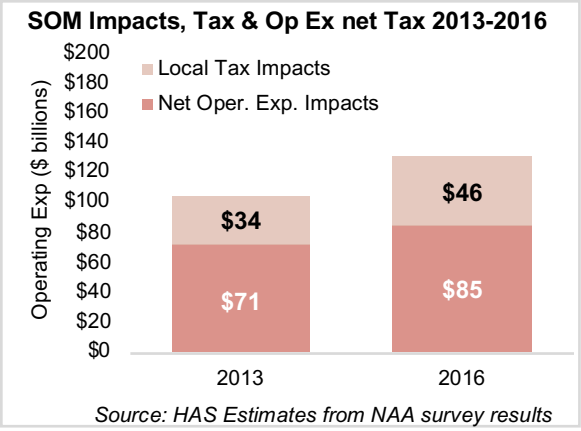
  San Francisco has the highest effective rent for 2016 at $32,315, well above New York's 2016 average of $29,065 (although New York rent statistics are skewed by its longstanding rent control system). San Jose, Boston, DC, San Diego, and Seattle report average rents of $28,700 to $18,050. Supply-constrained Honolulu, Los Angeles, and Miami round out the top 10.

  The top metros for 2013-2016 rent growth are more mixed. Atlanta and Dallas are the only very large metros in the top 10, with >20% growth. Most other top performers are small and mid-sized metros benefiting from strong in-migration and job creation (Sacramento, Charleston, Nashville, Portland, Salt Lake City, and Las Vegas). The average 3-year rent growth for these metros ranged from 26.5% - 21%.

SOM Tax Impacts

For the SOM (less Honolulu, for which we lack data), $45.2 billion in economic activity and 0.070 million jobs are attributable to 2016 apartment industry tax payments (federal, state, and local). These figures represent 3-year growth of 36% and 27.5%, respectively. With 63% of US 5+unit rental stock, the SOM contributed 80% of the economic and 75% of the employment impacts attributable to industry tax payments in 2016. Unsurprisingly, ranking the metros by the size of their 2016 economic impact tends to yield the largest ones, with New York, Los Angeles, Chicago, Dallas,

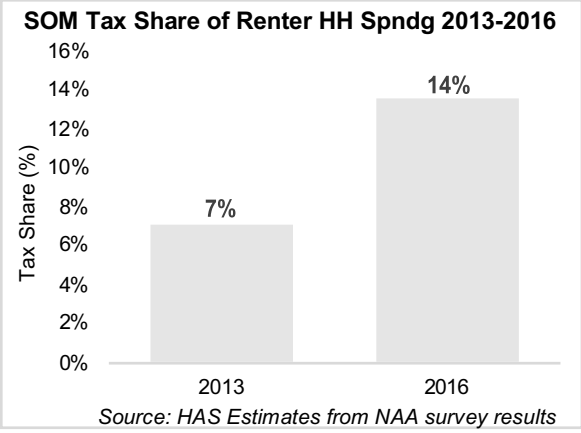


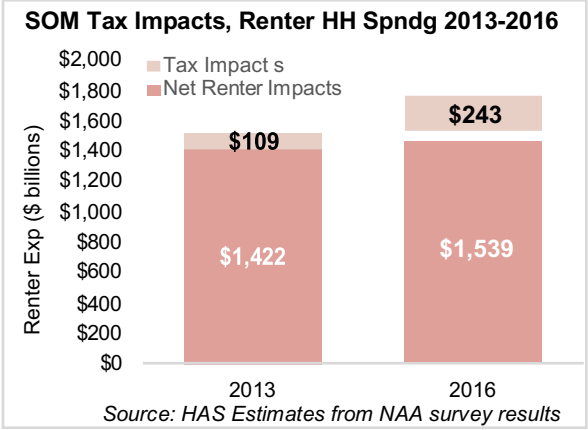


Houston, Atlanta, and DC among the top ten. Although smaller in size, San Francisco is among this group for the large size of its contribution; however, it lagged the SOM's average 3-year growth rate. Other tech metros also ranked highly on this measure, claiming the 11th through 14th positions despite significant disparities in their population size.

Metros that dominate the rankings for percentage growth are the mid-sized MSAs that have outperformed in many rankings of this type. Raleigh and New Orleans top the list, both having doubled their tax impacts over our brief study period. Other strong performers include Richmond (+85%), Orlando and Nashville (+57% for both). Two tech metros, Austin and Boston, posted 50 - 60% gains, as did Dallas and Atlanta. While 7 of the top 10 are from the South, no Western metro appears in the ranking until Salt Lake City at #22, with a 39.4% gain.

For the SOM, $240 billion in economic activity and 1.1 million jobs are attributable to 2016 federal, state, and local tax payments by 5+ renter households – more than double their 2013 totals ($109 billion and 0.54 million jobs). The top-ranked metros for 2016 economic impact are New York, Los Angeles, San Francisco, and the DC MSA. Together, these 4 metros claimed 43% of the SOM tax impact and 46% of the absolute increase in tax impacts between 2013 and 2016. New York dominates the ranking with a $53 billion contribution; at $24 billion, Los Angeles was a distant second. Other strong performers include Dallas, Chicago, Boston, and Seattle.





Unusually, 3 of the top 4 metros for absolute size of impact also score well for percentage growth. ***San Francisco and San Jose hold a sizable lead, with 300% and 275% impact growth, respectively, between 2013 and 2016.*** The remaining metros within the top 10 are a mix of large metros (DC, Houston, Los Angeles) that are enjoying solid growth, tech metros (Austin, Seattle), and mid-sized, rapidly expanding Southern metros (Nashville, Raleigh, Charlotte). Growth for this last group ranged from 175% to 145%, comfortably above the 120% SOM average for the period. Although the ranking order differs somewhat, the pattern for employment impacts is comparable. No Northeastern or Midwestern metros earned an above-average ranking for the percentage growth of their economic or employment impacts.

III. Conclusions

This study explored the impacts of the apartment industry on the US economy in 2013 and 2016. Our analysis revealed a significant contribution, with the industry generating almost 19% of total GDP (in nominal dollars) and 12% of total employment growth in 2016.

All four industry segments saw very strong growth over the 3 years studied, led by resurgent construction activity: the impacts from new apartment construction almost doubled between 2013 and 2016. In aggregate, economic and employment impacts from the 4 segments posted robust 15 - 20% gains during this time.

Impact analysis for the 50 states and 50 major metropolitan areas exhibited the same pattern, i.e., significant economic and job impacts with double-digit growth over the 3-year study period. We found that performance at all geographic levels was linked to growth trends in six economic and demographic variables.

These results provide a “snapshot” of industry impacts which capture a short period in the current economic cycle. However, the economy’s performance has been atypical in many respects as it recovered from the most severe downturn in generations. Readers should be cautious in projecting comparably strong performance for the future. Although study results are instructive, they do not provide a complete understanding of how economic and employment impacts from apartment industry activity may change over the course of a full economic cycle.

APPENDIX A

Summary of Economic/Employment Impacts - 50 US States + District of Columbia

by Industry Segment/5+ Unit Occupied Apartment Properties

2013 & 2016

2013			a. Construction		b. Renov & Repair/Cap Ex		c. Property Op Ex		d. Renter Hshld Spending		STATE TOTALS		Tax Portion of Op Ex		Renter Spending - Taxes	
Census Region	NAA 2013 Region	State	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Total Econ Impact (Bil $)	Employment Impact (No. of Jobs)	Total Econ Impact (Bil of US $)	Employment Impact (No. Jobs)
W	6	Alaska	$0.04	178	$0.05	190	$0.15	258	$3.20	19,088	**$3.44**	**19,714**	$0.04	65	$0.26	1,524
S	2	Alabama	$0.64	3,512	$0.32	1,722	$0.86	1,826	$18.91	112,133	**$20.73**	**119,193**	$0.18	388	$0.86	5,086
S	4	Arkansas	$0.45	2,536	$0.20	1,070	$0.39	807	$9.02	56,342	**$10.06**	**60,755**	$0.08	168	$0.35	2,159
W	6	Arizona	$1.20	6,082	$0.75	3,701	$2.23	4,749	$56.65	326,547	**$60.84**	**341,079**	$0.40	847	$3.35	19,303
W	6	California	$4.09	16,781	$5.20	20,845	$23.48	36,927	$372.37	1,758,350	**$405.15**	**1,832,901**	$6.09	9,570	$25.93	122,425
W	5	Colorado	$1.63	7,702	$0.73	3,360	$1.83	3,578	$42.35	228,738	**$46.54**	**243,378**	$0.38	738	$2.64	14,257
NE	1	Connecticut	$0.45	1,801	$0.30	1,195	$1.41	1,936	$18.88	81,798	**$21.04**	**86,730**	$0.39	540	$1.45	6,298
S	1	District of Columbia	$0.51	1,266	$0.18	461	$1.04	1,010	$10.25	42,731	**$11.98**	**45,469**	$0.26	253	$0.79	3,294
S	1	Delaware	$0.19	901	$0.07	350	$0.29	560	$4.95	27,621	**$5.50**	**29,432**	$0.04	77	$0.31	1,724
S	2	Florida	$4.08	21,217	$2.40	12,224	$8.73	20,056	$141.74	856,235	**$156.93**	**909,732**	$2.77	6,371	$7.87	47,558
S	2	Georgia	$2.35	11,913	$0.99	4,975	$3.38	6,348	$62.67	351,009	**$69.39**	**374,245**	$0.90	1,689	$3.30	18,493
W	6	Hawaii	$0.32	1,326	$0.29	1,169	$1.16	1,977	$16.84	90,325	**$18.61**	**94,797**	$0.29	495	$1.34	7,184
MW	5	Iowa	$0.68	4,114	$0.25	1,485	$1.07	2,462	$12.37	80,477	**$14.38**	**88,539**	$0.24	548	$0.74	4,798
W	6	Idaho	$0.15	908	$0.07	411	$0.32	710	$5.87	38,733	**$6.41**	**40,762**	$0.08	182	$0.28	1,850
MW	3	Illinois	$2.35	10,880	$1.74	7,824	$4.87	8,312	$81.20	412,834	**$90.17**	**439,851**	$1.66	2,826	$5.62	28,581
MW	3	Indiana	$1.09	6,302	$0.86	4,854	$1.95	4,259	$35.00	213,225	**$38.90**	**228,640**	$0.47	1,025	$1.92	11,692
MW	5	Kansas	$0.52	2,797	$0.32	1,681	$0.88	1,936	$17.19	100,992	**$18.91**	**107,406**	$0.16	363	$1.04	6,082
S	2	Kentucky	$0.48	2,761	$0.29	1,623	$0.71	1,544	$15.86	97,071	**$17.34**	**102,998**	$0.13	287	$0.70	4,259
S	4	Louisiana	$0.33	1,716	$0.26	1,323	$0.85	1,770	$17.14	101,322	**$18.58**	**106,131**	$0.11	236	$0.84	4,978
NE	1	Massachusetts	$0.87	3,647	$0.78	3,256	$3.74	6,084	$48.32	238,897	**$53.71**	**251,884**	$0.80	1,297	$3.96	19,563
S	1	Maryland	$1.08	4,388	$0.79	3,160	$3.03	5,519	$52.03	254,115	**$56.93**	**267,183**	$0.69	1,267	$3.85	18,821
NE	1	Maine	$0.06	343	$0.08	472	$0.28	699	$4.80	31,865	**$5.22**	**33,379**	$0.11	277	$0.27	1,806
MW	3	Michigan	$1.08	5,827	$1.16	6,139	$2.58	5,104	$48.86	285,673	**$53.68**	**302,743**	$0.65	1,285	$2.75	16,098
MW	3	Minnesota	$1.82	9,570	$0.83	4,218	$2.14	4,267	$35.61	202,355	**$40.39**	**220,410**	$0.64	1,276	$2.42	13,769
MW	5	Missouri	$0.90	5,221	$0.66	3,773	$1.46	3,248	$28.14	172,859	**$31.15**	**185,101**	$0.27	611	$1.61	9,887
S	2	Mississippi	$0.18	1,047	$0.16	889	$0.40	878	$8.64	55,293	**$9.38**	**58,107**	$0.09	204	$0.37	2,366
W	6	Montana	$0.20	1,255	$0.05	288	$0.15	370	$3.19	23,504	**$3.59**	**25,417**	$0.04	93	$0.15	1,115
S	2	North Carolina	$2.70	15,198	$1.00	5,559	$2.64	5,571	$52.65	320,851	**$58.99**	**347,180**	$0.57	1,208	$2.57	15,652
MW	5	North Dakota	$0.71	3,795	$0.11	592	$0.33	679	$4.86	28,913	**$6.02**	**33,979**	$0.09	176	$0.31	1,841
MW	5	Nebraska	$0.44	2,604	$0.19	1,052	$0.72	1,618	$9.91	60,303	**$11.26**	**65,577**	$0.14	305	$0.59	3,564
NE	1	New Hampshire	$0.10	547	$0.10	534	$0.39	701	$7.27	39,258	**$7.86**	**41,040**	$0.17	303	$0.58	3,117
NE	1	New Jersey	$1.54	6,570	$0.82	3,360	$3.68	6,047	$62.68	299,551	**$68.72**	**315,527**	$1.67	2,739	$5.32	25,433
W	5	New Mexico	$0.14	744	$0.14	745	$0.36	816	$8.88	57,944	**$9.52**	**60,249**	$0.06	133	$0.44	2,900
W	6	Nevada	$0.51	2,178	$0.32	1,323	$1.05	1,620	$26.31	118,322	**$28.19**	**123,443**	$0.18	276	$1.70	7,653
NE	1	New York	$2.60	10,438	$2.84	11,117	$21.83	31,577	$251.33	1,140,216	**$278.59**	**1,193,348**	$9.89	14,304	$20.45	92,793
MW	3	Ohio	$1.82	9,704	$1.46	7,669	$3.65	7,066	$67.03	385,831	**$73.97**	**410,269**	$0.92	1,781	$3.74	21,501
S	4	Oklahoma	$0.44	2,387	$0.33	1,722	$0.91	1,926	$17.88	105,360	**$19.58**	**111,395**	$0.12	247	$0.87	5,154
W	6	Oregon	$0.90	5,190	$0.51	2,917	$1.38	3,085	$32.12	204,578	**$34.91**	**215,771**	$0.43	962	$1.79	11,404
NE	1	Pennsylvania	$0.81	4,483	$1.01	5,430	$3.95	8,268	$59.35	346,004	**$65.12**	**364,186**	$0.88	1,838	$3.92	22,846
NE	1	Rhode Island	$0.04	200	$0.08	434	$0.34	672	$5.74	33,274	**$6.20**	**34,580**	$0.12	237	$0.39	2,288
S	2	South Carolina	$0.91	5,042	$0.33	1,774	$1.12	2,435	$20.21	124,723	**$22.56**	**133,974**	$0.30	655	$0.98	6,032
MW	5	South Dakota	$0.25	1,513	$0.09	517	$0.23	528	$3.75	25,888	**$4.32**	**28,446**	$0.06	137	$0.19	1,296
S	2	Tennessee	$1.19	6,467	$0.51	2,675	$1.58	3,190	$29.90	165,190	**$33.18**	**177,522**	$0.41	829	$1.38	7,615
S	4	Texas	$3.77	17,545	$3.28	14,767	$12.75	24,391	$205.77	1,073,399	**$225.58**	**1,130,102**	$4.61	8,812	$12.12	63,207
W	5	Utah	$0.46	2,551	$0.20	1,041	$0.47	971	$11.87	71,397	**$13.00**	**75,960**	$0.08	169	$0.73	4,399
S	1	Virginia	$1.74	8,164	$1.07	5,008	$4.11	7,686	$55.09	283,386	**$62.01**	**304,245**	$0.66	1,230	$3.82	19,658
NE	1	Vermont	$0.05	313	$0.04	258	$0.14	337	$2.20	14,431	**$2.43**	**15,339**	$0.06	134	$0.15	957
W	6	Washington	$1.84	7,708	$0.89	3,633	$3.10	4,843	$57.65	270,169	**$63.49**	**286,353**	$0.88	1,378	$3.77	17,644
MW	3	Wisconsin	$1.40	7,976	$0.67	3,802	$2.48	5,265	$28.77	176,568	**$33.32**	**193,611**	$0.50	1,073	$1.64	10,051
S	2	West Virginia	$0.04	237	$0.08	482	$0.20	442	$3.58	24,575	**$3.90**	**25,736**	$0.06	123	$0.15	1,043
W	5	Wyoming	$0.06	303	$0.03	125	$0.10	172	$1.65	9,088	**$1.84**	**9,688**	$0.01	24	$0.10	547
		SUM OF STATES	**$52.20**	**257,850**	**$35.88**	**169,197**	**$136.90**	**247,098**	**$2,198.50**	**11,639,352**	**$2,423.48**	**12,313,497**	**$40.83**	**72,050**	**$142.65**	**743,567**

Sources: National Apartment Association; CoStar; US Bureau of Economic Analysis; US Bureau of Labor Statistics; US Census Bureau; "US Apartment Demand: A Forward Look" HAS/Whitegate/Dinn May 2017

Summary of Economic/Employment Impacts - 50 US States + District of Columbia

by Industry Segment/5+ Unit Occupied Apartment Properties

2013 & 2016

2016			a. Construction		b. Renov & Repair/Cap Ex		c. Property Op Ex		d. Renter Hshld Spending		STATE TOTALS		Tax Portion of Op Ex		Renter Spending - Taxes	
Census Region	NAA 2016 Region	State	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Total Econ Impact (Bil $)	Employment Impact (No. of Jobs)	Total Econ Impact (Bil of US $)	Employment Impact (No. of Jobs)
W	7	Alaska	$0.07	276	$0.06	227	$0.14	226	$3.51	19,645	**$3.77**	**20,374**	$0.04	63	$0.51	2,880
S	9	Alabama	$1.16	6,232	$0.49	2,584	$1.06	2,217	$22.07	127,920	**$24.78**	**138,953**	$0.31	637	$1.50	8,717
S	6	Arkansas	$0.78	4,291	$0.32	1,709	$0.48	960	$11.79	72,487	**$13.36**	**79,447**	$0.11	227	$0.78	4,823
W	7	Arizona	$2.75	13,926	$0.99	4,884	$2.67	5,587	$66.83	383,392	**$73.23**	**407,790**	$0.50	1,040	$6.85	39,279
W	10	California	$9.34	35,356	$7.21	27,015	$27.08	39,398	$455.43	1,982,704	**$499.06**	**2,084,474**	$8.07	11,745	$72.62	316,138
W	8	Colorado	$3.32	15,178	$1.13	5,092	$2.51	4,740	$53.97	285,388	**$60.93**	**310,399**	$0.56	1,061	$6.21	32,853
NE	2	Connecticut	$0.69	2,622	$0.39	1,489	$1.65	2,163	$20.79	85,465	**$23.51**	**91,739**	$0.53	695	$2.52	10,377
S	1	District of Columbia	$0.99	2,203	$0.28	653	$1.27	1,106	$13.87	51,545	**$16.41**	**55,508**	$0.32	277	$2.58	9,570
S	1	Delaware	$0.30	1,479	$0.12	566	$0.25	464	$5.42	29,733	**$6.09**	**32,242**	$0.05	99	$0.52	2,834
S	9	Florida	$9.16	46,899	$3.37	17,063	$11.50	25,097	$182.60	1,061,730	**$206.63**	**1,150,788**	$4.27	9,308	$17.73	103,107
S	4	Georgia	$4.94	24,500	$1.82	8,896	$4.13	7,419	$79.13	429,728	**$90.02**	**470,543**	$1.39	2,498	$7.34	39,839
W	10	Hawaii	$0.60	2,339	$0.37	1,420	$1.23	1,921	$18.90	94,296	**$21.09**	**99,977**	$0.34	536	$2.97	14,803
MW	5	Iowa	$1.15	6,367	$0.31	1,698	$0.85	1,797	$13.21	79,773	**$15.51**	**89,635**	$0.24	505	$0.94	5,666
W	7	Idaho	$0.38	2,114	$0.09	488	$0.33	699	$6.04	38,007	**$6.83**	**41,308**	$0.10	214	$0.43	2,684
MW	3	Illinois	$4.22	18,795	$2.14	9,354	$5.77	9,521	$92.39	446,870	**$104.53**	**484,541**	$1.71	2,812	$9.49	45,882
MW	3	Indiana	$1.66	9,079	$0.83	4,459	$2.08	4,203	$37.73	216,792	**$42.30**	**234,533**	$0.50	1,004	$2.47	14,171
MW	5	Kansas	$0.75	3,841	$0.37	1,847	$0.86	1,792	$17.72	97,431	**$19.69**	**104,911**	$0.22	456	$1.37	7,516
S	4	Kentucky	$0.92	5,290	$0.49	2,792	$0.80	1,667	$18.27	108,500	**$20.49**	**118,250**	$0.17	359	$1.22	7,214
S	9	Louisiana	$0.51	2,641	$0.40	1,954	$0.94	1,808	$18.74	106,255	**$20.59**	**112,657**	$0.19	372	$1.34	7,583
NE	2	Massachusetts	$1.83	7,237	$1.05	4,148	$4.54	6,962	$53.95	249,838	**$61.36**	**268,184**	$1.28	1,959	$7.62	35,304
S	1	Maryland	$1.65	6,176	$1.37	5,101	$3.55	5,755	$61.82	275,691	**$68.39**	**292,724**	$1.00	1,622	$8.52	38,000
NE	2	Maine	$0.12	685	$0.12	676	$0.34	785	$4.64	29,388	**$5.21**	**31,534**	$0.14	311	$0.36	2,303
MW	3	Michigan	$2.41	12,593	$1.66	8,578	$2.96	5,552	$59.90	336,666	**$66.93**	**363,389**	$0.69	1,300	$4.33	24,364
MW	3	Minnesota	$2.97	15,181	$0.90	4,456	$2.68	5,027	$39.46	208,206	**$46.02**	**232,870**	$0.93	1,736	$3.61	19,043
MW	5	Missouri	$1.88	11,019	$0.71	4,104	$1.65	3,776	$34.14	211,712	**$38.38**	**230,612**	$0.26	591	$2.54	15,737
S	9	Mississippi	$0.22	1,258	$0.27	1,510	$0.46	989	$10.52	67,130	**$11.48**	**70,888**	$0.11	239	$0.73	4,634
W	8	Montana	$0.30	1,780	$0.07	424	$0.17	415	$3.62	25,527	**$4.16**	**28,145**	$0.03	61	$0.27	1,924
S	4	North Carolina	$5.01	27,289	$1.38	7,391	$3.23	6,475	$62.51	357,558	**$72.13**	**398,713**	$0.80	1,600	$5.35	30,586
MW	8	North Dakota	$0.89	4,852	$0.14	755	$0.34	726	$6.89	41,214	**$8.26**	**47,547**	$0.06	137	$0.65	3,914
MW	5	Nebraska	$0.72	3,983	$0.27	1,435	$0.72	1,640	$11.01	63,827	**$12.72**	**70,885**	$0.27	614	$0.81	4,679
NE	2	New Hampshire	$0.24	1,228	$0.15	758	$0.60	1,056	$7.04	36,733	**$8.03**	**39,775**	$0.17	307	$0.78	4,070
NE	1	New Jersey	$3.89	16,138	$1.43	5,778	$5.64	9,090	$72.87	336,913	**$83.83**	**367,918**	$2.49	4,016	$10.44	48,262
W	6	New Mexico	$0.14	718	$0.16	797	$0.41	863	$9.97	62,940	**$10.67**	**65,318**	$0.07	147	$0.73	4,584
W	7	Nevada	$1.25	5,215	$0.54	2,148	$1.43	2,190	$30.39	132,196	**$33.61**	**141,749**	$0.23	358	$3.10	13,486
NE	2	New York	$7.78	29,252	$5.63	21,039	$30.18	41,891	$280.02	1,222,898	**$323.61**	**1,315,080**	$13.34	18,511	$41.68	182,023
MW	3	Ohio	$2.59	13,459	$1.62	8,236	$4.28	7,786	$75.84	419,228	**$84.33**	**448,710**	$1.36	2,476	$5.49	30,351
S	5	Oklahoma	$0.72	3,865	$0.43	2,261	$0.94	2,027	$20.65	121,968	**$22.75**	**130,121**	$0.22	477	$1.49	8,777
W	7	Oregon	$1.82	9,828	$0.87	4,632	$1.73	3,447	$36.97	214,581	**$41.39**	**232,488**	$0.53	1,056	$3.64	21,134
NE	1	Pennsylvania	$1.67	8,790	$1.59	8,228	$4.93	9,580	$63.92	355,596	**$72.11**	**382,194**	$0.94	1,828	$6.10	33,921
NE	2	Rhode Island	$0.03	194	$0.16	912	$0.52	1,037	$7.17	43,236	**$7.89**	**45,379**	$0.18	354	$0.71	4,303
S	4	South Carolina	$1.93	10,128	$0.68	3,507	$1.42	2,857	$24.06	139,350	**$28.09**	**155,843**	$0.42	835	$1.95	11,310
MW	8	South Dakota	$0.41	2,278	$0.13	702	$0.29	610	$4.44	27,171	**$5.28**	**30,762**	$0.06	135	$0.30	1,808
S	4	Tennessee	$3.16	15,942	$1.04	5,182	$1.97	3,636	$38.32	200,380	**$44.48**	**225,140**	$0.60	1,112	$3.01	15,764
S	6	Texas	$8.31	37,685	$4.88	21,598	$16.31	29,701	$259.02	1,289,885	**$288.51**	**1,378,869**	$6.97	12,699	$27.48	136,832
W	8	Utah	$1.26	6,753	$0.26	1,373	$0.63	1,243	$14.99	85,817	**$17.14**	**95,185**	$0.12	237	$1.46	8,371
S	1	Virginia	$3.12	13,941	$1.49	6,671	$4.64	8,209	$68.98	338,529	**$78.24**	**367,350**	$1.08	1,917	$9.12	44,743
NE	2	Vermont	$0.10	601	$0.07	392	$0.21	464	$2.44	15,021	**$2.82**	**16,477**	$0.08	184	$0.22	1,370
W	7	Washington	$4.22	16,323	$1.13	4,296	$3.94	5,544	$70.82	296,127	**$80.11**	**322,291**	$1.19	1,680	$9.48	39,638
MW	3	Wisconsin	$2.23	12,132	$0.76	4,144	$1.74	3,497	$32.71	191,147	**$37.44**	**210,921**	$0.44	896	$2.50	14,631
S	4	West Virginia	$0.10	619	$0.10	625	$0.22	487	$4.27	28,971	**$4.70**	**30,703**	$0.07	165	$0.27	1,836
W	8	Wyoming	$0.05	219	$0.04	176	$0.07	132	$2.05	11,344	**$2.21**	**11,871**	$0.02	37	$0.20	1,110
		SUM OF STATES	**$106.71**	**500,792**	**$52.27**	**236,222**	**$168.36**	**286,235**	**$2,613.81**	**13,154,451**	**$2,941.15**	**14,177,700**	**$40.83**	**72,050**	**$304.31**	**1,484,749**

Sources: National Apartment Association; CoStar; US Bureau of Economic Analysis; US Bureau of Labor Statistics; US Census Bureau; "US Apartment Demand: A Forward Look" HAS/Whitegate/Dinn May 2017

APPENDIX B

Summary of Economic and Employment Impacts - 50 Major US Metros

by Industry Segment/5+ Unit Occupied Apartment Properties

2013 & 2016

2013

Census Region	NAA 2013 Region	State	Metro Area	a. Construction		b. Renov & Repair/Cap Ex		c. Property Op Ex		d. Renter Hshld Spending		METRO TOTALS		Tax Portion of OpEx *		Renter Spending on Taxes	
				Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Total Econ Impact (Bil $)	Total Employ Impact (No. Jobs per Mil$ Rev)	Total Econ Impact (Bil of US $)	Employment Impact (No. Jobs)
W	5	NM	Albuquerque	$0.10	497	$0.10	499	$0.23	454	$5.52	32,932	**$5.94**	**34,382**	$0.04	74	$0.28	1,696
S	2	GA	Atlanta	$2.24	9,931	$0.70	3,003	$2.40	3,886	$44.01	216,376	**$49.35**	**233,196**	$0.66	1,061	$2.61	12,832
S	4	TX	Austin	$2.20	9,994	$0.35	1,555	$1.40	2,497	$19.95	103,489	**$23.90**	**117,535**	$0.60	1,066	$1.30	6,743
S	1	MD	Baltimore	$0.57	2,247	$0.41	1,585	$1.32	2,183	$22.82	109,684	**$25.12**	**115,699**	$0.30	501	$1.61	7,726
S	2	AL	Birmingham	$0.25	1,190	$0.10	481	$0.25	456	$5.26	27,118	**$5.86**	**29,245**	$0.06	101	$0.27	1,409
NE	1	MA	Boston	$0.90	3,451	$0.80	3,093	$3.47	5,562	$42.54	203,667	**$47.71**	**215,773**	$0.74	1,186	$3.75	17,951
S	2	SC	Charleston	$0.26	1,148	$0.09	377	$0.29	461	$4.68	23,598	**$5.32**	**25,584**	$0.07	114	$0.27	1,370
S	2	NC	Charlotte	$1.03	5,072	$0.27	1,311	$0.68	1,195	$12.77	63,585	**$14.75**	**71,163**	$0.16	291	$0.71	3,518
MW	3	IL	Chicago	$2.54	11,539	$1.58	6,951	$4.31	7,418	$70.67	362,994	**$79.10**	**388,901**	$1.47	2,527	$5.24	26,935
MW	3	OH	Cincinnati	$0.42	2,104	$0.28	1,376	$0.65	1,226	$13.92	76,502	**$15.27**	**81,208**	$0.14	261	$0.87	4,774
MW	3	OH	Cleveland	$0.11	536	$0.28	1,373	$0.91	1,650	$12.54	69,926	**$13.84**	**73,484**	$0.20	358	$0.68	3,811
MW	3	OH	Columbus	$0.77	3,792	$0.36	1,703	$0.80	1,358	$15.94	83,924	**$17.86**	**90,777**	$0.28	470	$1.03	5,426
S	4	TX	Dallas	$3.90	17,564	$1.25	5,464	$4.15	7,452	$67.19	331,742	**$76.49**	**362,221**	$1.48	2,653	$4.27	21,103
W	5	CO	Denver	$1.60	7,316	$0.51	2,248	$1.27	2,384	$28.55	152,101	**$31.92**	**164,051**	$0.29	542	$1.86	9,891
MW	3	MI	Detroit	$0.63	2,810	$0.70	3,085	$1.86	2,946	$24.72	126,407	**$27.90**	**135,248**	$0.46	736	$1.54	7,877
W	6	HI	Honolulu	$0.28	1,286	$0.27	1,208	$0.98	1,805	$14.87	91,259	**$16.41**	**95,559**			$1.23	7,530
S	4	TX	Houston	$3.74	13,890	$0.77	2,758	$3.35	4,580	$50.09	213,680	**$57.95**	**234,907**	$1.22	1,666	$3.09	13,173
MW	3	IN	Indianapolis	$0.43	2,271	$0.30	1,543	$0.81	1,633	$14.63	82,862	**$16.16**	**88,310**	$0.19	393	$0.86	4,877
MW	5	KS	Kansas City	$0.51	2,439	$0.27	1,259	$0.79	1,502	$15.52	83,805	**$17.09**	**89,006**	$0.15	286	$1.04	5,628
W	6	NV	Las Vegas	$0.43	1,823	$0.26	1,020	$0.82	1,284	$20.81	95,335	**$22.31**	**99,462**	$0.14	219	$1.36	6,239
S	4	AR	Little Rock	$0.21	1,047	$0.09	426	$0.19	352	$4.29	23,220	**$4.78**	**25,045**	$0.04	73	$0.21	1,119
W	6	CA	Los Angeles	$3.19	13,495	$2.77	11,577	$8.37	13,674	$137.94	678,545	**$152.27**	**717,291**	$1.96	3,195	$9.60	47,217
S	2	KY	Louisville	$0.22	1,221	$0.15	816	$0.32	681	$7.52	43,164	**$8.21**	**45,882**	$0.06	130	$0.36	2,059
S	2	TN	Memphis	$0.25	1,228	$0.17	778	$0.49	880	$9.25	50,563	**$10.15**	**53,449**	$0.12	226	$0.48	2,619
S	2	FL	Miami	$2.69	12,585	$0.84	3,889	$3.61	6,798	$46.92	262,919	**$54.06**	**286,190**	$1.26	2,376	$2.67	14,955
MW	3	WI	Milwaukee	$0.30	1,443	$0.21	1,013	$0.59	1,041	$9.28	50,498	**$10.38**	**53,994**	$0.19	340	$0.55	3,006
MW	3	MN	Minneapolis	$1.88	9,248	$0.66	3,166	$1.69	3,175	$29.21	157,224	**$33.44**	**172,813**	$0.51	949	$2.19	11,787
S	2	TN	Nashville	$0.61	3,068	$0.19	901	$0.57	1,030	$11.04	59,065	**$12.41**	**64,063**	$0.15	278	$0.58	3,127
S	4	LA	New Orleans	$0.04	197	$0.06	283	$0.31	560	$6.18	33,742	**$6.60**	**34,781**	$0.04	75	$0.32	1,773
NE	1	NY	New York MSA	$4.30	16,841	$5.87	22,609	$26.94	43,409	$285.88	1,358,657	**$322.99**	**1,441,515**	$12.20	19,663	$24.86	118,169
S	4	OK	Oklahoma City	$0.21	1,030	$0.13	602	$0.37	647	$7.71	41,411	**$8.42**	**43,690**			$0.39	2,101
S	2	FL	Orlando	$1.47	11,650	$0.40	2,619	$1.20	2,922	$19.94	125,937	**$23.00**	**143,128**	$0.31	767	$1.15	7,281
NE	1	PA	Philadelphia	$0.83	3,879	$0.79	3,575	$2.67	5,152	$39.49	213,058	**$43.79**	**225,664**	$0.59	1,145	$2.95	15,911
W	6	AZ	Phoenix	$1.14	5,647	$0.53	2,528	$1.60	3,141	$41.00	227,427	**$44.26**	**238,742**	$0.27	526	$2.55	14,153
NE	1	PA	Pittsburgh	$0.14	765	$0.23	1,160	$0.67	1,317	$11.90	68,927	**$12.94**	**72,169**			$0.76	4,418
W	6	OR	Portland	$0.78	4,007	$0.40	2,035	$1.08	2,085	$24.96	139,381	**$27.23**	**147,509**	$0.34	650	$1.61	8,998
S	2	NC	Raleigh	$0.98	4,799	$0.21	1,003	$0.44	827	$8.97	48,604	**$10.61**	**55,232**	$0.09	162	$0.57	3,062
S	1	VA	Richmond	$0.30	1,479	$0.18	894	$0.56	1,088	$9.51	51,372	**$10.55**	**54,834**	$0.08	153	$0.58	3,141
W	6	CA	Riverside	$0.58	3,105	$0.44	2,316	$1.55	2,833	$26.47	153,136	**$29.04**	**161,390**	$0.38	701	$1.65	9,521
W	6	CA	Sacramento	$0.28	1,339	$0.26	1,238	$1.00	1,857	$19.18	104,418	**$20.72**	**108,852**	$0.24	440	$1.22	6,665
W	5	UT	Salt Lake City	$0.20	945	$0.14	670	$0.31	549	$7.46	36,576	**$8.11**	**38,740**	$0.05	96	$0.49	2,393
S	4	TX	San Antonio	$0.76	3,805	$0.28	1,378	$1.00	1,985	$16.34	98,071	**$18.38**	**105,239**	$0.35	699	$0.96	5,754
W	6	CA	San Diego	$0.87	3,582	$0.60	2,472	$2.44	4,085	$41.96	213,104	**$45.87**	**223,243**	$0.74	1,240	$3.02	15,357
W	6	CA	San Francisco	$1.46	4,346	$0.68	1,962	$5.07	6,579	$43.08	166,902	**$50.28**	**179,790**	$1.21	1,576	$3.48	13,469
W	6	CA	San Jose	$0.77	2,325	$0.35	1,011	$1.75	1,555	$16.55	54,967	**$19.42**	**59,857**	$0.72	643	$1.43	4,763
W	6	WA	Seattle	$1.56	5,844	$0.60	2,155	$2.34	3,234	$40.01	168,339	**$44.51**	**179,573**	$0.67	920	$2.92	12,284
MW	3	SD	Sioux Falls	$0.14	729	$0.03	149	$0.07	149	$1.48	8,601	**$1.72**	**9,628**			$0.09	532
MW	5	MO	St. Louis	$0.42	2,043	$0.29	1,366	$0.74	1,420	$14.15	75,778	**$15.60**	**80,607**	$0.15	282	$0.89	4,779
S	2	FL	Tampa	$0.90	4,374	$0.37	1,805	$1.35	2,722	$24.10	139,441	**$26.72**	**148,342**	$0.40	800	$1.36	7,865
S	1	DC	Washington MSA	$2.00	7,413	$1.11	4,078	$4.67	7,665	$62.52	301,437	**$70.30**	**320,593**	$1.24	2,034	$5.29	25,483

* There are missing values in the "Tax Portion of OpEx" columns for metros not covered in that year's NAA survey. In 2013, those metros are Honolulu, Oklahoma City, Pittsburgh, and Sioux Falls (SD). Because this subcategory largely reflects locally-set property taxes which can vary considerably, both by place and over time, applying the regional average in such instances was not feasible.

Summary of Economic and Employment Impacts - 50 Major US Metros

by Industry Segment/5+ Unit Occupied Apartment Properties

2013 & 2016

2016

Census Region	NAA 2013 Region	State	Metro Area	a. Construction		b. Renov & Repair/Cap Ex		c. Property Op Ex		d. Renter Hshld Spending		METRO TOTALS		Tax Portion of OpEx *		Renter Spending on Taxes	
				Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Economic Impact (Bil of US$)	Employment Impact (No. of Jobs)	Total Econ Impact (Bil $)	Total Employ Impact (No. Jobs per Mil$ Rev)	Total Econ Impact (Bil of US $)	Employment Impact (No. of Jobs)
W	5	NM	Albuquerque	$0.09	440	$0.10	464	$0.25	502	$6.09	35,499	**$6.53**	**36,906**	$0.04	85	$0.44	2,577
S	2	GA	Atlanta	$4.41	19,072	$1.30	5,511	$2.96	4,954	$54.87	263,774	**$63.54**	**293,312**	$1.00	1,673	$5.98	28,744
S	4	TX	Austin	$3.12	13,700	$0.62	2,683	$1.89	3,213	$27.32	140,707	**$32.95**	**160,303**	$0.96	1,623	$3.50	18,019
S	1	MD	Baltimore	$0.63	2,388	$0.59	2,211	$1.52	2,360	$27.44	123,621	**$30.19**	**130,580**	$0.41	628	$3.66	16,470
S	2	AL	Birmingham	$0.42	1,972	$0.13	598	$0.30	520	$5.59	27,794	**$6.44**	**30,884**	$0.10	166	$0.42	2,076
NE	1	MA	Boston	$1.78	6,482	$0.92	3,350	$4.15	6,075	$48.01	212,994	**$54.85**	**228,901**	$1.17	1,709	$7.66	33,977
S	2	SC	Charleston	$0.52	2,237	$0.15	609	$0.37	569	$5.81	28,923	**$6.85**	**32,338**	$0.10	146	$0.66	3,274
S	2	NC	Charlotte	$1.95	8,957	$0.36	1,614	$0.90	1,456	$17.09	76,105	**$20.31**	**88,132**	$0.24	388	$1.76	7,818
MW	3	IL	Chicago	$3.74	16,766	$2.02	8,917	$5.20	8,815	$81.04	409,257	**$92.00**	**443,755**	$1.54	2,604	$9.20	46,444
MW	3	OH	Cincinnati	$0.62	2,820	$0.34	1,499	$0.77	1,306	$15.38	77,849	**$17.10**	**83,474**	$0.20	348	$1.26	6,382
MW	3	OH	Cleveland	$0.13	625	$0.31	1,432	$0.95	1,565	$14.17	74,033	**$15.56**	**77,656**	$0.25	418	$1.01	5,293
MW	3	OH	Columbus	$0.98	4,696	$0.46	2,115	$1.12	1,822	$19.02	97,046	**$21.59**	**105,679**	$0.48	781	$1.70	8,675
S	4	TX	Dallas	$8.40	36,089	$1.73	7,252	$5.35	8,506	$83.04	377,066	**$98.53**	**428,912**	$2.23	3,537	$9.64	43,758
W	5	CO	Denver	$2.46	10,245	$0.72	2,909	$1.63	2,780	$34.20	170,420	**$39.00**	**186,353**	$0.37	633	$4.42	22,012
MW	3	MI	Detroit	$0.82	3,459	$0.90	3,757	$2.11	3,172	$28.74	137,399	**$32.57**	**147,788**	$0.49	731	$2.43	11,608
W	6	HI	Honolulu	$0.53	2,234	$0.32	1,342	$1.06	1,777	$16.41	92,412	**$18.32**	**97,765**			$2.62	14,774
S	4	TX	Houston	$6.08	23,869	$1.44	5,535	$4.13	5,970	$65.64	295,421	**$77.28**	**330,795**	$1.73	2,500	$7.85	35,321
MW	3	IN	Indianapolis	$0.78	3,789	$0.38	1,784	$0.95	1,779	$17.46	90,101	**$19.57**	**97,453**	$0.23	426	$1.35	6,984
MW	5	KS	Kansas City	$0.97	4,598	$0.36	1,653	$0.93	1,681	$18.26	93,744	**$20.53**	**101,676**	$0.24	428	$1.61	8,266
W	6	NV	Las Vegas	$1.06	4,249	$0.35	1,371	$1.09	1,722	$22.50	102,029	**$25.00**	**109,372**	$0.17	266	$2.30	10,408
S	4	AR	Little Rock	$0.31	1,452	$0.11	503	$0.20	346	$4.65	25,008	**$5.27**	**27,310**	$0.05	82	$0.33	1,752
W	6	CA	Los Angeles	$6.38	24,842	$3.56	13,897	$10.03	15,208	$158.49	718,912	**$178.46**	**772,859**	$2.71	4,104	$23.59	107,021
S	2	KY	Louisville	$0.40	2,109	$0.19	1,018	$0.36	693	$8.58	46,941	**$9.52**	**50,760**	$0.08	162	$0.64	3,515
S	2	TN	Memphis	$0.40	1,849	$0.22	976	$0.50	804	$10.21	53,788	**$11.34**	**57,416**	$0.15	242	$0.82	4,299
S	2	FL	Miami	$4.50	19,974	$1.42	6,247	$4.52	8,115	$56.88	298,285	**$67.31**	**332,620**	$1.82	3,260	$6.04	31,677
MW	3	WI	Milwaukee	$0.51	2,345	$0.27	1,250	$0.68	1,141	$10.88	56,822	**$12.34**	**61,558**	$0.14	228	$0.90	4,691
MW	3	MN	Minneapolis	$2.22	10,400	$0.82	3,743	$2.18	3,627	$31.85	154,360	**$37.08**	**172,130**	$0.75	1,253	$3.31	16,023
S	2	TN	Nashville	$2.08	9,306	$0.37	1,617	$0.78	1,293	$15.09	74,047	**$18.32**	**86,262**	$0.24	403	$1.59	7,810
S	4	LA	New Orleans	$0.08	372	$0.07	328	$0.35	656	$6.91	38,052	**$7.41**	**39,409**	$0.09	161	$0.54	2,966
NE	1	NY	New York MSA	$11.21	41,629	$8.22	30,292	$37.60	56,934	$324.63	1,461,268	**$381.66**	**1,590,123**	$16.67	25,246	$52.52	236,429
S	4	OK	Oklahoma City	$0.35	1,672	$0.18	821	$0.41	785	$8.97	47,064	**$9.91**	**50,342**	$0.10	185	$0.69	3,605
S	2	FL	Orlando	$2.64	12,786	$0.42	1,994	$1.47	2,730	$24.21	133,509	**$28.74**	**151,020**	$0.50	923	$2.33	12,835
NE	1	PA	Philadelphia	$1.58	6,909	$0.98	4,207	$3.18	5,783	$42.59	211,533	**$48.32**	**228,432**	$0.64	1,159	$4.94	24,543
W	6	AZ	Phoenix	$2.46	12,017	$0.77	3,670	$1.94	3,763	$48.64	264,951	**$53.81**	**284,400**	$0.36	696	$5.48	29,844
NE	1	PA	Pittsburgh	$0.26	1,299	$0.30	1,448	$0.88	1,616	$11.99	65,297	**$13.43**	**69,660**	$0.17	305	$1.03	5,604
W	6	OR	Portland	$1.56	7,520	$0.63	2,993	$1.37	2,416	$28.62	147,187	**$32.18**	**160,116**	$0.42	740	$3.35	17,241
S	2	NC	Raleigh	$1.15	5,246	$0.24	1,081	$0.62	1,049	$11.89	59,455	**$13.90**	**66,831**	$0.18	310	$1.45	7,260
S	1	VA	Richmond	$0.40	1,748	$0.21	924	$0.58	1,002	$10.63	51,142	**$11.83**	**54,817**	$0.15	251	$1.02	4,929
W	6	CA	Riverside	$0.82	4,234	$0.60	3,053	$1.69	2,952	$29.73	161,527	**$32.83**	**171,766**	$0.46	801	$3.27	17,747
W	6	CA	Sacramento	$0.35	1,375	$0.33	1,280	$0.98	1,456	$19.38	89,019	**$21.05**	**93,130**	$0.32	476	$2.40	11,017
W	5	UT	Salt Lake City	$0.68	3,144	$0.15	668	$0.40	670	$8.62	41,443	**$9.84**	**45,926**	$0.08	128	$0.90	4,312
S	4	TX	San Antonio	$0.99	4,573	$0.42	1,892	$1.33	2,432	$19.77	107,035	**$22.51**	**115,932**	$0.55	1,002	$1.92	10,395
W	6	CA	San Diego	$1.58	5,978	$0.78	3,007	$2.65	4,127	$48.94	228,763	**$53.96**	**241,875**	$0.84	1,304	$7.38	34,494
W	6	CA	San Francisco	$2.45	6,504	$1.02	2,657	$4.93	5,711	$57.27	195,557	**$65.67**	**210,429**	$1.61	1,863	$13.96	47,653
W	6	CA	San Jose	$1.17	2,807	$0.42	996	$1.96	1,364	$20.81	55,840	**$24.37**	**61,008**	$0.80	558	$5.41	14,525
W	6	WA	Seattle	$3.30	11,035	$0.69	2,237	$2.87	3,559	$27.52	101,763	**$34.38**	**118,594**	$0.89	1,100	$7.16	26,471
MW	3	SD	Sioux Falls	$0.26	1,262	$0.04	189	$0.10	190	$1.78	9,557	**$2.19**	**11,198**	$0.02	40	$0.15	830
MW	5	MO	St. Louis	$0.81	4,037	$0.32	1,559	$0.78	1,523	$16.09	89,239	**$18.00**	**96,358**	$0.12	238	$1.34	7,458
S	2	FL	Tampa	$1.68	8,259	$0.62	3,060	$1.62	3,437	$28.65	165,174	**$32.57**	**179,930**	$0.55	1,174	$2.81	16,178
S	1	DC	Washington MSA	$3.30	11,329	$1.48	5,052	$5.51	8,274	$79.04	347,912	**$89.33**	**372,566**	$1.82	2,733	$13.92	61,260

* There are missing values in the "Tax Portion of OpEx" columns for metros not covered in that year's NAA survey. For 2016, only Honolulu lacks coverage.
Because this subcategory largely reflects locally-set property taxes which can vary considerably, both by place and over time, applying the regional average in such instances was not feasible.

APPENDIX C

Methodology for Calculation of Impacts by Industry Segment

The approaches used to estimate the impacts of the apartment industry's four industry segments at the state and metro levels broadly followed the methodologies we developed at the national level; however, different data sources and modifications to our US analytical processes were required. The data and analyses ultimately employed are outlined below, by segment.

A. New Construction

The key statistic available for construction activity at the local level comes from the US Census Building Permits Survey. On a more aggregate basis, the US Census also provides data on construction starts, construction completions, and units under construction, as well as estimates of construction spending on a monthly basis for the US as a whole and for the four Census regions.

Using the Census data, we estimated the proportion of the total new multifamily residential construction that involved new structures containing 5 or more units and were destined for the rental market. For sub-US geographies, a first step involved estimating starts based on permit authorizations. These estimates were then adjusted for the pace of net project abandonments, the pattern of construction over time, and local construction costs to produce estimates of 5+unit rental completions. With this information, we prepared new construction output estimates for the 50 states + DC and the 50 selected metros.

B. Apartment Renovation and Repair / Capital Expenditures (cap ex)

The estimates for this segment average the results of two independent methods for deriving renovation and repair expenditures: 1) calculation of estimates from published statistics on construction put-in-place, and 2) estimates computed from the NAA survey results on reported capital expenditures. A summary description of the methodology based on published statistics appears here. The discussion of the estimate using capital expenditures appears in section C, Industry operating expenditures (op ex), below.

Currently, no statistical source reports residential repair and alterations expenditures. We developed overall expenditure estimates by combining two sources of data, both from the US Census:

- Survey of Residential Improvements and Repairs – SORAR (Annual, 1993 to 2007; discontinued). The spending patterns of rental property owners over this period provided a guide to the pace of relative spending in subsequent years.
- Value of Construction Put in Place Survey – VIP (Monthly since 1964)

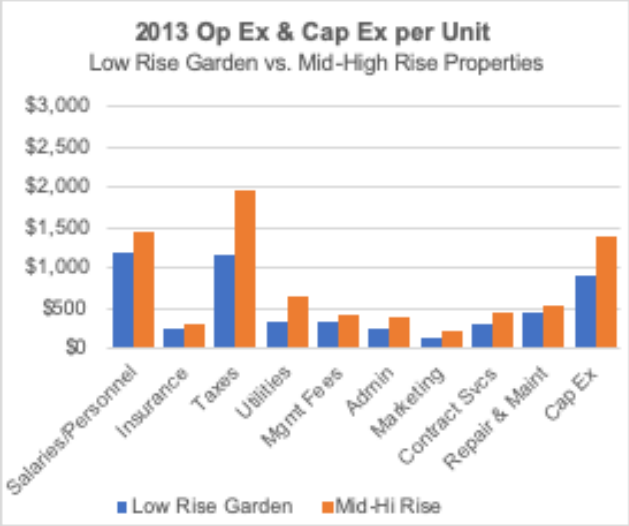
The principal current data source for construction spending on existing properties is the Construction Expenditure, also a Census Bureau publication. This provides estimates of total private residential construction spending, with a breakout for new residential structures by subtype. Improvement and repairs expenditures are not published directly but are calculated as the residual of total residential spending net of expenditures for new single family and multifamily structures.

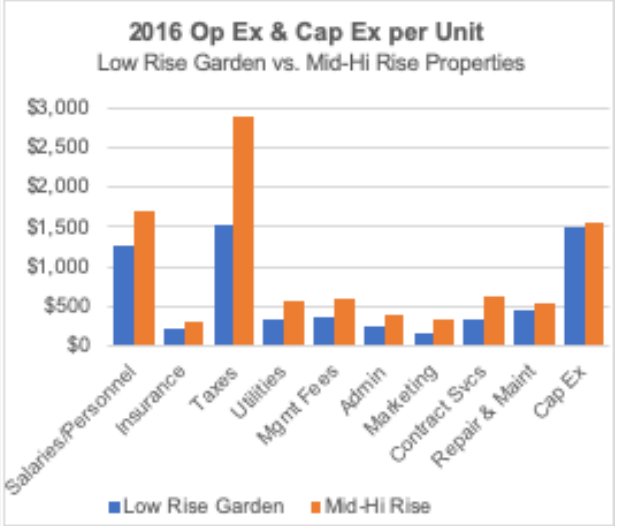
Using the strong statistical relationship between the VIP reports of implied improvements and repairs spending on existing private structures and total expenditures from the SORAR survey, we estimated SORAR-like expenditures on existing rental properties for 2013 and 2016. A simple model of real expenditures per unit in 5+ structures for 1993-2007 interval was constructed and unique model coefficients were estimated for each Census region. Local expenditures by state / MSA and year were then calculated using Census region coefficients, local vacancy rates, the local number of rental units in structures with 5+ units, and national price changes. These estimates allow for changes in construction costs and in market vacancy rates.

C. Industry operating expenditures (opex)

The Segment C. analysis relied upon the annual NAA Survey of Income and Expenses for 2013 and 2016, CoStar apartment inventory and rent data, and several public sources.

NAA's annual surveys capture detailed revenue and op ex data for a comparatively small share of the





US and individual metro markets. The results are dominated by low-rise garden style product; although it is growing, survey coverage of mid- to high-rise product (which encompasses properties with four or more stories) is limited. When evaluated separately, the national level survey data for these two product types reveal that mid-high rise properties on average have significantly higher per unit revenues and expenses than their low-rise counterparts. Mid-high rise property statistics also posted much stronger growth between 2013 and 2016, as shown in the above graphs. Using NAA data alone as the basis for calculating industry revenues and expenditures at any geographic level would therefore result in significant underestimates.

The solution was a hybrid approach that used completer and more representative 5+unit rental inventory and revenue data from Costar together with NAA survey results on operating and capital expenditures. Total dollar estimates for apartment industry operating expenditures were generated by applying per-unit expenditure estimates to annual effective revenue per unit.

The NAA surveys have no state-level data, but do report on a large and growing number of metro areas. For each metro, op ex and cap ex spending totals were calculated, then adjusted to reflect the size of the metro's 5+ unit apartment inventory. State-level data was estimated by aggregating total collected revenues, op ex and cap ex expenditures for all NAA-reported metros within each state, then adjusting the figures to reflect the size of that state's 5+ unit apartment inventory.

For the handful of states (e.g., Alaska, Hawaii, Maine, West Virginia) and the single metro (Honolulu) with no NAA survey coverage, we developed reasonable estimates for op ex and cap ex expenditure by using effective revenue figures for these geographies together with the appropriate state- or regional-level expenditure rates that were calculated for these categories.

The NAA's cap ex line item undoubtedly overlaps materially with Segment B's renovation and repair expenditures; however, we had no basis for estimating the degree to which this is true. Therefore, cap ex expenditures were separated from the op ex totals (Segment C) and impacts were calculated using the appropriate (i.e., residential maintenance and repair segment) multipliers. As a final step, the impacts calculated for renovations and repair and for cap ex were averaged to generate an estimate of impacts in this category.

D. Renter household spending

The analysis uses publicly available data from the Bureau of Labor Statistics and the Census Bureau. BLS's annual Consumer Expenditure Survey (CES) provides household expenditures by housing tenure. BLS's total US renter figures from the 2013 and 2016 surveys were adjusted to reflect spending only by renting households in 5+ unit apartment properties using annual American Community Survey (ACS) data.

For state and metro level calculations,

- BEA spending estimates were assembled for each Census region by category of expenditure, according to household tenure and a range of household income levels
- Per-household estimates were generated for renting households by income level
- Expenditures were then allocated across each region's states and metro areas using the estimated number of households by income in each of these geographies
- Finally, figures were adjusted to reflect the number of renting households occupying 5+ unit properties in each state and each metro.

This approach produces a more granular and accurate assessment of expenditure patterns for renting households in individual states and metro areas. However, it implicitly assumes that renting households in 5+ unit properties mirror the overall US renter population surveyed for the CES, in terms of demographic and income characteristics as well as spending patterns. We were unable to locate a data source that would permit us to verify the appropriateness of this assumption.

APPENDIX D

Study Data Sources

1. Multipliers

United States, States+DC, Metropolitan Statistical Areas, and Counties

- US Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW)
  - Average Annual Wages and Average Annual Employment by Industry
- US Bureau of Economic Analysis, Regional Data (GDP)
  - Components of Regional GDP, Income and Output by Industry

United States and States+DC

- US Bureau of Economic Analysis, Regional Consumption Data (PCE)
- Components of Regional Household Consumption by Industry

United States Only

- US Bureau of Economic Analysis, Input-Output Accounts (I-O)
  - Direct requirements tables: 2007 detailed and annual for 71 industries
  - I-O Use Table 2007
- US Bureau of Labor Statistics, Producer Price Indexes (PPI)
  - Selected index series to update 2007 detail to target year

2. Construction Impacts

States, Metropolitan Statistical Areas, and Counties

- US Census Bureau, Building Permits Survey (Permits)
  - Permits by Units in Property (monthly)
- US Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW)
  - Average weekly wage for construction workers

Four Census Regions

- US Census Bureau, New Residential Construction (Starts)
  - Units Started, Units Under Construction, Units Completed for all MF Properties (monthly)
- US Census Bureau, Length of Time, Authorization to Start, Start to Completion (monthly)
  - Time in months by Contractor-built and Units in Property
- US Census Bureau, Quarterly Completions by Intent and Design (Completions)
  - Units built with rental intent by units in property, average size of unit

United States

- US Census Bureau, American Housing Survey, 2013 and 2015 (AHS)
  - New Units by Tenure (owner, renter) and units in structure
- US Census Bureau, Construction Expenditures (VIP)
  - Construction put in place on new private multifamily residential structures

3. Apartment Renovation and Repair Impacts

United States, States, Major Metropolitan Statistical Areas

- CoStar
  - Rental Vacancy Rate, Structures with 5+ units (US Detail, States, 75 Major MSAs)
- Hoyt Advisory Services, U.S. Apartment Demand Study 2017
  - Occupied Rental Units in Structures with 5+ Units, from 2005

United States, 4 Census Regions

- US Census Bureau, Survey of Residential Improvements and Repairs (SORAR)
  - Expenditures by Tenure and Units in Structure, through 2007
  - Expenditures by Type of Job, Rental Structures, through 2007
- US Census Bureau, Decennial Census of Population and Housing (Census)
  - 1990, 2000. Baseline for Housing Units by Units in Structure for 1994-2004 interval

United States Only

- US Census Bureau, Value of Construction Put in Place Survey (monthly)
  - Expenditures on New Construction and on Improvements
- US Bureau of Labor Statistics, Producer Price Indexes (PPI)
  - PPI Commodity data for Net Inputs to Residential Construction
- US Bureau of Labor Statistics, Consumer Expenditure Survey (CES)
  - Maintenance and Repair Expenditures by Owners (netted from put-in-place figures)

4. Impacts of Apartment Property Operating Expenditure

United States, Major Metropolitan Statistical Areas

- National Apartment Association's (NAA) annual surveys
  - Actual collected revenue (rent + other)
  - Reported operating expenses (op ex) by category
  - Reported capital expenditure (cap ex) by category
- US Census Bureau, American Community Surveys (ACS)
  - Occupied rental inventory by product size and type

- 2017 NAA/NMHC US Apartment Demand study
    - Renter households by property size
- Costar, Inc.
    - Actual revenue per unit, 5+ unit rental properties

5. Impacts of Renter Household Spending

United States and 4 Census Regions

- US Bureau of Labor Statistics, Consumer Expenditure Survey
    - Household spending by housing tenure, household income level, and expenditure category

Census Regions, States, and Metropolitan Areas

- US Census Bureau, American Community Survey
    - At each geographic level, the number of households according to income category, tenure, and number of units in structure

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This report was prepared for the National Multifamily Housing Council and the National Apartment Association by Hoyt Advisory Services and Eigen10 Advisors, LLC.

Hoyt Advisory Services (HAS) is subsidiary of the Homer Hoyt Institute (HHI), an independent, non-profit research and educational foundation established in 1967 to improve the quality of public and private real estate decisions by expanding and disseminating the real estate body of knowledge, stimulating innovation in the discipline of real estate and land economics, building bridges among academia, industry, and government, and developing innovative approaches to the solution of real estate problems.

Research supported by HHI must meet the highest standards of scholarship, and it must further the improvement of decision making in the real estate industry. That is, it must combine rigor with relevance. HAS is able to engage PhDs from leading universities along with practitioners with proven, appropriate real estate expertise for the project, in this case partnering with Eigen10 Advisors and Dr. Hess.

Eigen10 Advisors, LLC provides real estate consulting services in the areas of investment analysis, portfolio structuring, capital formation strategies, market analysis, econometric modeling and forecasting, reporting and asset management.

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Reasonable efforts have been made to ensure that the data contained in this study reflect accurate and reliable information and are based on information that to our knowledge was current as of the date of this report. This study is based on estimates, assumptions, and other information developed from independent research efforts, models and general industry knowledge. No responsibility is assumed for inaccuracies in reporting by any data source used in preparing or presenting this study. This report represents a view of reasonable expectations as of the time the report was written, but such information, estimates, or opinions are not offered as predictions or assurances that particular results or events will occur. Actual results may vary from those described in this report, and the variations may be material. Therefore, no warranty or representation is made that any of the data, projected forecasts or results contained in this study will be achieved.

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