



# 2018 U.S. Office Market Update



**Jeff Adler**  
Vice President, Matrix

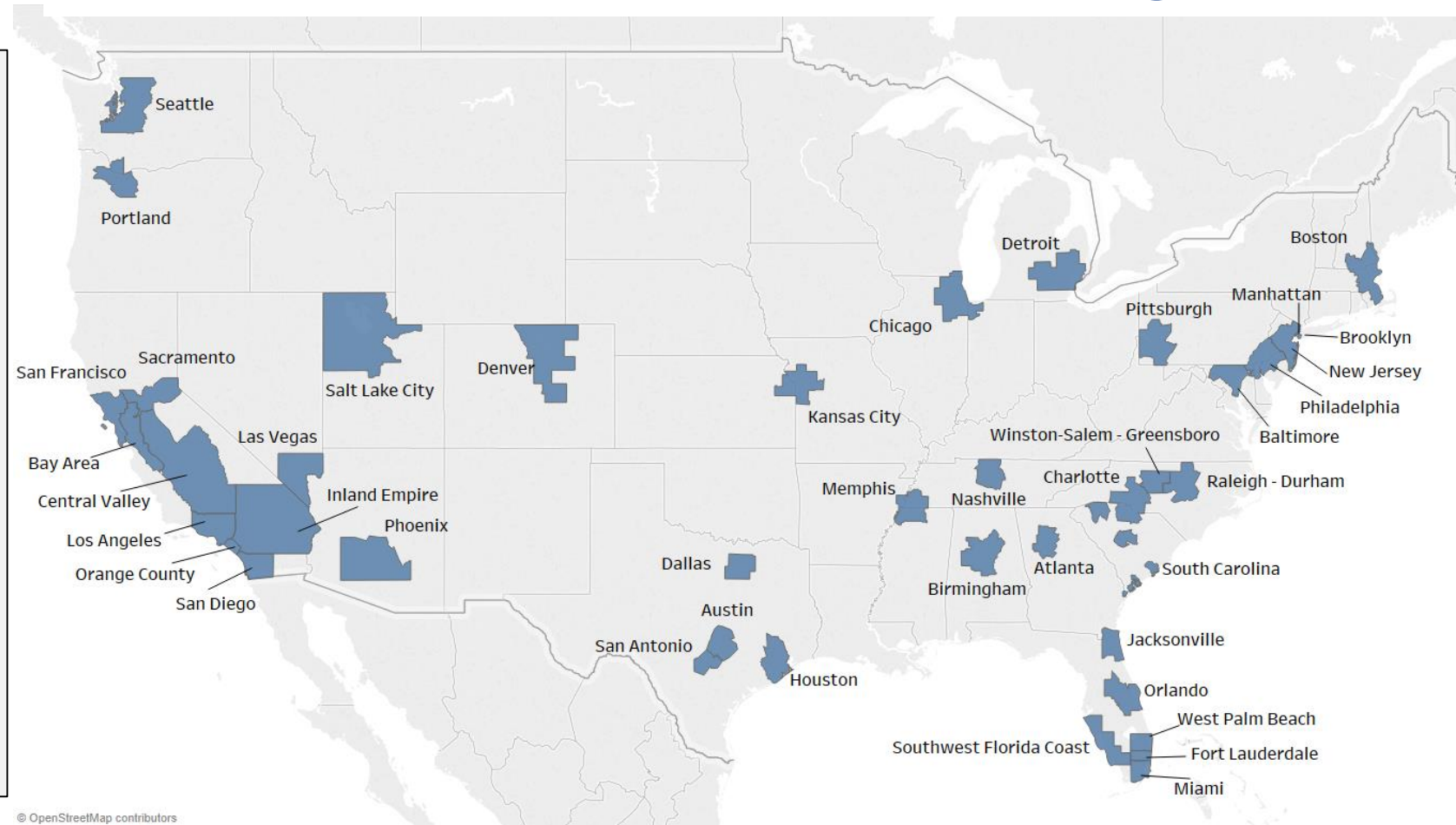


**Jack Kern**  
Director, Research and Publications

# Yardi Matrix Office Market Coverage – Over 4 Years in Process

## 45 Markets with Tenant and Listing Data

- Property Coverage
- 115 Markets
- 54,000+ Properties
- 7.5 Billion Square Feet
- Most Markets Down to 25,000 Square Feet
- 83 markets with Expert data
- 45 markets with tenant and listing information



# Today's Agenda

- Macroeconomic Outlook
- National Office Fundamentals and Trends
- The Value of Place Among and Within Markets
- Technology Disruptors That Will Affect All Commercial Real Estate



# The Yardi Matrix View – Office Investment Strategy

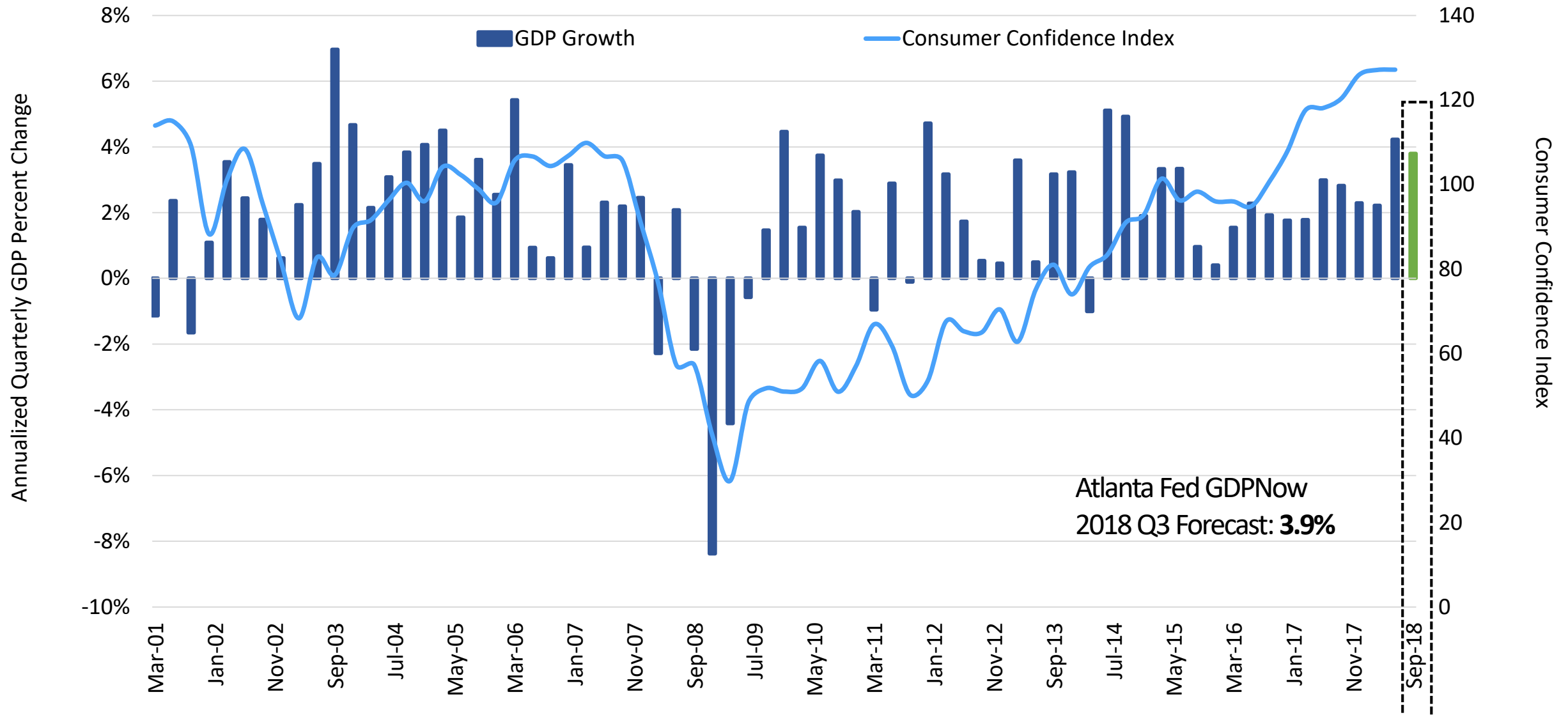
- **U.S. economy is in VERY good shape**
  - GDP and employment are up and growth is humming >3%, but they appear to be leveling out at this growth rate
  - Trade and immigration policies appear to be driving the downshift in the pace of growth
  - Oil prices up: \$70/bbl – will stay high (\$80/bbl?) for what looks like 18-24 months – Iran/Venezuela/Saudi/Russia impacts
    - As a meaningful producer, not a clear negative anymore, positive for the Oil Patch
  - Wages are rising and the labor market is tight – people are being pulled off the sidelines
  - Inflation is rising, but unlikely to break 2.5%; short-term interest rates up, 10 Yr range with 3% to 3.5%; Watch Yield Curve!
- **Conditions sufficient to maintain good office using employment growth, occupancy and slow rental growth**
  - Supply cresting in 2018 is a localized issue, but relevant in CBDs
  - Despite a peak in completions, a lot of markets are still undersupplied
  - Sales volume peaked in 2015 and has been dropping since
  - More than half of Yardi Matrix markets are seeing moderate rent growth, but some have seen rents fall since January – West Palm Beach, Manhattan, Bay Area
  - An aging population is fueling growth in medical office – especially in sunbelt markets

# Office Investment Strategy – Continued

- **Given that wealth is created via intellectual capital in concentrated locations...real estate follows**
  - Cost advantages and emerging intellectual hubs in formerly non-tech metros and traditionally overlooked cities are shifting the geography of jobs
  - Employment growth is moving out of CBDs/urban cores into “urbanized suburbs” – intellectual capital nodes
  - The longer the expansion goes on the more established the intellectual critical mass becomes
  - Tax reform will likely accelerate these trends, but the process does take time, allowing multiple entry points for investors
- **Advances in the Internet of Things (IoT) and Artificial Intelligence (AI), and the 5G network which is its underpinning, drive-**
  - The ability to have self correcting and self learning processes which will streamline production (reduce costs)
  - The ability to leverage data to create new products, services, and create new “gatekeepers” to consumer \$
    - Both of these will pressure mid-skill jobs, widening again the issues of income distribution
- **Investment Strategy is bifurcated**
  - Capital preservation (international gateway CBDs) and capital appreciation (suburban revitalization, primary and secondary cities)...there is also some drift down to some tertiary markets also evident
- **As in Multifamily, it’s a sharpshooters game**

# Macroeconomic Outlook

# U.S. Economic Growth is Pretty Good

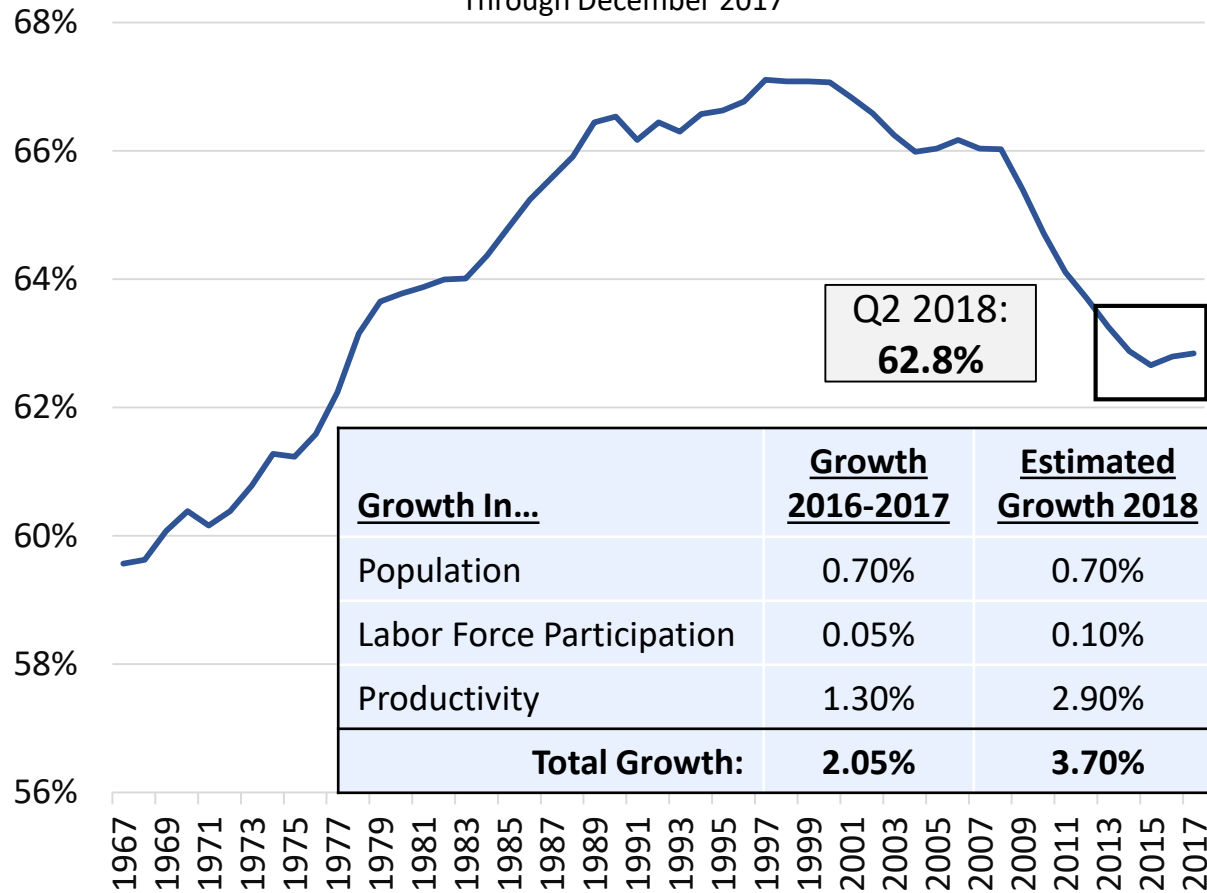


# Factors Driving GDP Show Signs of Growth

Where will U.S. GDP growth come from?

Labor Force Participation Rate

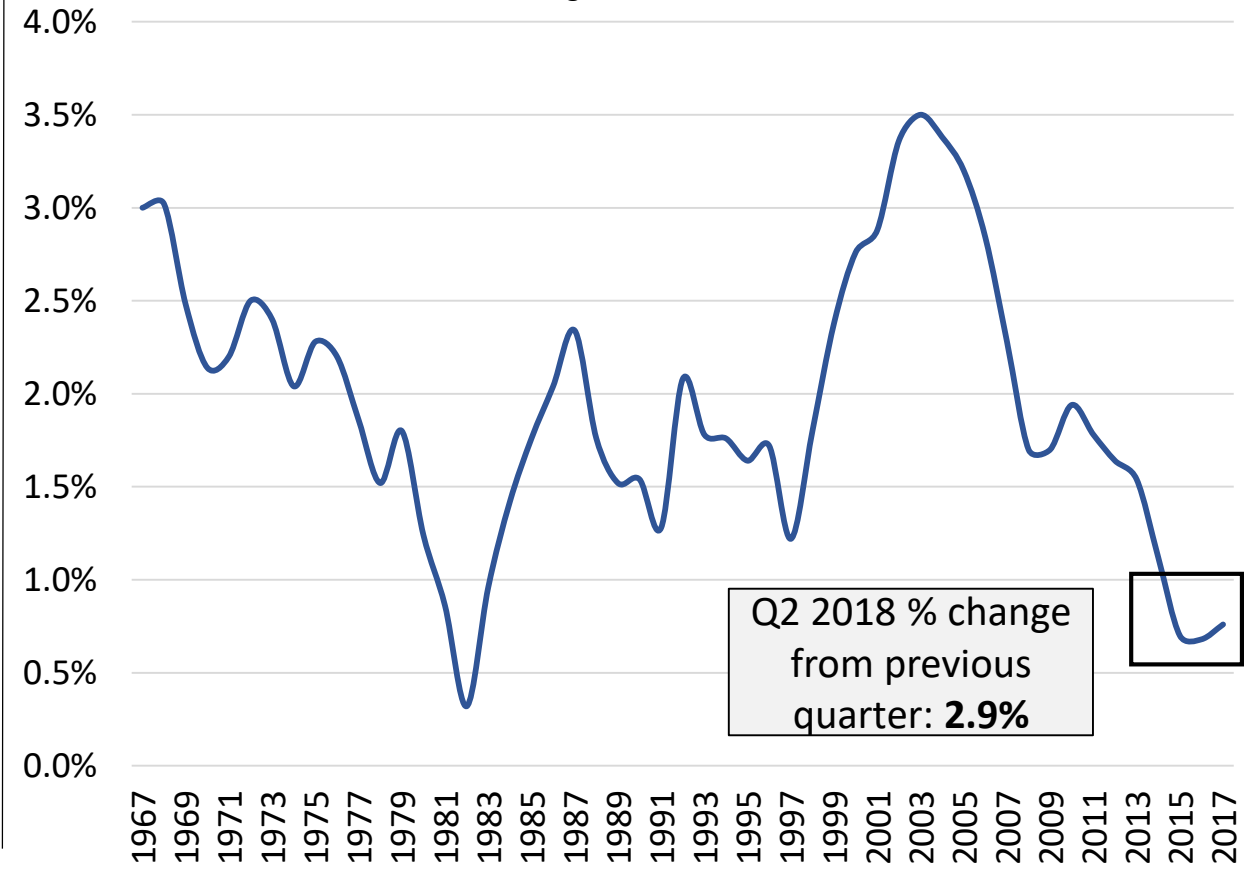
Through December 2017



Labor Productivity Annual Change

Nonfarm Business Sector

Through December 2017



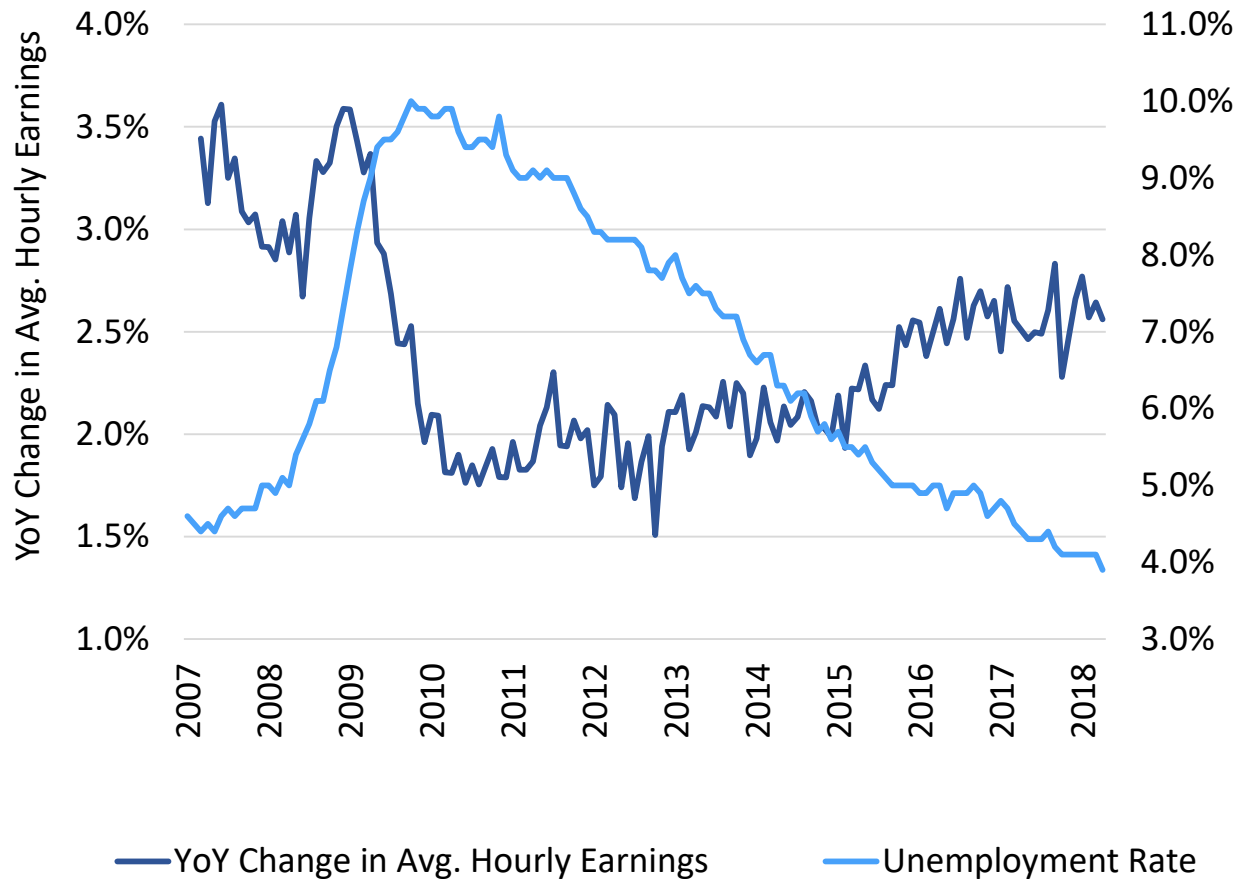
\*Labor productivity graph is based on a 6-year rolling average

Source: Moody's Analytics; Bureau of Labor Statistics (BLS)



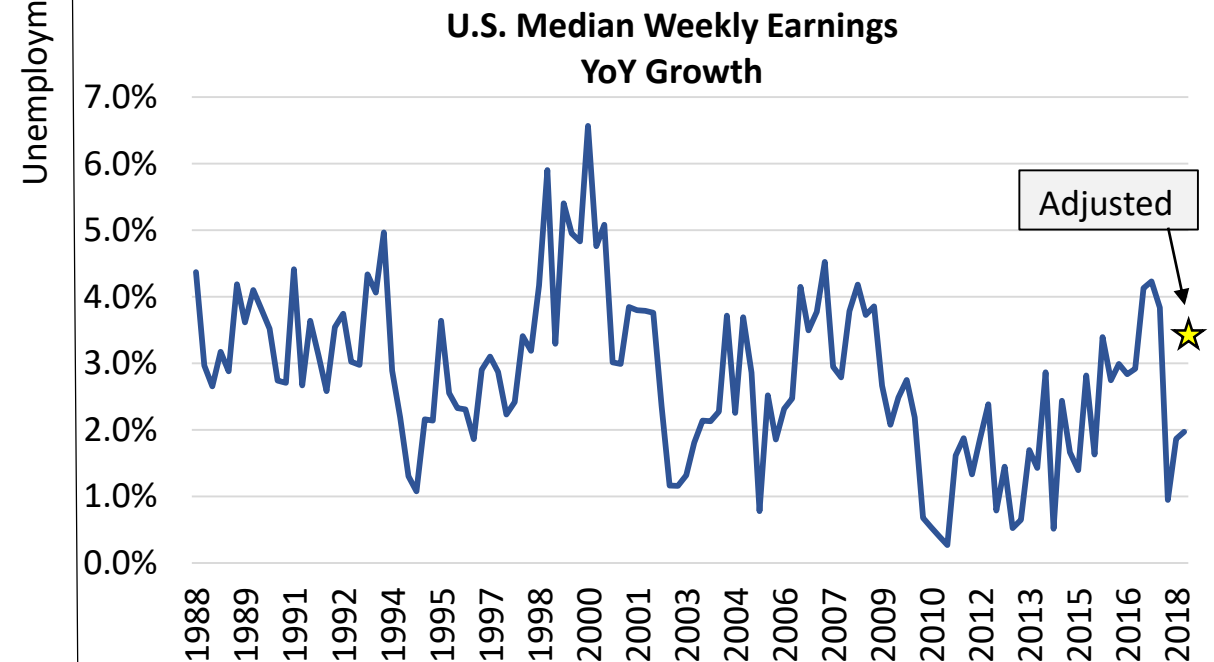
# Will Productivity Out-Distance Real Wage Growth?

## U.S. Wage Pressure Increasing



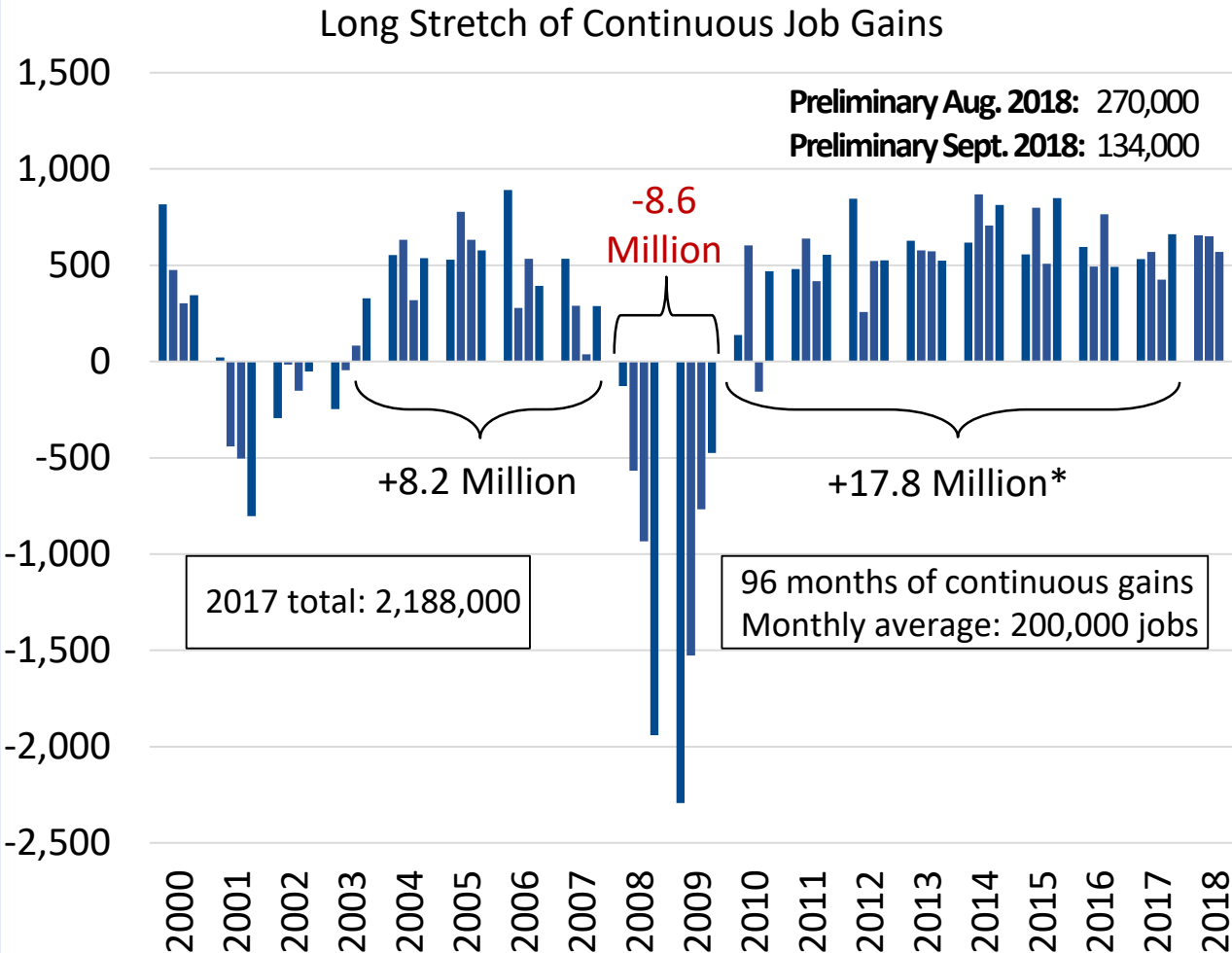
## Wage Growth Reports Hide Demographic Shift

- 2018 Q2 median weekly earnings of full time workers rose 2%
- Wage growth is better than the headline numbers indicate
- Held down by the exchange of new workers for new retirees
- New workers generally earn less than workers who are leaving full-time employment (boomers)
- Adjusting for this, 2018 Q2 wage growth was actually 3.5%



# Tight Labor Market, Pulling People off the Sidelines

It is difficult to find labor at the right *price*, with the right *skills*, in the right *city*

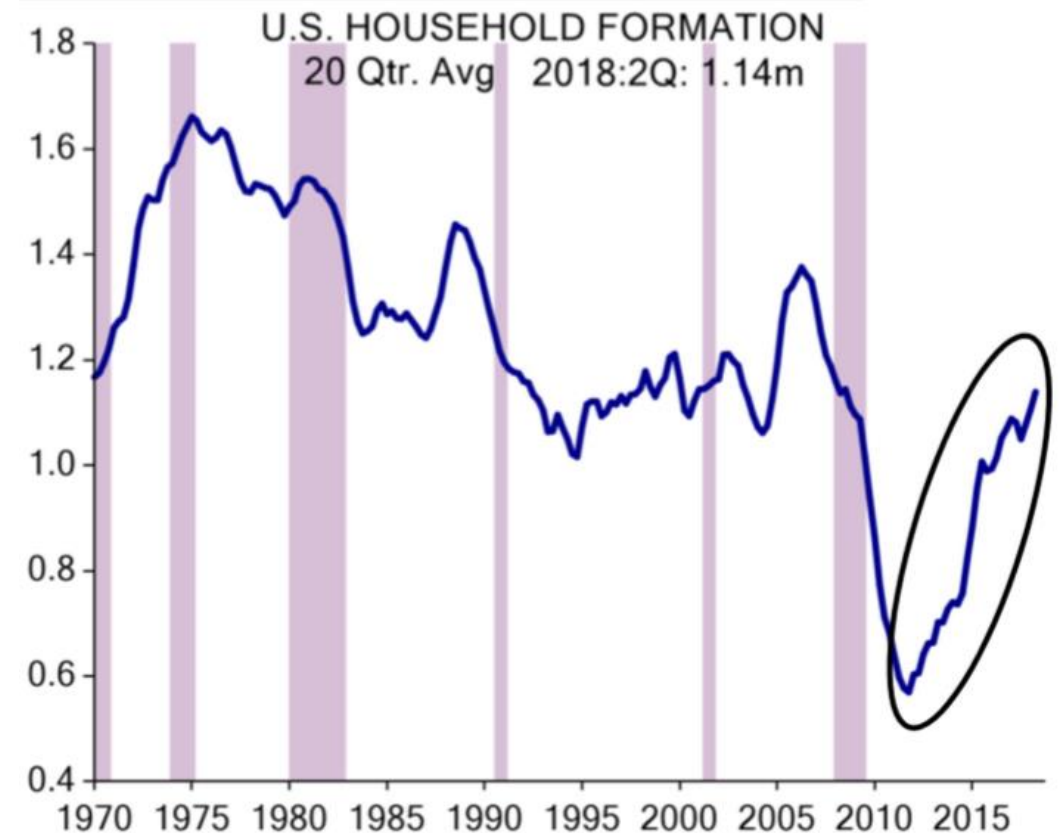


\*Through December 2017

Source: Moody's Analytics; Bureau of Labor Statistics (BLS); The Conference Board

# Millennials are a Positive Force for the Expansion

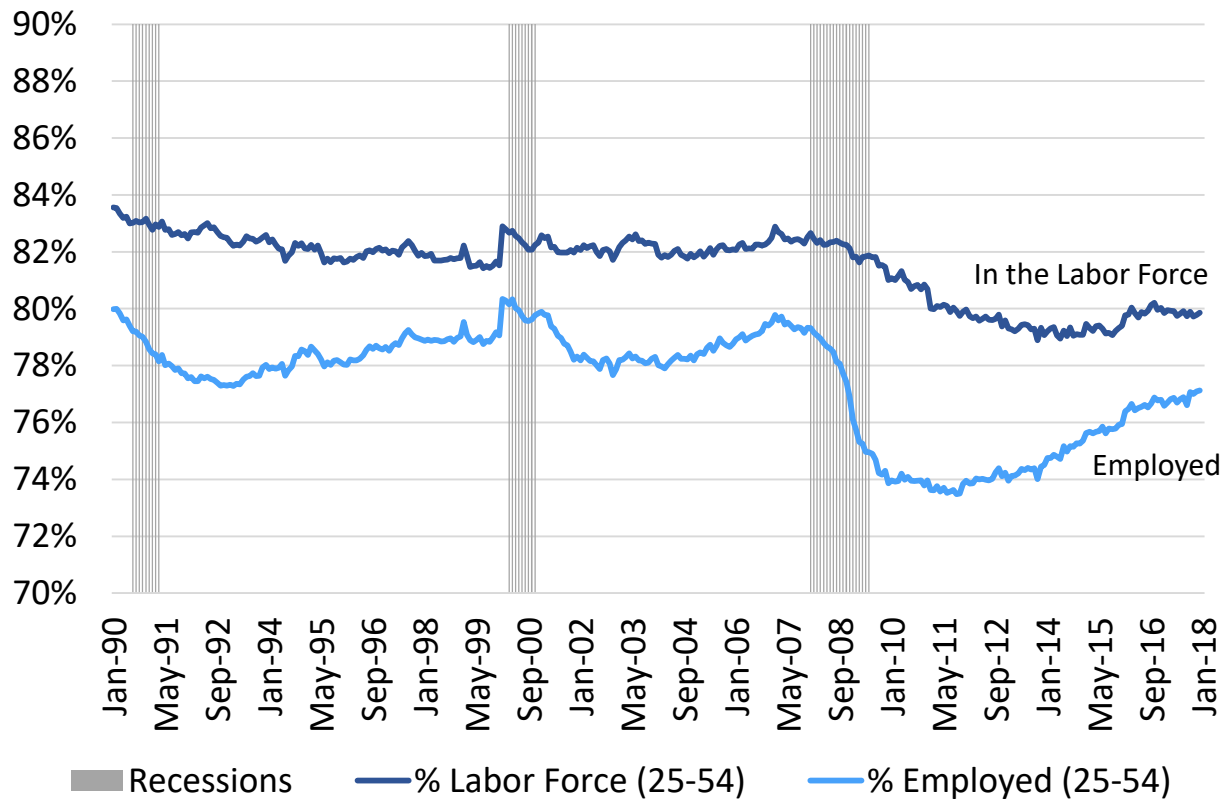
- Employment of Millennials has accelerated over the past decade
- Employment of Millennials increased 2.7% YoY in July vs. 1.3% for employment excluding Millennials
- Household formation has doubled



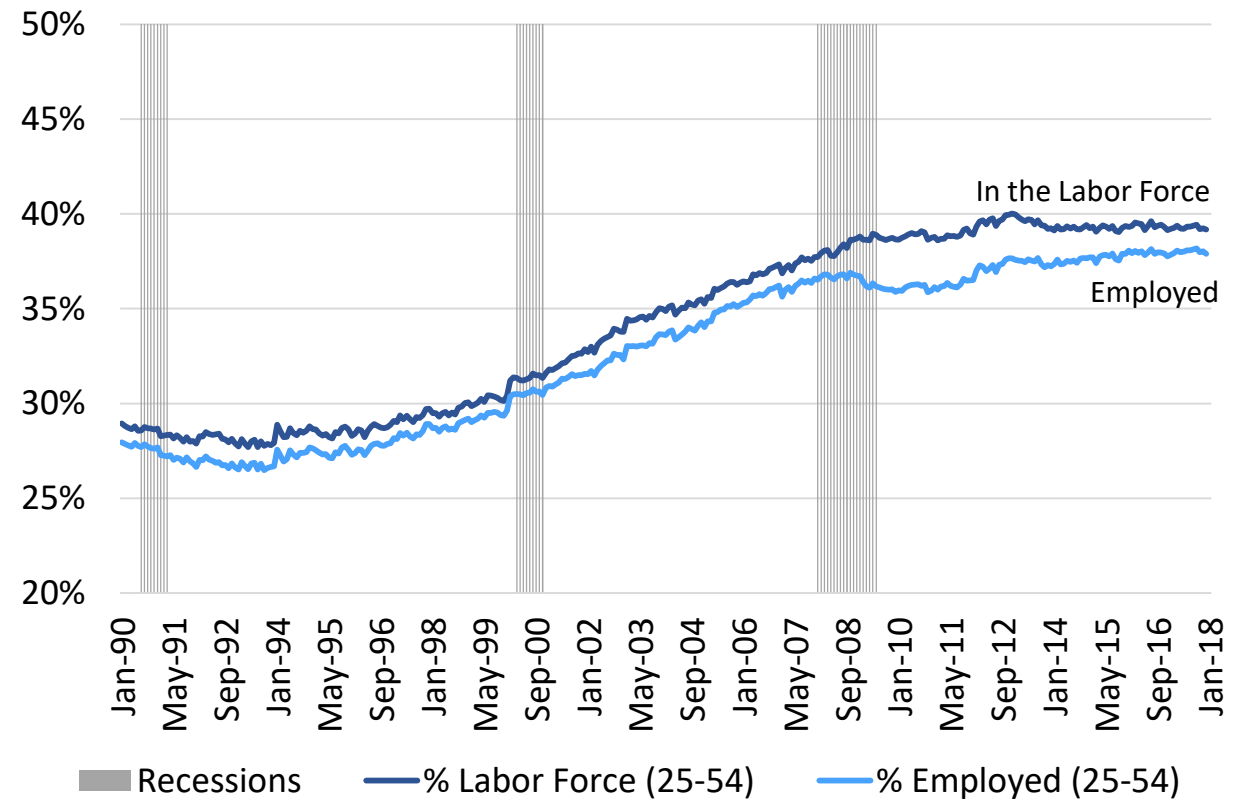
# Reserve Supply of Labor

- Another 2% of the prime-age population could get engaged – approximately 2.6 million people
- Participation rates for people age 55+ are rising – buoying the expansion

Share of Prime-Age Population (25-54) That Is...

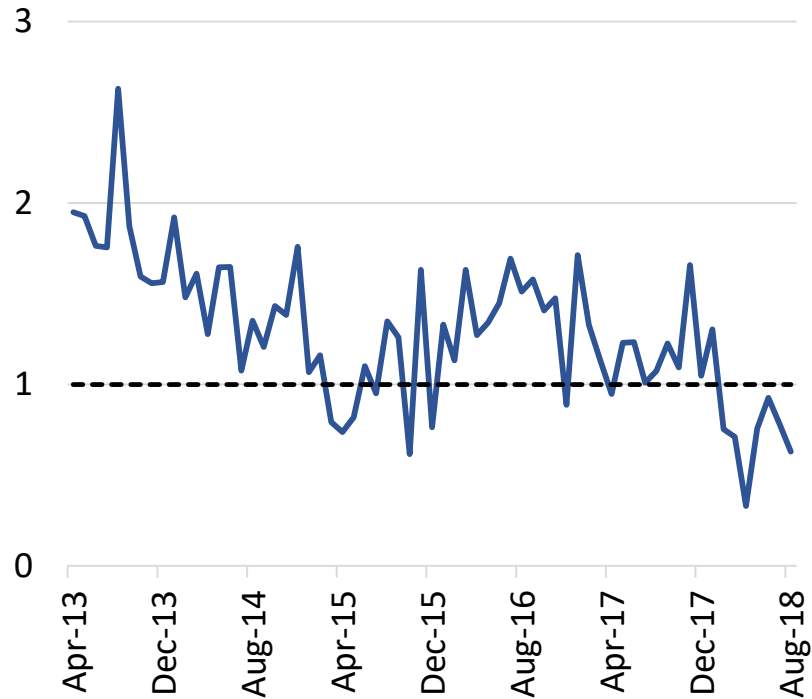


Share of Age 55+ Population That Is...

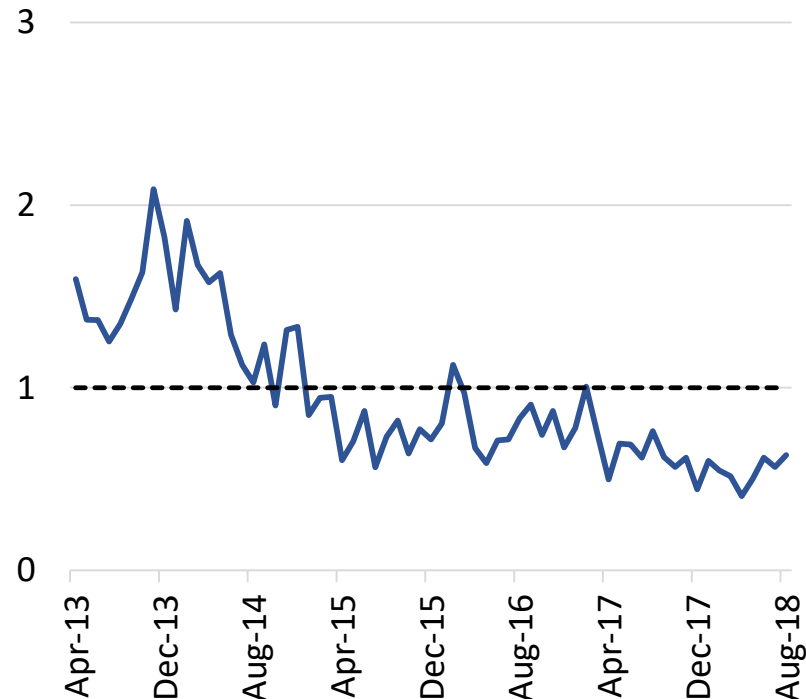


# Unemployed Persons per Job Opening: Office-Using Industries

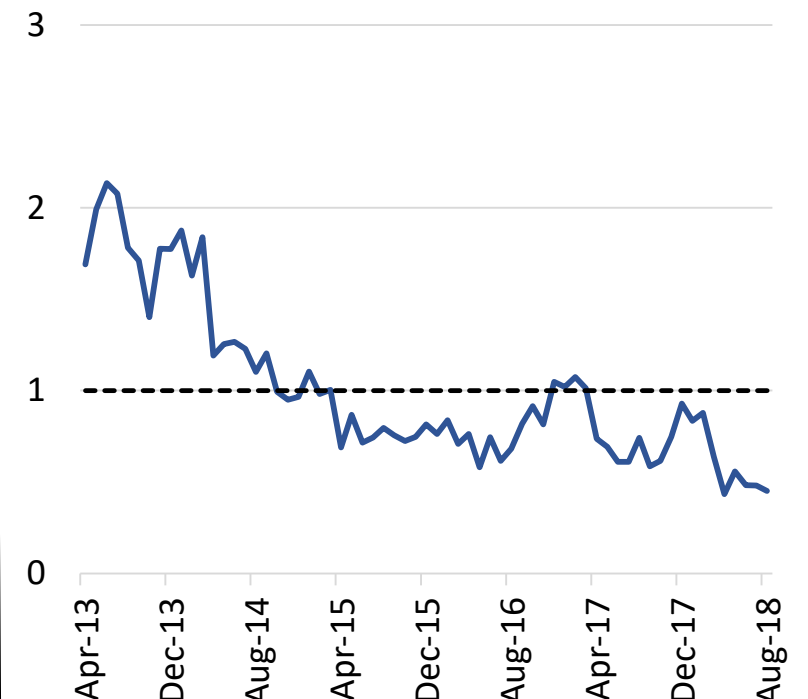
### Information



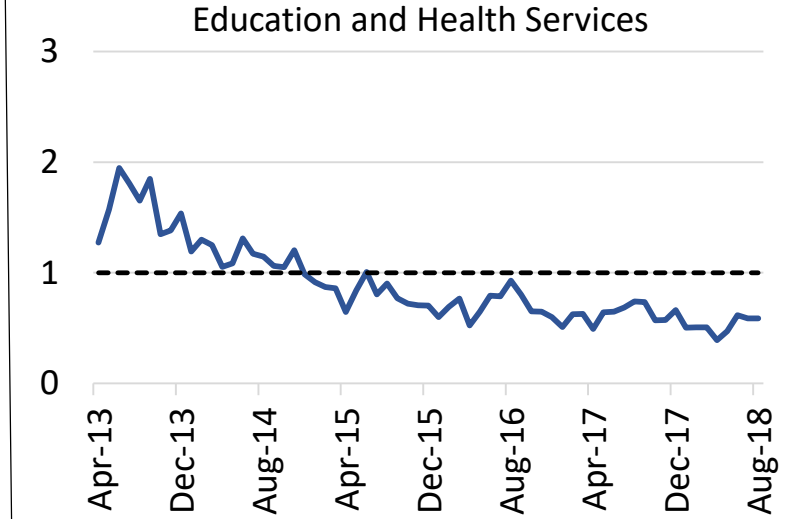
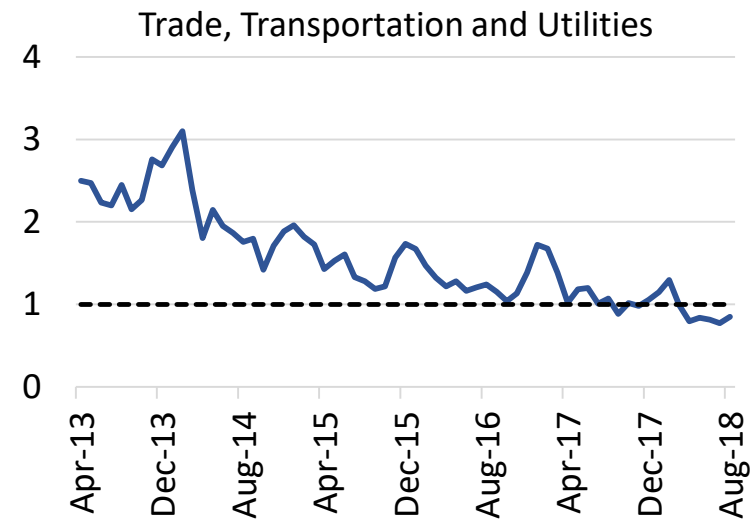
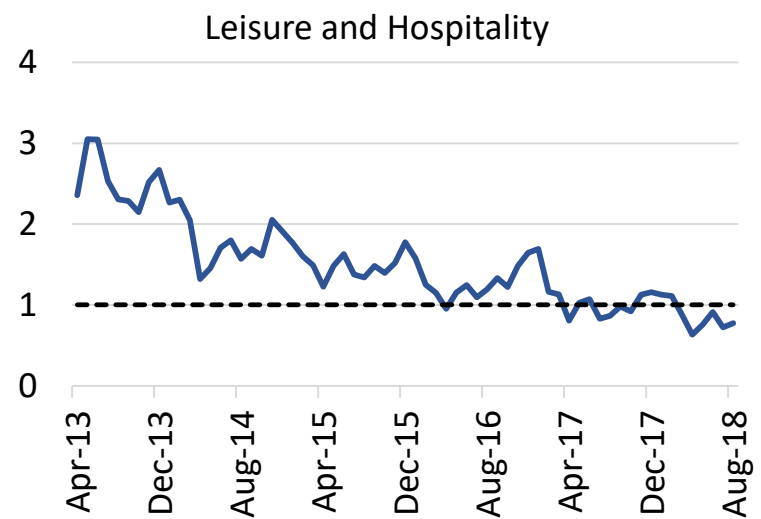
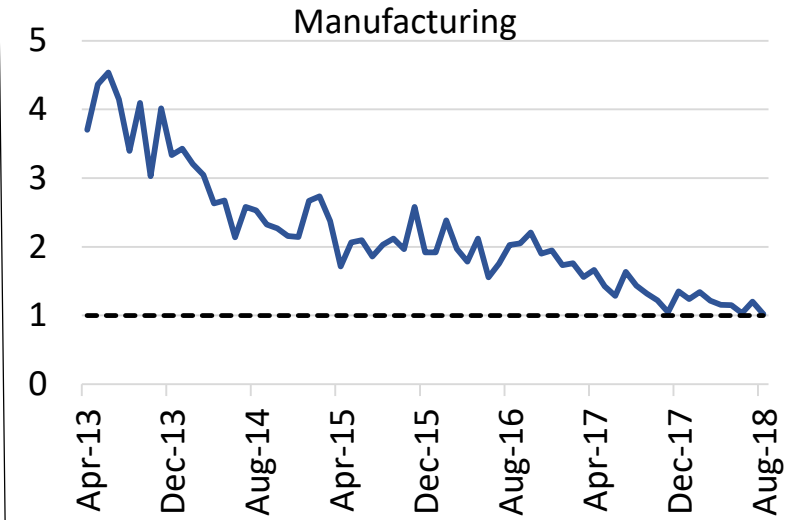
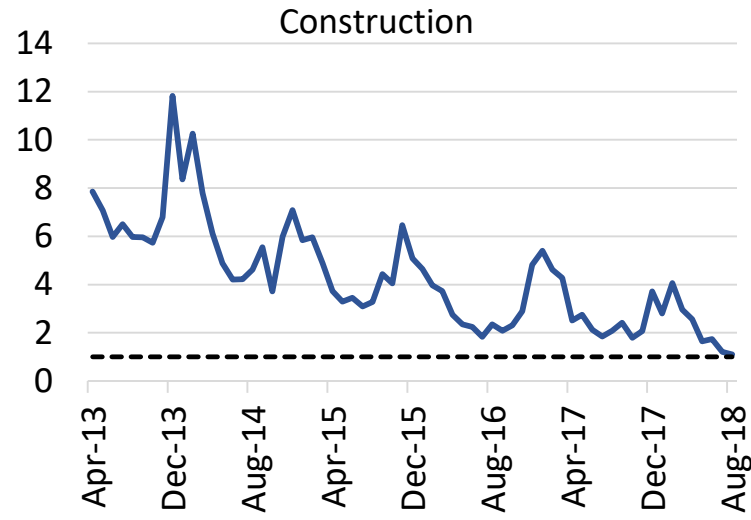
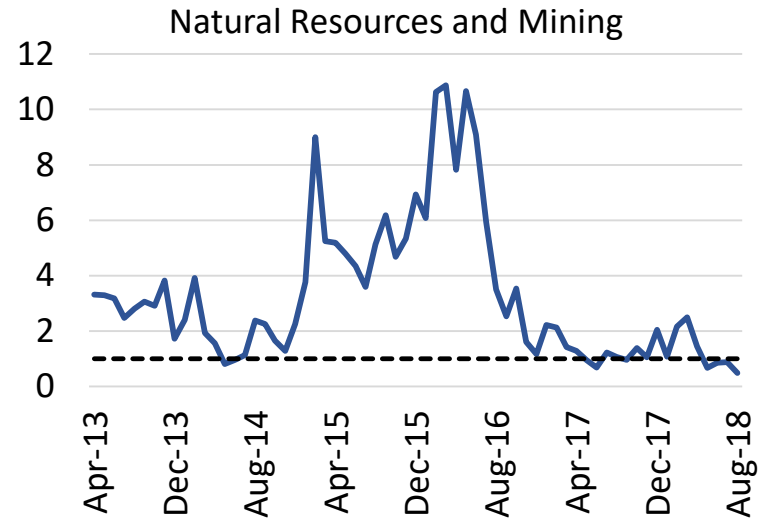
### Financial Activities



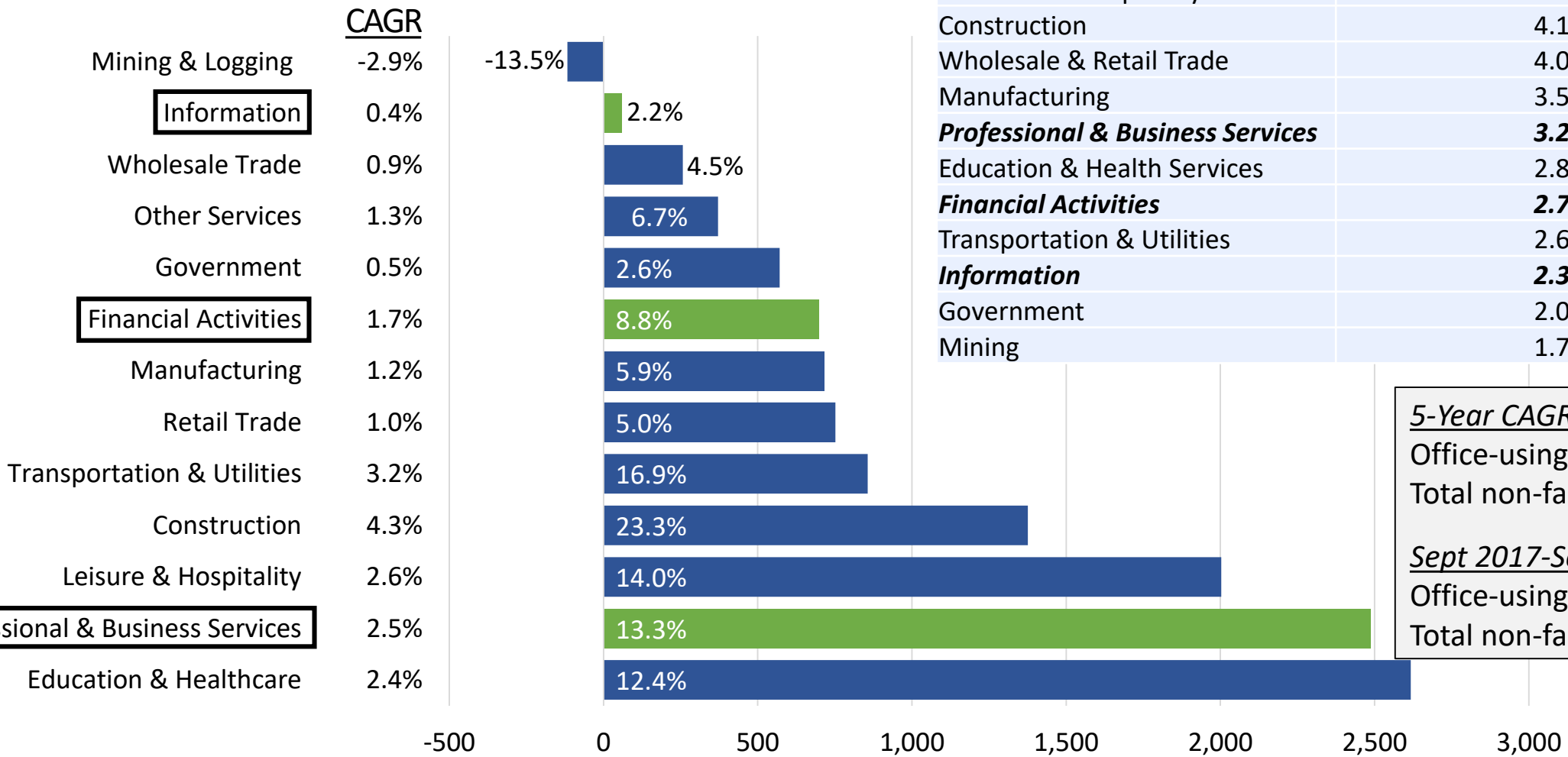
### Professional and Business Services



# Unemployed Persons per Job Opening: Non Office-Using Industries



# Office-Using Sectors Outpaced Overall Job Growth Over the Last Five Years



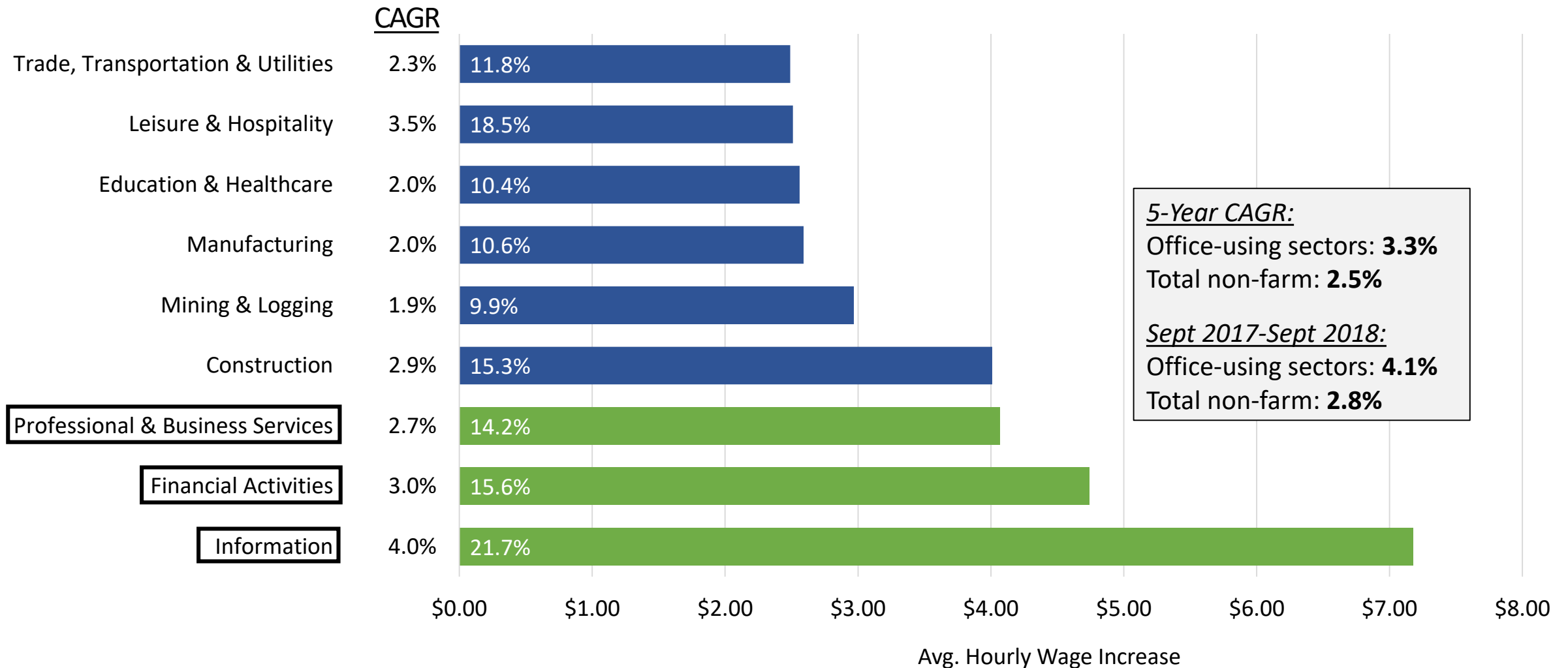
Sector	Sept 2018 Unemployment Rate
Leisure and Hospitality	5.4%
Construction	4.1%
Wholesale & Retail Trade	4.0%
Manufacturing	3.5%
<b>Professional &amp; Business Services</b>	<b>3.2%</b>
Education & Health Services	2.8%
<b>Financial Activities</b>	<b>2.7%</b>
Transportation & Utilities	2.6%
<b>Information</b>	<b>2.3%</b>
Government	2.0%
Mining	1.7%

**5-Year CAGR:**  
 Office-using sectors: **2.1%**  
 Total non-farm: **1.8%**

**Sept 2017-Sept 2018:**  
 Office-using sectors: **2.1%**  
 Total non-farm: **1.7%**

\*September 2013-September 2018, boxed labels are office-using sectors  
 Source: Moody's Analytics; Bureau of Labor Statistics (BLS)

# Office-Using Sectors Exhibit the Most Wage Growth September 2013-September 2018

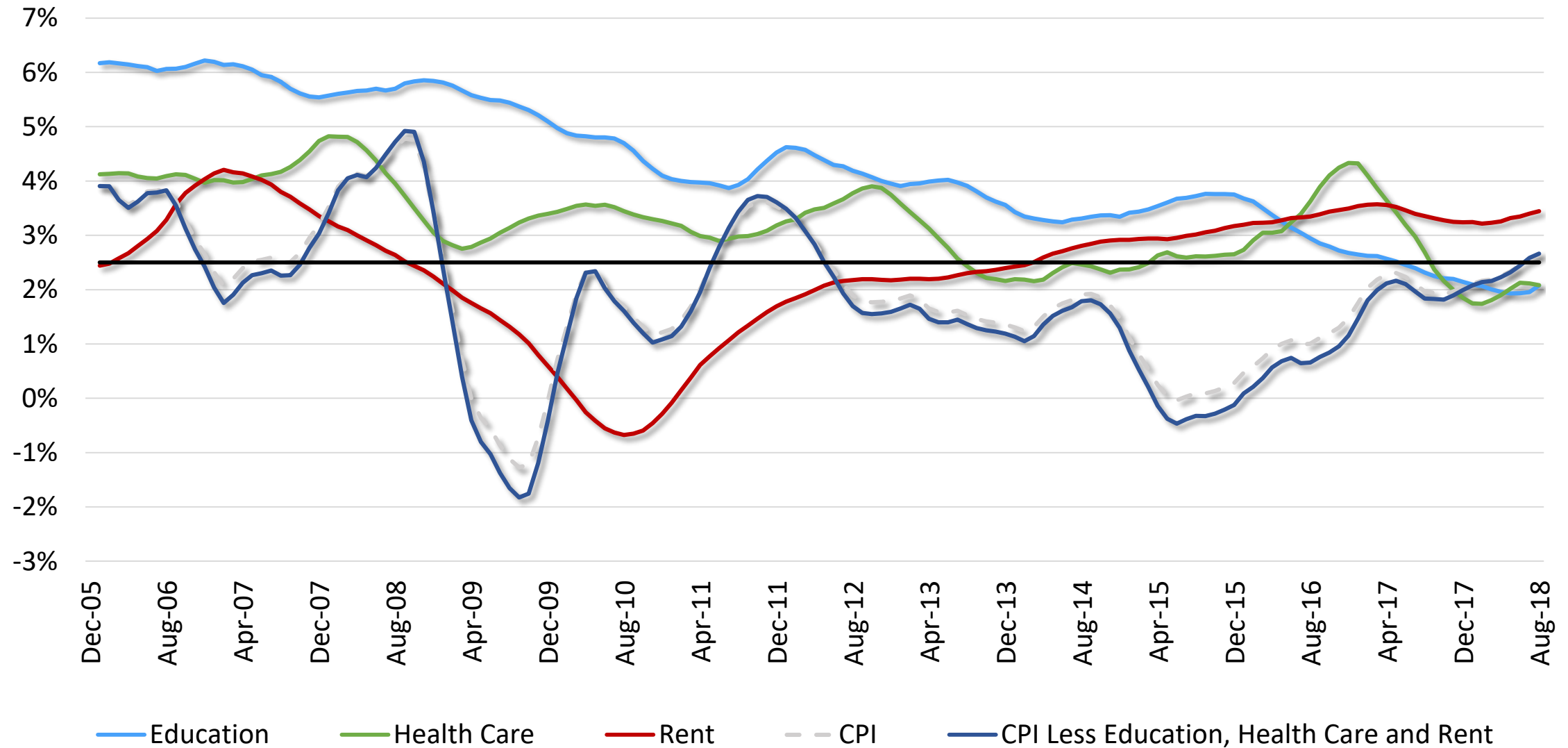


\*Boxed labels are office-using sectors

Source: Moody's Analytics; Bureau of Labor Statistics (BLS)



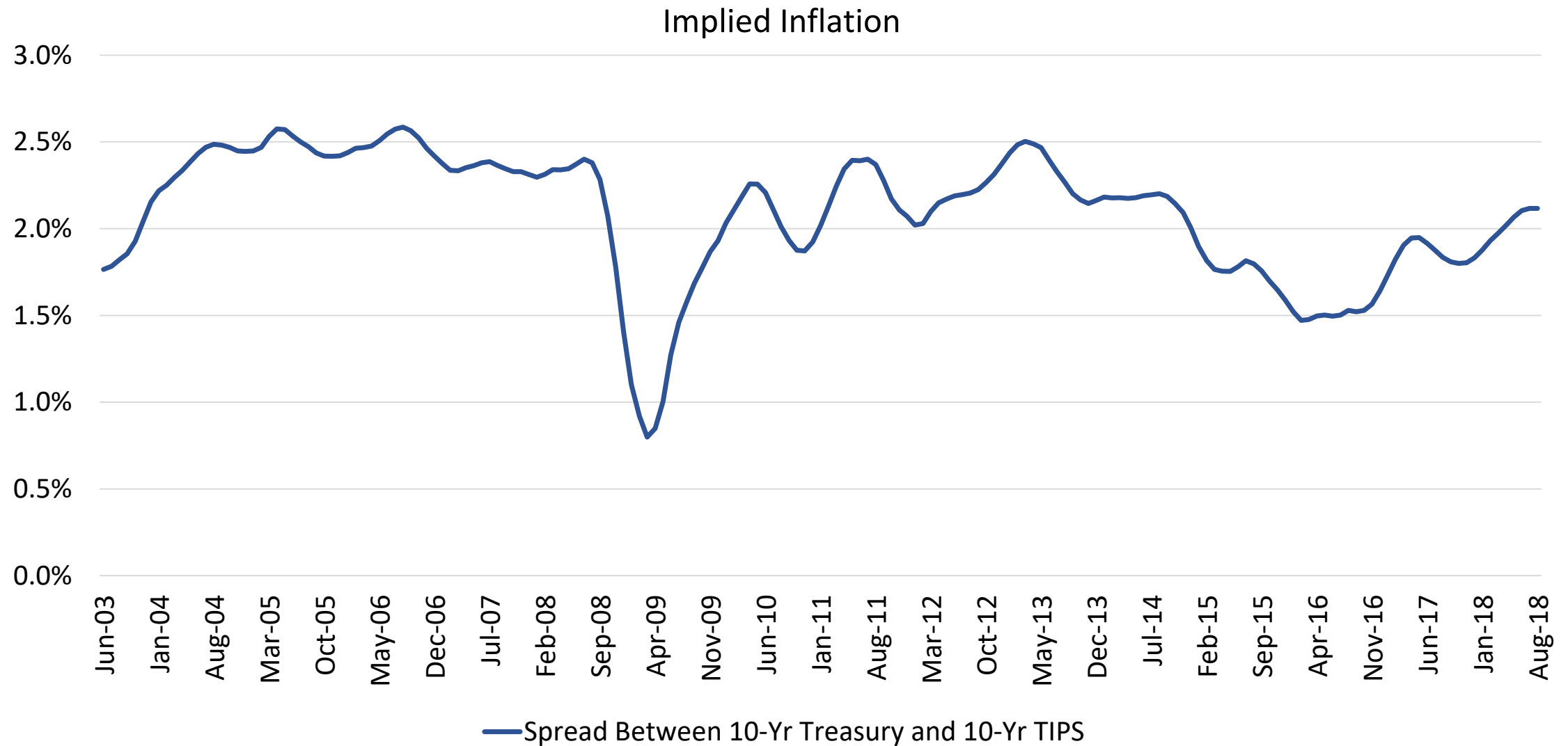
# Inflation Rising, But Unlikely to Break Out >2.5%



\*YOY 6 month moving avgs. CPI Less Health Care, Education and Rent is an estimate using BLS document "Math calculations to better utilize CPI data"

Source: Moody's Analytics; Bureau of Labor Statistics (BLS)

# Implied Inflation Has Increased, but Remains Low



Source: Federal Reserve Bank of St. Louis; Moody's Analytics; U.S. Bureau of Labor Statistics (BLS)

# Inflation Moving Up, but Not Sharply

## 1980's, 1990's, and 2000's:

- Average hourly earnings accelerating from 2% to 4% in 2 ½ years

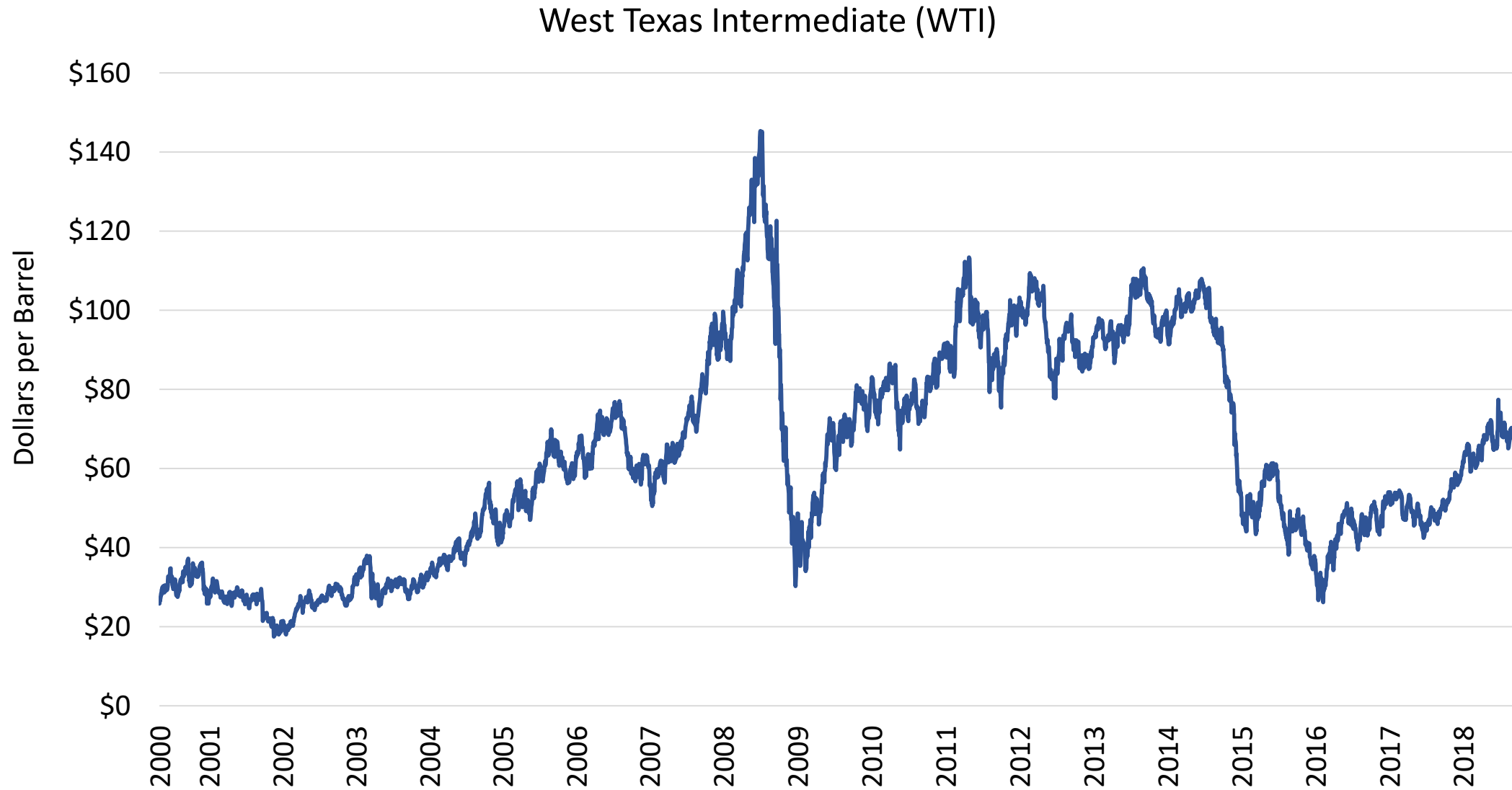
## Now:

- Average hourly earnings have accelerated to just 2.7% in 5 years
- At this rate, won't hit 4.0% for another 9 years

***This argues for a very long expansion***



# Oil Prices are Rising – Not a Clear Negative Anymore



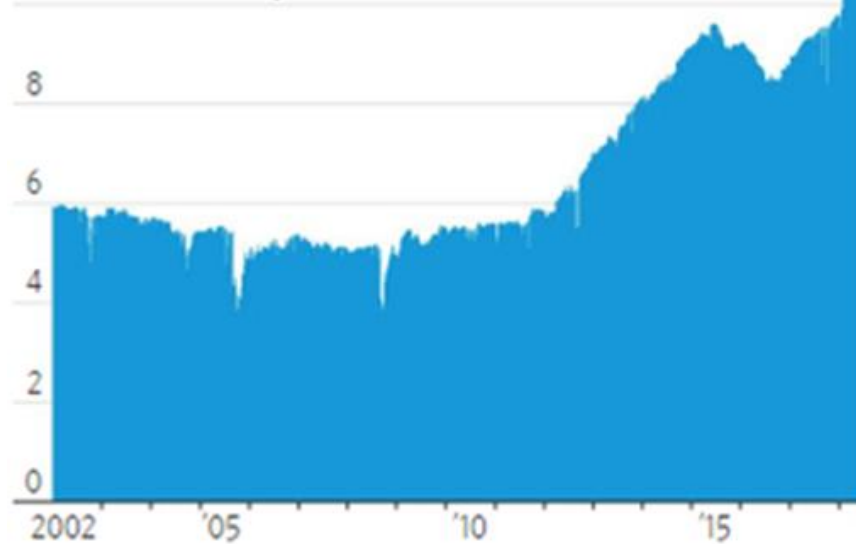
# Oil and Gas Industry Subject to Technological Advances- Just Like All Others

## *Shrinking Workforce*

U.S. oil production is at an all-time high even though employment is down from the 2014 peak

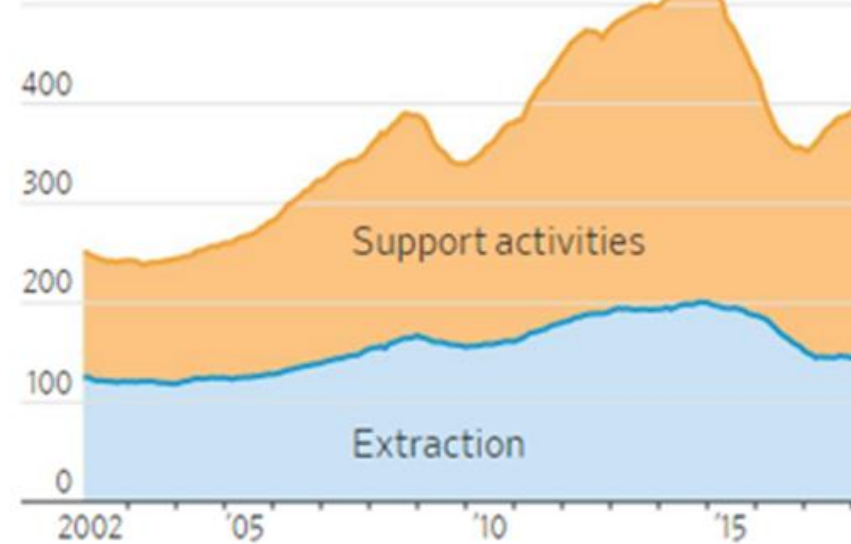
Oil production

10 million barrels a day



Oil and gas employment\*

500 thousand

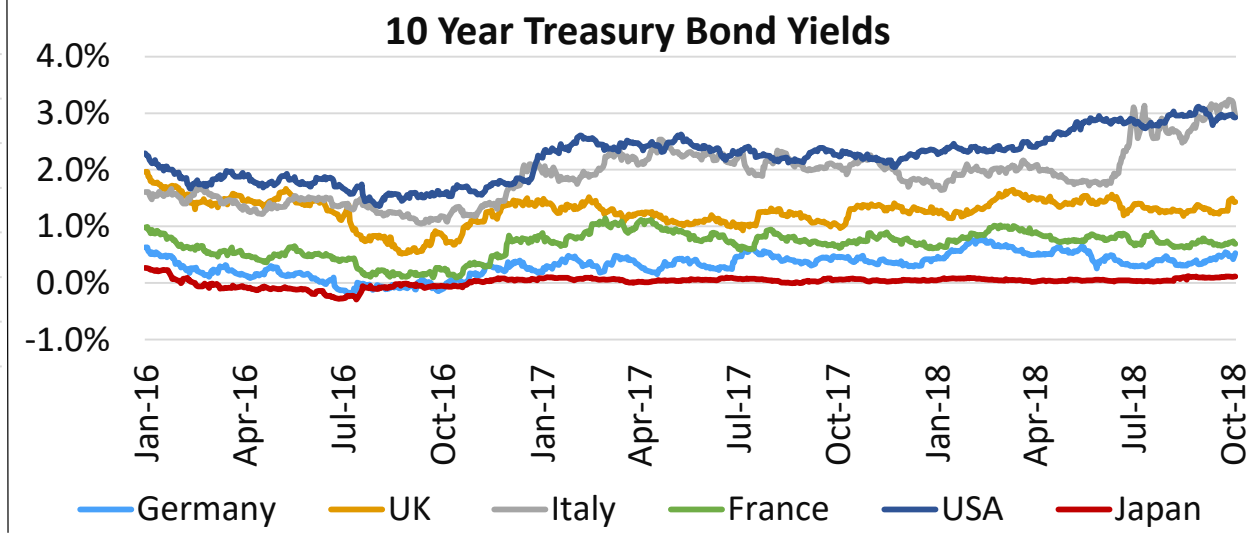
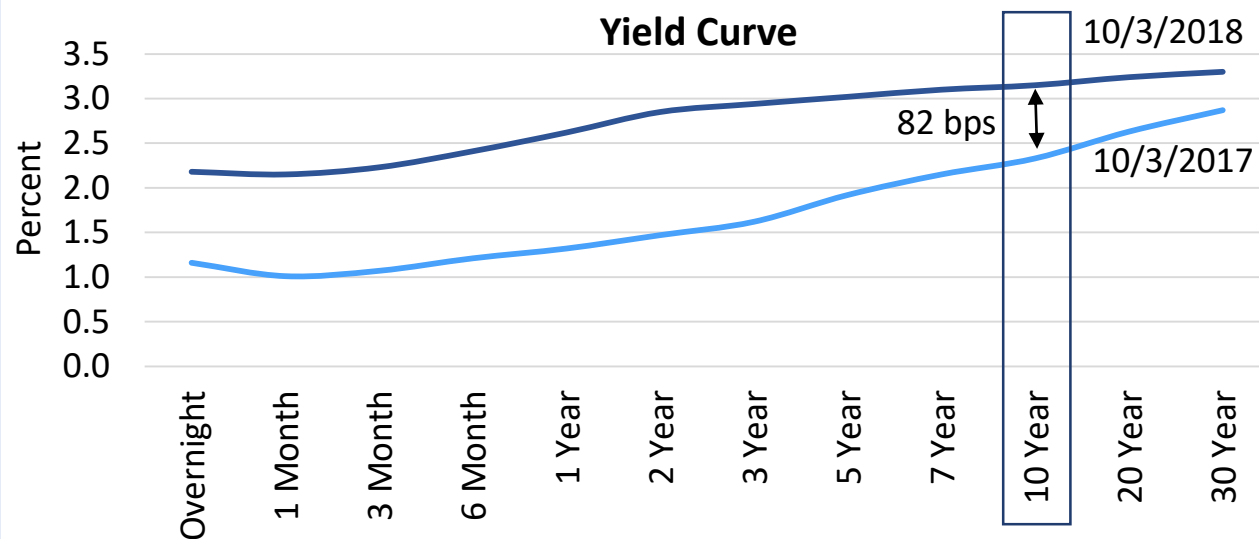
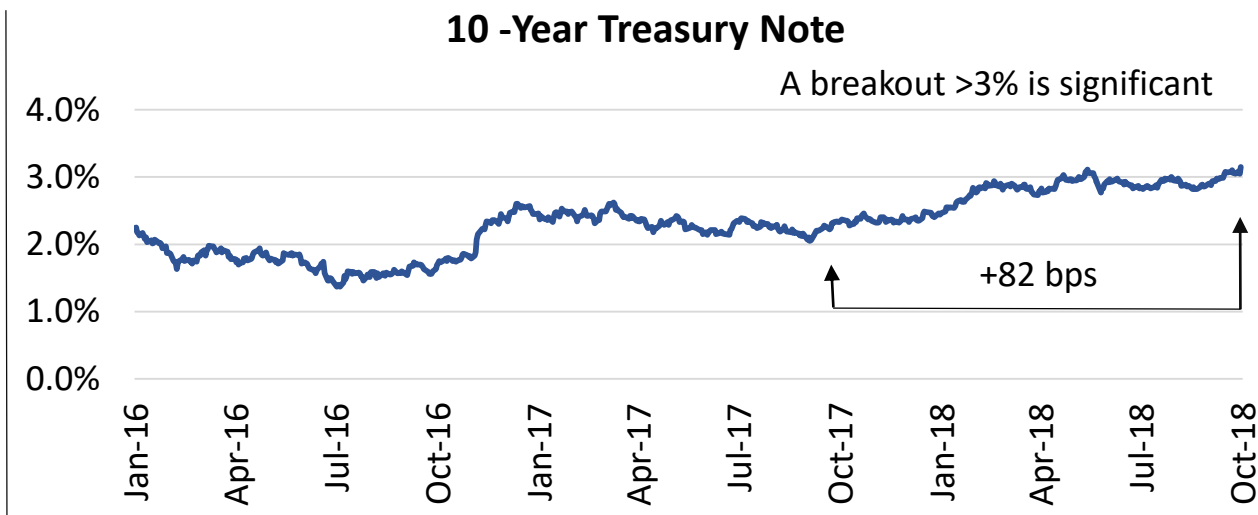
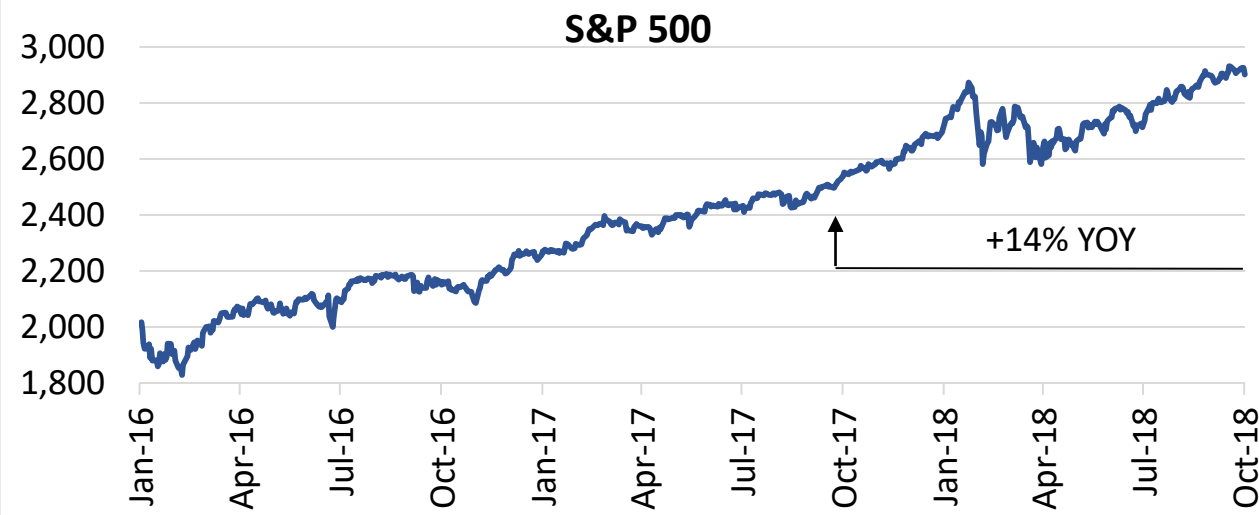


- Tech has transformed labor needs in most manufacturing – now making a splash in the energy business
- One of the last sectors where blue-collared workers could depend on six-figure salaries
- Underground tools capture data and smaller teams of remote technical analysts replacing field workers

\*Support activities include employees of service and drilling companies, while extraction refers to operating and producing companies

Source: Christopher Matthews, "Oil's New Technology Spells End of Boom for Roughnecks", Wall Street Journal; Energy Information Administration; Labor Department data via Ingham Economic Reporting

# The U.S. Economy is in High Gear – Despite Stock Market Correction



# Watch for These 5 Signs that Presage a Recession

1. Average Hourly Earnings Growth goes from 2.5% to 4.0%
2. Cyclical Sector Share of GDP moves from 24% to 28% of GDP
3. GDP Deflator moves from <2.0% to 2.5%
4. Operating Capacity Utilization Rate moves from 76% to 80%
5. Yield Curve Inverts (10 Yr treasury rate less Fed Funds Rate) from +90bp to >-50bp → NOT YET! Best guess 2020-2021

# Timing of the Next Recession

## 5 Models Developed by Ed Hyman at Evercore ISI

On track to reach recession-signal level in...

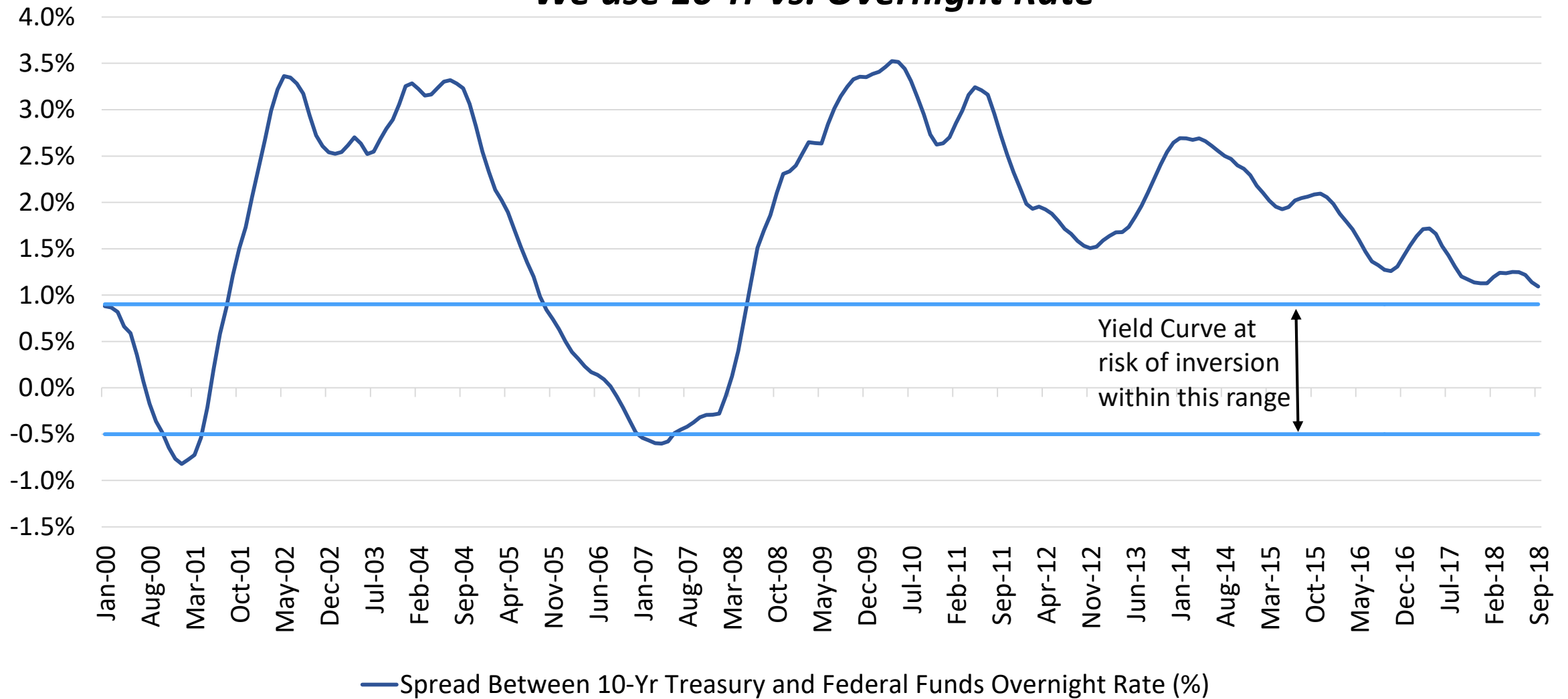
1. Average Hourly Earnings – **9 years**
2. Cyclical sectors % GDP – **6 years**
3. OECD Leading Economic Index – **5 years**
4. Housing starts – **3.5 years**
5. Fed funds – **2.5 years**

Based on the average of the above 5 models, the next recession will begin in 5.2 years, or at the end of 2023, with a range of 2021-2027



# There's Some Debate About Which Yield Curve to Use

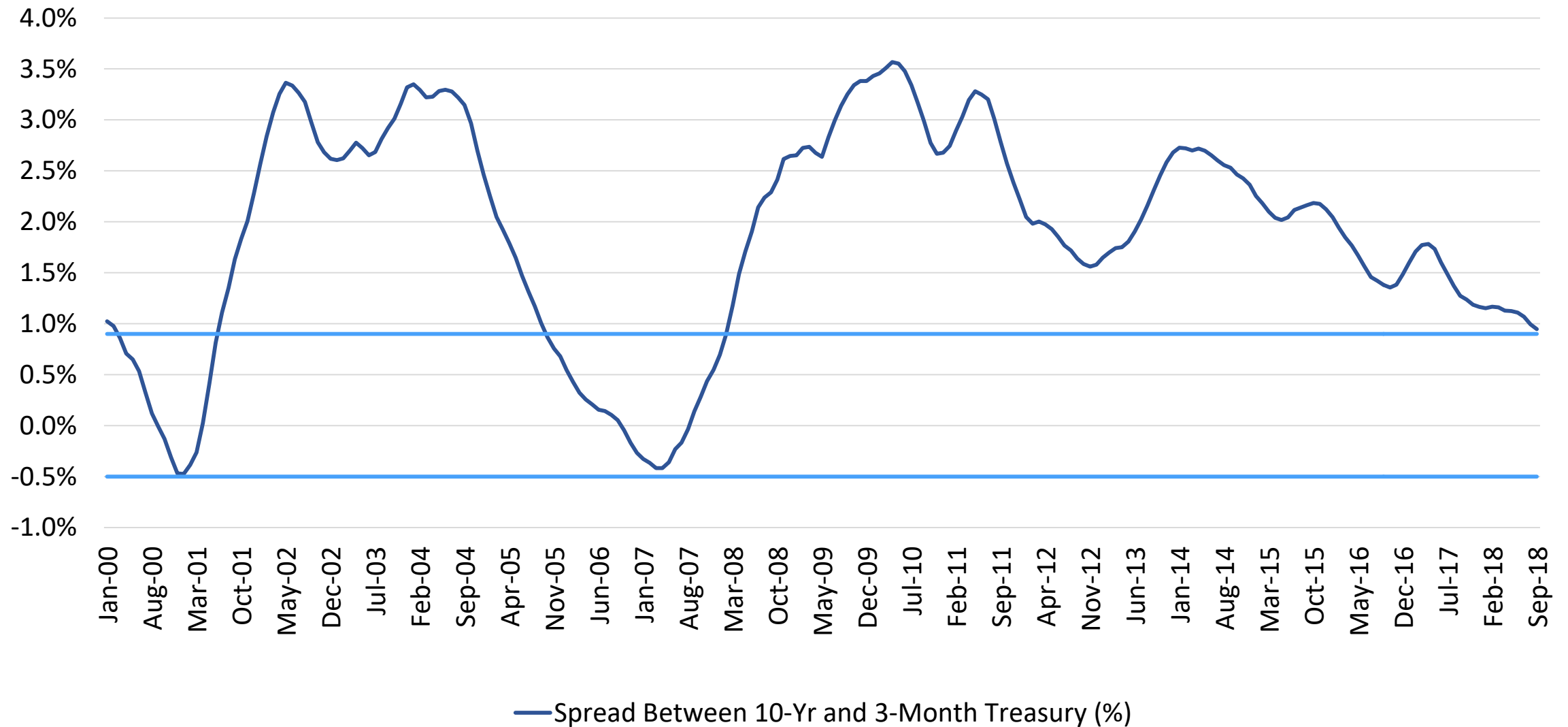
## *We use 10 Yr vs. Overnight Rate*



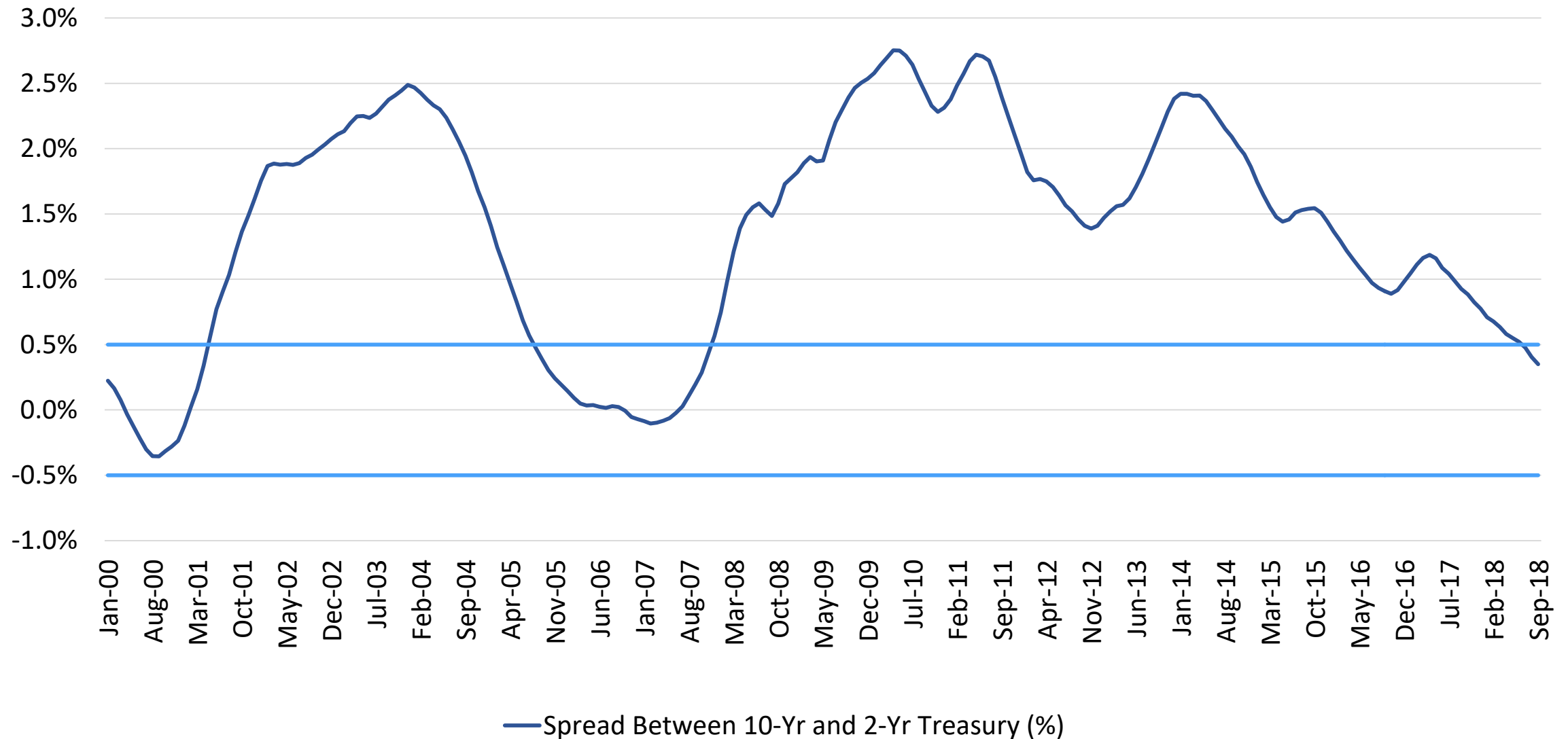
\*Data is based on 6-month rolling averages

Source: Moody's Analytics; U.S. Board of Governors of the Federal Reserve System (FRB)

# U.S. 10-Year Treasury and 3-Month Treasury Spread



# U.S. 10-Year Treasury and 2-Year Treasury Spread



Source: Moody's Analytics; U.S. Board of Governors of the Federal Reserve System (FRB)

# U.S. Federal Policy Mix is Mildly Pro-Growth

## Pro-Growth

- Tax Reform
- Regulatory Relief
- Executive Orders
  - Energy
  - Finance
  - Labor Costs



Generally Positive Progress

## Pro-Growth but Slow

- Infrastructure
- Education Reform
  - German Model
- Healthcare Reform



Progress in Tone,  
but Not Yet Substantive

## Anti-Growth

- Immigration Control
- Trade Renegotiation
  - President Trump announced U.S. will impose tariffs on steel and aluminum imports



Recent Tariff Move a Potential Drag on Growth

# So What?

- The U.S. economy is strong
  - Employment and wage growth are good
  - How much slack is left?
    - Productivity
    - Labor force participation
- } Both need to, and are, rising
- Inflation rising but not a lot, so the 10 yr rate is the binding constraint on the yield curve
  - Fiscal policy is mildly pro-growth
    - Keep putting money to work

# National Office Fundamentals and Trends

# Market Classifications

## Gateway Markets

Bay Area  
Boston  
Brooklyn  
Chicago  
Los Angeles  
Manhattan  
Queens  
San Francisco  
Washington, D.C

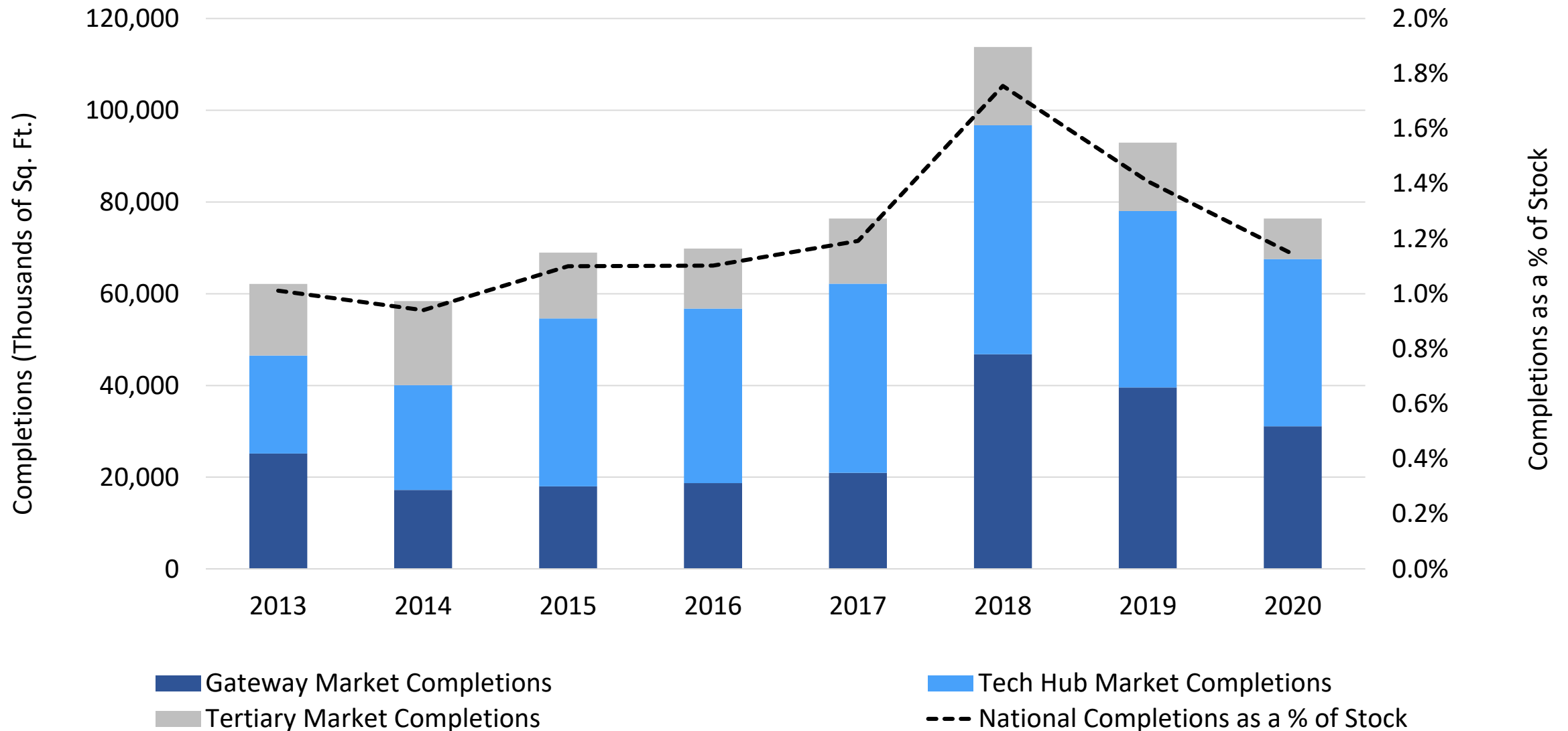
## Tech Hub Markets

Atlanta	Minneapolis-St. Paul
Austin	Nashville
Boise	Omaha
Charlotte	Orlando
Columbus	Philadelphia
Dallas-Fort Worth	Phoenix
Denver	Pittsburgh
Detroit	Portland
Houston	Raleigh-Durham
Indianapolis	Sacramento
Jacksonville	Salt Lake City
Kansas City	San Diego
Las Vegas	Seattle
Madison	Tampa
Miami	

## Tertiary Markets

Remaining 77 Yardi® Matrix office markets

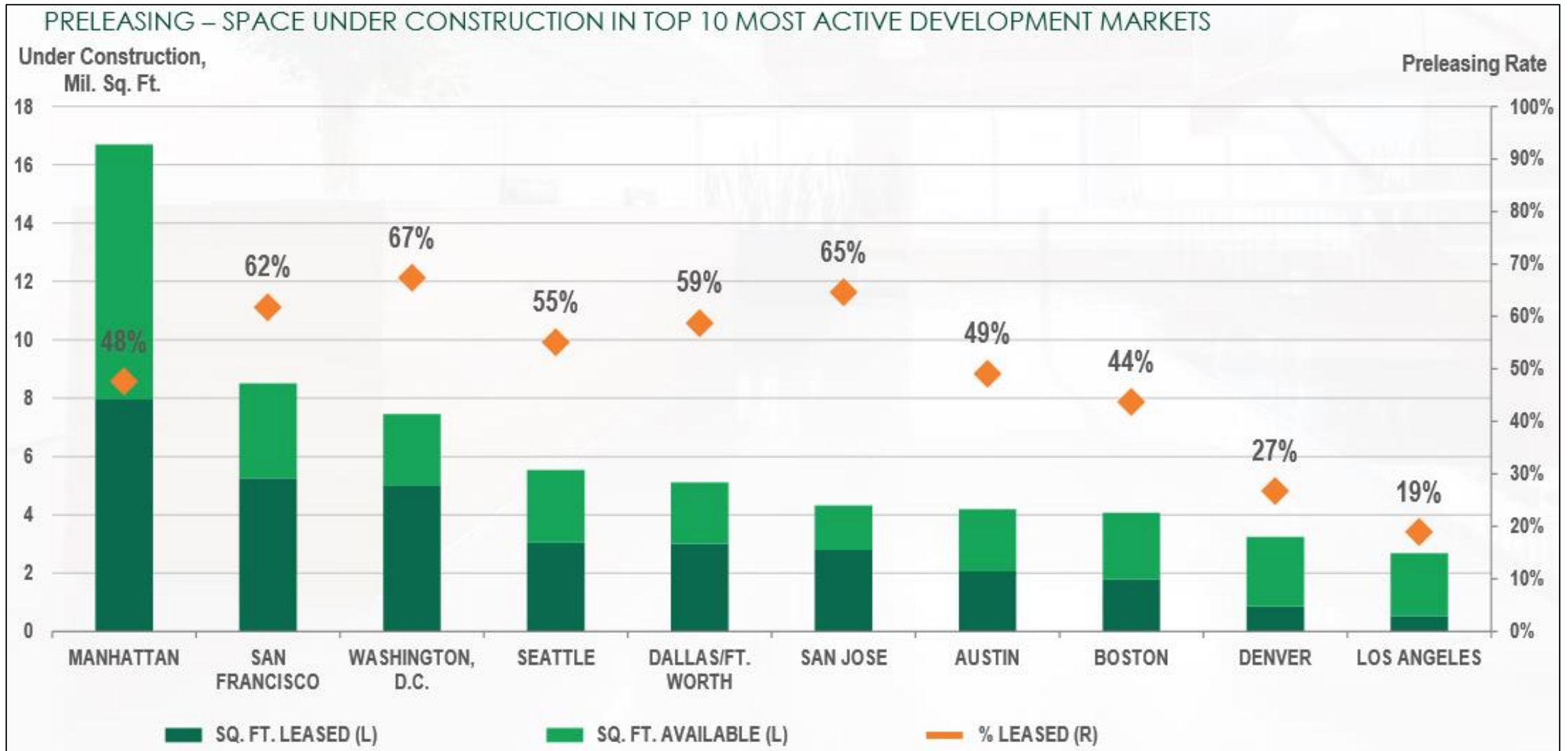
# National Supply Additions Expected to Peak This Year



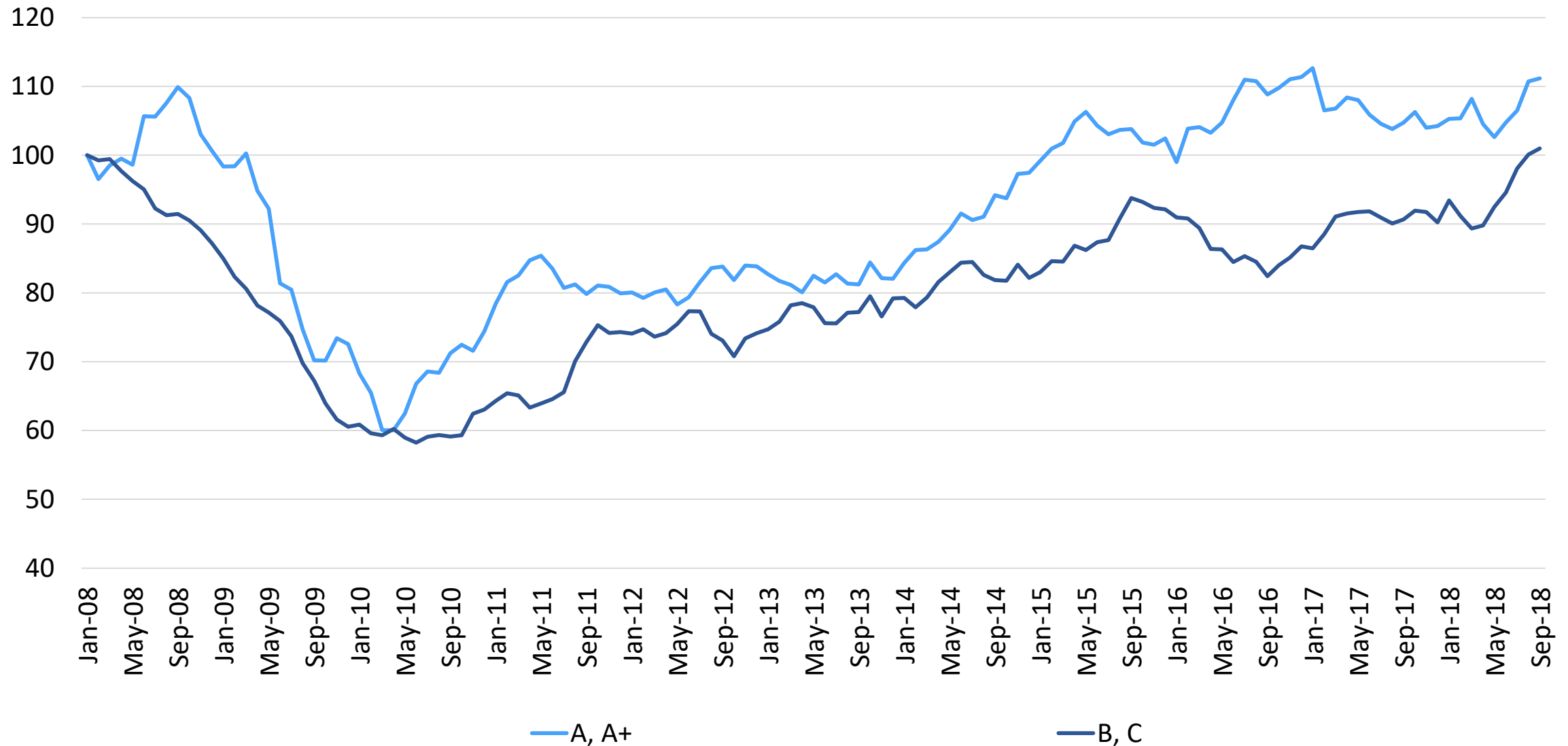




# Strong Demand is Evidenced by High Preleasing Levels



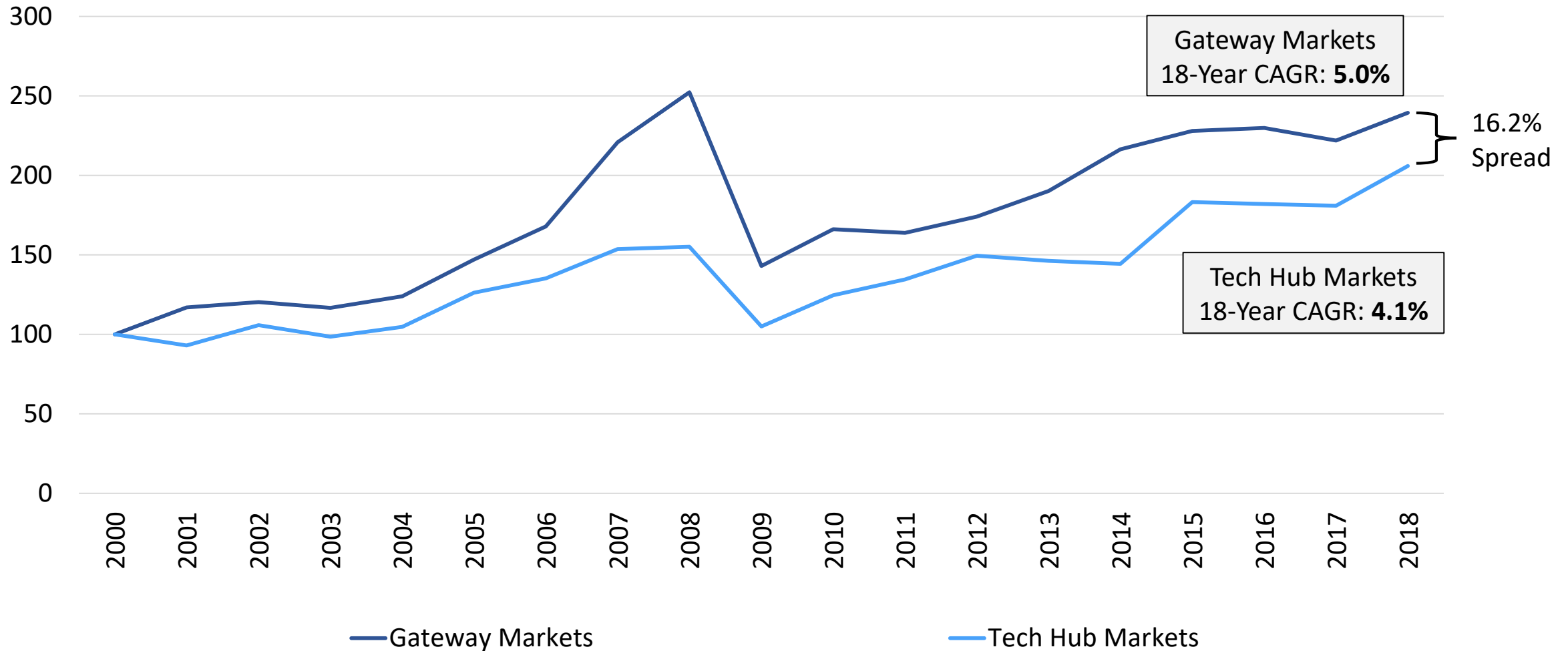
# Since the Recession, Class A Has Outperformed B/C



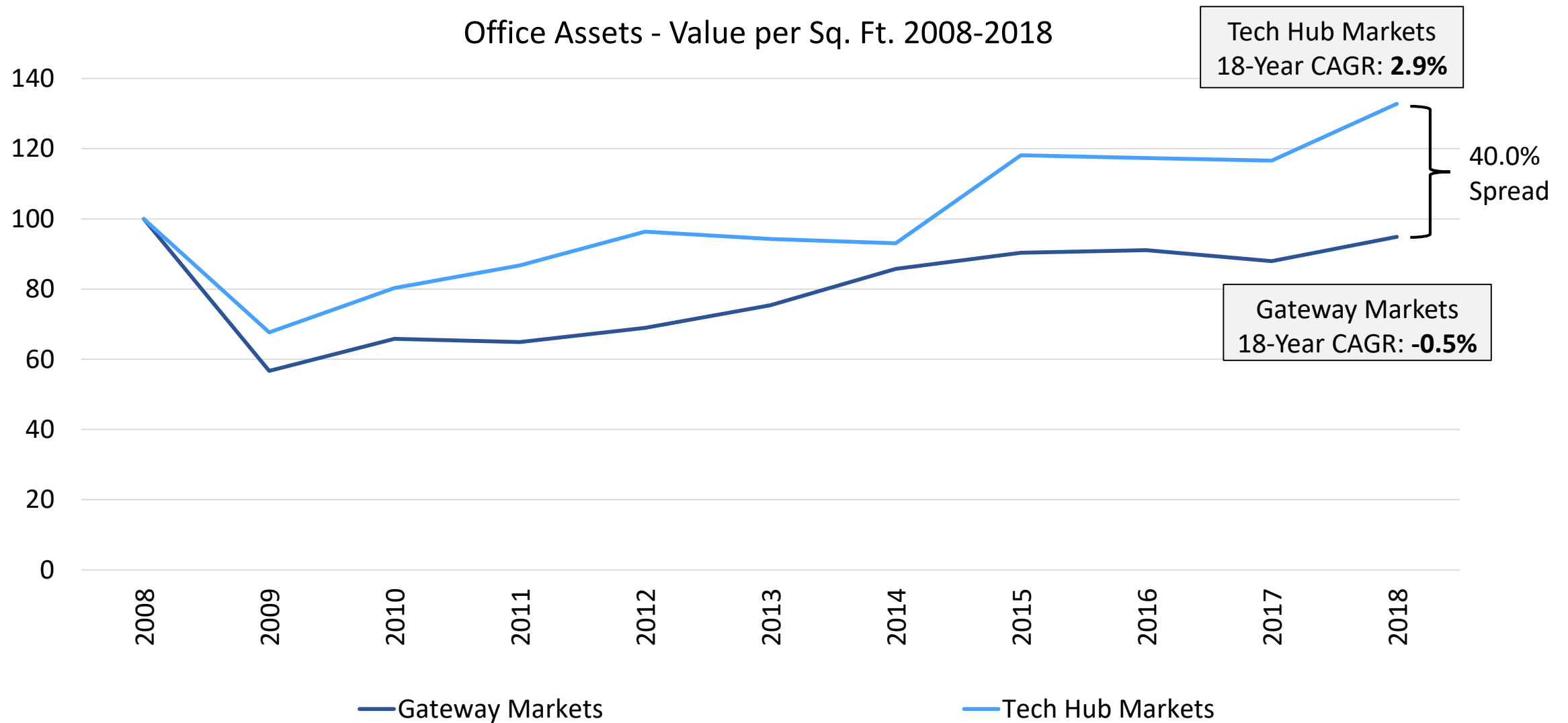
\*Index 2008 = 100  
Source: Yardi®Matrix

# Gateway Markets Have Outperformed Since 2000, but...

Office Assets - Value per Sq. Ft. 2000-2018

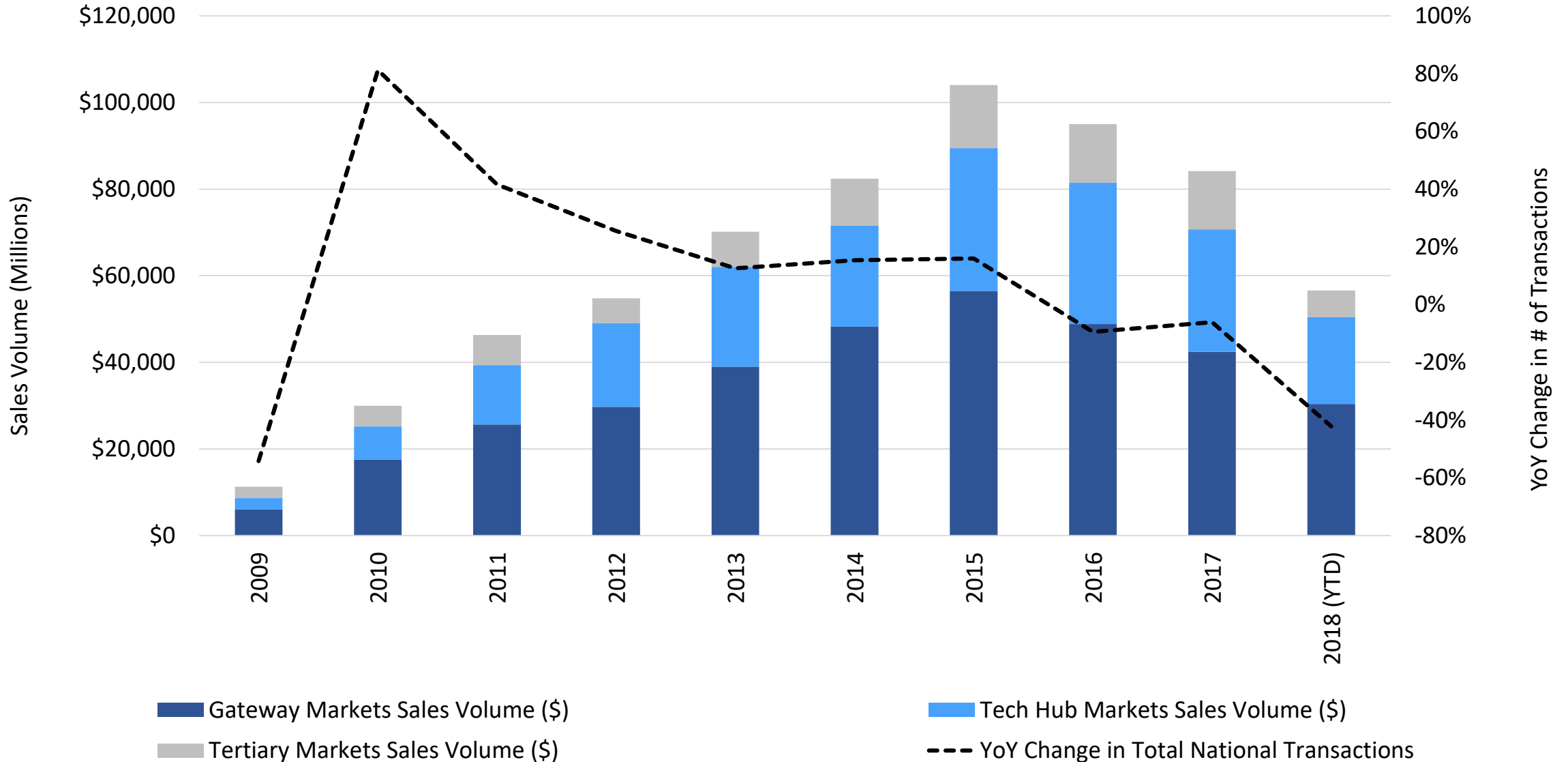


# Tech Hub Markets Have Outperformed Since 2008



\*Index 2008 = 100  
Source: Yardi®Matrix

# Sales Volume is Dropping in Each Market Category



# Fundamentals Are Improving in Tech Hub Markets

Market	6 Month Change in Full Service Equivalent Asking Rents	6 Month Change in Availability Rate	September Full Service Equivalent Asking Rent	September Availability Rate	New Supply as a % of Stock last 12 months
Tampa	7.9%	0.5%	\$25.01	12.2%	0.8%
Orange County	7.1%	1.6%	\$34.23	12.2%	1.4%
Boston	5.8%	-0.5%	\$35.31	10.4%	1.3%
Miami	5.7%	-0.3%	\$37.41	13.2%	5.0%
Philadelphia	5.4%	0.4%	\$27.64	12.2%	1.5%
Jacksonville	5.1%	-0.6%	\$20.82	13.1%	0.9%
Raleigh - Durham	4.8%	1.6%	\$24.99	13.9%	2.6%
Winston-Salem	4.4%	2.7%	\$18.31	16.1%	0.6%
Denver	3.8%	0.7%	\$27.81	14.4%	2.5%
Portland	3.2%	-0.3%	\$29.37	11.4%	2.2%
Phoenix	3.0%	-1.6%	\$25.69	17.4%	1.1%
Orlando	2.7%	-0.4%	\$21.01	12.0%	0.6%
Austin	2.5%	1.1%	\$38.52	10.5%	2.1%
Seattle	2.4%	0.6%	\$33.63	9.8%	1.2%
Fort Lauderdale	2.3%	-1.2%	\$29.08	13.5%	0.5%
San Diego	2.1%	1.4%	\$37.80	13.7%	1.0%
Sacramento	2.0%	1.0%	\$23.51	14.5%	0.2%
Chicago	1.6%	-0.2%	\$28.90	16.5%	0.9%
Dallas - Fort Worth	1.6%	0.4%	\$27.07	20.1%	2.3%
Los Angeles	1.0%	-0.3%	\$36.39	14.5%	0.4%
Inland Empire	0.7%	-0.5%	\$23.02	12.3%	0.8%
San Francisco	0.7%	-1.1%	\$56.20	8.2%	2.7%
Atlanta	0.4%	0.3%	\$25.44	16.4%	1.3%

# Fundamentals Are Improving in Tech Hub Markets

Market	6 Month Change in Full Service Equivalent Asking Rents	6 Month Change in Availability Rate	September Full Service Equivalent Asking Rent	September Availability Rate	New Supply as a % of Stock last 12 months
San Antonio	-0.5%	-0.6%	\$24.60	13.9%	0.7%
Houston	-0.8%	0.7%	\$29.40	22.8%	0.6%
Southwest Florida Coast	-1.5%	1.0%	\$23.11	13.1%	0.0%
Manhattan	-2.0%	0.7%	\$72.47	9.2%	1.1%
Bay Area	-3.0%	-1.0%	\$40.25	16.6%	2.3%
West Palm Beach	-3.7%	0.6%	\$30.70	14.1%	0.2%
Charlotte	-5.6%	0.2%	\$26.45	12.6%	1.3%
Baltimore	N/A	N/A	\$24.90	14.2%	0.8%
Birmingham	N/A	N/A	\$20.17	13.3%	1.1%
Brooklyn	N/A	N/A	\$56.02	9.5%	1.3%
Central Valley	N/A	N/A	\$24.23	11.7%	1.6%
Detroit	N/A	N/A	\$21.52	18.3%	0.2%
Kansas City	N/A	N/A	\$20.97	13.2%	0.7%
Las Vegas	N/A	N/A	\$25.22	18.1%	0.6%
Memphis	N/A	N/A	\$18.09	18.3%	1.6%
Minneapolis - St. Paul	N/A	N/A	\$25.73	12.4%	0.6%
Nashville	N/A	N/A	\$27.03	10.7%	3.4%
New Jersey	N/A	N/A	\$32.91	20.4%	0.2%
Pittsburgh	N/A	N/A	\$23.39	13.2%	0.2%
Salt Lake City	N/A	N/A	\$24.28	10.5%	1.3%
South Carolina	N/A	N/A	\$21.08	13.4%	0.9%
St. Louis	N/A	N/A	\$21.20	13.9%	0.7%



# Matrix Expert National Operating Data

% Change March '18-Oct '18	Atlanta	Austin	Boston	Chicago	Denver	Los Angeles	Manhattan	Miami	San Diego	San Francisco	Seattle	Washington DC
Total Operating Income	2.3%	4.5%	0.6%	4.8%	2.4%	2.8%	-0.5%	4.6%	-6.0%	7.9%	11.4%	3.6%
Payroll	0.0%	12.6%	2.9%	-7.6%	5.3%	10.6%	-1.9%	20.1%	-8.1%	3.9%	7.8%	0.7%
Marketing & Advertising	33.3%	0.0%	0.0%	40.0%	20.0%	20.0%	120.0%	0.0%	0.0%	57.1%	100.0%	-12.5%
Repairs & Maintenance	6.8%	2.5%	1.7%	0.7%	3.2%	5.8%	11.6%	3.1%	-4.1%	9.9%	4.7%	0.3%
Administrative	2.8%	1.1%	0.0%	5.2%	2.8%	9.9%	8.2%	1.7%	19.0%	12.8%	-0.9%	5.5%
Management Fees	0.0%	16.9%	-2.1%	-1.4%	1.3%	4.8%	12.1%	9.0%	-10.6%	16.1%	-1.2%	4.1%
Utilities	4.6%	4.8%	10.1%	4.0%	-2.4%	5.2%	12.9%	-0.5%	-0.6%	10.0%	-3.0%	6.2%
Real Estate & Other Taxes	2.7%	4.4%	-0.4%	7.2%	6.8%	8.7%	0.6%	6.4%	8.0%	7.7%	12.6%	0.0%
Insurance	0.0%	5.6%	0.0%	0.0%	5.9%	16.0%	-2.0%	1.2%	-5.3%	13.3%	2.5%	22.2%
Other Operating Expenses	57.1%	35.3%	5.5%	-60.0%	-50.0%	-27.7%	24.0%	57.1%	35.7%	42.9%	16.7%	-11.8%
Total Operating Expense	4.1%	5.6%	2.0%	2.3%	3.5%	6.3%	5.6%	5.6%	1.1%	10.1%	5.2%	1.6%
<b>Net Operating Income</b>	<b>0.9%</b>	<b>3.6%</b>	<b>-0.3%</b>	<b>7.6%</b>	<b>1.6%</b>	<b>0.5%</b>	<b>-5.5%</b>	<b>3.8%</b>	<b>-9.4%</b>	<b>6.8%</b>	<b>0.4%</b>	<b>5.0%</b>
<b>Cap Rate (October 2018)</b>	<b>6.3%</b>	<b>7.4%</b>	<b>6.1%</b>	<b>6.2%</b>	<b>5.6%</b>	<b>5.0%</b>	<b>3.9%</b>	<b>5.3%</b>	<b>6.1%</b>	<b>5.6%</b>	<b>5.7%</b>	<b>6.1%</b>

# Market Level Supply and Demand – Last Five Years

*National supply growth doesn't look crazy, but what have we seen at the market level over the last five years?*

Market	2013 Supply	5-Year Supply Growth	5-Year Demand Growth	Net %	Current Vacancy	Market	2013 Supply	5-Year Supply Growth	5-Year Demand Growth	Net %	Current Vacancy
<b>Pittsburgh</b>	<b>64</b>	<b>6.8%</b>	<b>3.6%</b>	<b>(3.2%)</b>	<b>13.2%</b>	Denver	131	5.1%	15.0%	9.9%	14.4%
Houston	229	11.8%	11.7%	(0.1%)	22.8%	Dallas	275	7.7%	18.1%	10.4%	20.1%
Minneapolis	108	5.8%	6.1%	0.4%	12.4%	Atlanta	171	3.8%	14.7%	10.9%	16.4%
Kansas City	52	7.6%	9.8%	2.2%	13.2%	Raleigh-Durham	50	8.5%	19.5%	11.0%	13.9%
San Diego	91	5.2%	7.7%	2.4%	13.7%	Portland	51	3.8%	16.0%	12.2%	11.4%
Salt Lake City	43	14.4%	16.9%	2.5%	10.5%	Miami	56	3.2%	16.9%	13.8%	13.2%
Los Angeles	291	4.2%	7.2%	3.0%	14.5%	Fort Lauderdale	32	2.3%	16.5%	14.2%	13.5%
Philadelphia	165	3.7%	7.0%	3.3%	12.2%	Tampa	58	3.3%	19.4%	16.2%	12.2%
St. Louis	56	4.6%	8.2%	3.6%	13.9%	Charlotte	57	7.9%	24.8%	16.9%	12.6%
Boston	197	7.3%	11.2%	4.0%	10.4%	Nashville	39	13.6%	30.7%	17.1%	10.7%
Chicago	281	3.4%	7.6%	4.2%	16.5%	Las Vegas	24	4.1%	22.3%	18.1%	18.1%
Detroit	109	2.5%	9.1%	6.5%	18.3%	Austin	54	15.4%	34.5%	19.1%	10.5%
Seattle	112	10.9%	18.6%	7.7%	9.8%	Orlando	47	3.8%	24.8%	21.1%	12.0%
Sacramento	74	0.6%	9.6%	9.0%	14.5%	Bay Area	219	8.0%	29.8%	21.8%	16.6%
Phoenix	104	9.0%	18.3%	9.3%	17.4%	San Francisco	152	5.9%	30.6%	24.7%	8.2%

\*Supply data in millions of square feet

\*Demand is office-using employment growth

Source: Moody's Analytics; U.S. Bureau of Labor Statistics (BLS); Yardi® Matrix



# Market Level Supply and Demand – Next Two Years

*How does supply fit demand over the next two years?*

Market	2018 Supply	2-Year Supply Growth	2-Year Demand Growth	Net %	Current Vacancy	Market	2018 Supply	2-Year Supply Growth	2-Year Demand Growth	Net %	Current Vacancy
<b>San Francisco</b>	<b>161</b>	<b>7.8%</b>	<b>3.0%</b>	<b>(4.8%)</b>	<b>8.2%</b>	Dallas	296	5.2%	6.1%	0.9%	20.1%
<b>Miami</b>	<b>57</b>	<b>6.8%</b>	<b>2.3%</b>	<b>(4.5%)</b>	<b>13.2%</b>	Salt Lake City	49	3.6%	4.8%	1.2%	10.5%
Austin	62	8.1%	5.2%	(2.9%)	10.5%	Philadelphia	171	2.4%	3.8%	1.3%	12.2%
Charlotte	61	6.4%	4.0%	(2.5%)	12.6%	Phoenix	114	3.4%	4.7%	1.3%	17.4%
Portland	53	6.6%	4.7%	(1.9%)	11.4%	Denver	137	3.4%	4.8%	1.4%	14.4%
Bay Area	236	6.4%	4.9%	(1.5%)	16.6%	Orlando	48	4.2%	5.6%	1.4%	12.0%
Raleigh-Durham	55	6.0%	5.1%	(0.9%)	13.9%	Nashville	44	4.1%	5.5%	1.5%	10.7%
Chicago	290	3.7%	3.1%	(0.5%)	16.5%	Boston	211	2.8%	4.5%	1.7%	10.4%
Detroit	112	1.6%	1.3%	(0.3%)	18.3%	Sacramento	74	1.2%	3.1%	1.9%	14.5%
Seattle	125	7.0%	6.8%	(0.2%)	9.8%	Minneapolis	114	2.3%	4.5%	2.2%	12.4%
St. Louis	59	2.1%	2.2%	0.1%	13.9%	Fort Lauderdale	33	2.7%	5.1%	2.4%	13.5%
Atlanta	177	3.0%	3.4%	0.4%	16.4%	Tampa	59	1.7%	4.3%	2.6%	12.2%
Pittsburgh	68	1.6%	2.3%	0.7%	13.2%	San Diego	96	2.4%	5.2%	2.8%	13.7%
Los Angeles	304	2.2%	3.0%	0.8%	14.5%	Las Vegas	25	2.4%	5.7%	3.3%	18.1%
Kansas City	56	1.3%	2.2%	0.8%	13.2%	Houston	256	1.7%	8.1%	6.4%	22.8%

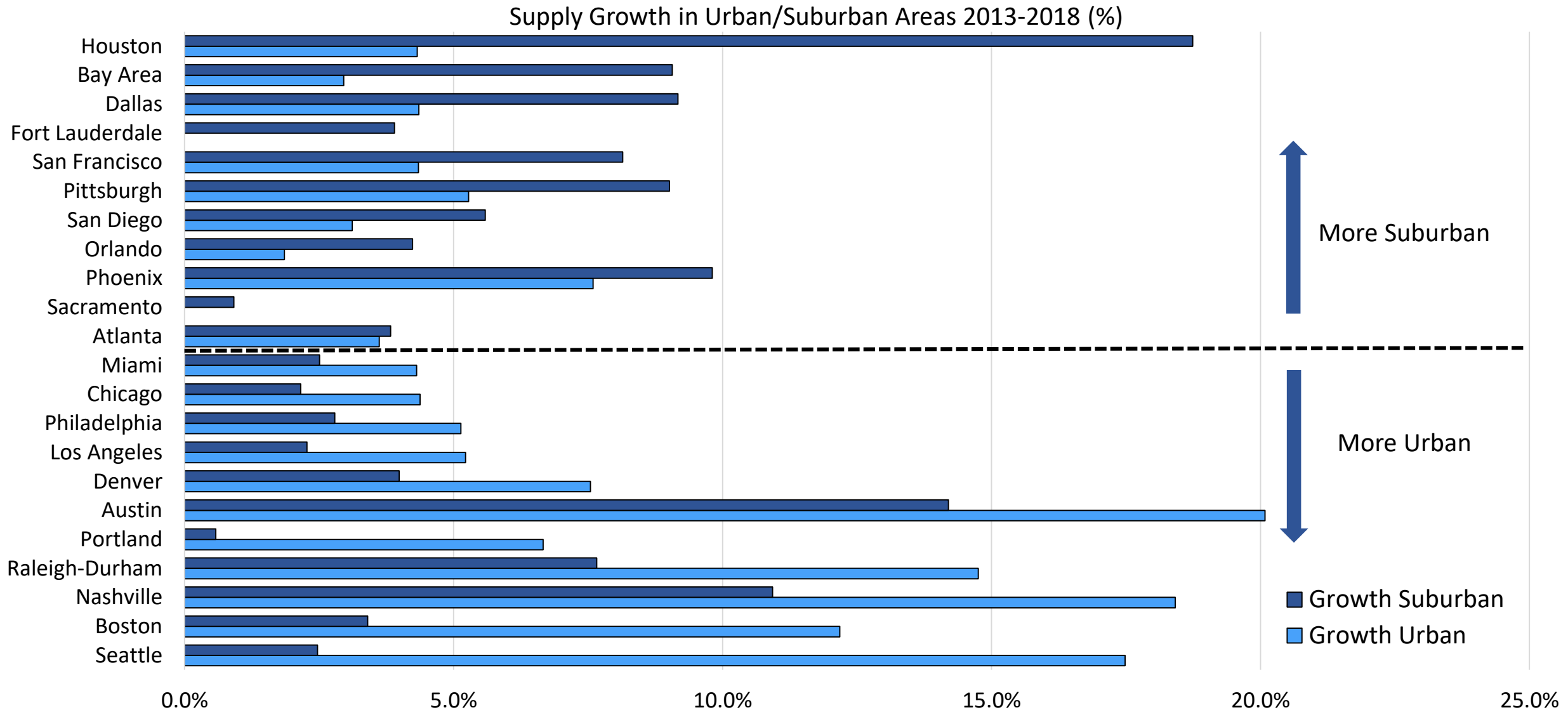
\*Supply data in millions of square feet

\*Demand is office-using employment growth

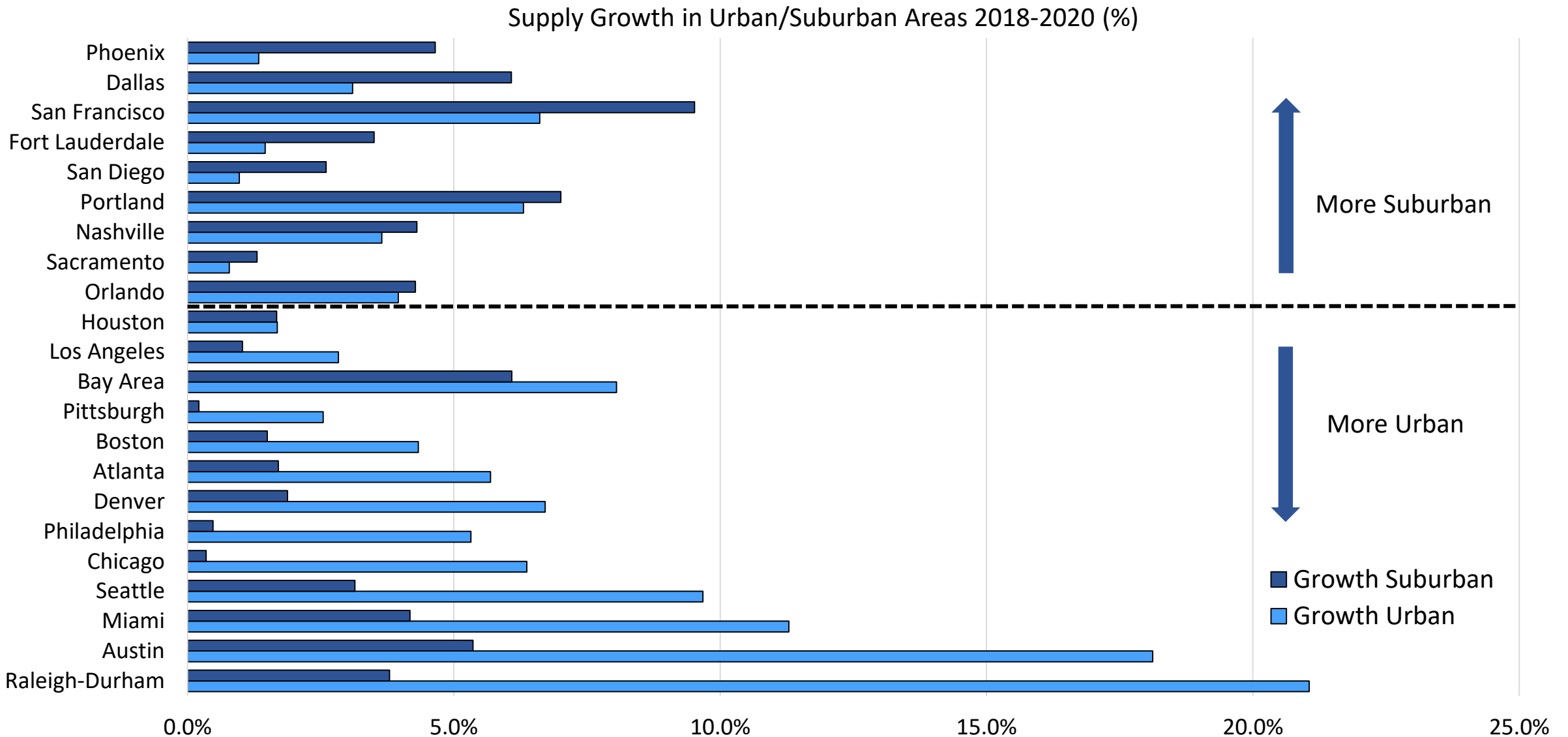
Source: Moody's Analytics; U.S. Bureau of Labor Statistics (BLS); Yardi® Matrix



# Has Past Development Been Urban or Suburban?



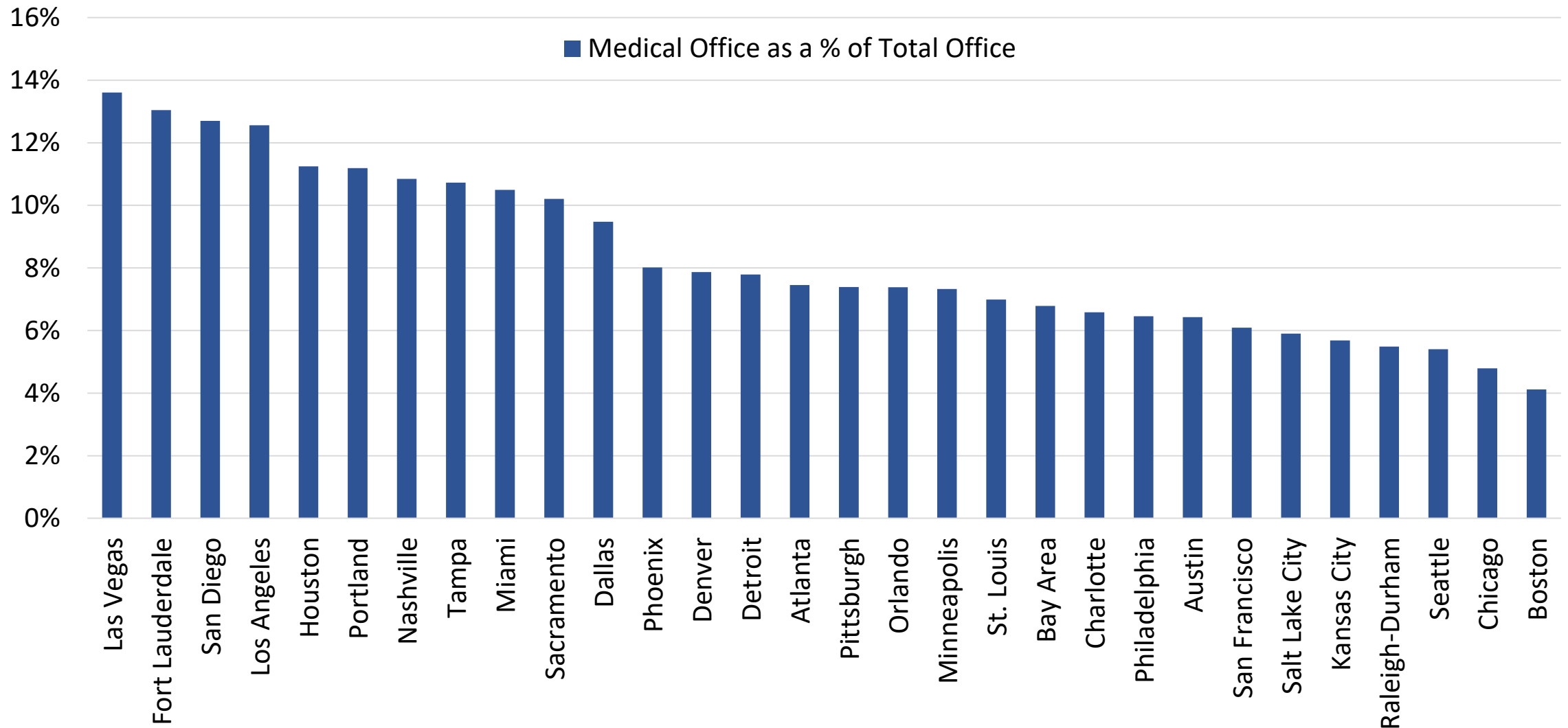
# Will New Supply be Urban or Suburban?



# Secular Pressures Continue to Alter the Office Market

- Decreasing Square Foot per Employee
  - Specifically in CBD and high cost metros
- Co-working
  - Pulls roughly 1-3% of market demand from traditional office leases
  - More highly concentrated in dense, high cost gateway markets
- Talent Pool for Office Using Employment
  - Diversifying and moving to lower cost markets

# Sunbelt Markets Have Higher Concentrations of Medical Office



# So What?

- Economic conditions are sufficient to maintain good office using employment growth, occupancy and slow rental growth
- Supply is expected to peak this year due to a spike in gateway market completions, yet supply is still trailing demand in a lot of markets
- Sales volume peaked in 2015 and has been dropping since
- More than half of Yardi Matrix markets are seeing moderate rent growth, but some have seen rents fall since January – West Palm Beach, Manhattan, Bay Area
- Sunbelt markets have the highest concentration of medical office, and the aging population will continue to fuel growth



# The Value of Place Among and Within Markets

# Job Growth is Happening in Tech Hub Markets

At this stage in the economy, companies are relocating and expanding in markets where their money will get them further

## Charles Schwab

- Relocated jobs from San Francisco to lower-cost states like Texas and Colorado
- Consolidated Denver-area employees and newly relocated employees into a \$230 million campus in Lone Tree, CO
- Light rail currently being extended in part to accommodate employees and other residents drawn to the area

## KPMG

- Developing \$400 million, 55-acre learning, development and innovation campus in Lake Nona outside of Orlando
- Create 330 new jobs and 800,000 sq. ft. for meeting, classroom, residential and dining facilities

Market	2016-2017 Emp. Growth	Trend	Market	2016-2017 Emp. Growth	Trend
Reno	5.0%	Accelerating	San Diego	2.0%	Decelerating
Boise	4.1%	Accelerating	Fort Lauderdale	2.0%	Decelerating
Nashville	3.2%	Decelerating	Denver	2.0%	Decelerating
Orlando	3.2%	Decelerating	West Palm Beach	1.9%	Decelerating
Austin	3.2%	Decelerating	Columbus	1.9%	Decelerating
Charlotte	2.9%	Decelerating	New York	1.8%	Decelerating
Las Vegas	2.9%	Decelerating	Boston	1.7%	Decelerating
Dallas	2.8%	Decelerating	Washington DC	1.6%	Stable
Phoenix	2.8%	Decelerating	Minneapolis	1.6%	Stable
Seattle	2.7%	Decelerating	Kansas City	1.6%	Decelerating
Raleigh	2.6%	Decelerating	Detroit	1.6%	Decelerating
Portland	2.5%	Decelerating	Philadelphia	1.5%	Stable
South Bay Area	2.5%	Decelerating	Miami	1.4%	Decelerating
Charleston	2.3%	Decelerating	Indianapolis	1.4%	Decelerating
Salt Lake City	2.3%	Decelerating	Los Angeles	1.2%	Decelerating
East Bay Area	2.3%	Decelerating	Newark	1.2%	Stable
Atlanta	2.3%	Decelerating	Pittsburgh	1.1%	Accelerating
San Francisco	2.3%	Decelerating	St. Louis	1.0%	Decelerating
Sacramento	2.1%	Decelerating	Houston	0.9%	Decelerating
Tampa	2.1%	Decelerating	Chicago	0.9%	Decelerating
Orange County	2.1%	Decelerating	Milwaukee	0.3%	Decelerating

# Population Growth is in Tech Hub Markets

With the exception of Washington DC, tech hub and tertiary markets are the only ones seeing stable or rising population growth since 2015

Market	2015 Pop. Growth	2016 Pop. Growth	2017 Pop. Growth	Overall Trend
New York	0.6%	0.4%	0.2%	Decelerating
Los Angeles	0.5%	0.3%	0.1%	Decelerating
Chicago	0.0%	-0.1%	-0.1%	Falling
Houston	2.6%	2.0%	1.4%	Decelerating
Washington DC	1.0%	1.0%	1.1%	Stable
Philadelphia	0.2%	0.2%	0.3%	Stable
Atlanta	1.7%	1.6%	1.5%	Decelerating
Dallas	2.2%	2.2%	2.1%	Decelerating
Boston	0.7%	0.6%	0.6%	Decelerating
Phoenix	2.0%	2.0%	1.9%	Decelerating
San Francisco	1.3%	0.9%	0.6%	Decelerating
Tampa	2.0%	2.1%	1.8%	Decelerating
Seattle	1.7%	1.9%	1.6%	Decelerating

Market	2015 Pop. Growth	2016 Pop. Growth	2017 Pop. Growth	Overall Trend
Denver	2.1%	1.6%	1.3%	Decelerating
Miami	1.2%	1.1%	0.6%	Decelerating
Newark	0.2%	0.3%	0.4%	Rising
Orlando	2.7%	2.6%	2.3%	Decelerating
Portland	1.7%	1.7%	1.2%	Decelerating
Pittsburgh	-0.3%	-0.3%	-0.3%	Steady/Negative
Austin	3.0%	3.0%	2.7%	Decelerating
Columbus	1.2%	1.2%	1.6%	Rising
Indianapolis	0.8%	0.9%	1.1%	Rising
Nashville	2.1%	2.2%	1.8%	Decelerating
Raleigh	2.4%	2.5%	2.3%	Decelerating
Salt Lake City	1.2%	1.6%	1.4%	Decelerating

Although population is falling in Pittsburgh, the greater downtown's population expanded by 22% between 2010 and 2016

# States That Spend & Tax Less Have Higher Growth Rates

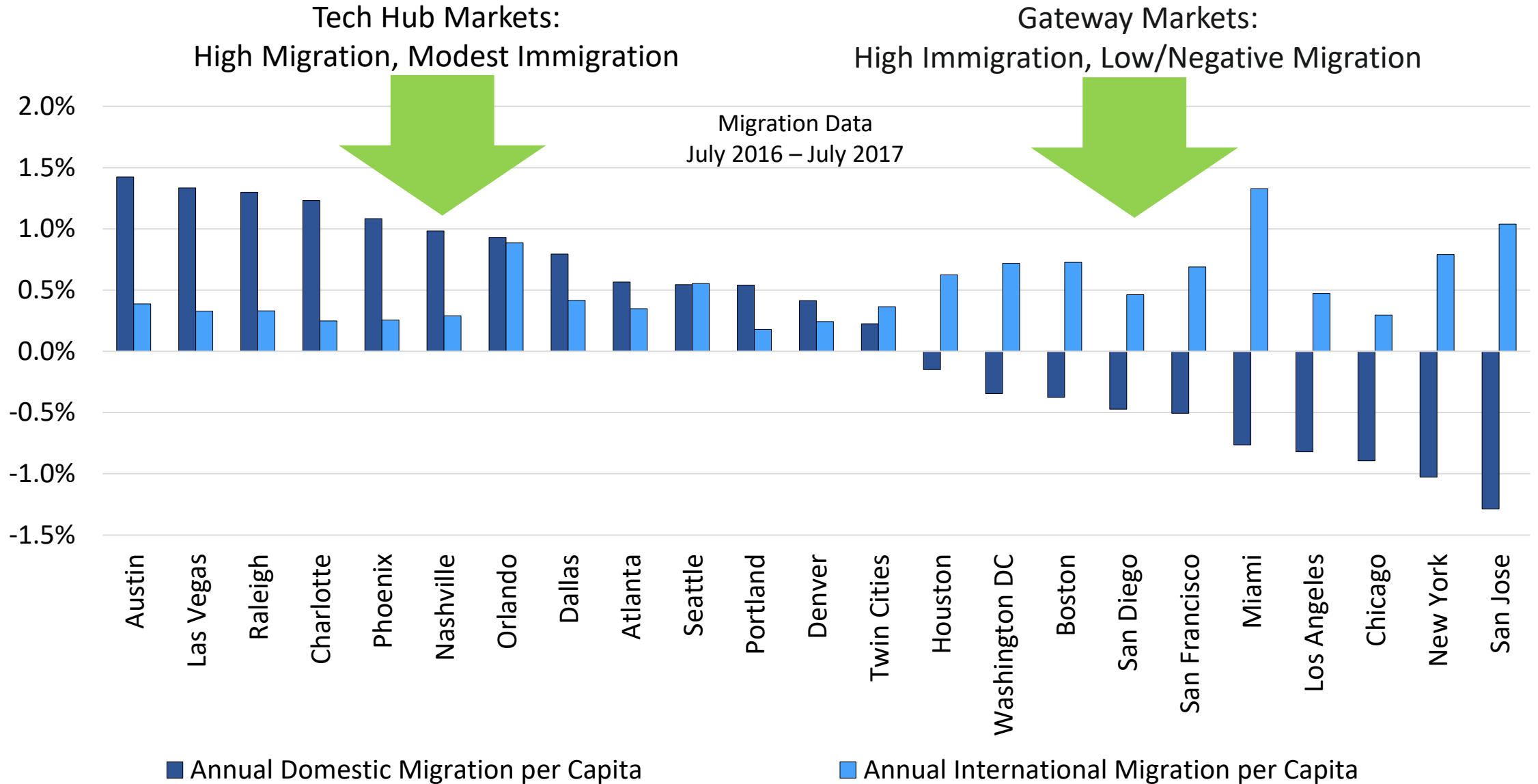
ALEC-Laffer State Economic Performance Rankings, 2006-2016

Rank	State	State GDP	Domestic Migration	Non-Farm Payroll	Rank	State	State GDP	Domestic Migration	Non-Farm Payroll
1	Texas	6	1	2	26	Maryland	16	42	23
2	Washington	3	7	5	27	New Hampshire	30	26	27
3	North Dakota	1	16	1	28	Delaware	36	19	31
4	Utah	5	13	3	29	Arkansas	34	20	32
5	Colorado	13	5	4	30	Indiana	20	39	28
6	Oregon	10	10	12	31	Louisiana	48	15	25
7	South Carolina	14	6	15	32	Kansas	23	38	30
8	South Dakota	4	22	9	33	Nevada	49	11	35
9	Montana	8	18	11	34	Missouri	31	34	33
10	Tennessee	15	9	14	35	Pennsylvania	17	44	37
11	North Carolina	21	3	17	36	Alabama	38	17	44
12	Idaho	22	14	6	37	Wisconsin	24	40	36
13	Nebraska	2	29	13	38	Vermont	35	28	39
14	Georgia	26	8	16	39	Alaska	50	31	24
15	Massachusetts	9	41	8	40	West Virginia	33	24	49
16	Oklahoma	25	12	22	41	Maine	43	25	43
17	Florida	39	2	19	42	Ohio	27	45	40
18	Iowa	7	30	29	43	Wyoming	47	21	50
19	New York	12	50	7	44	Mississippi	37	36	46
20	California	11	49	10	45	New Mexico	44	32	45
21	Hawaii	18	33	21	46	Illinois	32	48	41
22	Minnesota	19	37	18	47	Michigan	40	47	38
23	Virginia	28	27	20	48	Rhode Island	45	35	48
24	Kentucky	29	23	26	49	New Jersey	41	46	42
25	Arizona	42	4	34	50	Connecticut	46	43	47

Source: ALEC.org: Rich States, Poor States: Alec-Laffer State Economic Competitiveness Index: Arthur Laffer, Stephen Moore and Jonathan Williams; The Wall Street Journal: So Long California. Sayonara, New York: Arthur Laffer and Stephen Moore

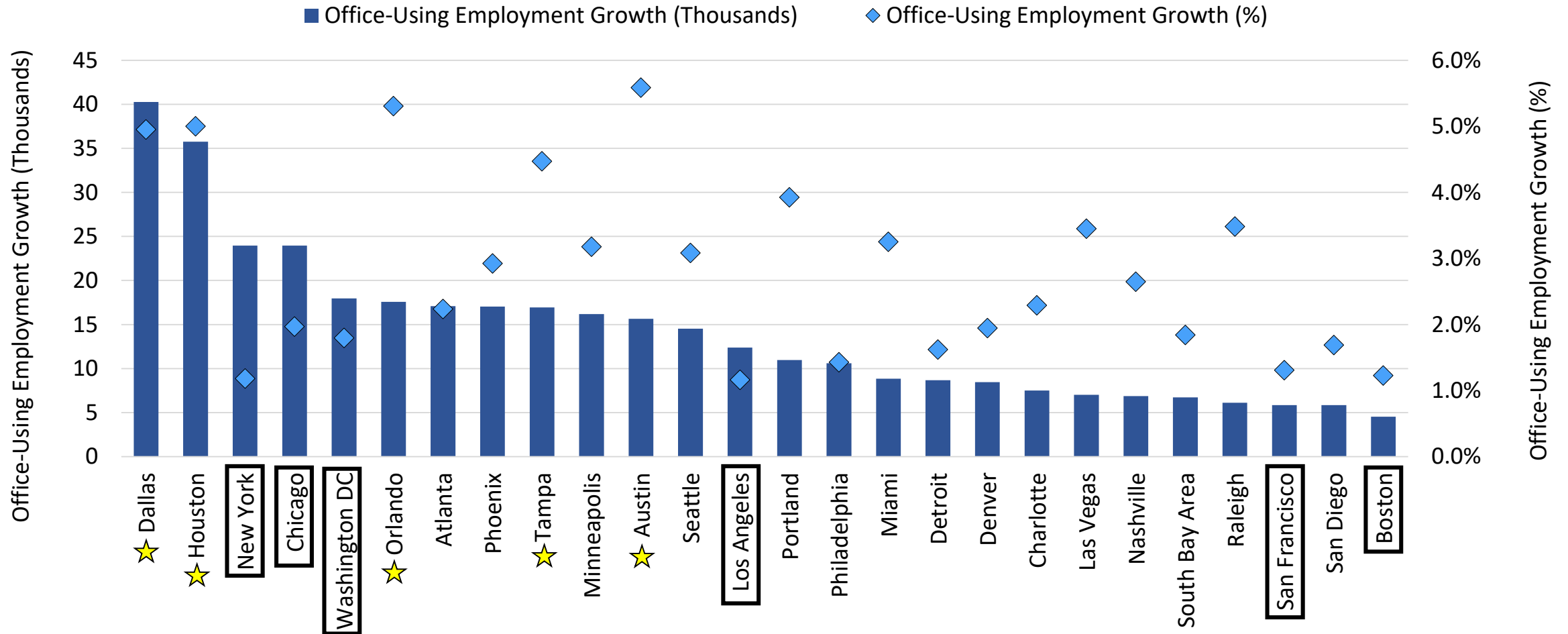


# Immigration is Key to Gateway Population Growth



# Tech Hub Cities Will Benefit the Most Moving Forward

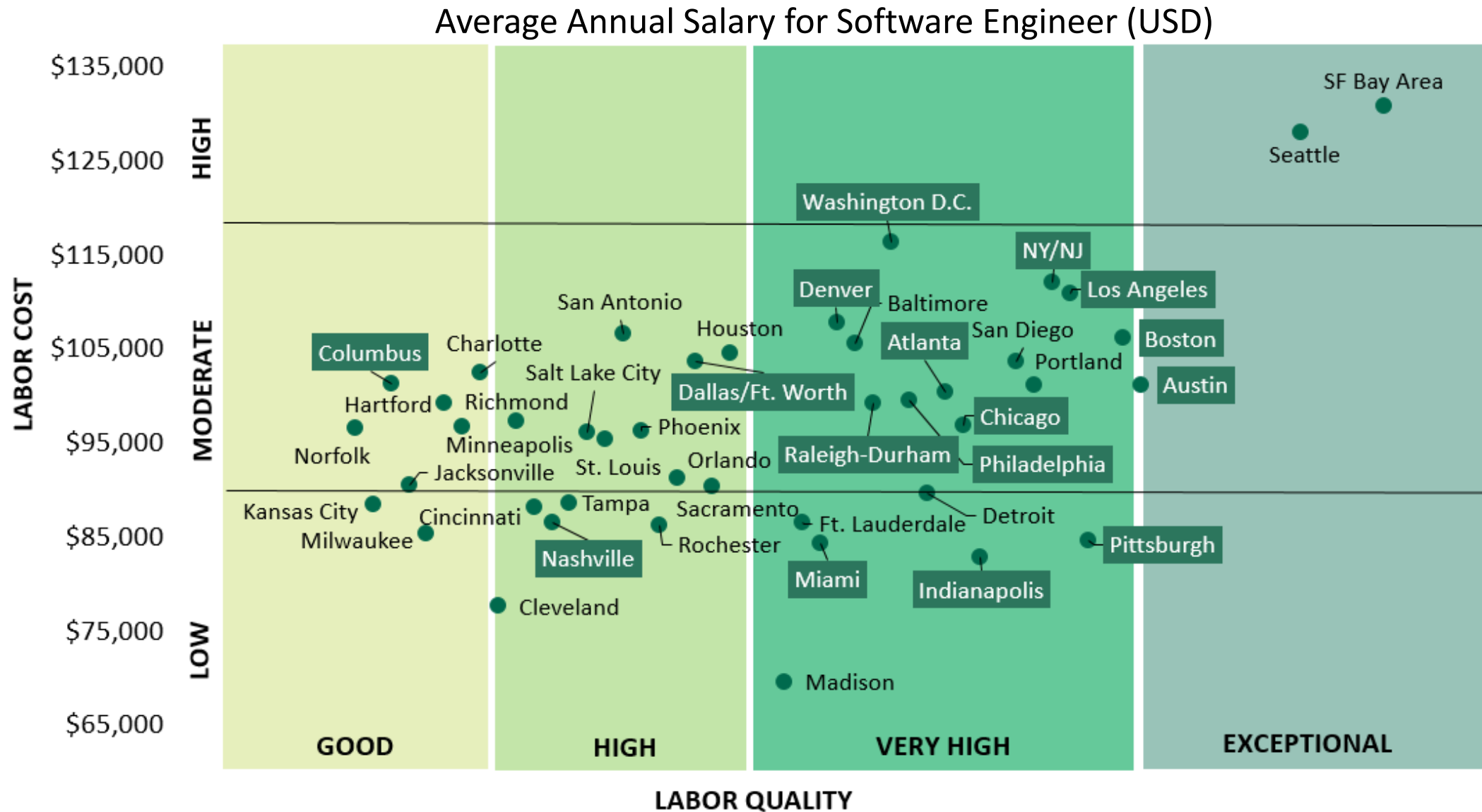
Office-Using Employment Growth Next Two Years  
Q3 2018 - Q3 2020 (Forecast)



\* ★ indicates markets with office-using employment expected to surge upwards of 4.0% by 2019

Source: Moody's Analytics; Bureau of Labor Statistics (BLS); Yardi® Matrix

# Tech Talent Quality vs. Cost Analysis



\*Boxed markets are part of the Amazon 20 finalists

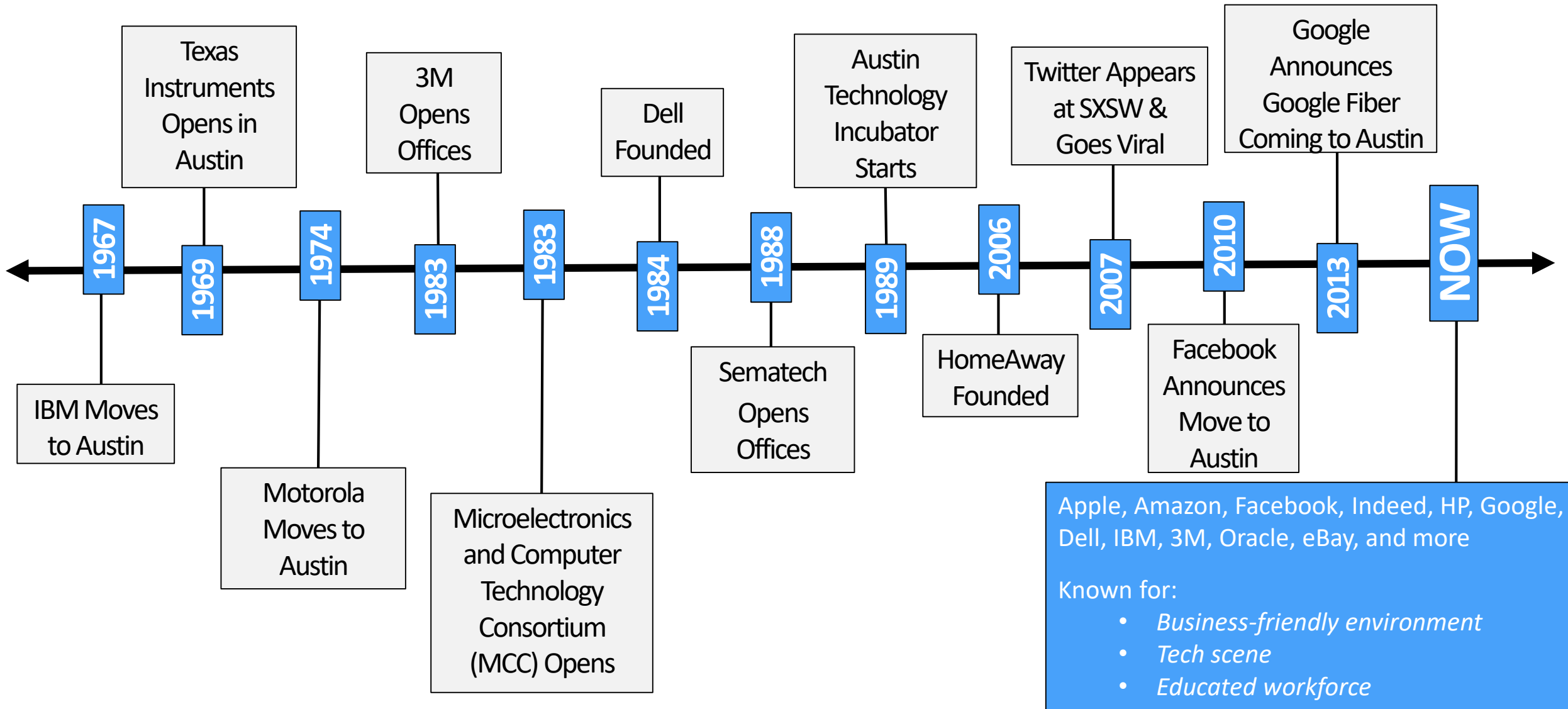
Source: CBRE Research, 2018; CBRE Labor Analytics; U.S. Bureau of Labor Statistics (BLS); Statistics Canada, April 2018; U.S. News & World Report

# Tech Talent Quality vs. Cost Analysis

	GOOD	HIGH	VERY HIGH	EXCEPTIONAL
HIGH COST				<ul style="list-style-type: none"> <li>Seattle</li> <li>San Francisco/Bay Area</li> </ul>
MODERATE COST	<ul style="list-style-type: none"> <li>Minneapolis</li> <li>Charlotte</li> <li>Richmond</li> <li>Hartford</li> <li>Jacksonville</li> <li>Columbus</li> <li>Norfolk</li> </ul>	<ul style="list-style-type: none"> <li>Houston</li> <li>Sacramento</li> <li>Dallas/Ft. Worth</li> <li>Orlando</li> <li>Phoenix</li> <li>San Antonio</li> <li>St. Louis</li> </ul>	<ul style="list-style-type: none"> <li>Salt Lake City</li> <li>Austin</li> <li>Boston</li> <li>Los Angeles</li> <li>NY/NJ</li> <li>Portland</li> <li>San Diego</li> <li>Chicago</li> <li>Atlanta</li> </ul>	<ul style="list-style-type: none"> <li>Philadelphia</li> <li>Washington D.C.</li> <li>Raleigh-Durham</li> <li>Baltimore</li> <li>Denver</li> </ul>
LOW COST	<ul style="list-style-type: none"> <li>Cleveland</li> <li>Milwaukee</li> <li>Kansas City</li> </ul>	<ul style="list-style-type: none"> <li>Rochester</li> <li>Tampa</li> <li>Nashville</li> <li>Cincinnati</li> </ul>	<ul style="list-style-type: none"> <li>Pittsburgh</li> <li>Indianapolis</li> <li>Detroit</li> <li>Miami</li> <li>Ft. Lauderdale</li> <li>Madison</li> </ul>	<div style="border: 1px solid black; padding: 5px;"> <p>*Blue markets are part of the Amazon 20 finalists</p> </div>

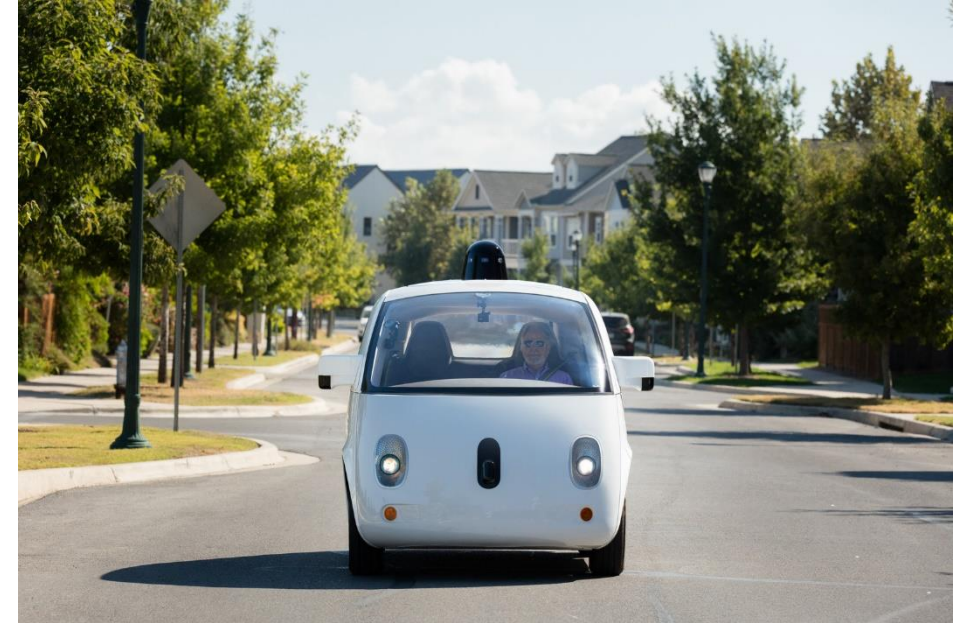


# Timeline for Austin Shows Tech Development Takes Time



# Phoenix, AZ

- Arizona's promise to keep the driverless car industry free of regulations has attracted many companies:
  - Waymo, Uber, Lyft, General Motors, Intel...
  - Phoenix residents are test-riding Waymo's vehicles as passengers
  - Waymo has self-driven more than 5 million miles across all locations since 2009
  - Uber's self-driving trucks are conducting regular freight halls in AZ through the Uber Freight network
- Advanced Manufacturing
  - Industry leaders manufacturing in Phoenix– Intel, Microchip, Freescale Semiconductor, Honeywell, JDA Software, and Frito Lay
  - Since 1979, Intel has invested more than \$20 billion in Arizona to develop advanced high-tech manufacturing capacity
  - Intel announced a \$7 billion expansion slated to bring 3,000 new jobs to Phoenix



# Orlando, FL

## Lake Nona

- 17 square mile master-planned community – one of the country’s fastest growing
- More than 12,000 residents and more than 10 million sq. ft. of residential and commercial facilities
- Health and life sciences cluster
- Lake Nona Town Center
  - 3.8 million sq. ft. campus
  - 80,000 sq. ft. of retail, restaurant, and entertainment

## Johnson & Johnson

- \$18 million expansion of its existing 17,000 sq. ft. development and training center
- New regional headquarters
- Create 25 position by Dec 31 2020 that pay an average annual wage of \$100,000



# What Helps a City Reach its Critical Point to Succeed?

*All existing tech markets have these characteristics to some degree*

Public and Private Partnerships

Friendly Business Environment

Community and Amenities that Retain and Draw in Talent

Educated Workforce

# What's Going on in Columbus?

## Public and Private Partnerships

- Many public and private entities partnered for massive development along both sides of the Scioto River
  - Columbus Downtown Development Corporation (CDDC), Columbus Center of Science and Industry (COSI), State of Ohio, civic and community leaders
- Public and private entities are also teaming to revitalize the previously struggling Milo-Grogan area

## Community and Amenities that Retain and Draw in Talent

- Open parks, walkways and bike paths, restaurants, museums, a band shell, fountain, carousel, etc. along both sides of the Scioto River
- Development of an 18-hour mixed-use district, with 1,700 residential units, 800,000 sq. ft. of office, 150,000 sq. ft. of restaurant and retail space, and a 150-room boutique hotel

## Friendly Business Environment

**STATE RANK – #14**

- State and city tax credits and incentive packages encouraging retention and expansion of companies in the Columbus area, including Koorsen Fire & Security (25 jobs), Matic Insurance Services (50 jobs), Accenture plc (200 jobs)

## Educated Workforce

University	Approx. Enrollment 2017
Ohio State University	66,444
Ohio University	29,712
Miami University	19,452
Kent State University	28,972
University of Dayton	10,803

# What's Going on in Columbus?

- Accenture Plc named Columbus one of 14 U.S. innovation hubs for the global IT consulting firm
  - Adding 200 jobs by end of 2020
- Koorsen Fire & Security
  - Adding 14,000 sq. ft., 25 jobs, and \$1 million to payroll
  - Ohio Tax Credit Authority approved a 0.991%, five-year tax credit
- Matic Insurance Services Inc.
  - \$400,000 expansion of call center into administrative office – 50 new jobs by 2020
  - Utilizing state and city incentive packages
- JP Morgan Chase, Honda, Huntington Bank – large employers
- Milo-Grogan area near downtown is emerging thanks manufacturing hub
  - Public-private partnership transforming the neighborhood
  - New housing, improved infrastructure and neighborhood, job training and employment resources
- Development along the Scioto River
  - Accessible urban amenity for Downtown's residents, professionals and visitors
  - Center of Science and Industry and National Veterans Memorial and Museum
  - Scioto Peninsula Park and Garage – 6.5-acre park and 600-space underground parking garage
  - 18-Hour Mixed-Use District
    - Planned 1,700 residential units, 800,000 sq. ft. of office, 150,000 sq. ft. of restaurant and retail, hotel
  - Franklinton – multimillion-dollar housing, retail and office developments in the works
  - Scioto Mile
    - Reconnected downtown to the Scioto River with parks, boulevards, bikeways, and pedestrian paths
    - John W. Galbreath Bicentennial Park – 15,000 sq. ft. fountain, band shell, restaurants
    - Scioto Greenways – 33 acres of new urban greenspace
    - Columbus Commons – 6 acre park: gardens, performance stage, carousel, outdoor reading room, NEOS play system, Bocce ball courts, two cafes

## Average Rent Compared to Nearest Gateway Cities

Market	Avg. Rent – Sept 2018
<b>Columbus</b>	<b>\$951</b>
Chicago	\$1,502
Washington DC	\$1,762



**7,576,592** passengers flew in and out of John Glenn Columbus International Airport in 2017

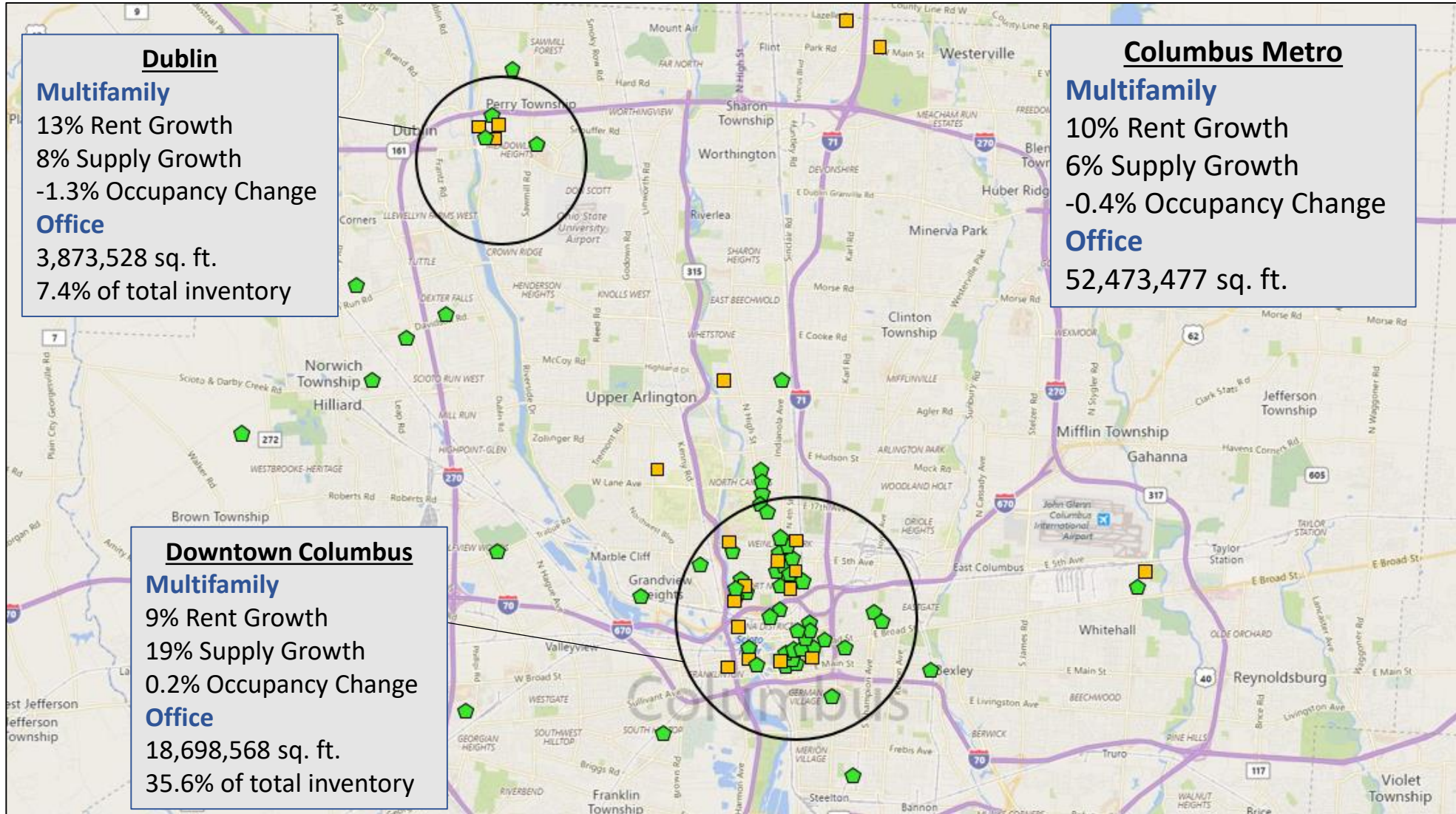
**79,828,183** passengers flew in and out of O'Hare International Airport in 2017

**23,928,248** passengers flew in and out of Ronald Reagan Washington National Airport in 2017

35 multifamily transactions valued at \$393 million in 2017



# Columbus Intellectual Capital Nodes



■ Office Development

◆ Multifamily Development

\* Multifamily rent and occupancy growth based on Sept 2016 through Sept 2018

\* Office inventory as of Sept 2018

Source: Yardi® Matrix

# What's Going on in Indianapolis?

## Public and Private Partnerships

- Many public and private entities partnered for the creation of the 16 Tech Innovation Community
  - Planned 60-acre site slated to become a biotech hub
  - Various industry, government, philanthropic, nonprofit, and university partners

## Friendly Business Environment

**STATE RANK – #10**

- Indiana Economic Development Corporation
  - Offers many business tax incentives, corporate tax credits and economic development programs
  - Very competitive business tax structure
  - Tax credits and training grants promoting growth for Aggressively Organic (200 jobs), BrainForest (185 jobs), along with various others

## Community and Amenities that Retain and Draw in Talent

- 16 Tech Innovation Community will be a live, work, play community supporting quality of life
  - Parks, restaurants, retail, art, offices, apartments and hotels
- Home of the NCAA, Super Bowl champions, Indy 500, Indiana Pacers, world class symphony

## Educated Workforce

University	Approx. Enrollment 2017
Butler University	5,022
University of Indianapolis	5,500
Indiana University School of Medicine	1,400
Indiana University-Purdue University Indianapolis	29,790
Indiana University	49,695
Purdue University	41,573



# What's Going on in Indianapolis?

- GEICO adding 1,400+ new jobs, including hundreds of IT professionals
  - Quadrupled workforce since 2013
- \$259 million FedEx distribution center adding 450 jobs
- Tech and health care expanding
  - Indiana University Health planning \$83 million expansion of hospital
  - New \$50 million hospital and new health-care facility, multiple new centers being planned
  - Large tech presence – Salesforce and InfoSys
- 16 Tech Community
  - 24-hour live, work, play and learn environment
  - Coworking and makerspace, offices and labs, apartments, hotels, restaurants, retail
  - Connected by 15 acres of green space with parks, walking and biking trails, and access to waterways
  - First phase of construction:
    - 120,000 sq. ft. innovation community hub
    - 250-unit apartment complex
    - Office and warehouse renovation
    - New Class A office building and research space
    - Food, beverage and retail space
    - Bridge connecting with Indiana University-Purdue University Indianapolis (IUPUI), IU School of Medicine and hospital campuses
    - Pedestrian and cycling path
    - Public art and central green space

## Average Rent Compared to Nearest Gateway City

Market	Avg. Rent – Sept 2018
Indianapolis	\$897
Chicago	\$1,502



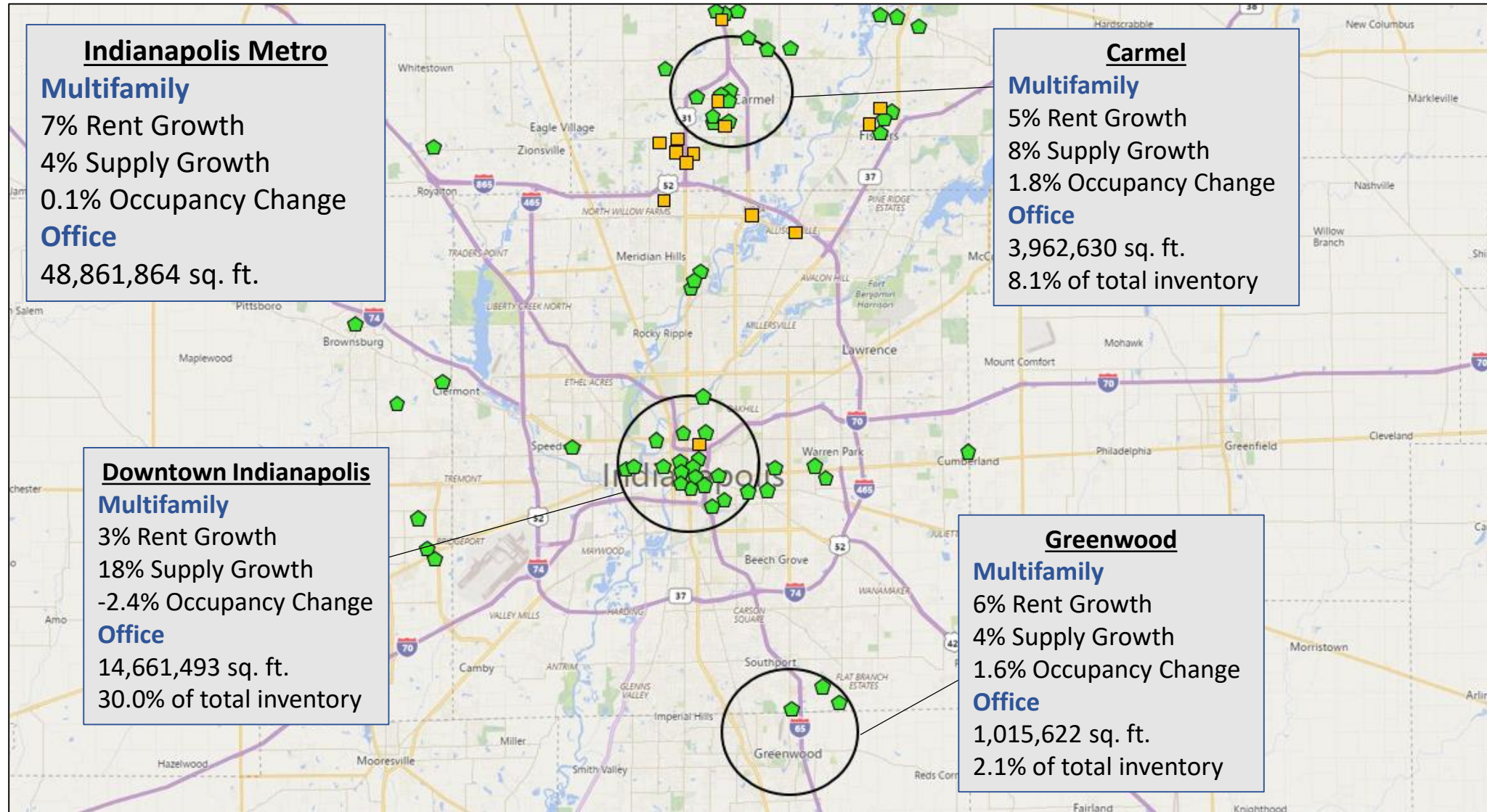
**8,511,959** passengers flew in and out of Indianapolis International Airport in 2017

**79,828,183** passengers flew in and out of O'Hare International Airport in 2017

51 multifamily transactions valued at \$590 million in 2017



# Indianapolis Intellectual Capital Nodes



■ Office Development

◆ Multifamily Development

\* Multifamily rent and occupancy growth based on Sept 2016 through Sept 2018

\* Office inventory as of Sept 2018

Source: Yardi® Matrix

# What's Going on in Pittsburgh?

## Public and Private Partnerships

- City, regional, and State institutions partnered to create the Pittsburgh Technology Center, a high-tech hub in the city
- The Allegheny Conference brings together public and private sector leaders to improve the economic future and quality of life in Pittsburgh
- Innovate PGH built to accelerate city's status as a central hub for innovation and technology – City of Pittsburgh, Carnegie Mellon, University of Pittsburgh, UPMC, etc.

## Community and Amenities that Retain and Draw in Talent

- The Strip District is a nationally-known and thriving neighborhood filled with residents, workers, visitors and tourists
  - Offers shopping, living, working and recreational experiences, easily accessible by mass transit
- East Liberty and Lawrenceville neighborhoods emerging, attracting artists, entrepreneurs, tech offices, restaurants

## Friendly Business Environment

**STATE RANK #27**

- The State of Pennsylvania is not very business friendly
- Pittsburgh Regional Alliance (PRA) offers services to companies looking to locate or expand in Pittsburgh
  - Site selection, market research, international business support, funding and incentives solutions, workforce attraction and retention resources, connections to industry leaders

## Educated Workforce

University	Approx. Enrollment 2017
University of Pittsburgh	28,642
Carnegie Mellon University	14,528
Duquesne University	8,717
Chatham University	2,269
Point Park University	901

# What's Going on in Pittsburgh?

- Uber's Advanced Technologies Group testing self-driving cars is based in Pittsburgh
- Recent arrivals/expansions of Google, Uber, Amazon underpin the growing tech presence
- Amazon expanding existing office by 22,000 sq. ft. and 125 new tech jobs
- The Strip District
  - Plans to convert 100 year old railroad loading dock into retail, restaurants and pedestrian passages
  - Mixed-use development that will include small and local businesses
  - Land across the street also purchased with plans to invest \$50 million for office conversion
- City is slowly losing residents, but according to the Pittsburgh Downtown Partnership, greater downtown's population expanded by 22% between 2010 and 2016
- CSX wrapping up its \$850 million rail terminal
- Shell's \$6 billion plant expected for completion in 2020
- Eight new hospitals with a collective price tag of \$2.7 billion underway or close to breaking ground
- \$750 million, multi-phase redevelopment of the former Civic Center arena
  - Could bring 1,000 residential units, and office/retail
- Technology Center
  - Office park on 48-acre site, academic, tech, and innovation hub
  - Partnership of several city, regional, and State institutions Home to many high-tech buildings
  - Deal in place to build six-story, 155,932 sq. ft. office building
  - Pittsburgh Technology Council
    - Assists tech companies with business development, talent retention, government relations and visibility services
    - Helps companies at all growth stages build new business, connect to capital, grow a workforce and make headlines

## Average Rent Compared to Nearest Gateway Cities

Market	Avg. Rent – Sept 2018
<b>Pittsburgh</b>	<b>\$1,103</b>
Washington DC	\$1,762
New York	\$3,779

**8,988,016** passengers flew in and out of Pittsburgh International Airport in 2017

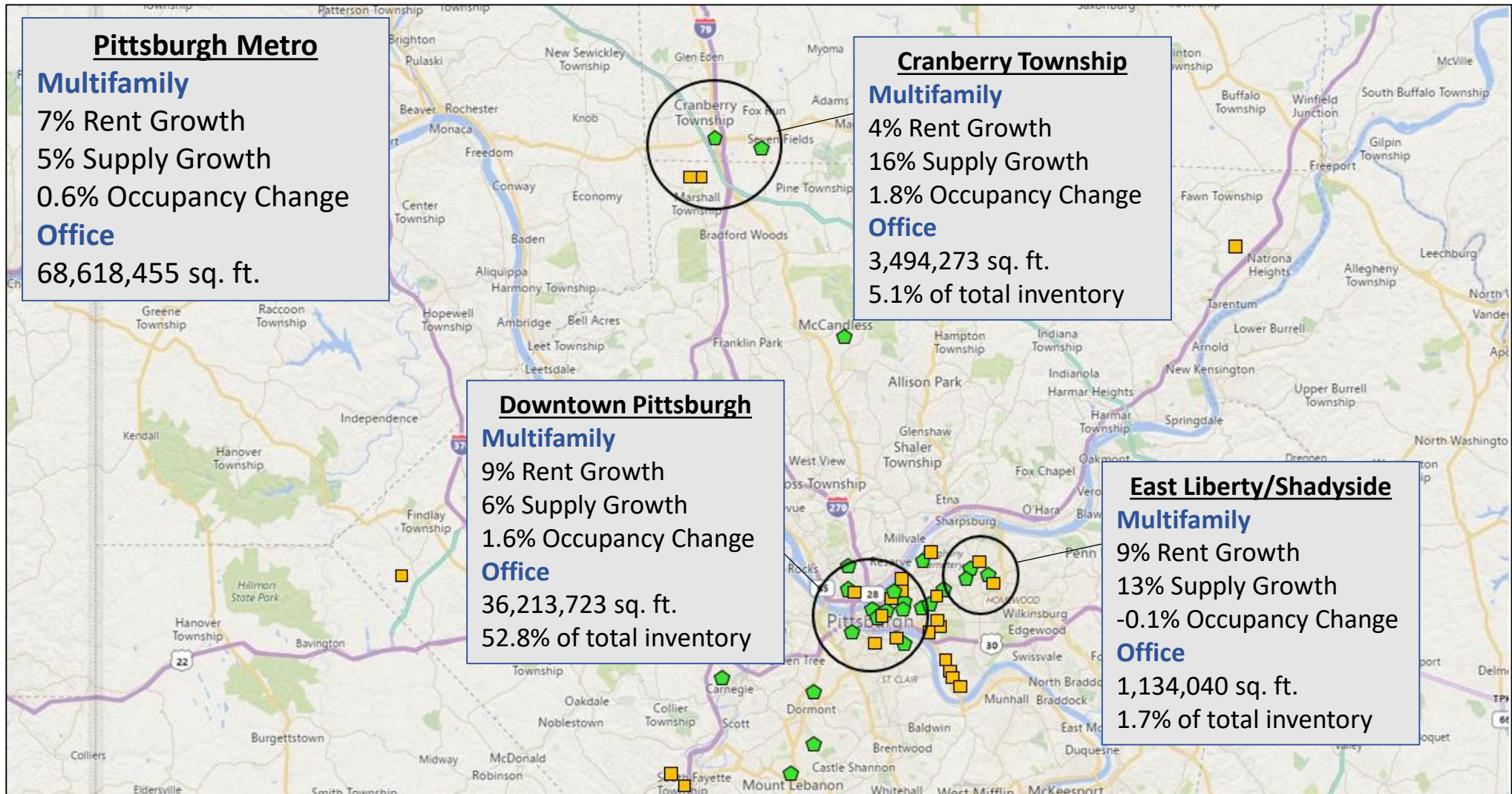
**23,928,248** passengers flew in and out of Ronald Reagan Washington National Airport in 2017

**59,345,421** passengers flew in and out of John F. Kennedy International Airport in 2017

12 multifamily transactions valued at \$107 million in 2017



# Pittsburgh Intellectual Capital Nodes



■ Office Development

◆ Multifamily Development

\* Multifamily rent and occupancy growth based on Sept 2016 through Sept 2018

\* Office inventory as of Sept 2018

Source: Yardi® Matrix

# What's Going on in Philadelphia?

## Public and Private Partnerships

- 30th Street Station District – Amtrack, Brandywine Realty Trust, Drexel University, PennDOT, SEPTA and SOM
- Schuylkill Yards – Brandywine Realty Trust, Drexel University, the City of Philadelphia, etc.
- Schuylkill River Development Corporation – many city, state, private foundations and organizations teaming up to maximize the potential of the Schuylkill Banks

## Community and Amenities that Retain and Draw in Talent

- Schuylkill Yards – innovation community
  - Connected to city's economic and education centers
  - Office, residential, retail, hotel, lab space, innovation space, improved greenspace and streetscape
  - Restaurants, bars and storefronts
- Schuylkill Banks – construction, programming, and maintenance of a continuous 8-mile riverfront trail and greenway with associated access points and amenities along the Banks

## Friendly Business Environment

**STATE RANK #27**

- The State of Pennsylvania is not very business friendly
- Schuylkill Yards & Keystone Opportunity Zone, giving residents and businesses various state and city tax benefits that will further stimulate investment and growth
- Aramark received significant state incentives – some reported \$20.5 million – to keep World Headquarters in city, bringing ~1,200 employees to the new office

## Educated Workforce

University	Approx. Enrollment 2017
Drexel University	24,190
University of Pennsylvania	21,599
Temple University	40,240
Penn Medicine	595
The University of the Sciences	2,664
Lincoln University	2,266

# What's Going on in Philadelphia?

Average Rent Compared to Nearest Gateway Cities	
Market	Avg. Rent – Sept 2018
Philadelphia	\$1,322
Washington DC	\$1,762
New York	\$3,779



**29,585,754** passengers flew in and out of Philadelphia International Airport in 2017

**23,928,248** passengers flew in and out of Ronald Reagan Washington National Airport in 2017

**59,345,421** passengers flew in and out of John F. Kennedy International Airport in 2017

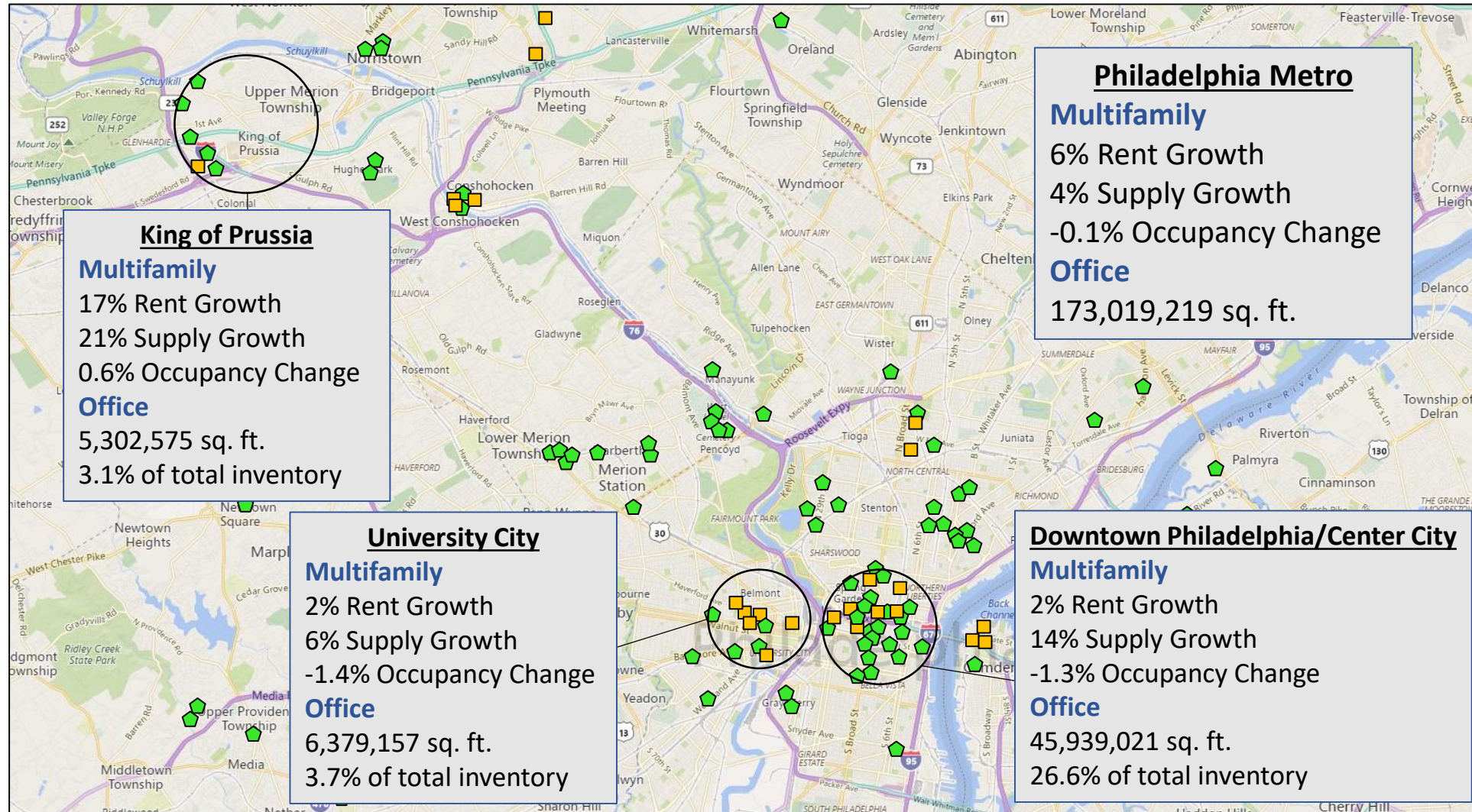
43 multifamily transactions valued at \$1.2 billion in 2017

- Comcast Technology Center
  - \$1.5 billion, 60-story, 1,121 sq. ft. tower, next to current world headquarters
  - Host technologists, engineers and software architects, a media center and startup incubator
- Presidential City
  - High-rise community currently under redevelopment, 1,000+ units coming online this year
- Entercom Communications Corp.
  - Nation's #2 radio station group owner
  - Planning to relocate corporate headquarters to building on Schuylkill waterfront
- Aramark
  - \$15 billion, Fortune 200 global leader in food, facilities management and uniforms
  - Planning to relocate world headquarters to Schuylkill waterfront, 1,200+ new employees
- Home prices increasingly rapidly- some young professionals being priced out
  - Discussion of law requiring property developers to set aside 10% of new projects as below-market units
- Schuylkill Yards
  - Innovation community – connection to economic and education centers
  - Knowledge neighborhood, leveraging the R&D resources of:
    - Drexel University, University of Pennsylvania, Penn Medicine, Children's Hospital of Philadelphia, University of the Sciences, Lincoln University, Science Center, Wistar Institute
  - Potential to add 25,000 new jobs and create millions of dollars in new tax revenue
  - Encourages human interaction – walking, meeting, shared experiences, collaboration
  - Fully engaged ecosystem – physical spaces become the framework to accelerate creativity, academic research, and commerce

- SCHUYLKILL YARDS**
- 14 acres of land
  - 6.5M sq. ft. greenspace
  - 987K sq. ft. innovation space
  - 2.8 M sq. ft. office
  - 1M sq. ft. lab
  - 1.6 M sq. ft. residential
  - 247K hotel
  - 132K retail



# Philadelphia Intellectual Capital Nodes



■ Office Development

◆ Multifamily Development

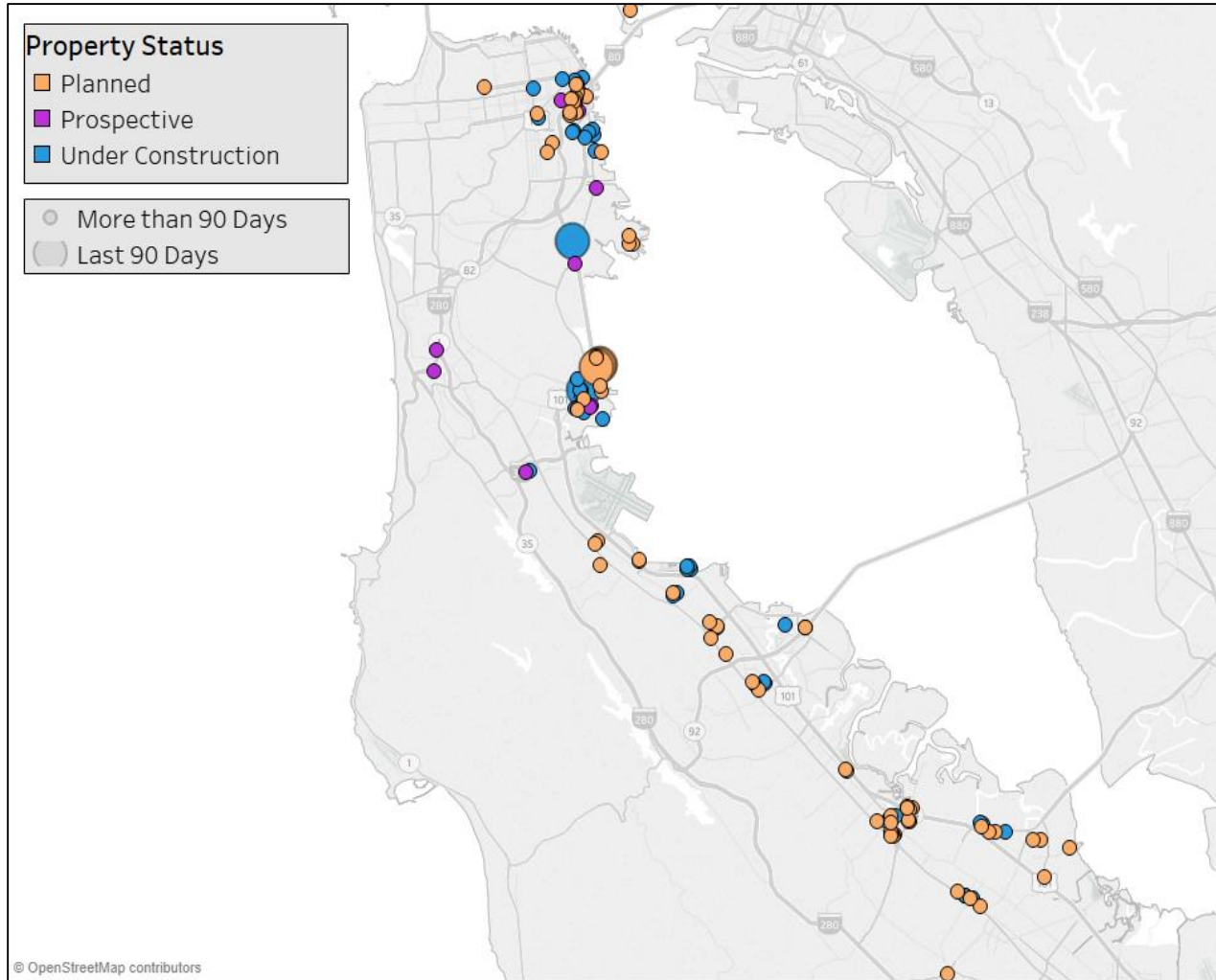
\* Multifamily rent and occupancy growth based on Sept 2016 through Sept 2018

\* Office inventory as of Sept 2018

Source: Yardi® Matrix

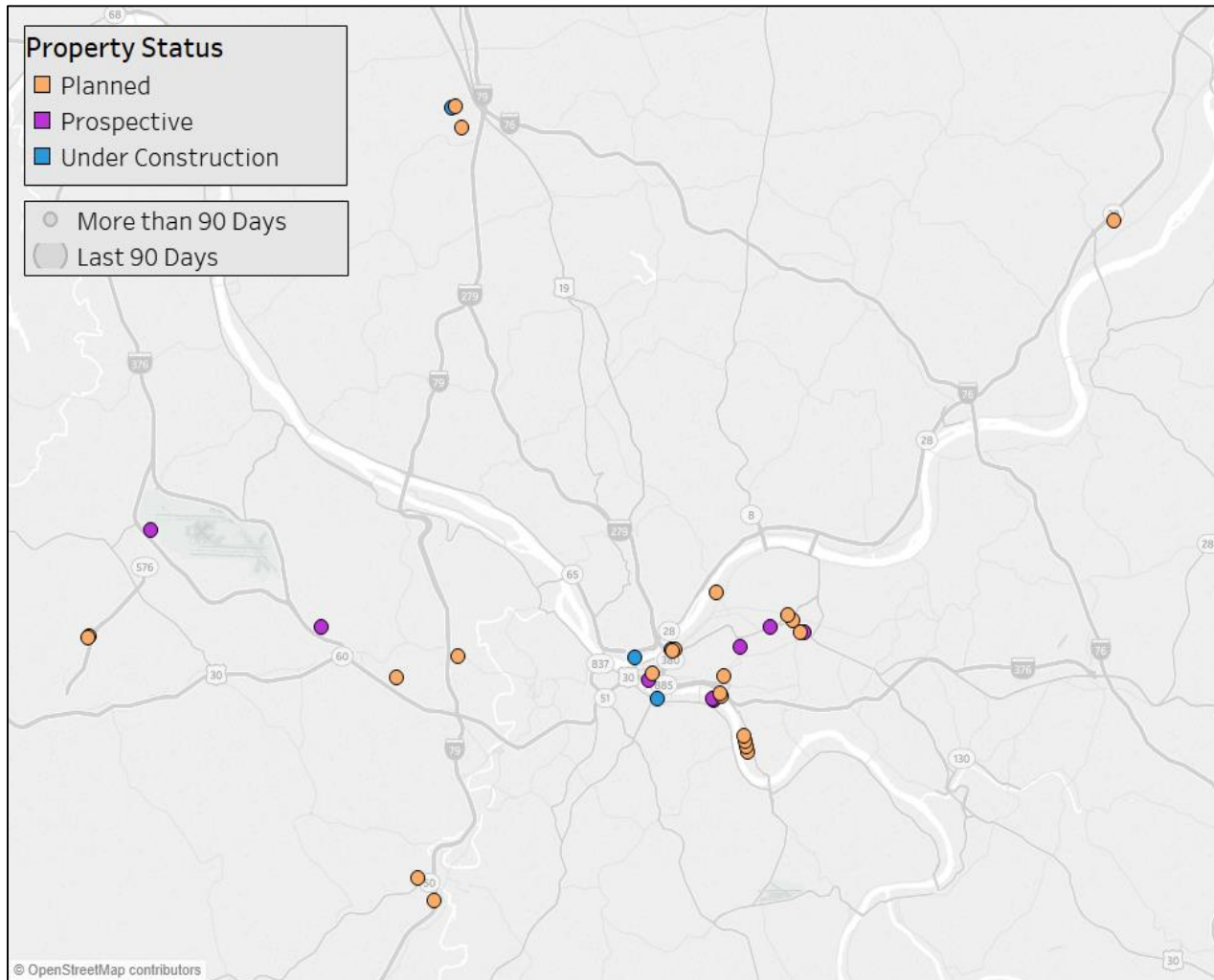


# San Francisco Has a Heavy Development Pipeline, but Opportunities Exist Outside of the Urban Core



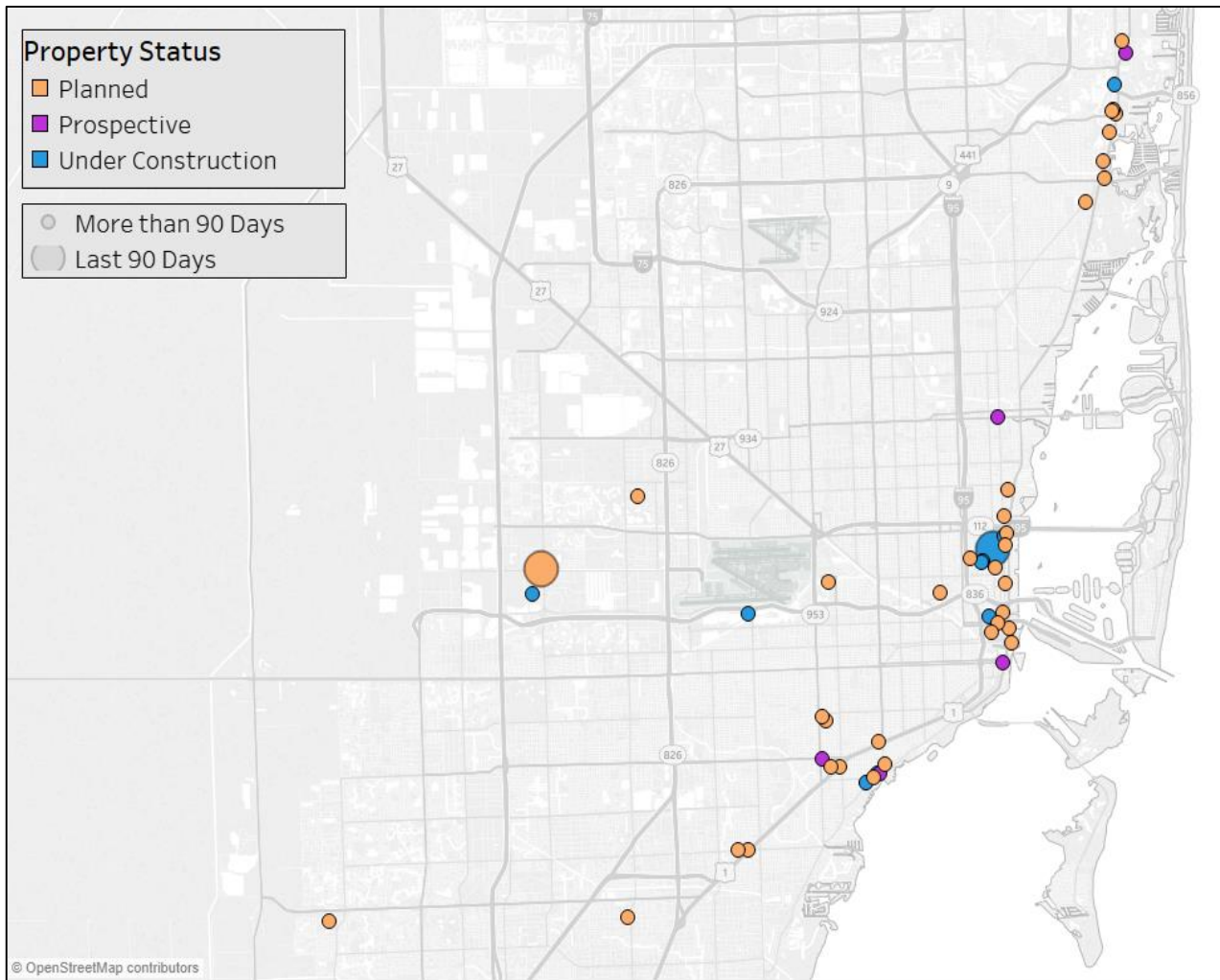
Top 5 Submarkets: Under Construction, Planned and Prospective	# of Projects	% of Total
San Francisco - SOMA	20	14.2%
Redwood City	17	12.1%
Menlo Park	17	12.1%
South San Francisco	16	11.3%
Burlingame	10	7.1%

# Pittsburgh Development Pipeline



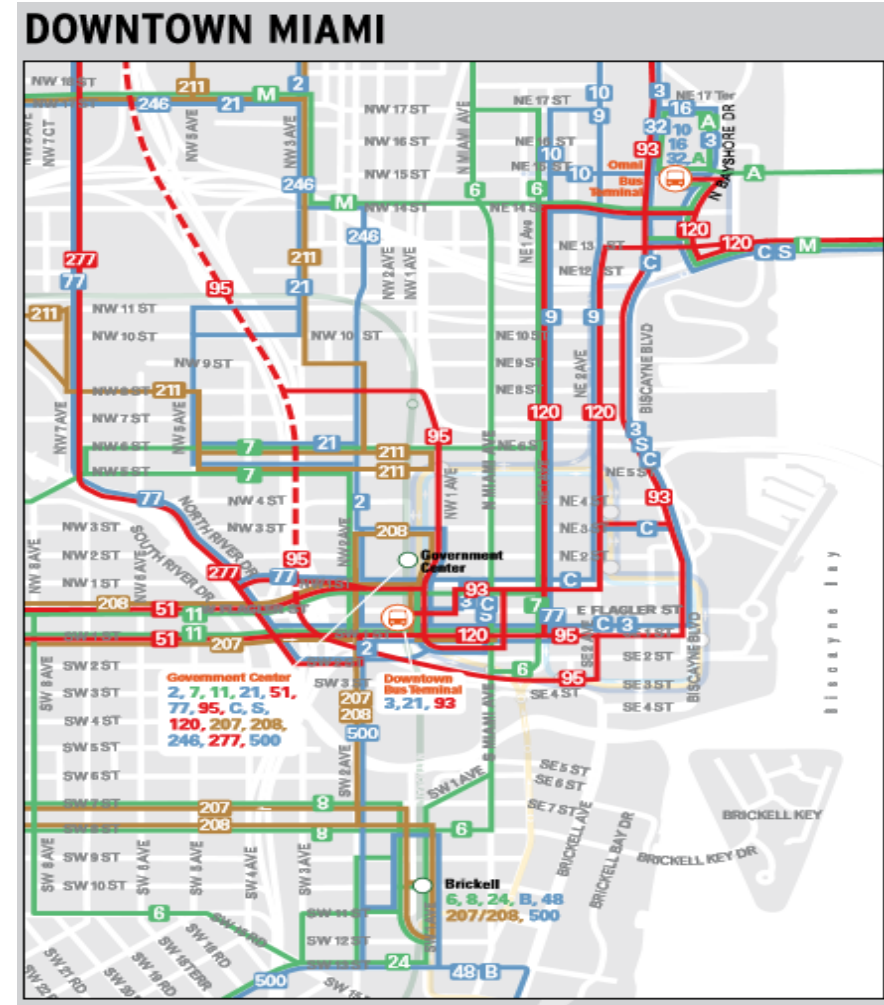
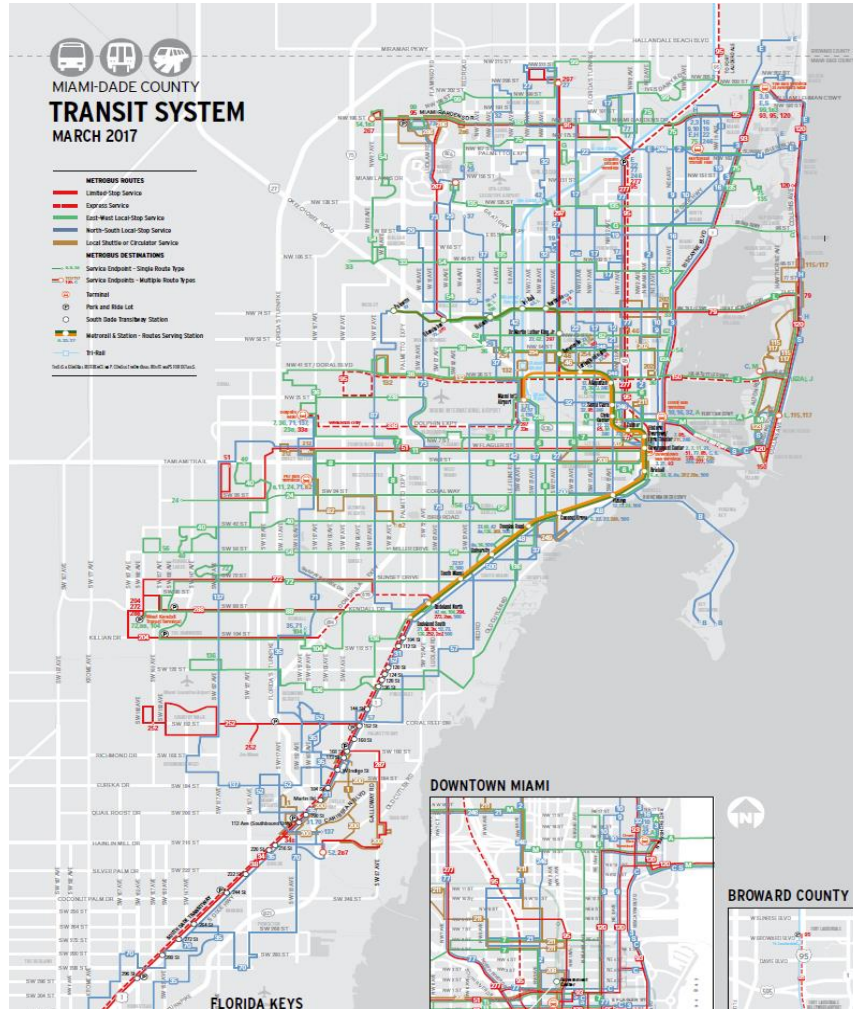
Top 5 Submarkets: Under Construction, Planned and Prospective	# of Projects	% of Total
South Side - Technology Drive	8	22.9%
Oakland	8	22.9%
Greater Downtown	5	14.3%
Cranberry	3	8.6%
Parkway West	3	8.6%

# Miami Development Pipeline

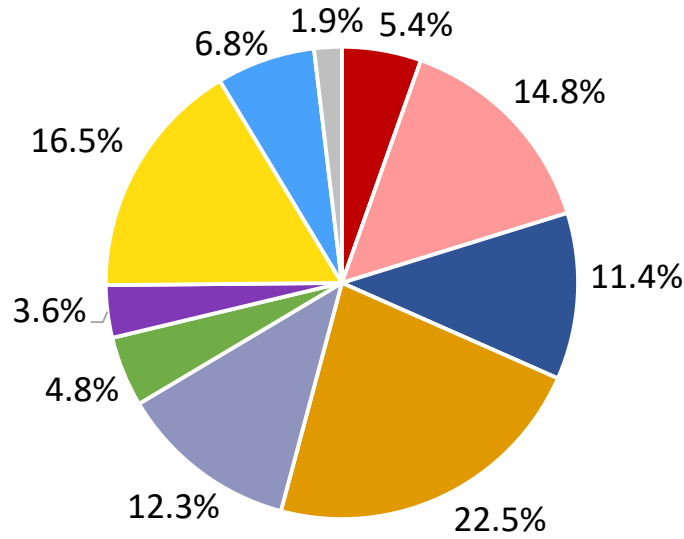


Top 5 Submarkets: Under Construction, Planned and Prospective	# of Projects	% of Total
Miami North	13	26.0%
Aventura	9	18.0%
Miami CBD	7	14.0%
Miami Coconut Grove	6	12.0%
Airport West	3	6.0%

# Miami Transportation Maps

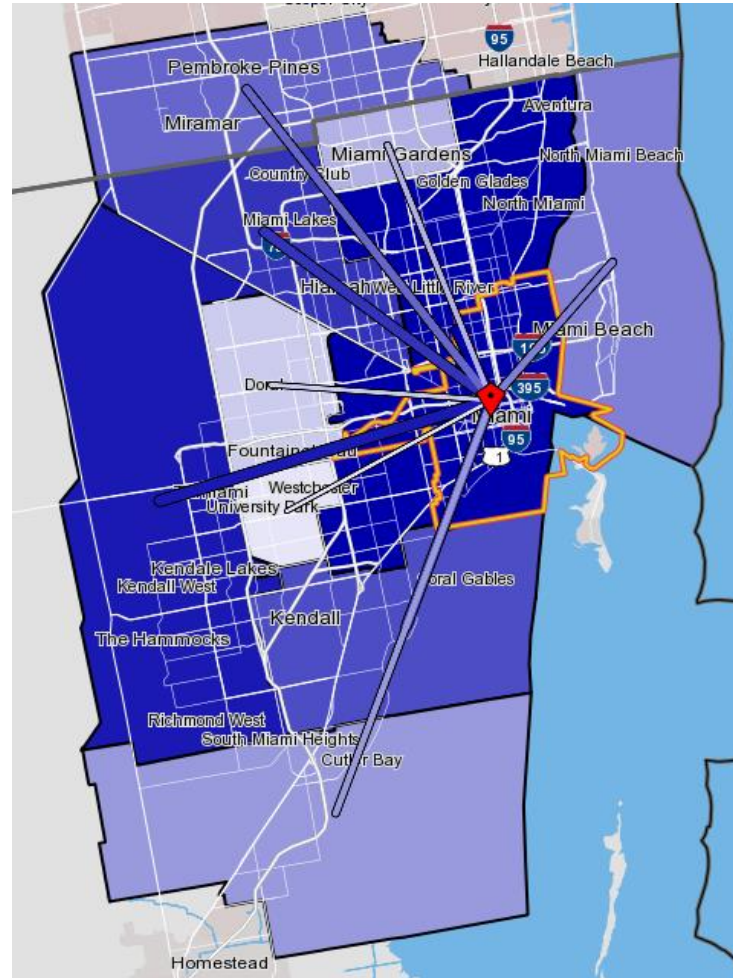


# Miami Employment and Transportation



- Mining, Logging, Construction
- Education And Health Services
- Government
- Trade, Transportation, Utilities
- Leisure and Hospitality
- Other Services
- Manufacturing
- Professional and Business Services
- Financial Activities
- Information

Blue areas are the top 10 county subdivisions where Miami workers live



The majority of Miami workers live in the closest surrounding county subdivisions, likely since commute times are long

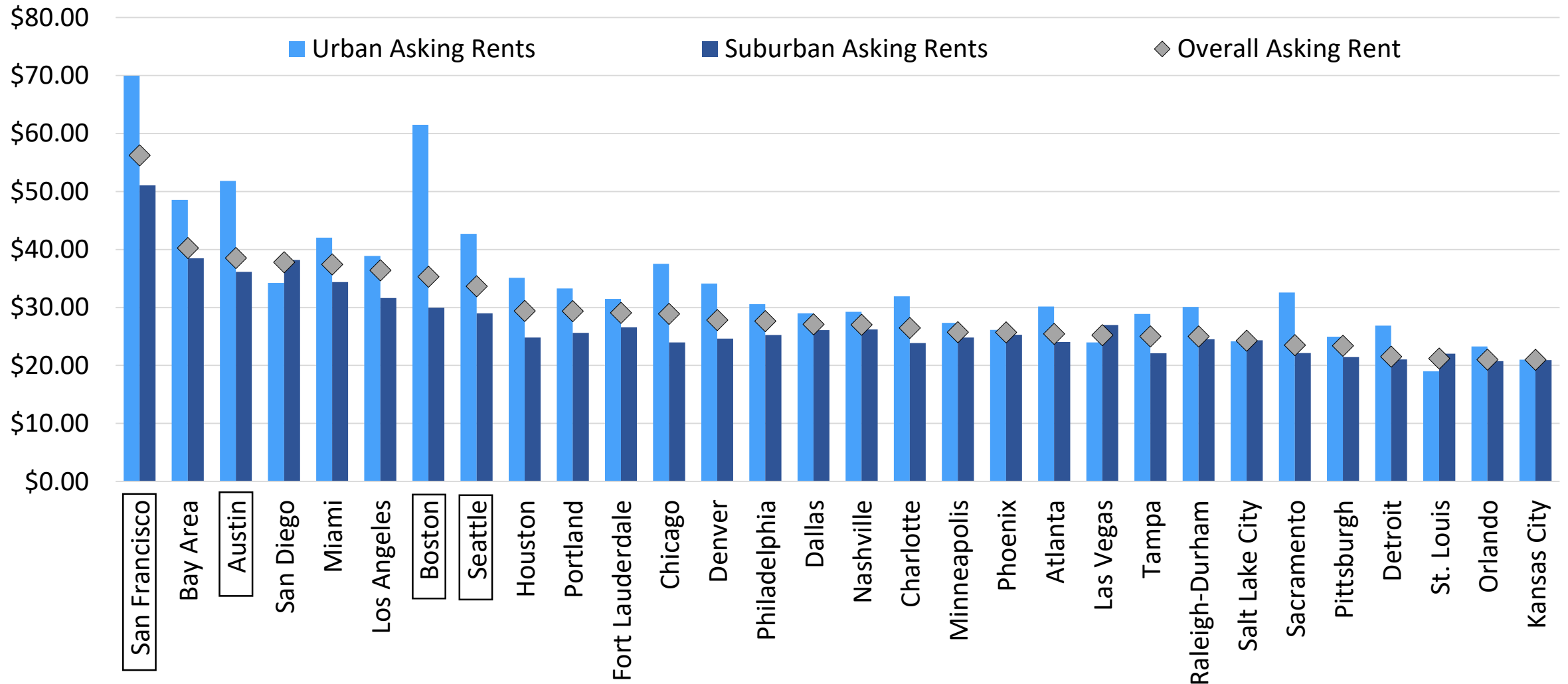


Area accessible in one hour at

4 p.m. 7 p.m. 10 p.m.

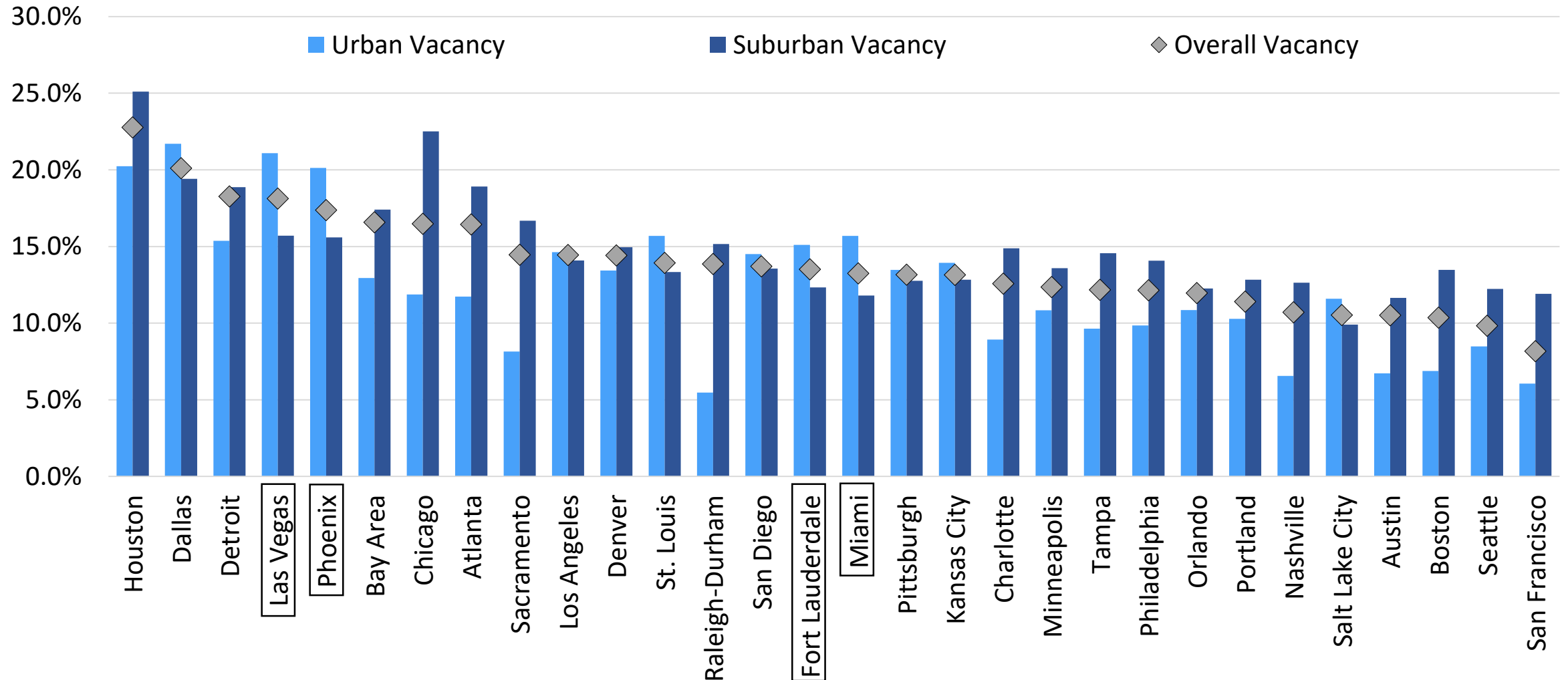
\*Map based on 2014 data; Employment based on Sept 2018 data

# Some Markets Have a Big Spread Between Urban and Suburban Rents



\*Data as of September 2018  
Source: Yardi®Matrix

# Urban Vacancy is Lower Than Suburban with Some Notable Exceptions



# So What?

- The geography of jobs is shifting – employment growth is moving out of gateway cities into tech hub cities, and out of CBDs/urban cores into “urbanized suburbs” or intellectual capital nodes
- The longer the expansion, the more established the intellectual critical mass becomes
- Makes way for new investment themes – buying core assets as capital preservation, or buying and repurposing fringe assets as value appreciation
  - Urban core downtown = capital preservation
  - Urban secondary and suburban primary = capital appreciation
- As in Multifamily, it’s a sharpshooters game



# Technology Disruptors That Will Affect All Commercial Real Estate

# Technology's Impact on the Future of Real Estate

- Position where wealth is created and where the value of “place” will increase
- With a focus on live/work/play then “fulfill”/store

## Technologies

### Energy

- Batteries
- Solar

### Electric & Autonomous Vehicles

- Lithium-Ion Batteries
- LIDAR Sensors

### \*IoT/Sensors

- Smart Office & Smart Home
  - Amazon Echo
  - Nest Thermostat

### \*Artificial Intelligence/Robotics

- Drones
- Virtual Realty

## “Taken-for-Granted” Tablestakes

### Connectivity – Building Level

- 1G Connectivity, 40x High Speed
- Mobility
- Security

### Connectivity – WiFi

- 5G Connectivity required for IoT and AV – rolls out in 2020
- 4G rolled out in 2009

### Collaboration

- Mobile apps
- Connectivity and free-up trapped resources

\*Focus today on these two

# What is the Internet of Things?

- Network of physical objects that contain embedded technology to sense, communicate, and interact with the external environment
- Started with internet ➡ then mobile ➡ now internet of things
- **Industrial IoT and Consumer IoT**
  - Headlines on Consumer IoT...but Industrial IoT will get picked up faster
  - Intersection between Industrial IoT and Consumer IoT is **Multifamily**

*Certain decisions need to be made instantaneously at the “things” level before even making it to the cloud*

<b><u>The “Things”</u></b> Devices, machines, people, tools, cars, animals, clothes, toys, environment, buildings, etc.	<b><u>Stage 1</u></b> Sensors/Actuators  (Wired/Wireless)	<b><u>Stage 2</u></b> Internet Gateways, Access Points, DAQ, Control  (Data Aggregation, A/D, Measurement, Control)	<b><u>Stage 3</u></b> Edge IT  (Analytics, Pre- Processing)	<b><u>Stage 4</u></b> Data Center/Cloud  (Analytics, Management, Archive)
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Real Time

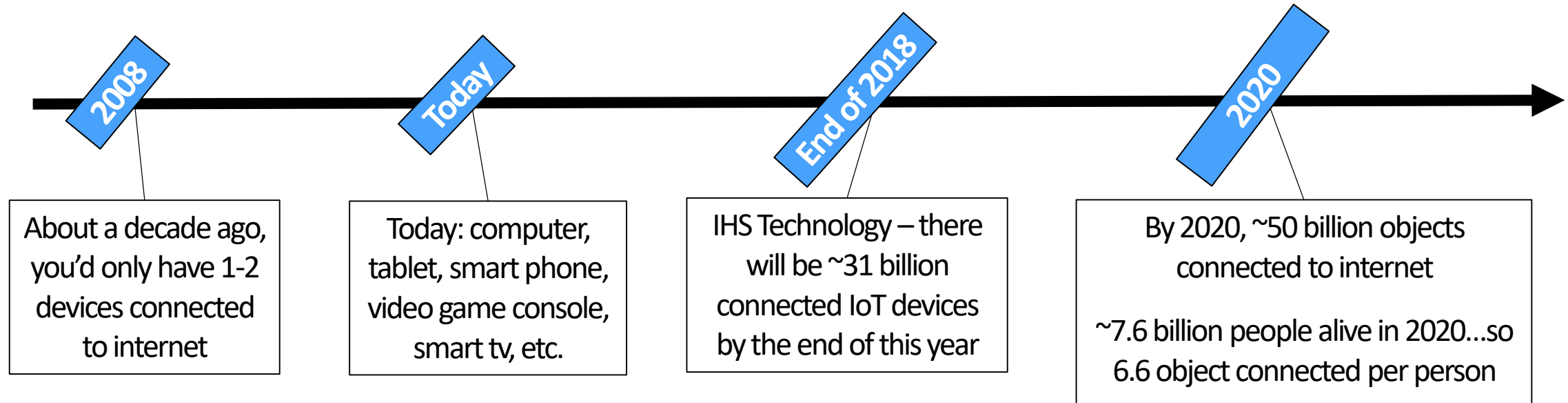
Early Life

In Motion

At Rest

Archived

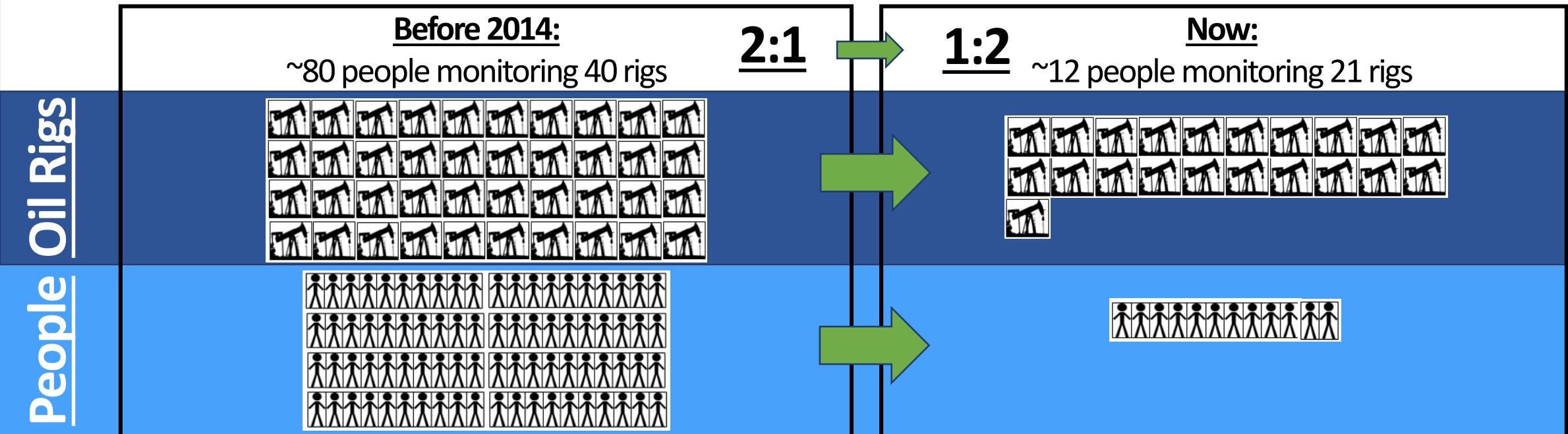
# Rapid Growth in IoT Devices Will Continue



- Each of BMW's self-driving cars logs 40 terabytes of data every day
  - 20 times the amount of information recorded by an Airbus A380 as it crosses the Atlantic
- With the rapid growth and adoption of IoT devices, there is even greater growth in data, computing power, storage, etc.
- The need for high-powered data centers will continue to explode

# Industrial IoT in “Digital Oil Fields”

- Industrial IoT being used to control oil drills and monitor the earth’s crust
- Underground tools capture data and small teams of technical analysts located remotely are replacing laborers
- Baker Hughes (GE Company) focused on recruiting high-tech workers, increasingly from Silicon Valley
- Devon Energy Wellcon Center Example:
  - Small team of engineers and scientists monitor every well the company is drilling and fracking in the U.S.
  - Drilling and construction **costs down**, but **production rates up**



# Commercial IoT in Everyday Objects – Intelligent Tires

## Sensors Measure:

Tire Pressure

Temperature

Axil Load

Tread Depth

Wheel Alignment

Road Conditions



Tire movement can generate energy to power sensors

**Goodyear** showcased the latest advances on its intelligent tire prototype at the 2018 Geneva International Motor Show

Complete tire information system includes tire, sensors and cloud-based algorithms that work together to communicate in real-time with fleet operators via mobile app

# Shelter, Transportation, and Energy Become Software Platforms...and They Will All Connect



- Everything within your home will eventually be connected to one platform
  - Example scenario:
  - Your house recognizes you and unlocks the front door
  - Your living room taps into a cloud-based profile of preferences like climate control, music, lighting
  - Your refrigerator tells you what is inside, makes recommendations for meals, and orders groceries



- Car will connect to manufacturer and dealer
- Manufacturer can use data to improve design, manufacturing process, and pinpoint common denominators if issues arise
- Car can use platform to order replacement parts, offer service appointment times to service the vehicle, and provide directions to the nearest dealer
  1. Streamlined inventory mgmt for dealer
  2. Better, safer car for manufacturer
  3. Driver back on the road safer and quicker

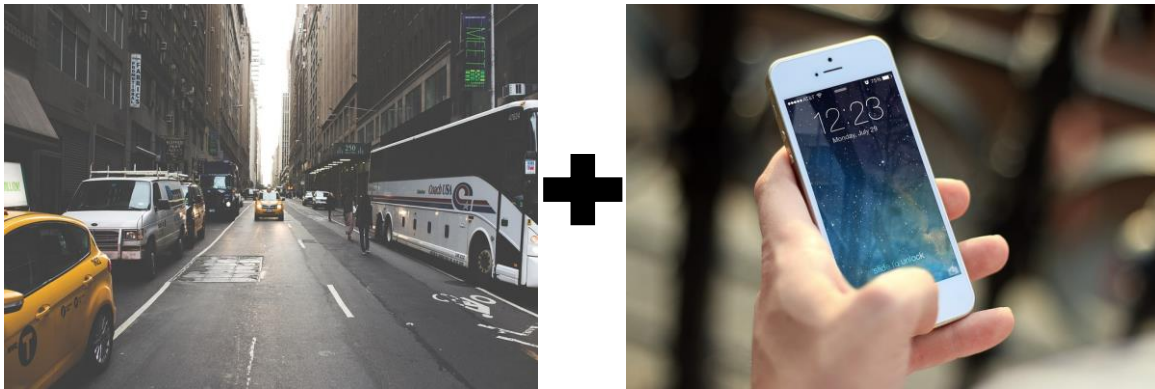


- Sensors can monitor panel performance and provide real-time insight to mgmt teams
- Companies can use data from sensors to gain more granular oversight over installations
- Data analysis tools can give organizations the opportunity to use data from the past and present to more accurately predict future outcomes
- Eventually, Solar panels adjust automatically to the position of the sun throughout the day

# Cities With Labor Flexibility Could Provide Higher Service with Fewer Employees

## Barcelona Smart City

*One of the most IoT integrated smart cities in the world*



### Smart Parking

- Sensors show drivers where available parking spots are located
- **+ \$50 million/year in revenue**



### Smart Lights

- Sensors tell lights when they need to be on
- **- \$37 million/year in energy costs**

### Smart Gardens

- Sensors tell where to water and when
- **- \$58 million/year in water costs**





# IoT in Office: Case Study

## Building Details:

- 1144 Fifteenth in Denver's LoDo district
- 40-story high-rise completed in March 2018

## IoT Technology:

- Leak detectors throughout building, along with system lining basement walls to detect water
  - Helps management figure out where leaks occur
- Maintenance machine in building analyzes several metrics
  - Tenants can control their lease space through their machines
    - Ex: automatic shading feature
  - Public spaces and restrooms include sensors to track movement and reduce energy usage
  - Smart elevator system
    - When a floor is selected on the elevator screen, system optimizes the movement of elevator cars to maximize the amount of people moving around – reduces energy load



# Implications for Industrial and Consumer IoT

*Industrial IoT* is about cutting/reducing costs

*Consumer IoT* is for generating revenue and creating new capabilities

Middle skill jobs will be automated the fastest

Why? IoT removes the need for people to be involved in processes



## IoT in Smart Warehouses

- Sensors can produce data about product inventories, shipment locations, ambient temperatures, retail purchase rates
- Organizations can automatically restock inventories, predict product arrival times/potential delays, warn about spoilage or other quality control issues, and react to changes in demand



## Safer, More Cost-Effective Fleet Operations – Sierra Wireless

- Compliance with environmental and safety regulations
- Optimized maintenance and logistics
- Monitor driver performance and vehicle status for better safety and fuel consumption
- Scheduled preventative maintenance to improve vehicle valuation

# What is Artificial Intelligence?

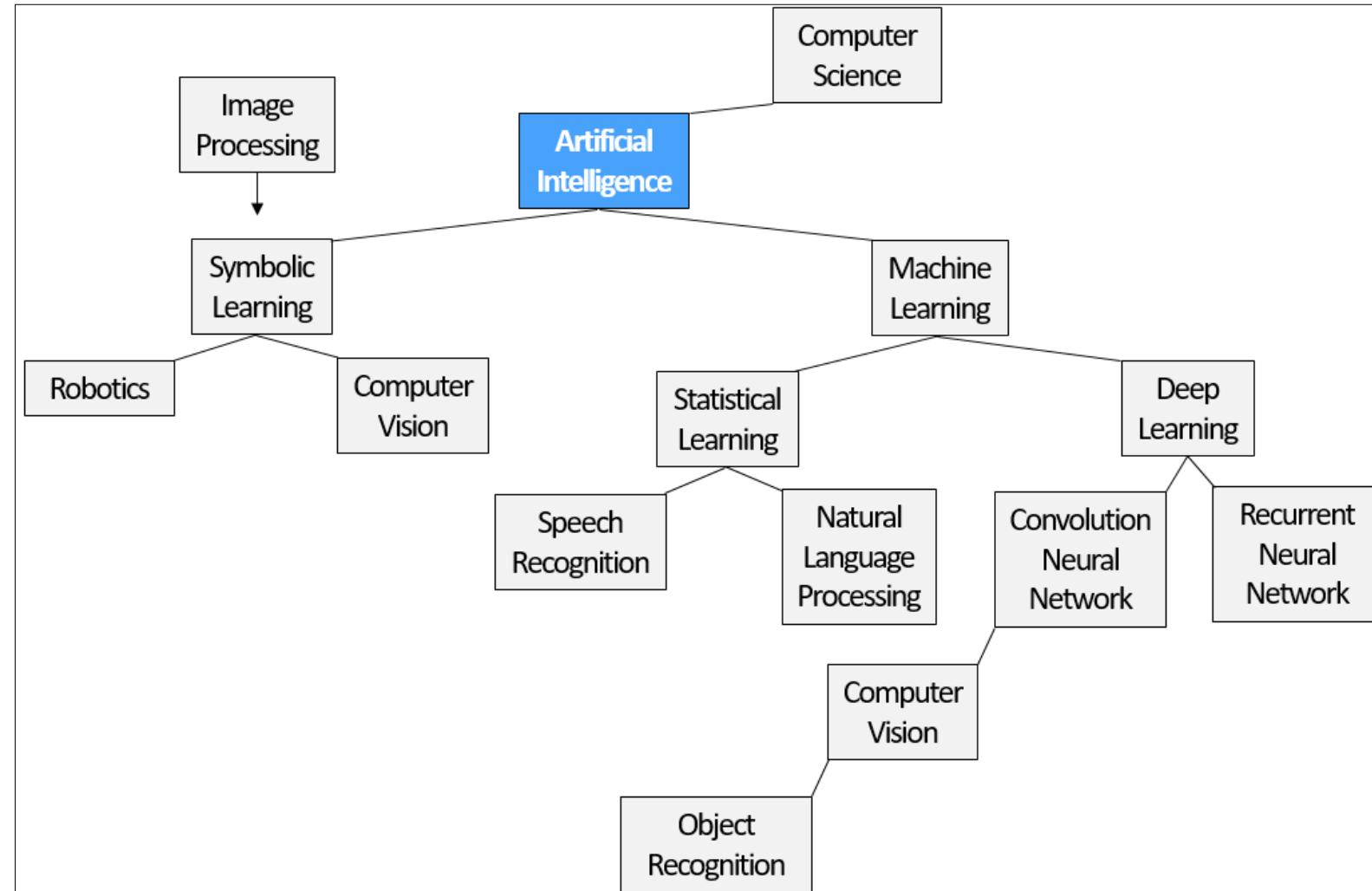
## Different Levels of AI

Starting now with machine learning

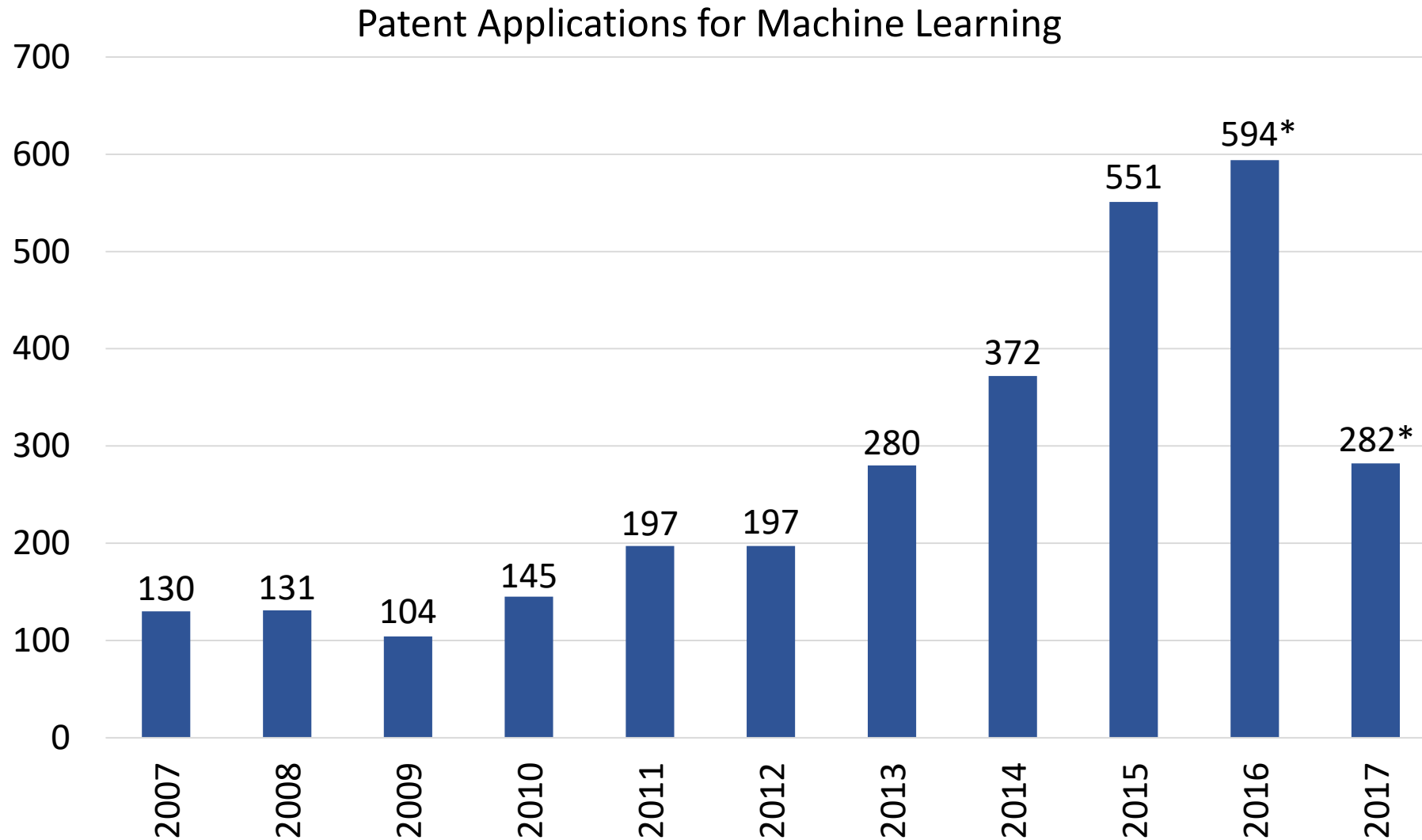
Next, go from training machines to understand data to having algorithms and machines train themselves

Eventually, machine will talk to human with speech and output an answer

## Many Technologies Have to Come Together



# Companies are Rushing to Patent AI Technology



\*Data for 2016 and 2017 are incomplete because of 18-month lag in publication; applications become public 18 months after filing

Source: Yardi®Matrix; Tom Simonite, "Despite Pledging Openness, Companies Rush to Patent AI Tech", wired.com; U.S. Patent filings via Webb, Short, Bloom, and Lerner, National Bureau of Economic Research

# AI Paving the Way for Model-Driven Businesses

- Models are being used to improve crop yields in agriculture
- In 2013 Monsanto bought The Climate Corp. (TCC) and uses model-driven farming to produce more-resilient crops
- Monsanto's models predict optimal places for farmers to plant based on:
  - Historical yields
  - Weather data
  - Tractors equipped with GPS and other sensors
  - Field data collected from satellite imagery, which estimates where rainfall will pool and subtle variations in soil chemistry



**Do you see AI around you now? YES!**

## **NETFLIX**

- Recommendation model worth ~\$1 billion/year in revenue
- Any time a customer accepts or rejects a recommendation, the algorithm improves
- Drives 80% of content consumption

## **amazon**

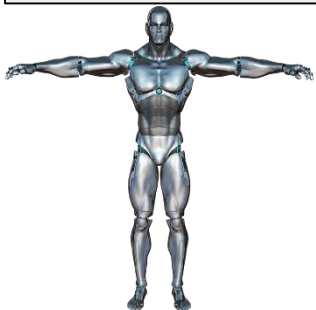
- Product recommendations drove ~35% of revenue by 2013

# Implications for Artificial Intelligence

- Artificial intelligence will primarily impact higher-skilled jobs
- Low skilled jobs with high human interaction – need societal acceptance of machinery before service industries become automated
- However...*Robotics are Close*
  - Sensors are getting more powerful and smaller – you can put it on an exoskeleton
  - Ex: Robots doing guided tours through rental properties, allows agents to manage properties online
  - The robot has potential to get so good that low-skilled jobs get eliminated too

## Artificial Intelligence in Logistics

- Typical fulfillment center has human pickers walking 15 miles/day to assemble orders
- inVia Robotics – robots autonomously navigate warehouse, pull from shelves, deliver to stationary human picker
- Models consider item popularity and probability of association (ex: putting sunglasses near sunscreen) to adjust warehouse layout automatically and minimize miles robots must travel
- Every order provides feedback and improves productivity across the system



## AI for Rent

- You can rent an AI platform and just use your data (Google/Microsoft)
- Do you want to deal with developing your own AI solutions, or just rent from someone else?
- Can become a revenue stream for companies with strong AI platforms

# A Hurdle for IoT and AI – It Can All Be Hacked!

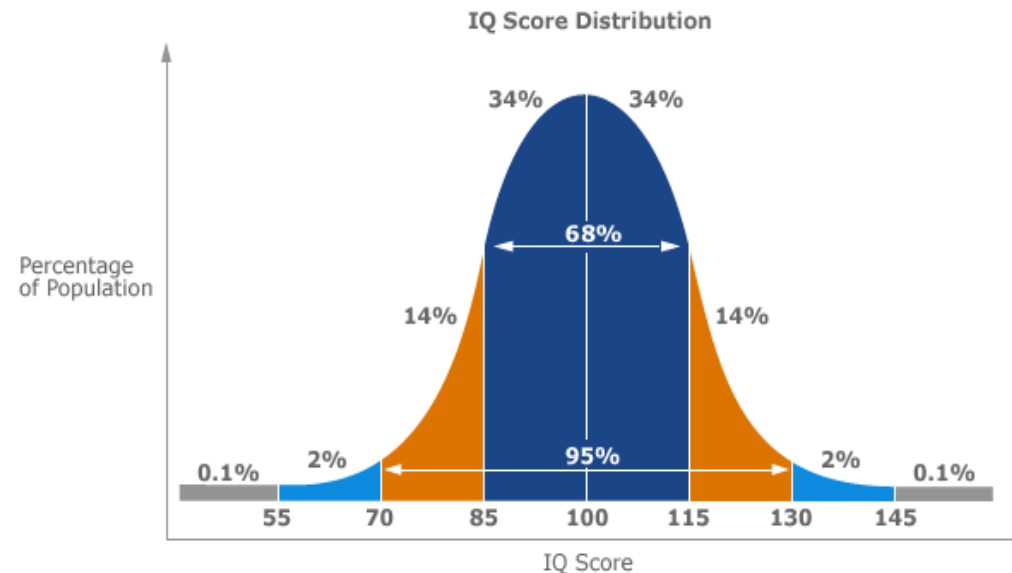


- Regulatory burden is so high, people will look to third party providers to manage security of their IoT and AI networks
- What is considered “private” and what isn’t?
  - It’s a fluid definition
  - Aggregating and anonymizing data is private, but not as useful
  - Valuable when it can be tied to an individual, but then it’s not private
- Countries with large military establishments – U.S., China, Russia, Israel – will be best positioned with managing security



# Overall Implications – All Levels of Jobs Will Eventually be Impacted

- Immediate impact likely in middle wage/middle skill jobs (IoT)
- Highly skilled job affected next (AI)
- Once society accepts machinery in the service industry, lower-skilled jobs will be impacted (Robotics)
- McKinsey Global Institute:
  - Automation will displace 400-800 million jobs by 2030, requiring ~375 million people to switch job categories entirely

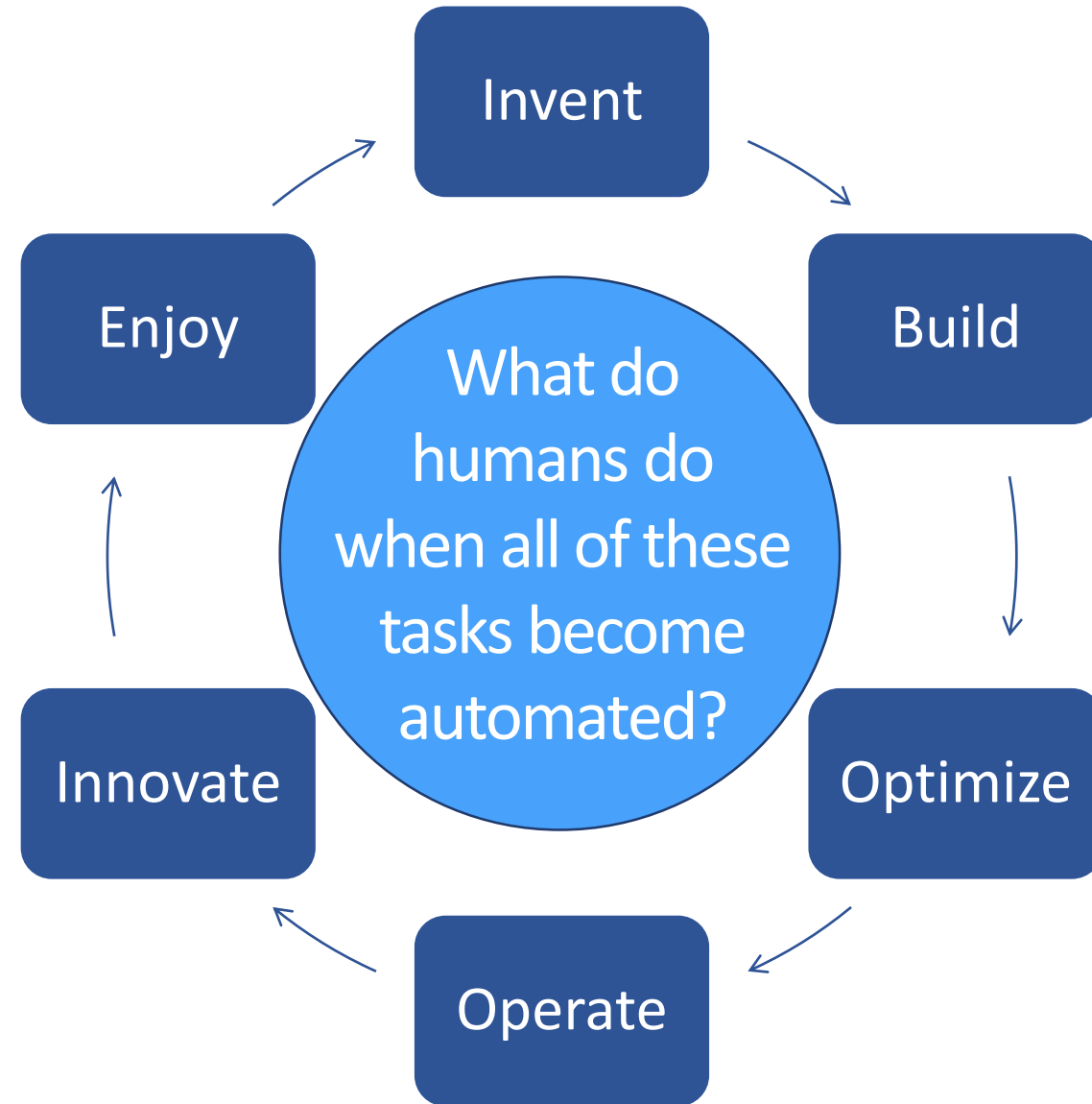




# The Bottom Line: A Case for Intellectual Capital Nodes

## We cannot replace our need to:

- Create new things
- Improve them
- Build interpersonal relationships



# Technology's Impact on the Future of Real Estate

- Position where wealth is created and where the value of “place” will increase
- With a focus on live/work/play then “fulfill”/store

## Technologies

### Energy

- Batteries
- Solar

### Electric & Autonomous Vehicles

- Lithium-Ion Batteries
- LIDAR Sensors

### \*IoT/Sensors

- Smart Office & Smart Home
  - Amazon Echo
  - Nest Thermostat

### \*Artificial Intelligence/Robotics

- Drones
- Virtual Realty

## “Taken-for-Granted” Tablestakes

### Connectivity – Building Level

- 1G Connectivity, 40x High Speed
- Mobility
- Security

### Connectivity – WiFi

- 5G Connectivity required for IoT and AV – rolls out in 2020
- 4G rolled out in 2009

### Collaboration

- Mobile apps
- Connectivity and free-up trapped resources

\*Focus today on these two

# Office Investment Strategy – Continued

- **Given that wealth is created via intellectual capital in concentrated locations...real estate follows**
  - Cost advantages and emerging intellectual hubs in formerly non-tech metros and traditionally overlooked cities are shifting the geography of jobs
  - Employment growth is moving out of CBDs/urban core into “urbanized suburbs” – intellectual capital nodes
  - The longer the expansion goes on the more established the intellectual critical mass becomes
  - Tax reform will likely accelerate these trends
  - But the process does take time, allowing multiple entry points for investors
- **Advances in the Internet of Things (IoT) and Artificial Intelligence (AI), and the 5G network which is its underpinning, drive-**
  - The ability to have self correcting and self learning processes which will streamline production (reduce costs)
  - The ability to leverage data to create new products, services, and create new “gatekeepers” to consumer \$
    - Both of these will pressure mid-skill jobs, widening again the issues of income distribution
- **Investment Strategy is bifurcated**
  - Capital preservation (international gateway CBDs) and capital appreciation (suburban revitalization, primary and secondary cities)...drift down to some tertiary markets also evident
- **Pick your targets...Carefully!**

# Contact Information

Thank you! We are happy to answer any questions. Please contact:

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