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Office Industry Overview Oct 2017

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Today's Agenda

- Macroeconomic Outlook
- Demand Trends
- Commercial Real Estate Fundamentals
- Technology, Demographics, Migration and Immigration

The Yardi Matrix View- Office Investment Strategy

- We are initiating investment strategy coverage for the office asset class - with a bifurcated strategy
- US office strategy can be thought of in two broad categories - cash yield and asset preservation in the international gateway core cities, and repositioning/re-invention of environments in gateway cities' urbanizing suburban nodes and non-gateway top 40 cities and their intellectual capital nodes
- US macroeconomic conditions, while not great, are solid and generating job growth of ~175-200K jobs per month
  - Enough to maintain decent office-using employment growth, occupancy and slow rental growth
  - Secular changes in sq. ft. per person, co-working, and on-demand space are dampening influences on space needs
- US office supply growth is fairly concentrated in gateway or rapidly growing metro areas
  - Supply surges in SF, Bay Area, Manhattan, Los Angeles, Seattle are very heavily tech influenced
  - Re-invention of suburban office parks and creation of integrated communities is underway as value added plays
- Oil prices are range bound - $40-$50/bbl. with regional pain continuing - Houston (?), OKC and Pittsburgh
- Major top 40 non-gateway markets, and their growing intellectual capital nodes, are well positioned to benefit from domestic migration and lower costs vs. gateway cities…and largely insulated from national immigration policy
  - Opportunistic or yield investors need to move to "unloved" markets away from institutional investors
  - Value-add has good odds of success, on fundamentals - but asset price change has narrowed the opportunity recently

Source: Yardi®Matrix

How Do Things Look Now?

- The outlook is on balance positive, but guarded for the next 18-24 months as supply gets absorbed; the extent of which remains based upon the balance of pro-growth vs. immigration/trade policy emphasis
- US macro conditions
  - USA today mirrors tensions in 1930's - slow growth, deep divisions - regionally, socially, economically, politically
  - Recent Eurozone economic growth is encouraging; increased geopolitical risk of a miscalculation by rogue/non-state players
  - Getting US GDP growth from 2% up to 3% is the heavy lift
  - Potential for pro-growth policies come in two forms:
    - Executive: loosening of regulations - which is coming as departments are being staffed
    - Legislative: (tax reform, education reform, health care re-reform, infrastructure spending) may take some time to play out
  - Immigration and trade restriction policies impact is currently at the "margins" – but evident
    - The 6 international gateway cities are exposed the most; other major cities benefit from domestic migration
    - Extractive (mining) and transformative (manufacturing) regions may benefit slightly vs. tech—but long term wealth creation is still intellectually based– in all its forms
    - There are ripple effects in the construction trades, raising costs/delaying completions - impacting MF construction delays
  - Yet, in a still low yield environment: where can an investor find yield?
  - Monetary policy, and the debt surge it has engendered in the government & publicly traded corporate sector, has reached its limits (or very near its limits) – pro-growth fiscal policy ***is*** the way forward
  - US commercial real estate is still the place to be, but the ride is going to be bumpy

Source: Yardi®Matrix

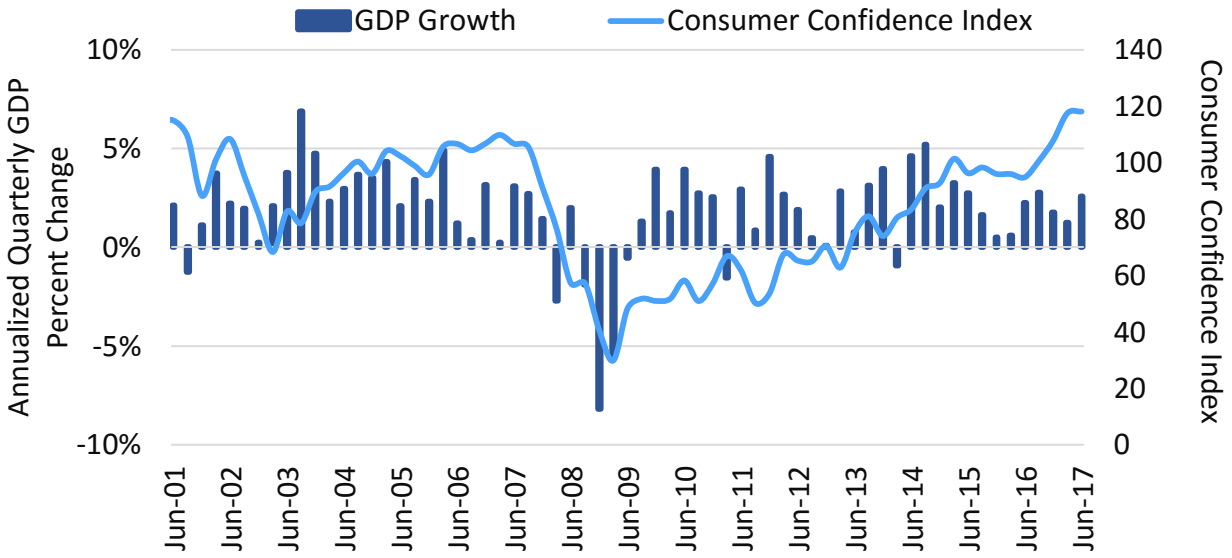
How Do Things Look Now?

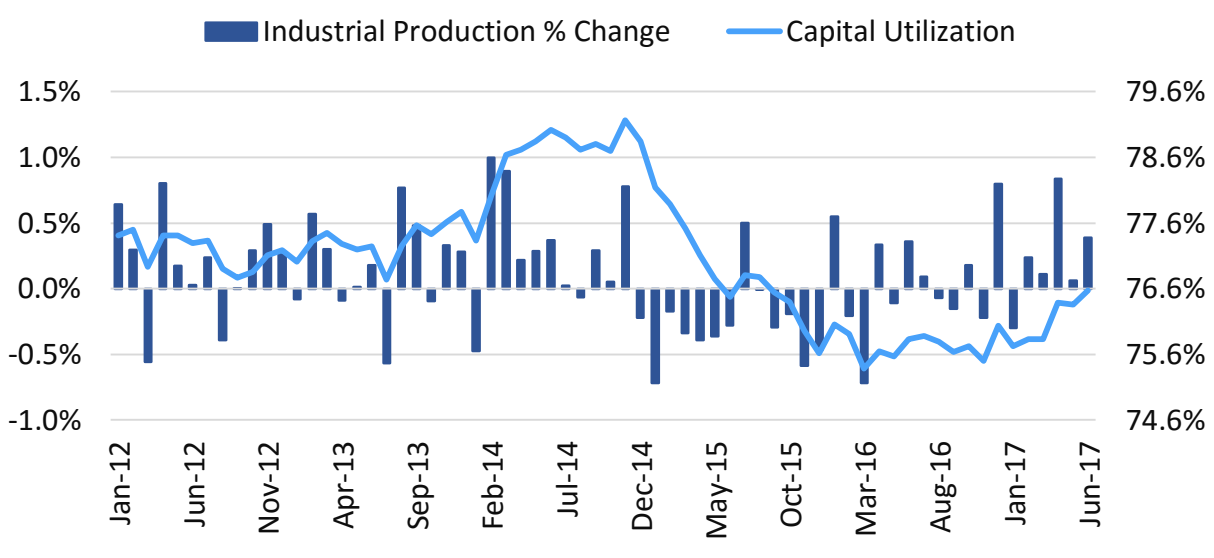
The Outlook on balance positive; the extent of which is based upon the balance of pro-growth vs. immigration/trade policy emphasis

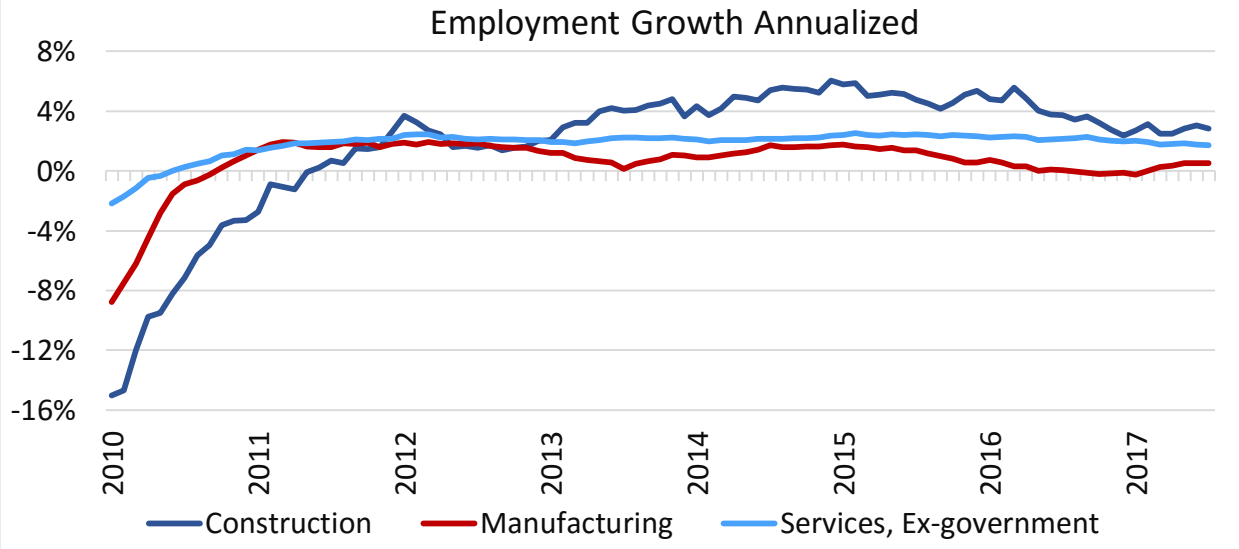
- US office market conditions
  - Decent vacancy (low teens) except for Manhattan (8%) and San Francisco (9%); Houston still reeling (21.5%)
  - Slow rent growth- ~1-2% ;
  - Structural components of demand are still positive
  - Wage pressures in the US are growing, leading to out-migration from international gateway cities to top "40" tier
  - Supply growth peaking in 2017 at 90 MM sq. ft., declining to 50MM sq. ft. in 2018
- Dislocation in commercial real estate debt markets, driven by regulatory influences, is restraining growth in new construction financing
  - Dislocations in bank and CMBS debt markets will extend the office growth up-cycle- after its delayed start from the global financial crisis
  - Debt availability and cost is more tied than ever to global financial markets
  - Long-term rates are not moving at the same pace that is expected in short-term rates
    - Yield curve shape bears close watching;
- Asset value growth will be restrained, but not stopped, due to these cross-current
  - Depends on pace of income growth relative to upward interest rate movements; it's a game of grinding out returns
  - But watch out below if fiscal policy stalls, and job growth stalls with it in the next 24 months
- Long-term technology revolutions in energy & transportation are now within the 10 year investment horizon
  - Time to put it on your radar screen

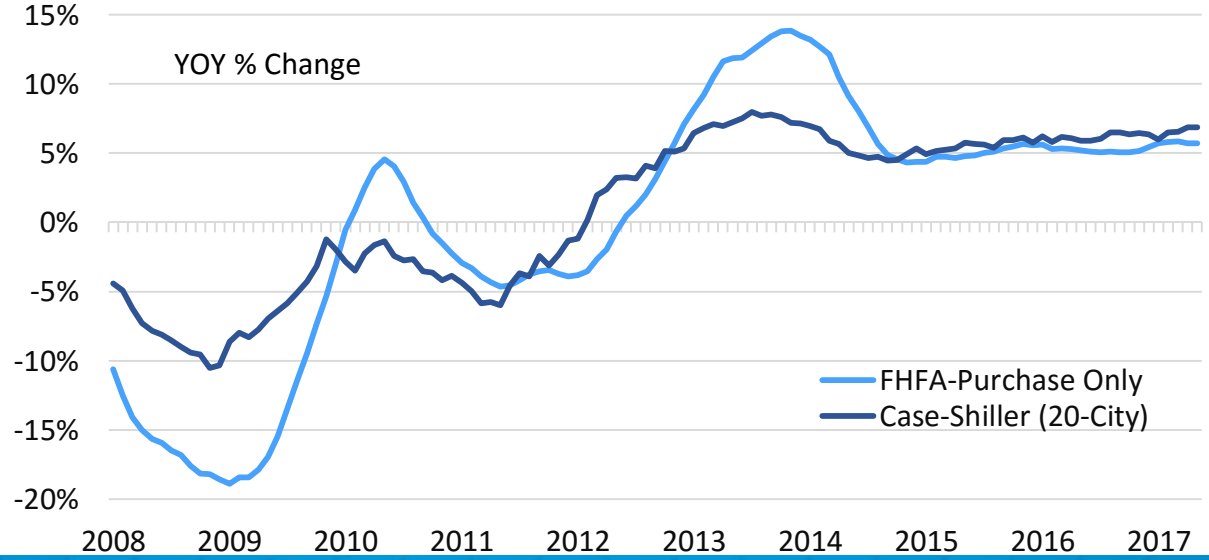
Source: Yardi®Matrix

U.S. Economic Growth is OK









Source: Moody's Analytics; Bureau of Labor Statistics (BLS); S&P Dow Jones Indices LLC; CoreLogic, Inc; Federal Housing Agency (FHFA); Freddie Mac; Fannie Mae; U.S. Bureau of Economic Analysis (BEA); U.S. Board of Governors of the Federal Reserve System (FRB); Investing.com

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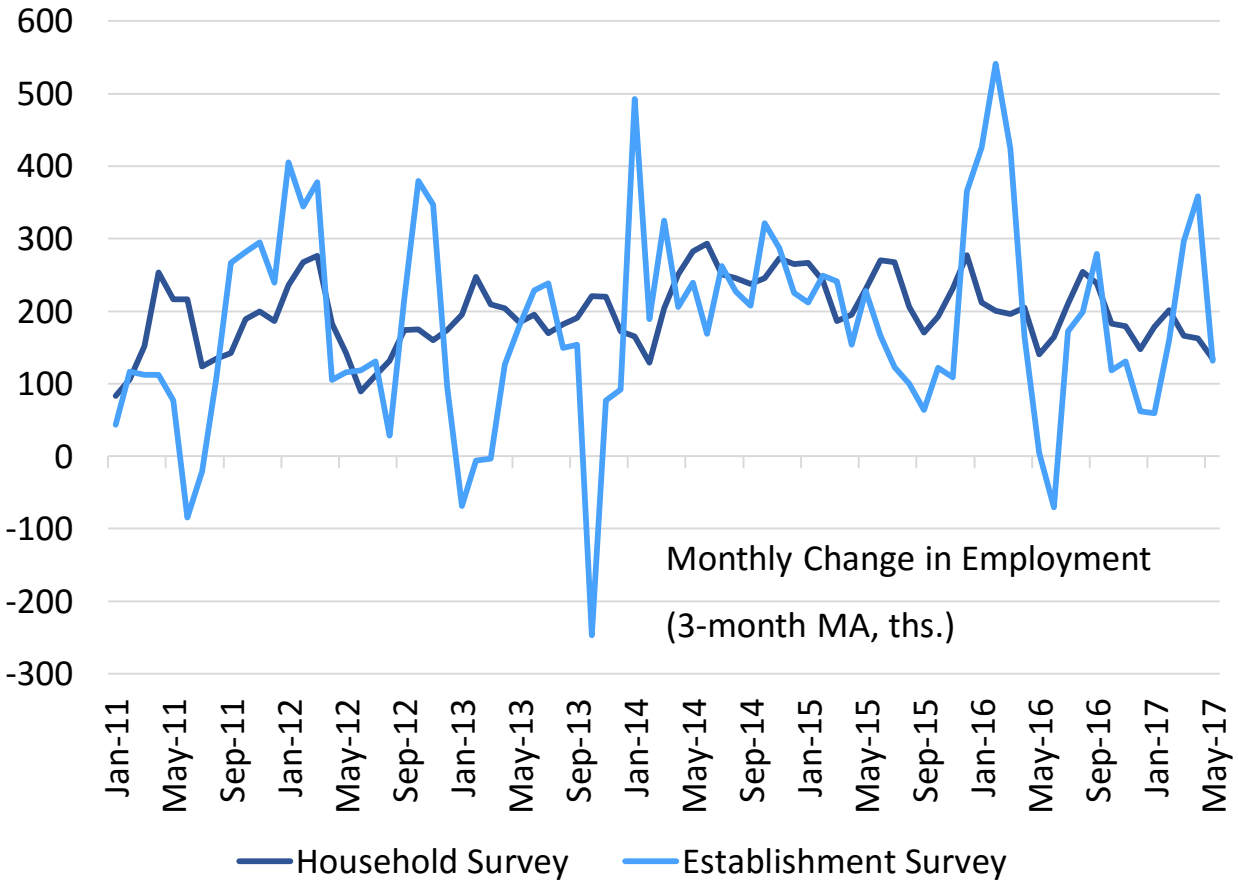
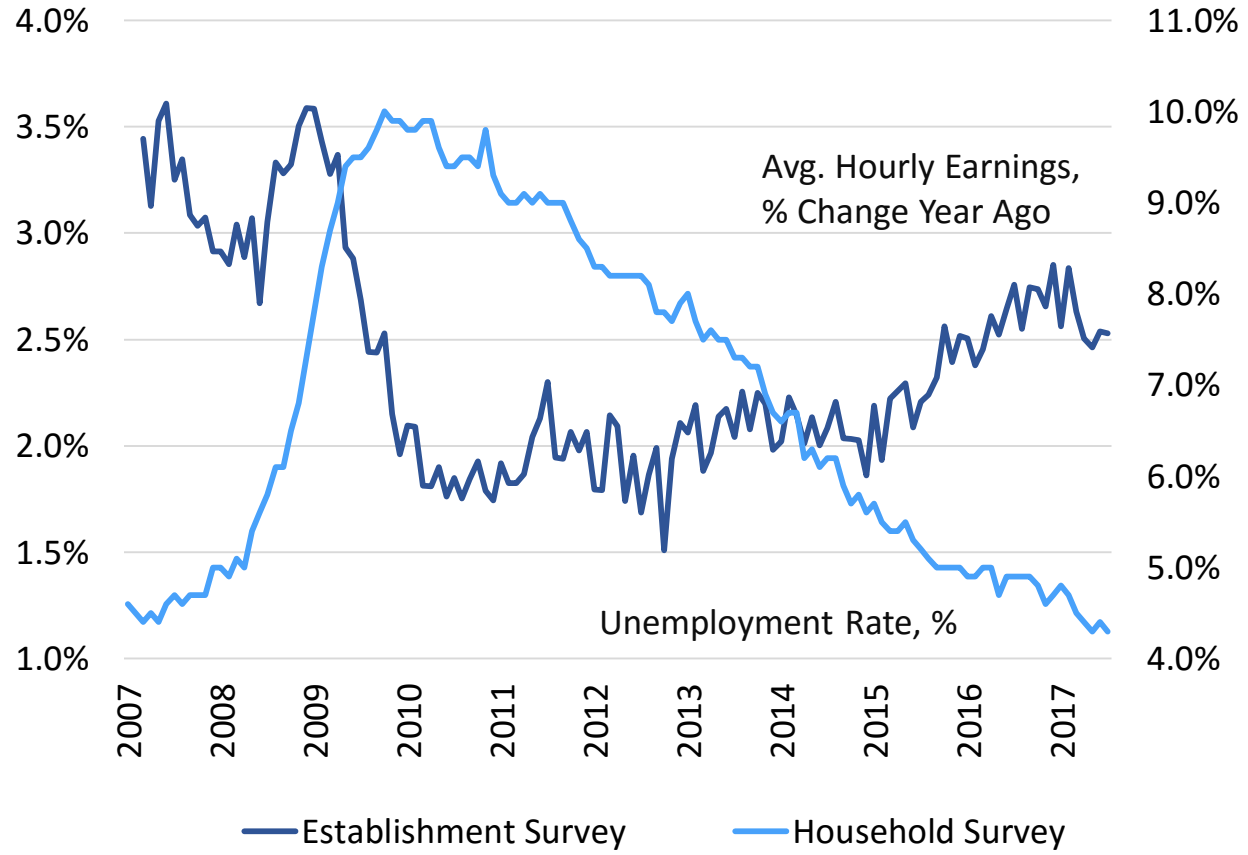
Job Growth and Wage Growth

Job formation good, but a tad more volatile



U.S. Wage Pressure Increasing



Source: Moody's Analytics; Bureau of Labor Statistics (BLS); Current Population Survey (CPS)

Earnings are Being Artificially Held Down

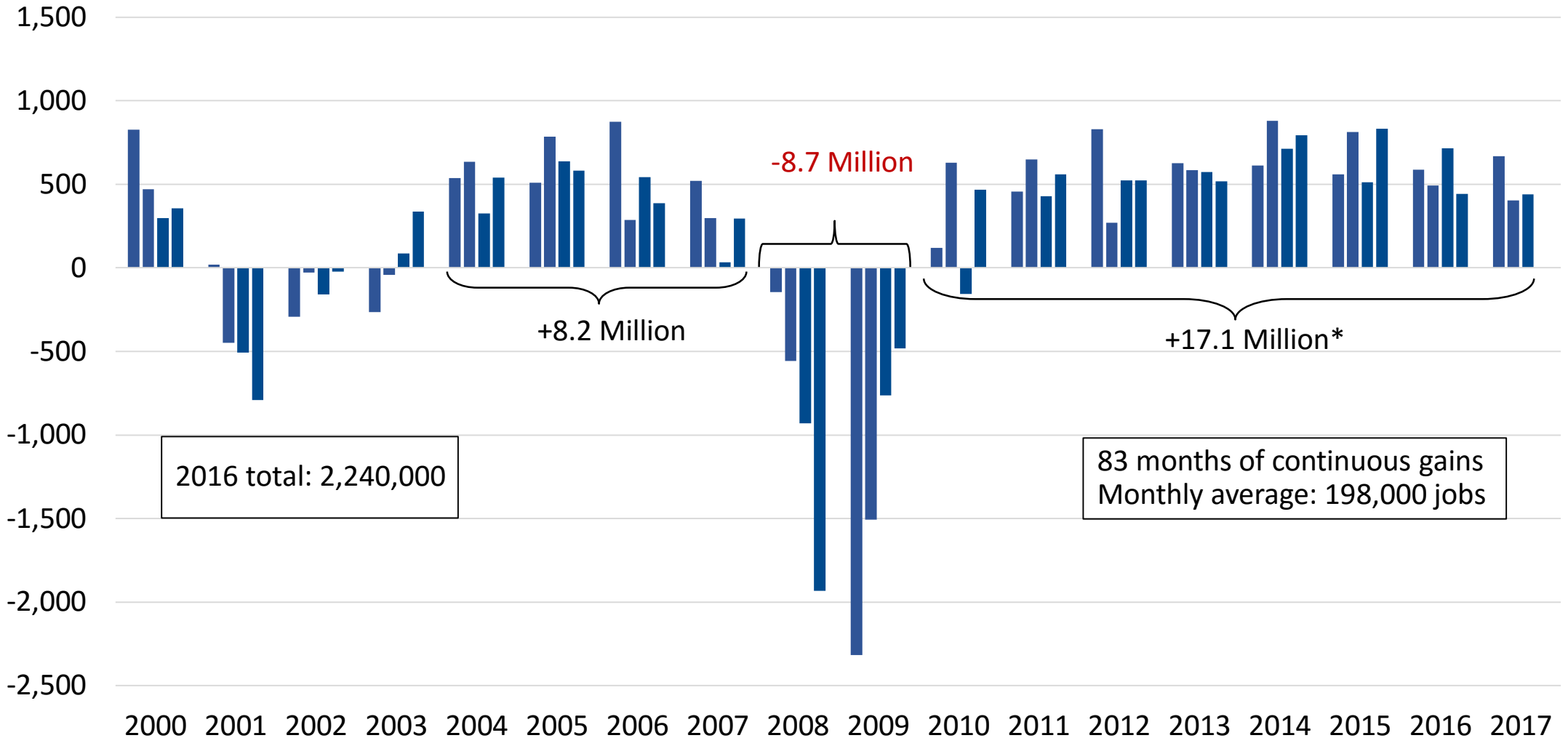
The Good News on Wage Growth

The San Francisco Fed Aug 14, 2017

The overall exchange of new workers for new retirees is holding earnings down by a little under 2 percentage points. Median weekly earnings actually rose in 2Q to +4.2% y/y, according to the U.S. Department of Labor. That's the fastest pace since 2007. Adjust for baby boomers and that would rise to +5.2%.

Source: Evercore; The San Francisco Fed

Quarterly Job Growth



*Through August 2017

Source: Bureau of Labor Statistics (BLS)

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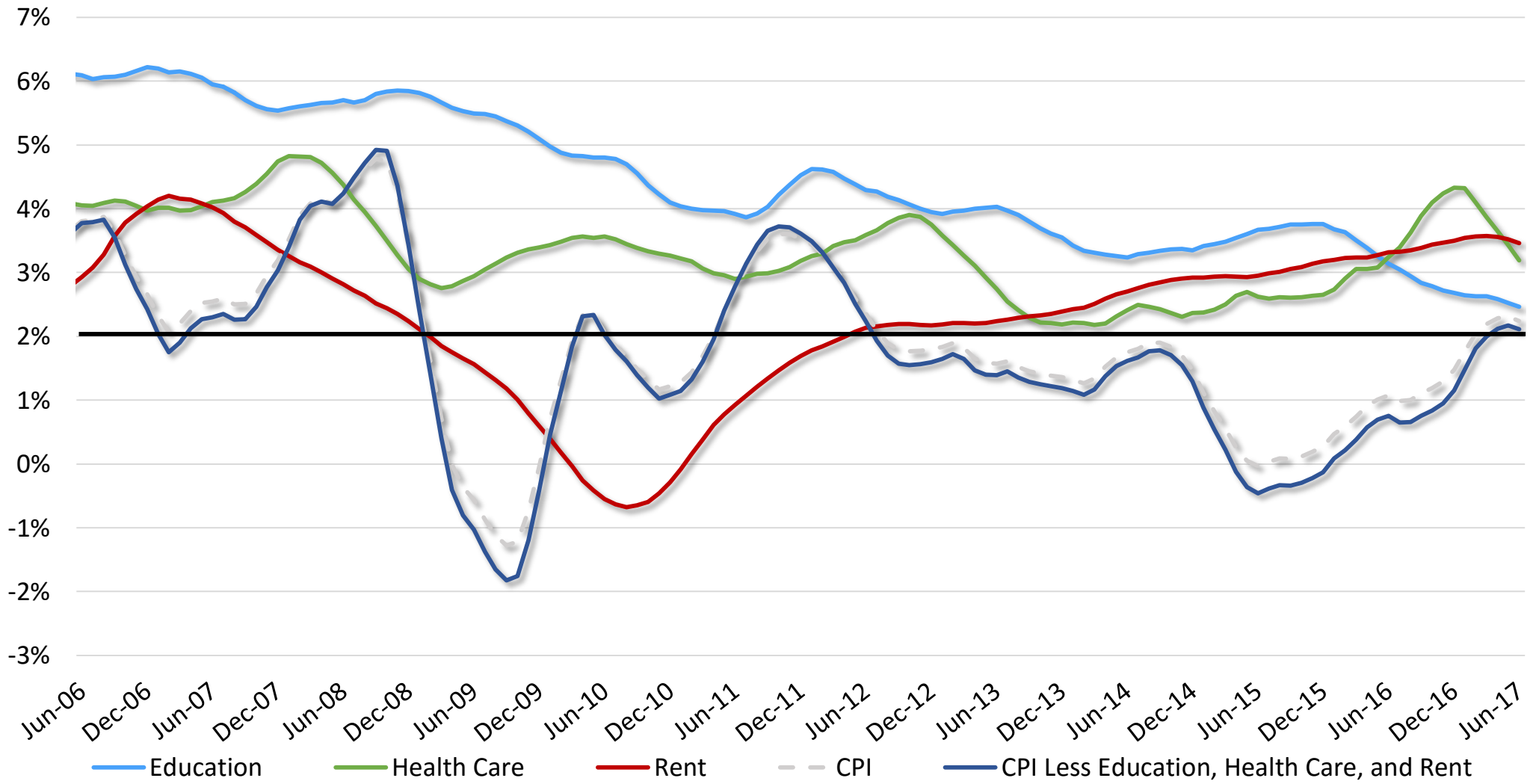
Inflation Rising, But Unlikely to Break Out >2.5%



*Growth numbers are YOY 6 month moving averages. CPI Less Health Care, Education and Rent is an estimate using the BLS document "Math calculations to better utilize CPI data"

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

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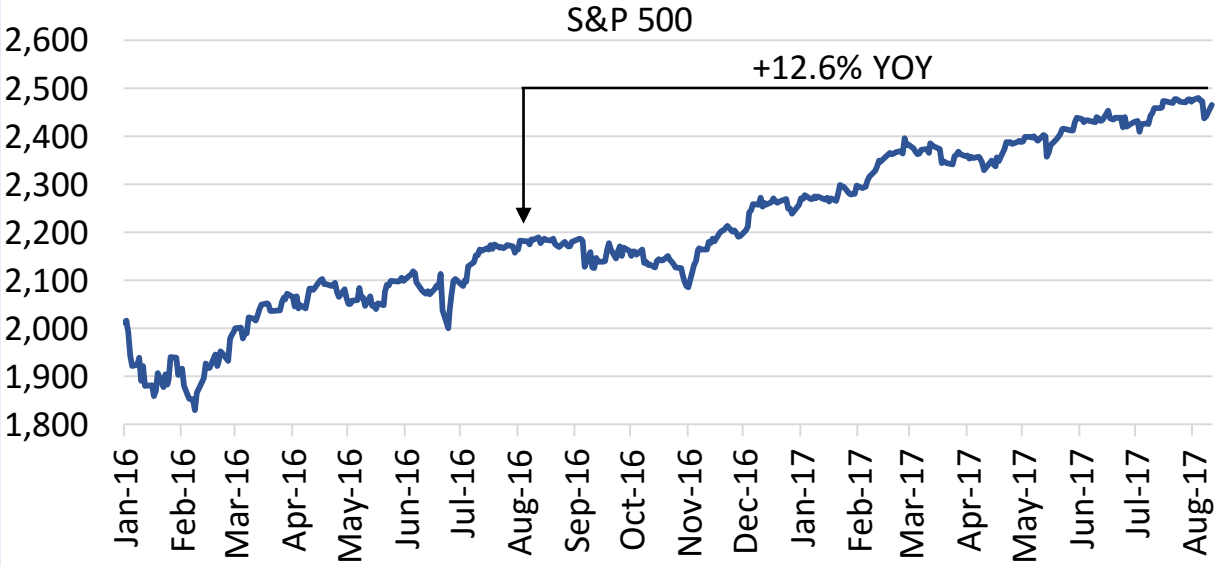
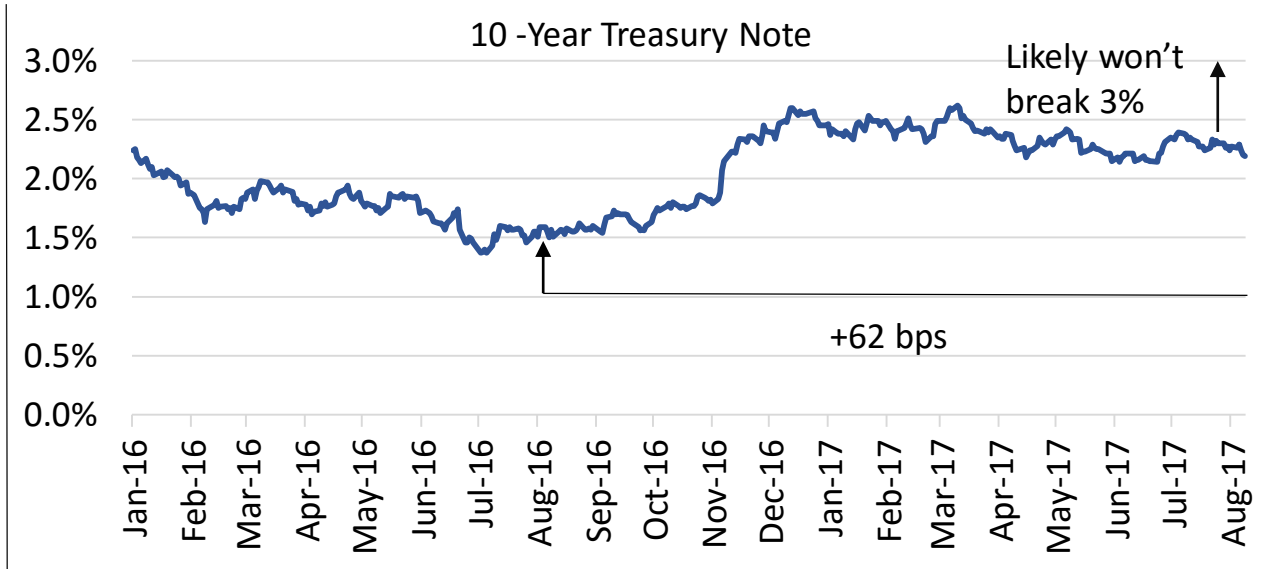
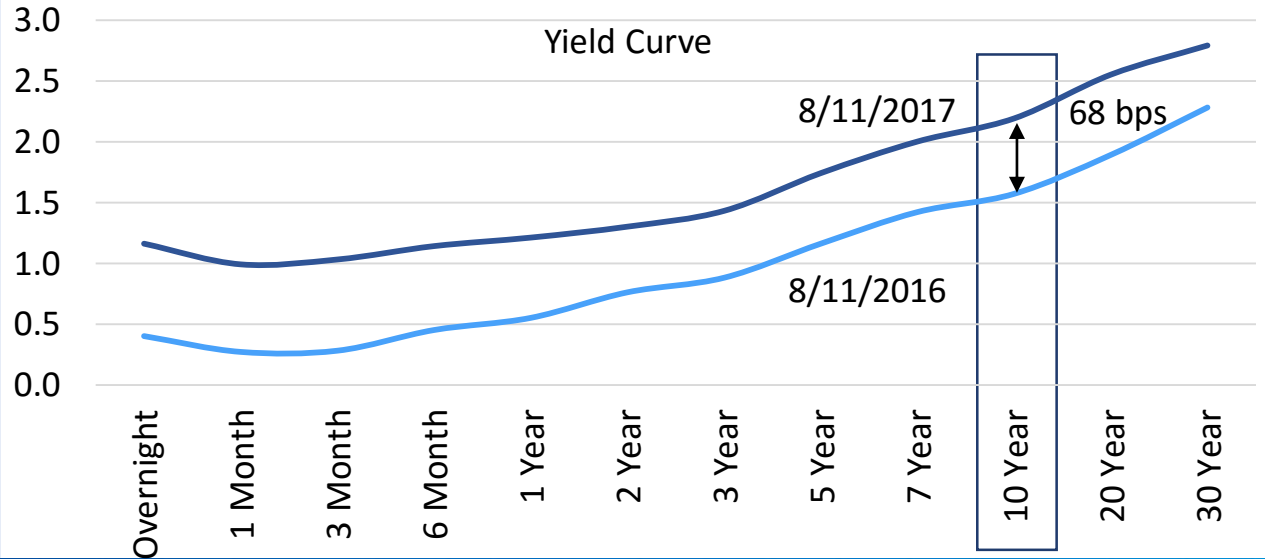
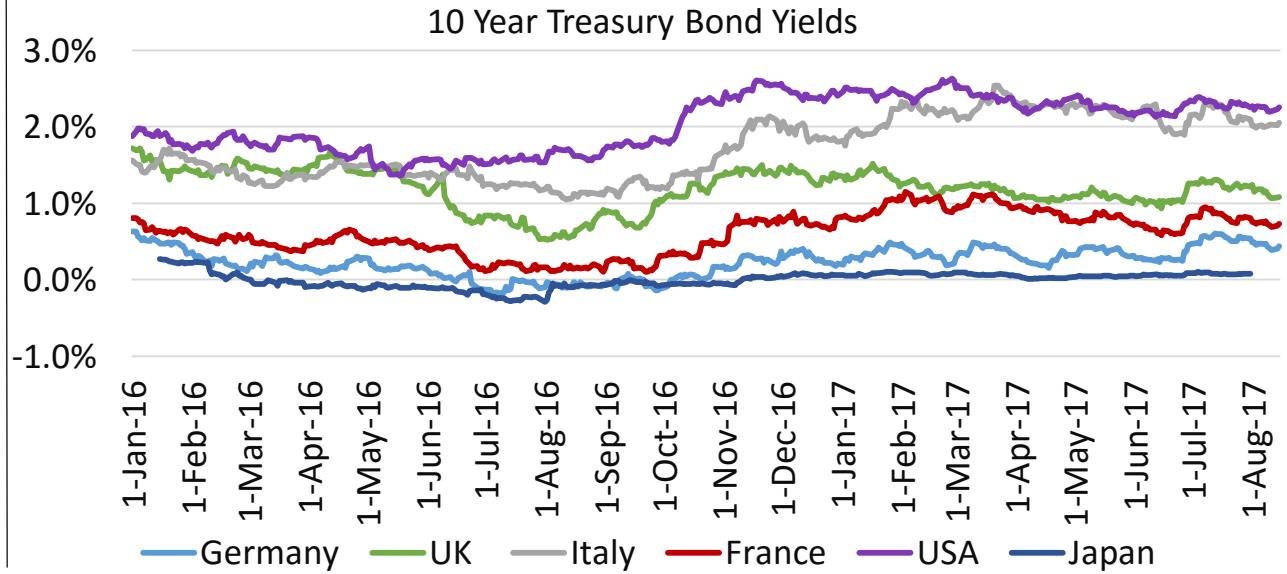
U.S. and International Financial Market









Source: Moody's Analytics; Investing.com

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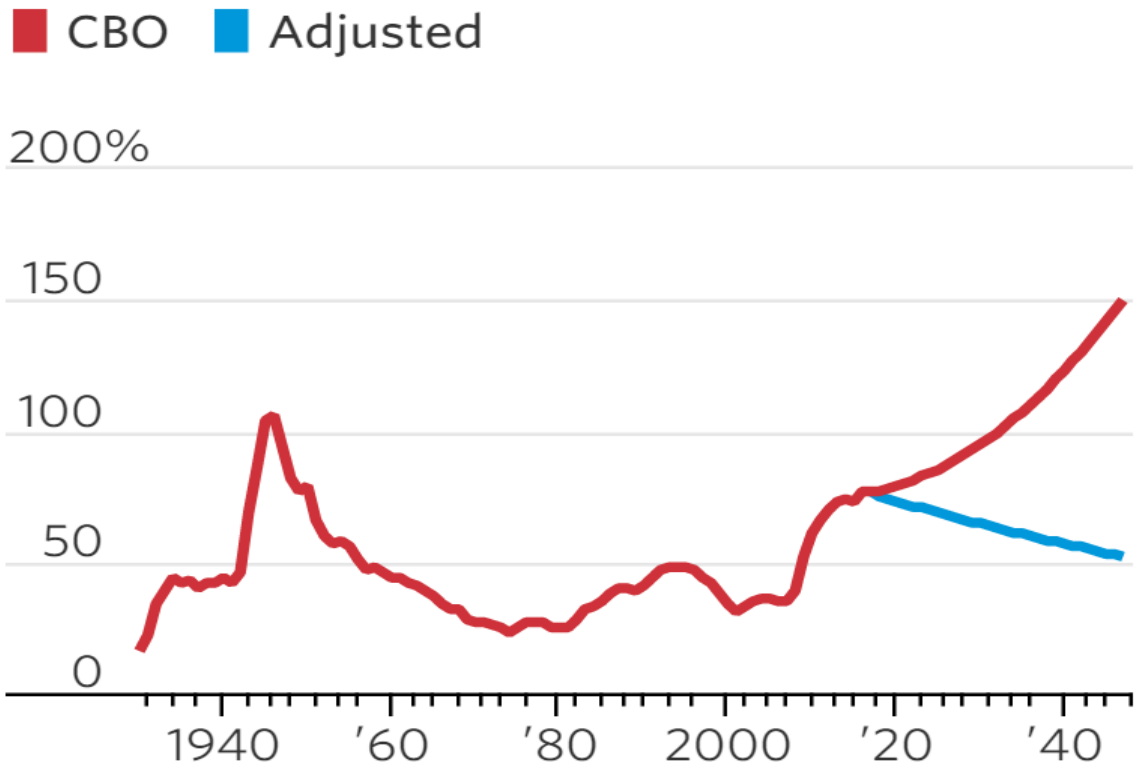
It’s Not All Sunshine and Roses…

- Raising long-term GDP growth from 2% to 3% drives just about everything
  - US government debt, equity markets, corporate debt, etc.
  - That’s what matters



<u>How do we get there?</u>
<u>3 Levers to Pull</u>

1. Population Growth = +0.8%

2. **Labor Force Participation Rate = +1.4%**
(if rate grows from 62.9% to 64%)

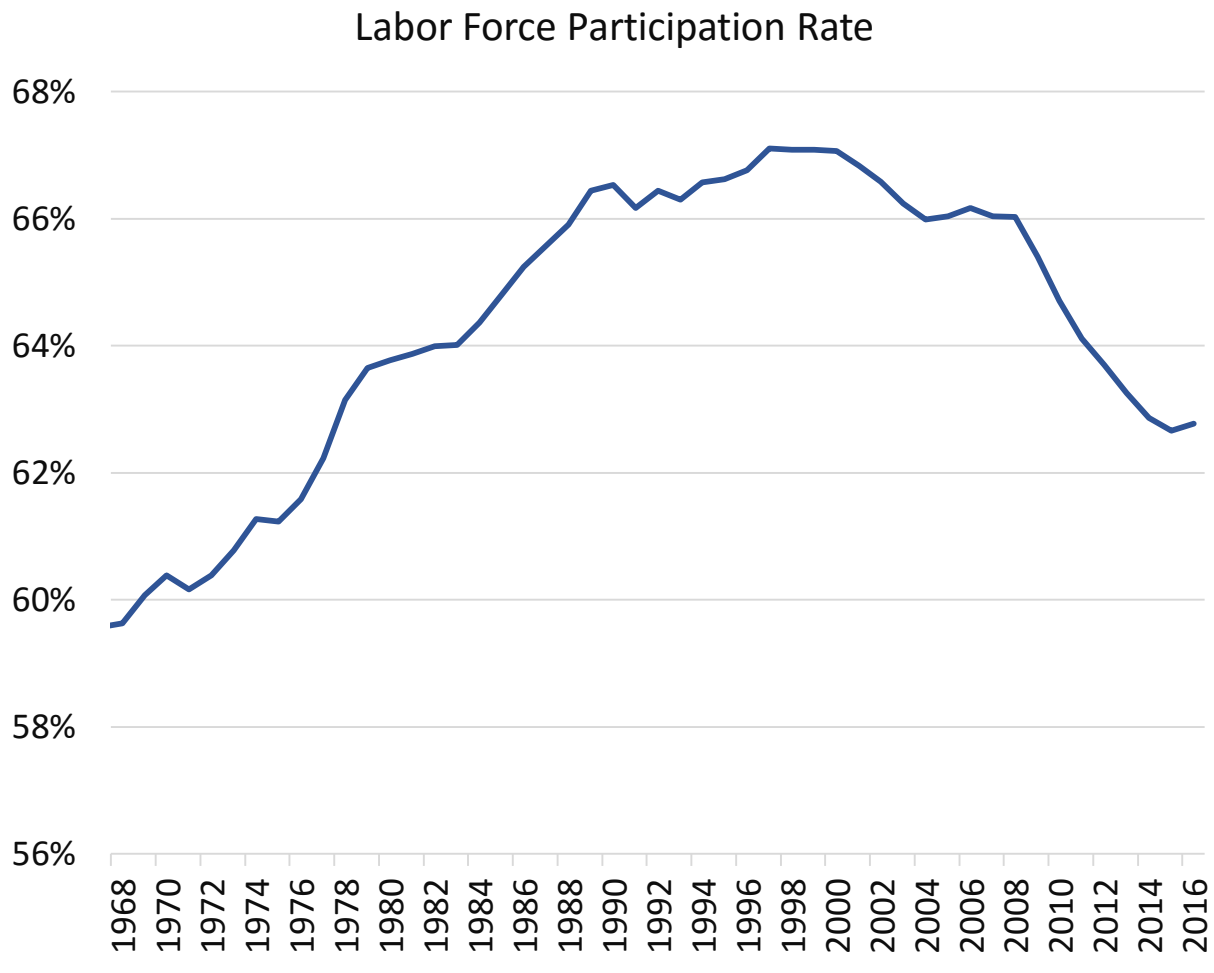
3. Productivity Growth = +1.3%

Real GDP Growth =>3.0%

Source: Congressional Budget Office; Wall Street Journal

Getting U.S. GDP to Grow Means Swimming Upstream

Where will U.S. GDP growth come from?



*Through December 2016

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

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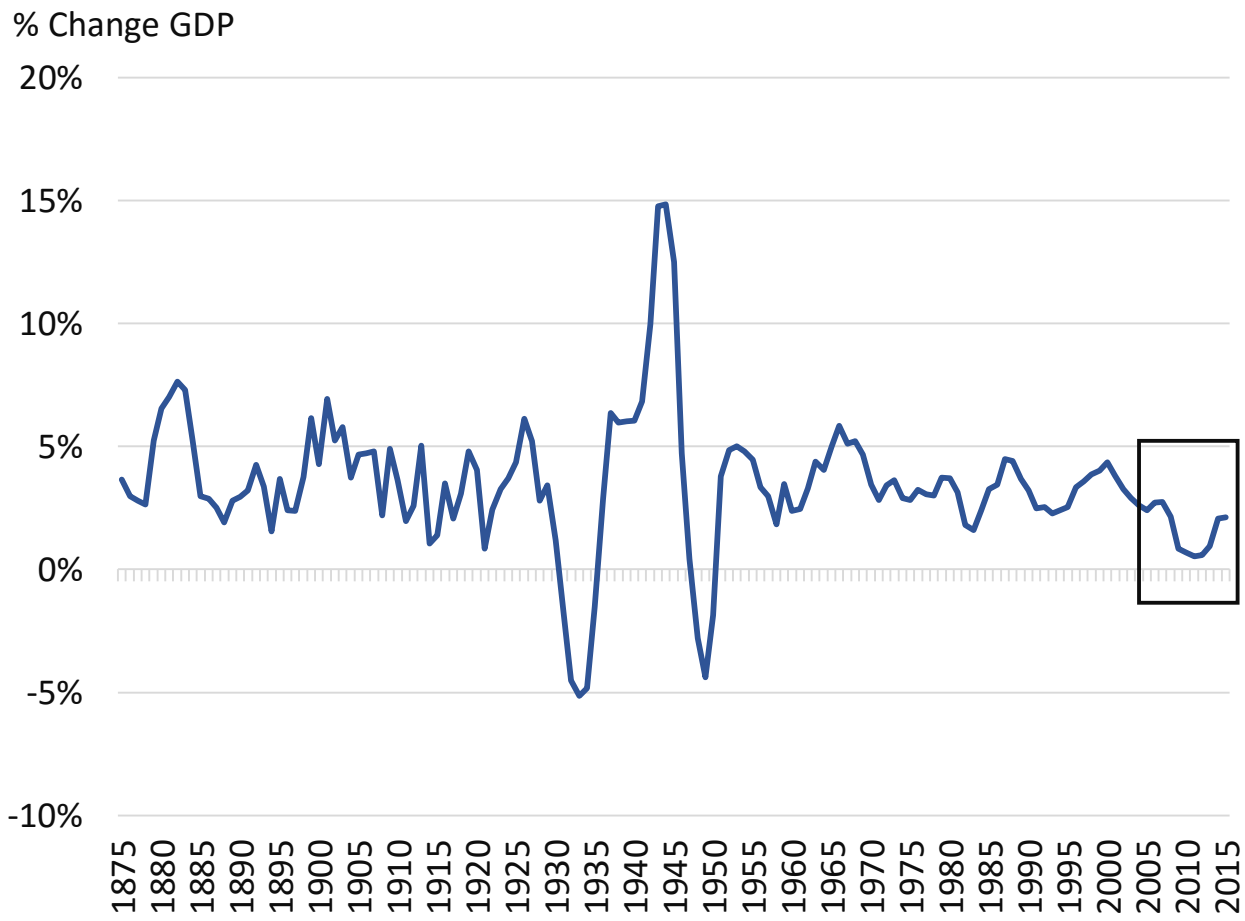
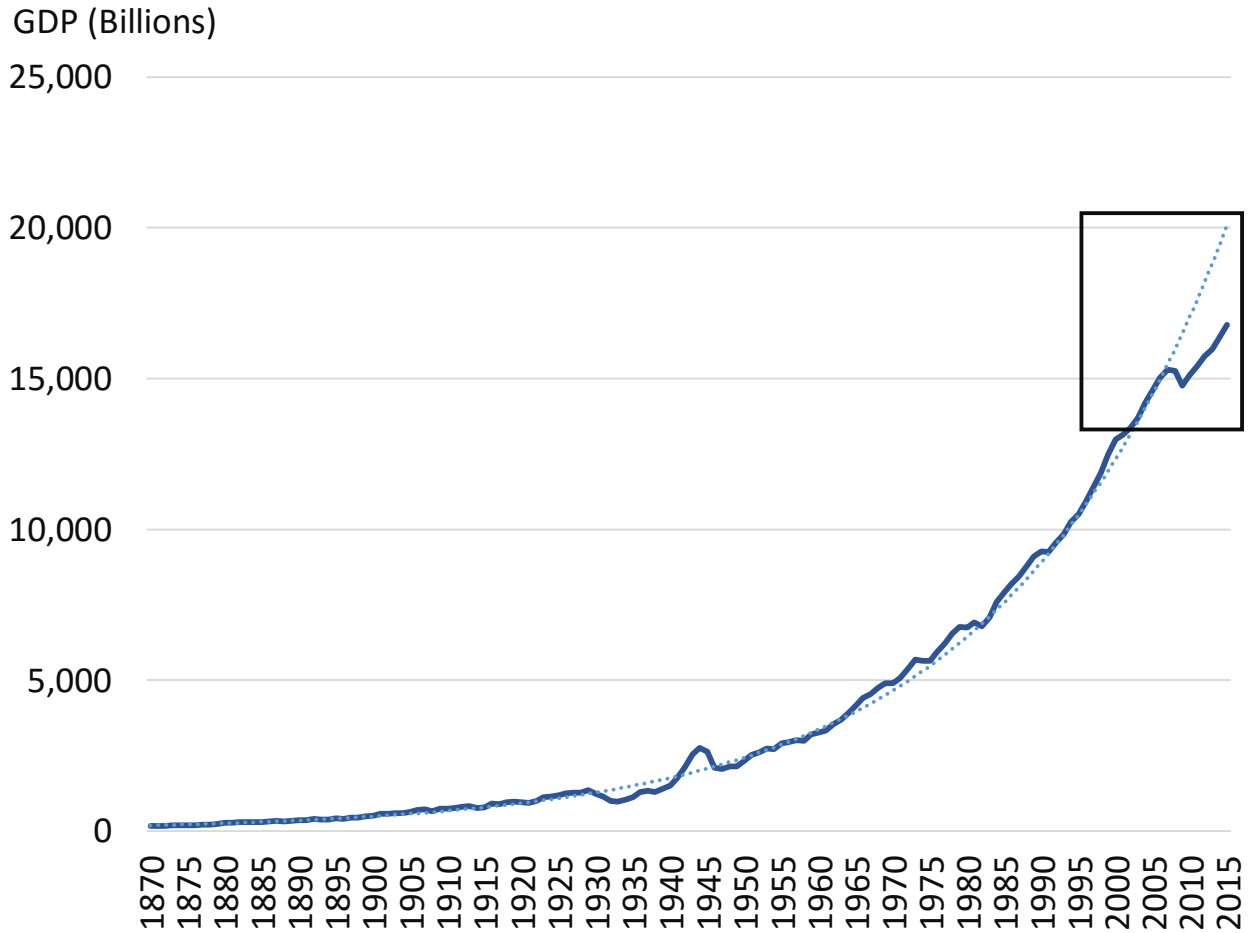
GDP Has Been Slow to Recover, Feels Like the 1930's

Currently in a Slow-Recovery Period



GDP Falls Short of Trend line



*Percent change GDP figures are YOY 5-year moving averages

Source: Worldeconomics.com

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Economic Structure Transition Problems

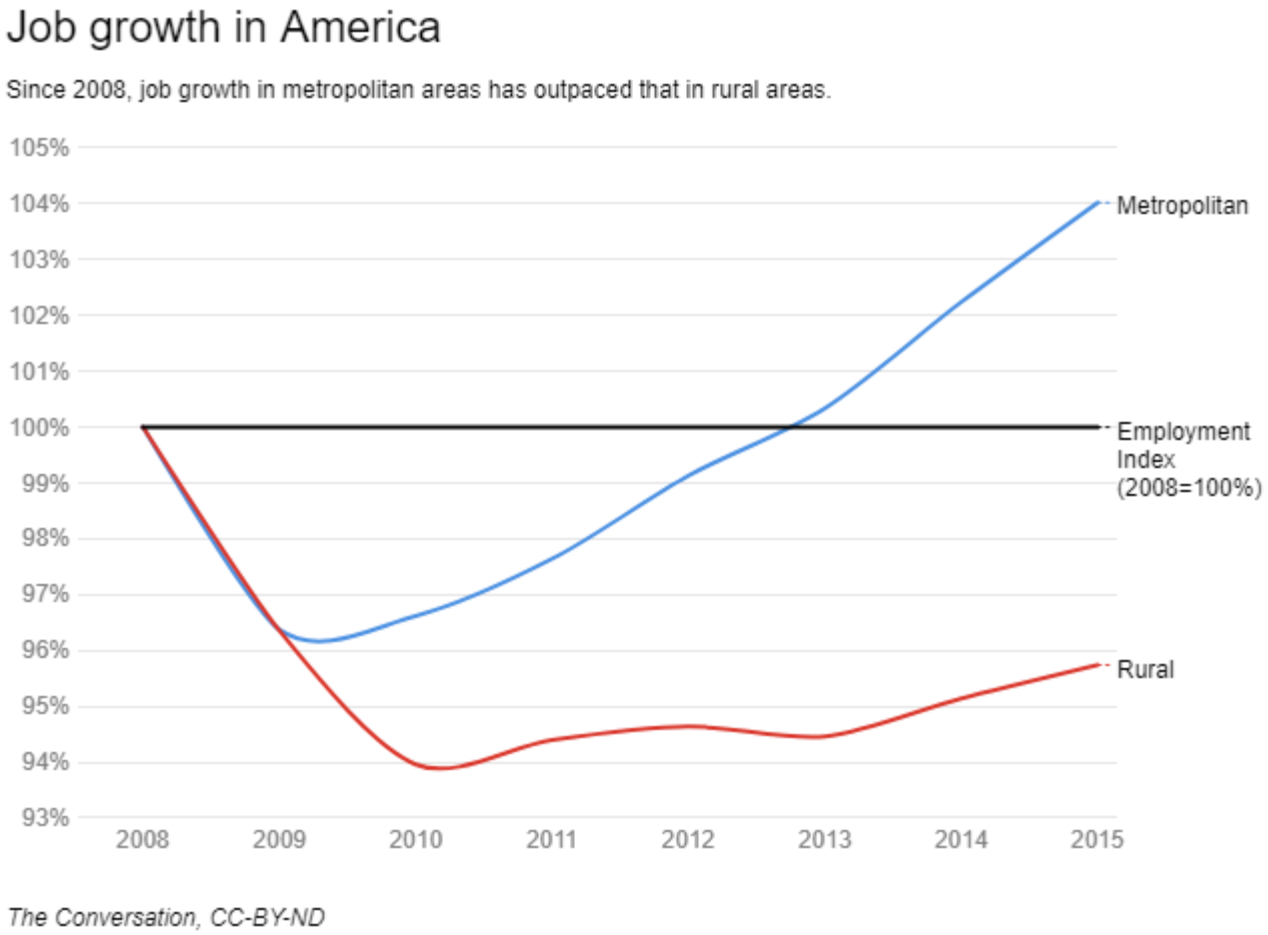
Composition of recent job gains enabled by duration of expansion

GOOD:

- Coming from the lower-end
- Pulling people off the sidelines

BAD:

- Heavily concentrated around large metros with intellectual capital nodes
- Isolating rural Americans, leading to rural poverty



Source: usnews.com; Integrated Public Use Microdata Series: Version 6.0, 2008-2015 ACS

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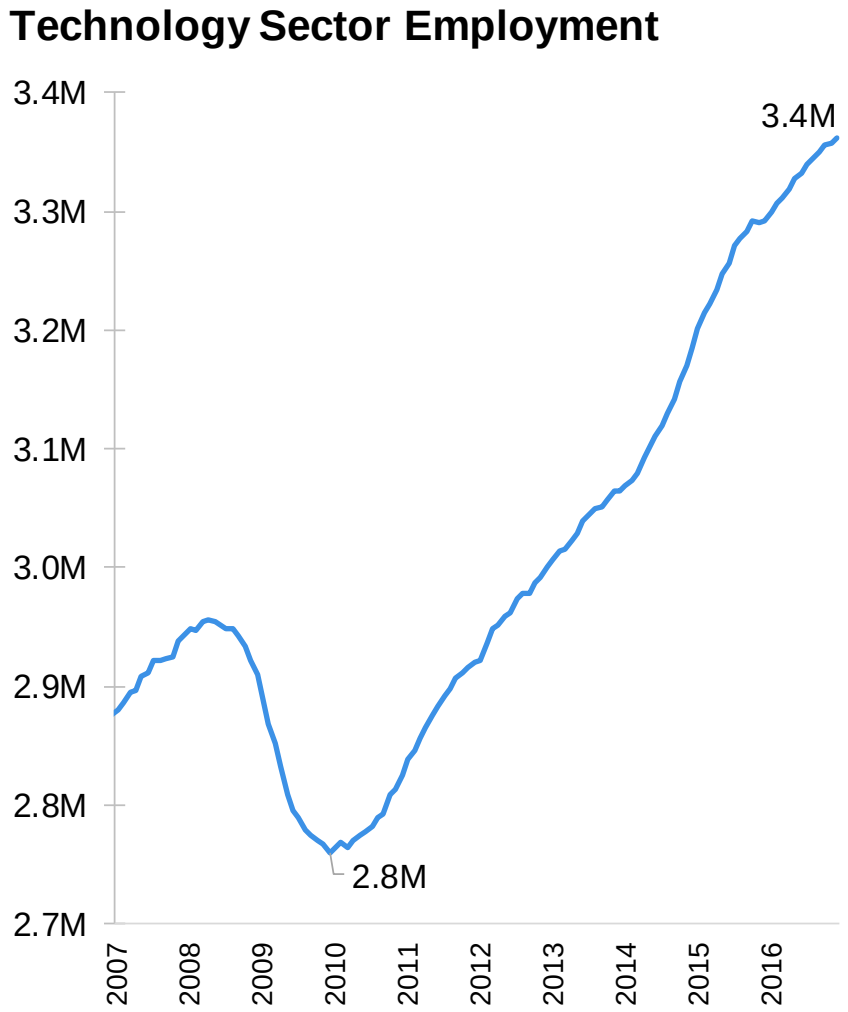
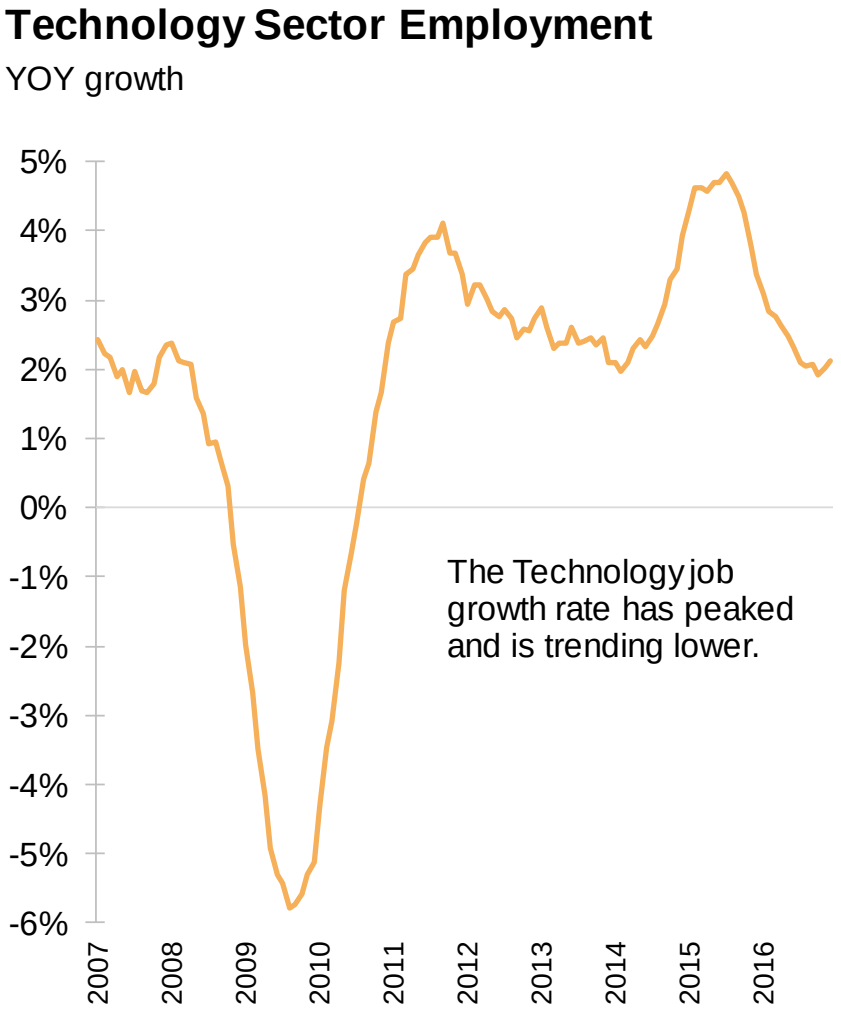
Tech Employment Up, But Job Growth is Slowing

Employment up since bottoming in late 2009, but job growth is slowing





*Technology jobs are defined as Bureau of Labor Statistics (BLS) NAICS codes:
Computer and Electronic Products, Data Processing & Hosting, Computer Systems Design and Related Services

Source: John Burns Real Estate Consulting, LLC; Bureau of Labor Statistics (BLS) (Data: Dec-16, Pub: Feb-17)

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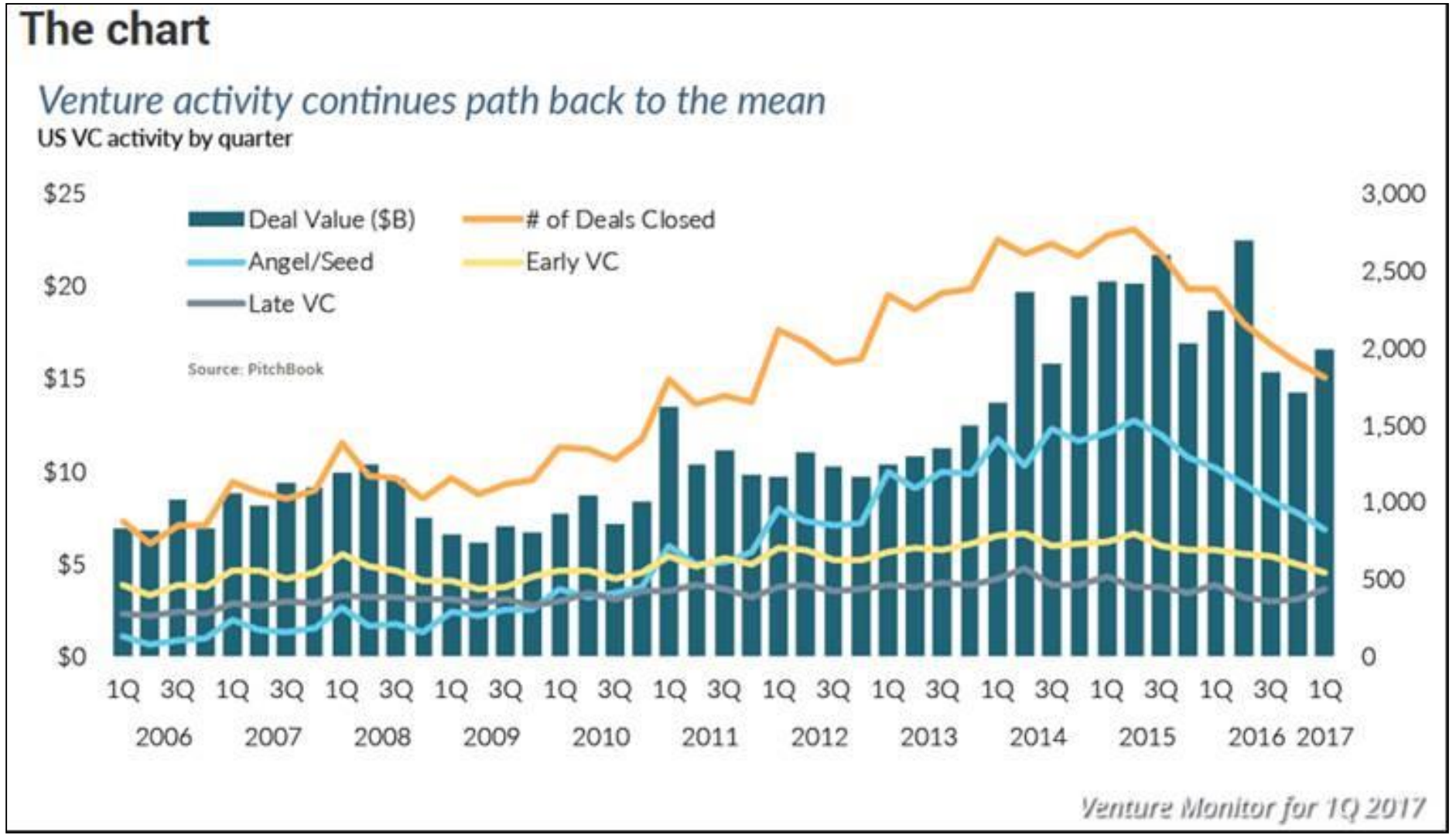
Venture Capital is a Precursor for the Tech Economy



Source: National Venture Capital Association

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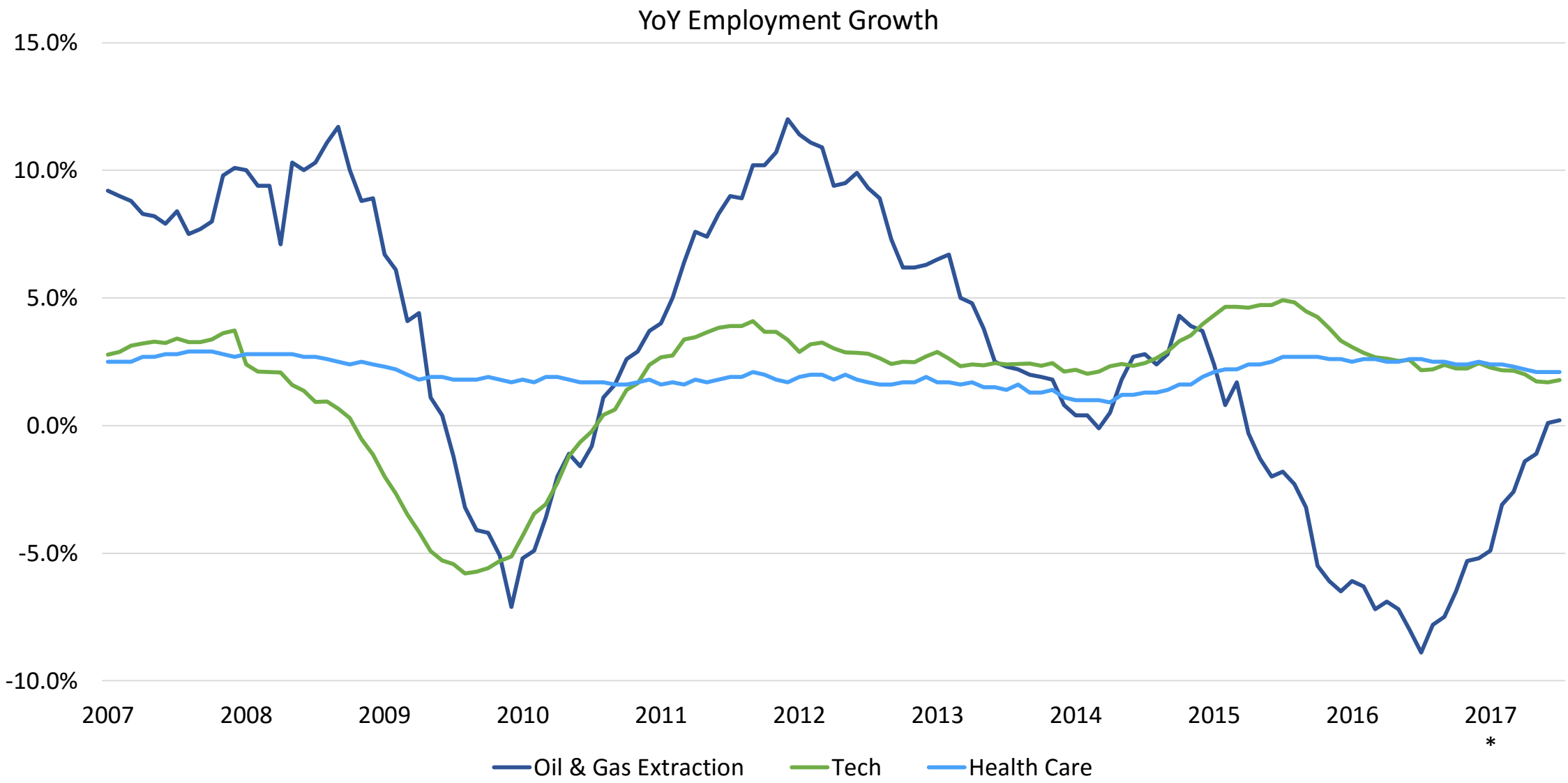
Former Engines of Expansion Rebalancing but Sustaining



*Through July 2017

Source: Bureau of Labor Statistics (BLS)

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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

Source: Yardi®Matrix, Evercore ISI

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

Pro-Growth

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

Generally Positive Progress

Pro-Growth but Slow

- Tax Reform
- Healthcare Reform
- Infrastructure
- Education Reform
  - German Model

Progress in Tone, but Not Yet Substantive

Anti-Growth

- Immigration Control
- Trade Renegotiation

Noise but Some Derivative Impacts

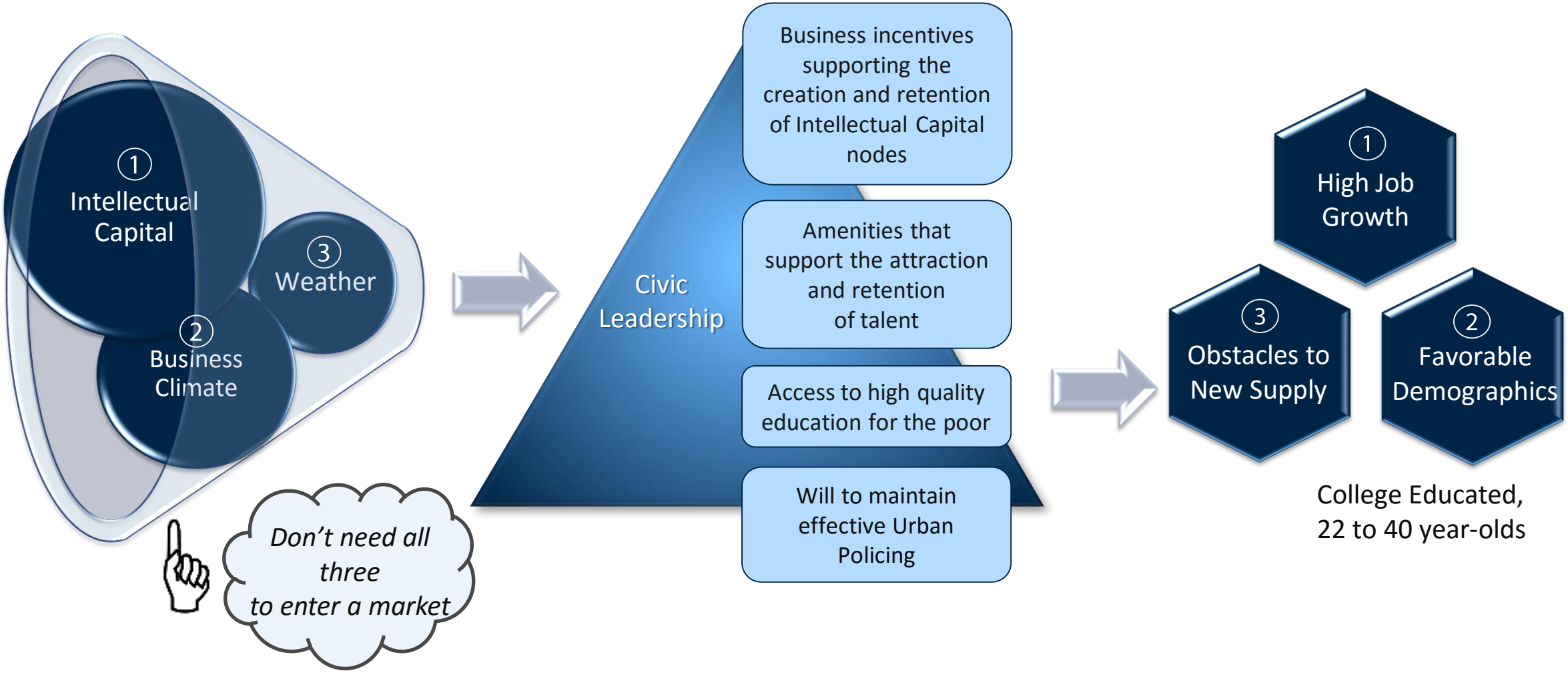
Source: Yardi®Matrix

So What? Economy & Federal Policy

- Job growth overall looks good and reasonably steady – demand shock unlikely
- Inflation is range bound and unlikely to break out – either up or down
- Near term (12-24 months) pressures are building in the sectors that led us out of the last recession:
  - Technology and Healthcare – could be mitigated by pro-growth fiscal policy
- Job formation, and wealth creation has been highly concentrated in urbanized metro areas
- Long term sector fundamentals still favor tech—but broadly speaking
- Positive public policies can extend the expansion

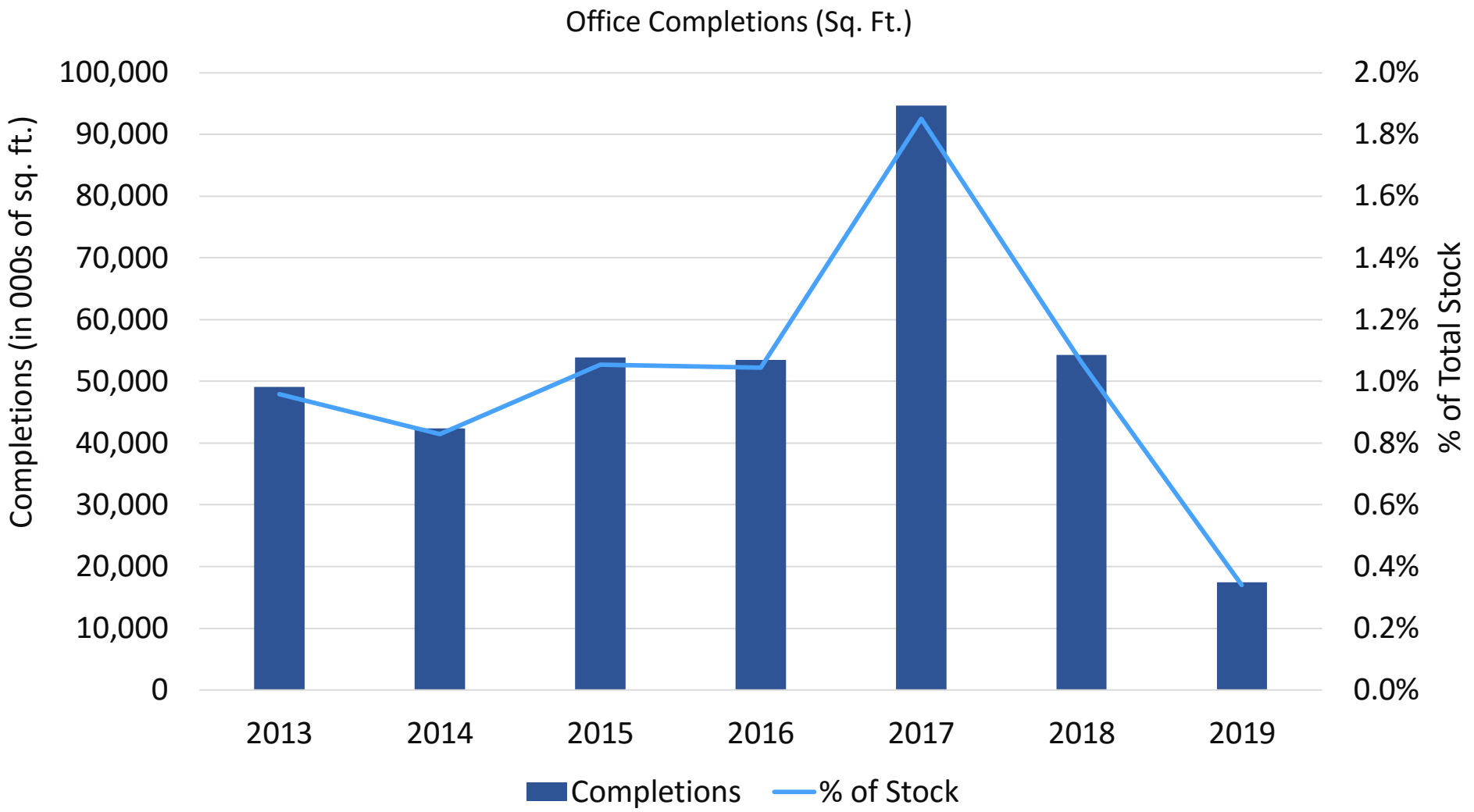
Source: Yardi®Matrix

The Investment Decision-Making Process



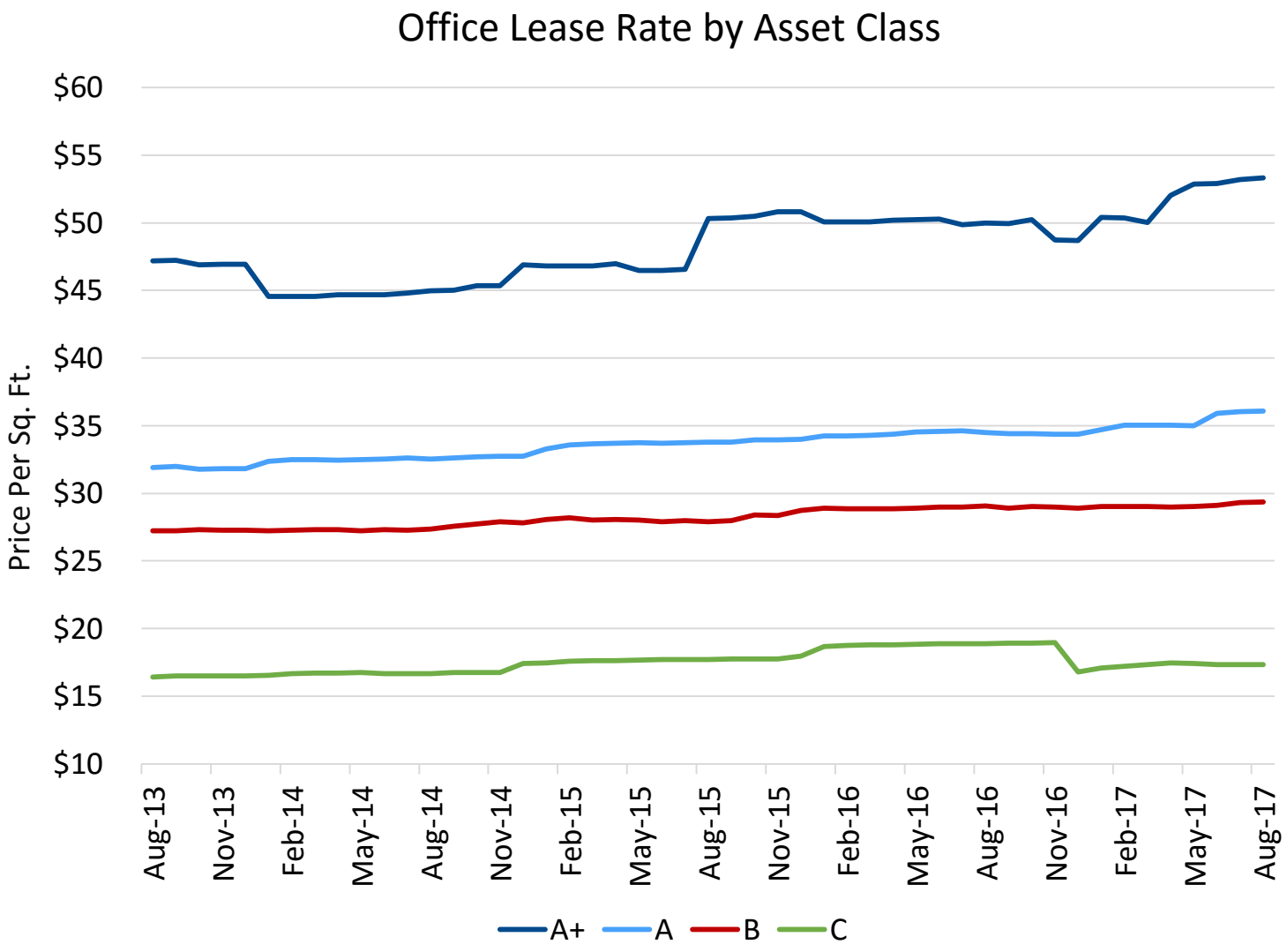
Source: National Resource Network Anchor Institutions Report, 2015; ULI Emerging Trends in Real Estate Report, 2015, 2016; Stephen Klineberg, Kinder Institute for Urban Research; Levitz, Jennifer. "Charter School Battle Heats Up." The Wall Street Journal 11 Oct. 2015

National Office Supply is Expected to Peak in 2017



Source: Yardi®Matrix

Office Lease and Vacancy Rates



Market	Vacancy Rate excluding Sublease	Vacancy Rate Including Sublease
Atlanta	15.3%	15.7%
Bay Area	12.9%	14.9%
Denver	13.1%	13.3%
Fort Lauderdale	14.9%	15.2%
Houston	18.9%	21.7%
Inland Empire	15.4%	15.6%
Los Angeles	13.9%	14.3%
Manhattan	7.1%	8.0%
Miami	12.3%	13.1%
Orange County	10.8%	10.9%
Phoenix	17.7%	18.7%
Sacramento	13.8%	14.1%
San Diego	12.1%	12.7%
San Francisco	7.5%	8.9%
West Palm Beach - Boca Raton	15.9%	16.3%

Source: Yardi®Matrix

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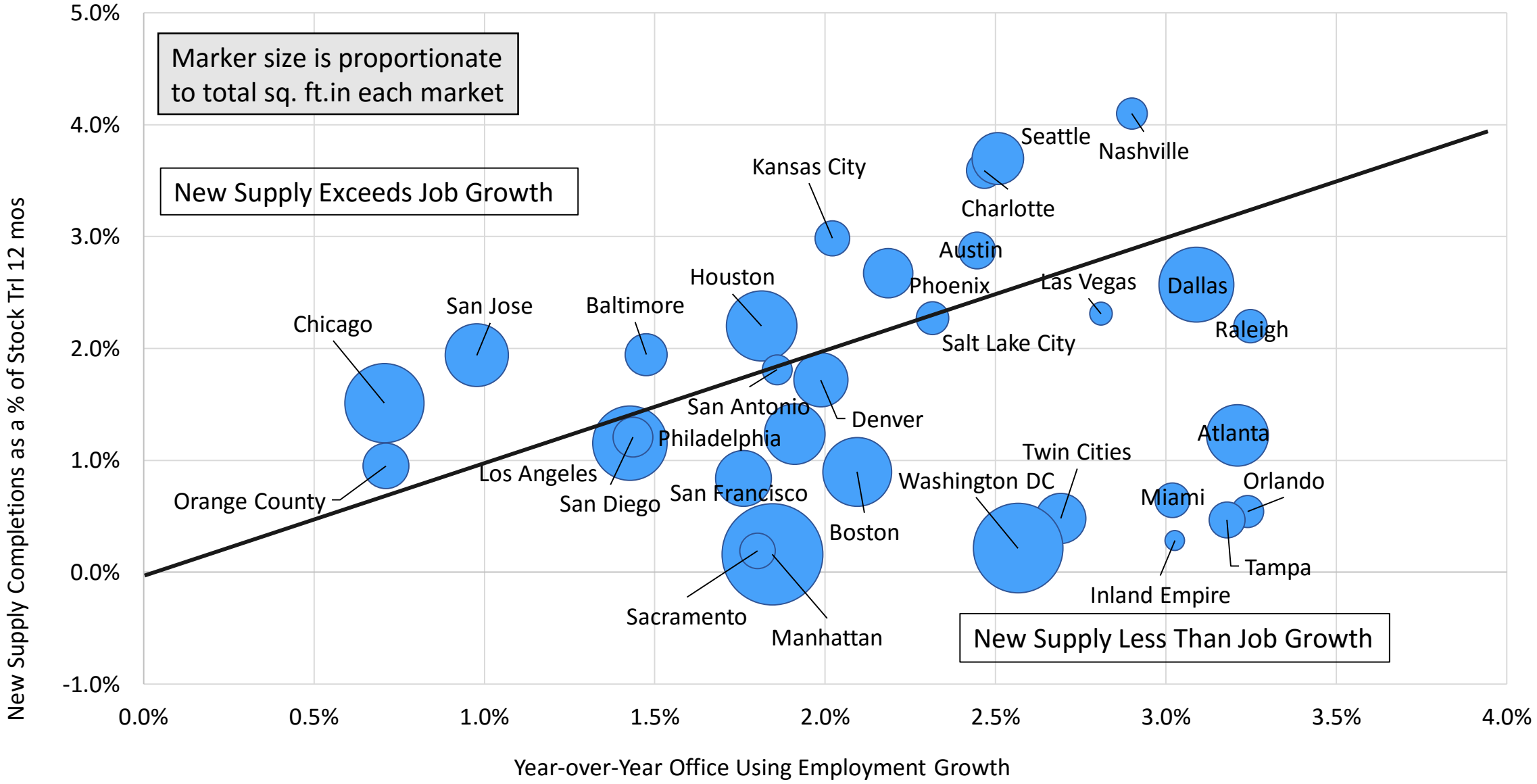
Office Vacancies and Rent Trends

Office lagged the multifamily sector and is still absorbing space, with limited new supply

Metro	Office: Vacancy excluding Sublease	Office: Vacancy including Sublease	Office: Leases Rent Growth Jan 2017-May2017	Office: Under Construction New Supply % of Stock
Los Angeles	12.1%	12.7%	0.8%	3.8%
Orange County	10.0%	10.1%	0.6%	2.5%
San Diego	10.7%	11.3%	-0.2%	1.1%
Inland Empire	15.6%	15.6%	0.0%	0.8%
San Francisco	7.2%	8.4%	2.3%	6.6%
Bay Area	11.6%	13.3%	1.7%	7.0%
Phoenix	16.1%	16.8%	0.8%	1.3%
Atlanta	14.1%	14.2%	0.8%	3.1%
Miami	10.6%	11.2%	-0.4%	3.2%
Fort Lauderdale	14.4%	14.7%	-0.7%	2.3%
West Palm Beach	14.5%	14.8%	0.3%	0.2%
Manhattan	7.4%	7.8%	0.6%	3.8%

Source: Yardi® Matrix

Office-Using Employment Growth Outpacing Supply



Source: Yardi®Matrix

Office – Under Construction Inventory as a % of Stock

Primary Markets

Market	Under Construction % of Stock
Boston	2.5%
Chicago	2.0%
Los Angeles	2.0%
Manhattan	4.2%
San Francisco	**7.4%**
Washington DC - Suburban Maryland	2.3%
National Average	**2.5%**

Data as of August 28, 2017
Source: Yardi®Matrix

Office – Under Construction Inventory as a % of Stock

Secondary Markets

Market	Under Construction % of Stock
Atlanta	3.9%
Austin	**6.0%**
Bay Area	**6.4%**
Brooklyn	**14.8%**
Charlotte	4.1%
Dallas - Fort Worth	5.2%
Denver	2.9%
Houston	1.0%
Inland Empire	2.4%
Las Vegas	1.0%
Miami	3.6%
Minneapolis - St. Paul	0.9%

Market	Under Construction % of Stock
Portland	5.3%
Nashville	4.9%
Orange County	2.3%
Orlando	2.3%
Philadelphia	2.4%
Phoenix	1.8%
Raleigh - Durham	3.9%
Sacramento	0.3%
Salt Lake City	0.9%
San Diego	1.0%
Seattle	**6.2%**
National Average	**2.5%**

Data as of August 28, 2017
Source: Yardi®Matrix

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Office – Under Construction Inventory as a % of Stock

Tertiary Markets

Market	Under Construction % of Ctock
Baltimore	1.7%
Birmingham	1.1%
Bridgeport – New Haven	0.3%
Buffalo	0.9%
Central Valley	0.9%
Cincinnati	1.6%
Cleveland - Akron	0.7%
Columbus	2.3%
Dayton	0.2%
Detroit	0.7%
Fort Lauderdale	0.7%

Market	Under Construction % of Stock
Grand Rapids	1.4%
Huntsville	1.7%
Indianapolis	0.6%
Jacksonville	0.5%
Kansas City	0.1%
Lexington	0.6%
Long Island	0.1%
Louisville	1.8%
Memphis	5.0%
Mobile	1.5%
New Jersey	0.9%

Market	Under Construction % of Stock
Pittsburgh	0.4%
Portland ME	0.8%
Providence	2.2%
Rochester	1.9%
San Antonio	2.1%
South Carolina	1.0%
Southwest Florida Coast	**7.2%**
Tampa - St Petersburg - Clearwater	0.6%
West Palm Beach - Boca Raton	0.2%
Winston-Salem - Greensboro	0.4%
National Average	**2.5%**

Data as of August 28, 2017
Source: Yardi®Matrix

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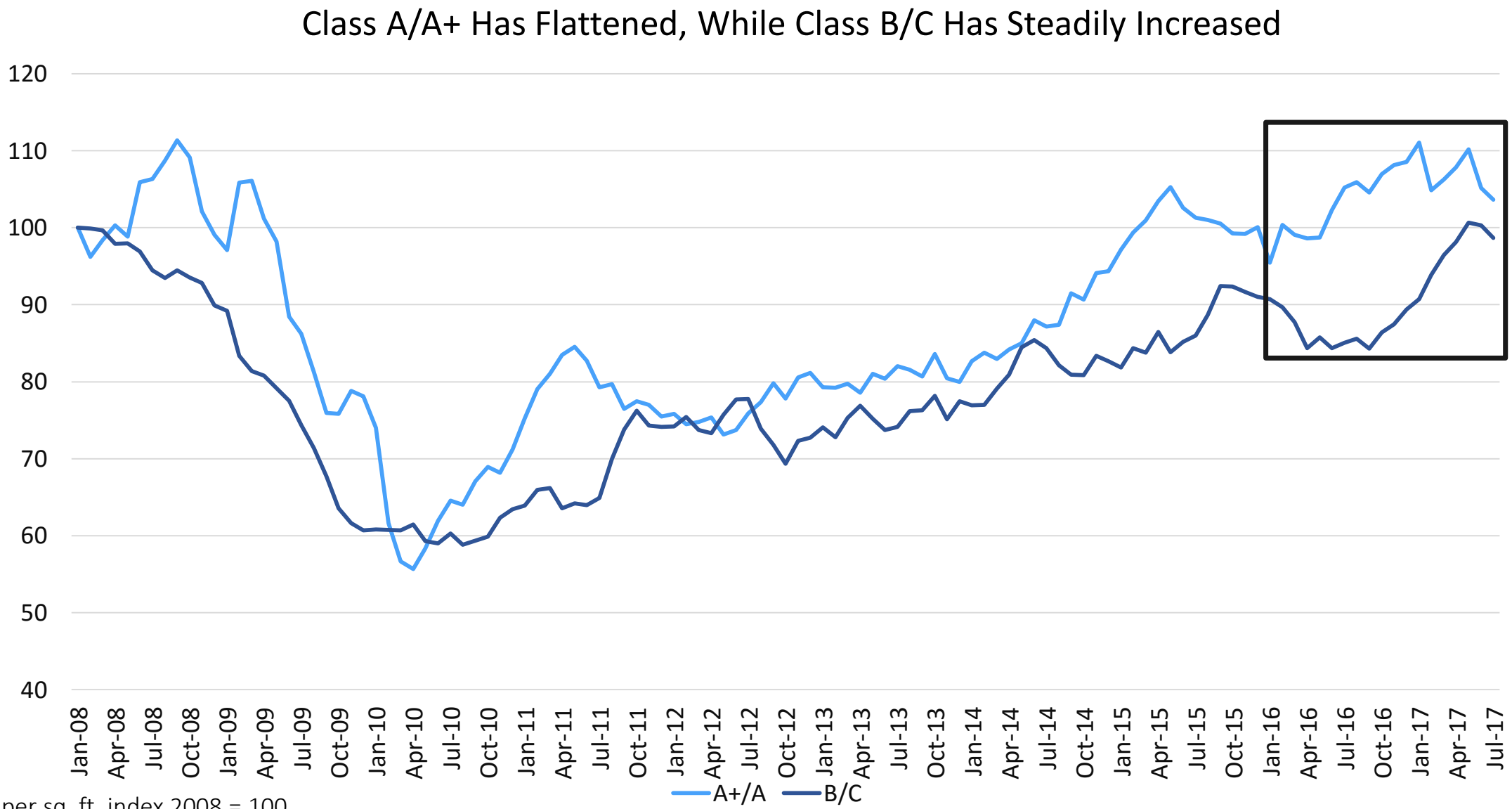
Office Price Per Sq. Ft. Index 2008-2017



Sales price per sq. ft. index 2008 = 100

Source: Yardi®Matrix

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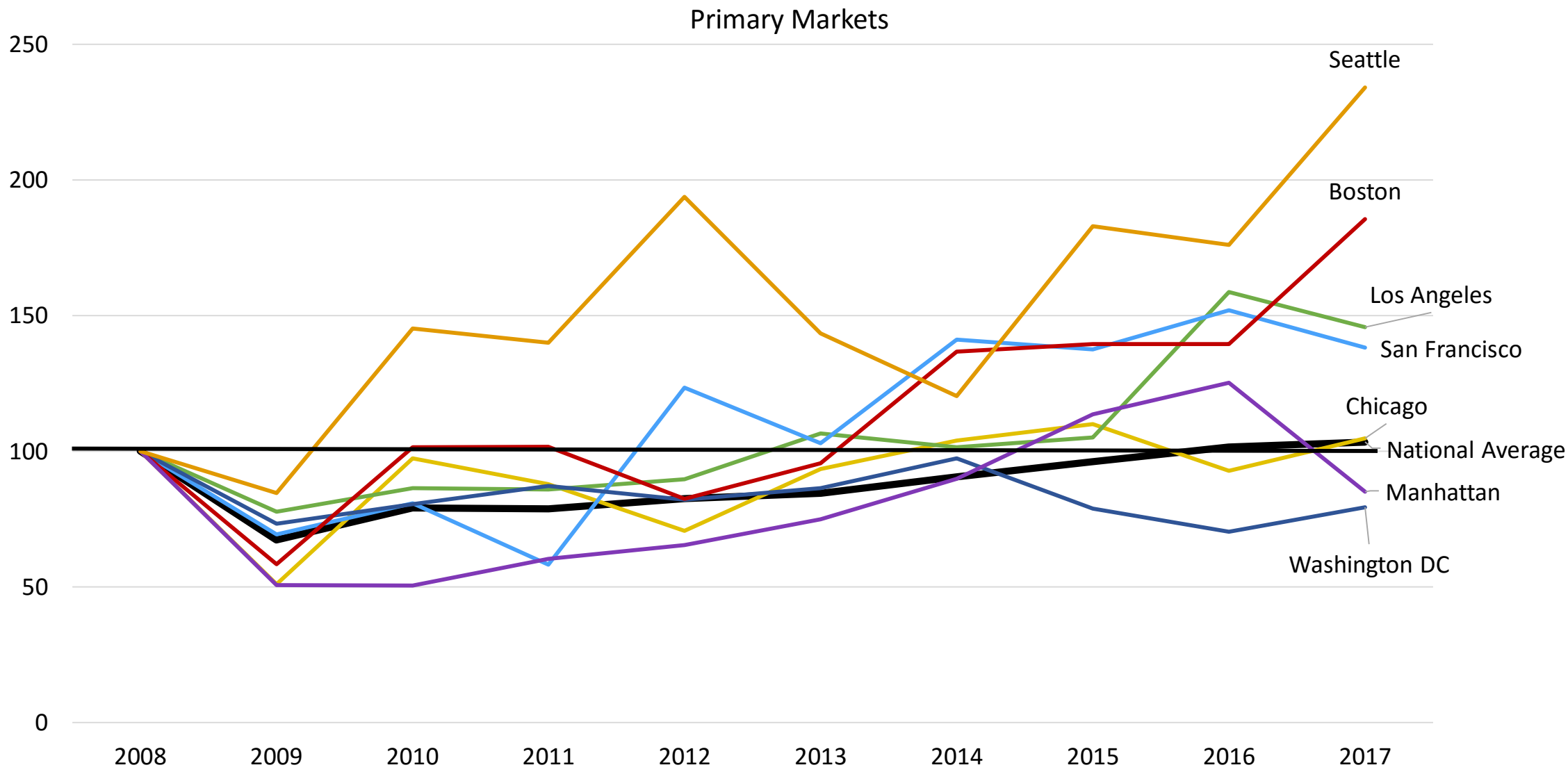
Sales Price Per Sq. Ft. Index 2008-2017



Sales price per sq. ft. index 2008 = 100

Source: Yardi®Matrix

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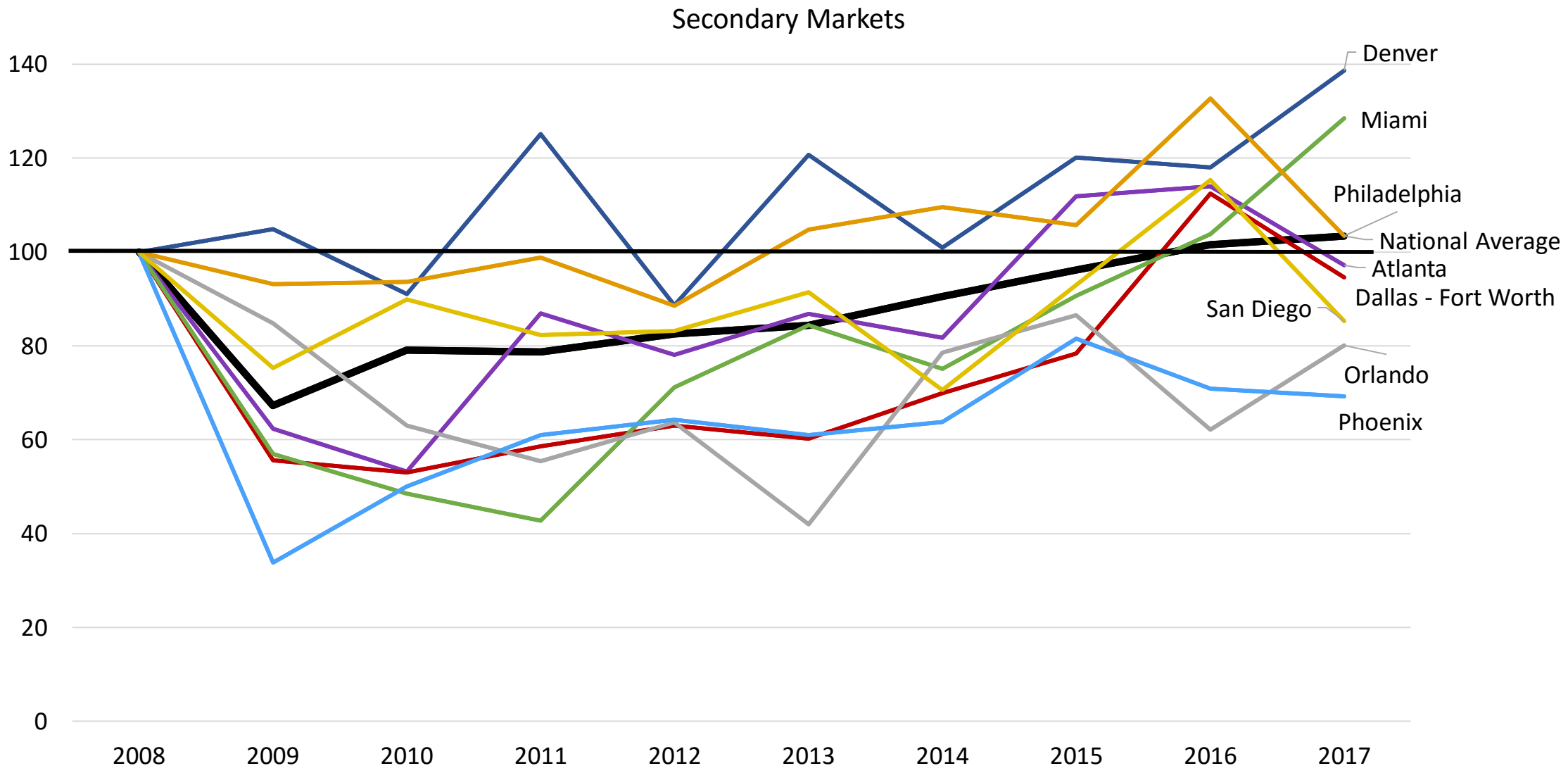
Sales Price Per Sq. Ft. Index 2008-2017



Sales price per sq. ft. index 2008 = 100

Source: Yardi®Matrix

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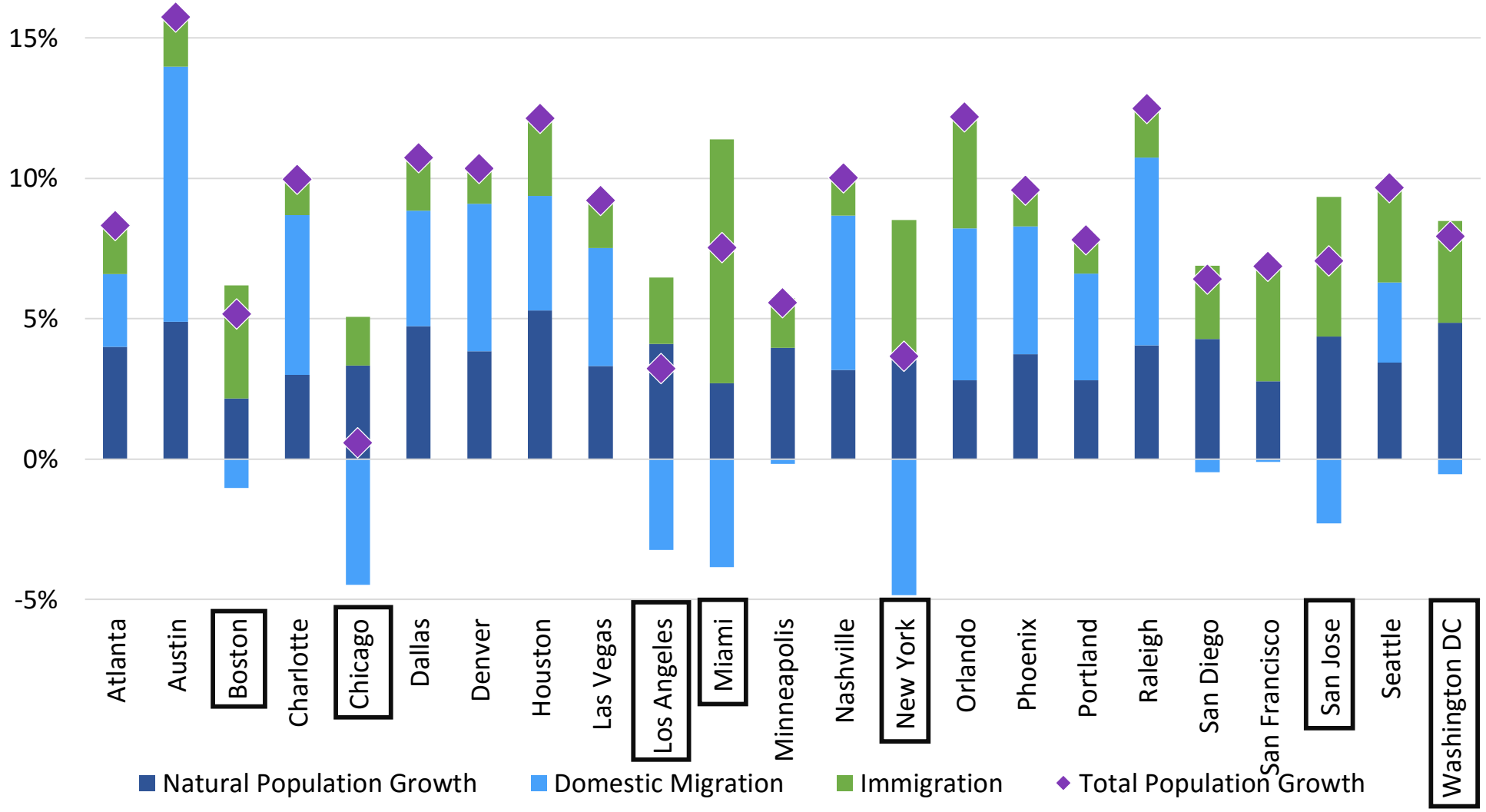
Foreign Immigration Drives International Gateway City Growth



*2011-2016

Source: U.S. Census Bureau (BOC); Moody's Analytics

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Gateway Cities Exposed

International cities' net migration deficit is only made up by immigration.

Within that, certain industries and cities are impacted by specific programs:

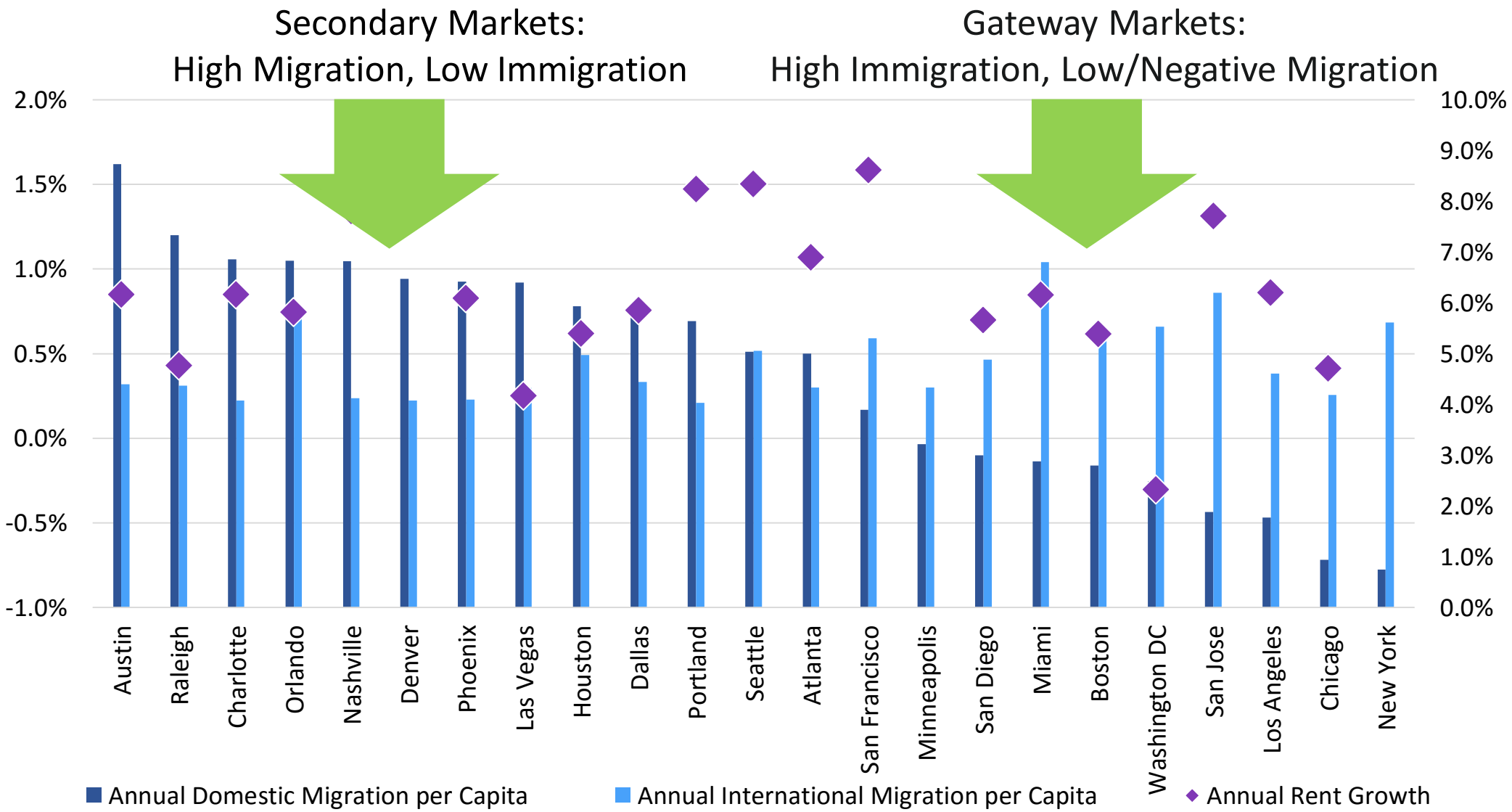
H1-B /EB-5	Industries Affected
• San Francisco	Tech, Finance
• Boston	Tech, Healthcare
• New York	Finance, Tech
• Washington, D.C.	Healthcare, Defense

Certain cities, while not international gateways, are exposed to a lesser degree:

H1-B /EB-5	Industries Affected
• Seattle	Tech
Restrictive Borders	
• Miami	Hospitality
• Orlando	Hospitality, Construction
• Los Angeles	Construction

Source: Yardi®Matrix

Immigrant vs Domestic Migrant Patterns



*2012-2016 Migration Data

Source: U.S. Census Bureau (BOC); Moody's Analytics; Yardi® Matrix

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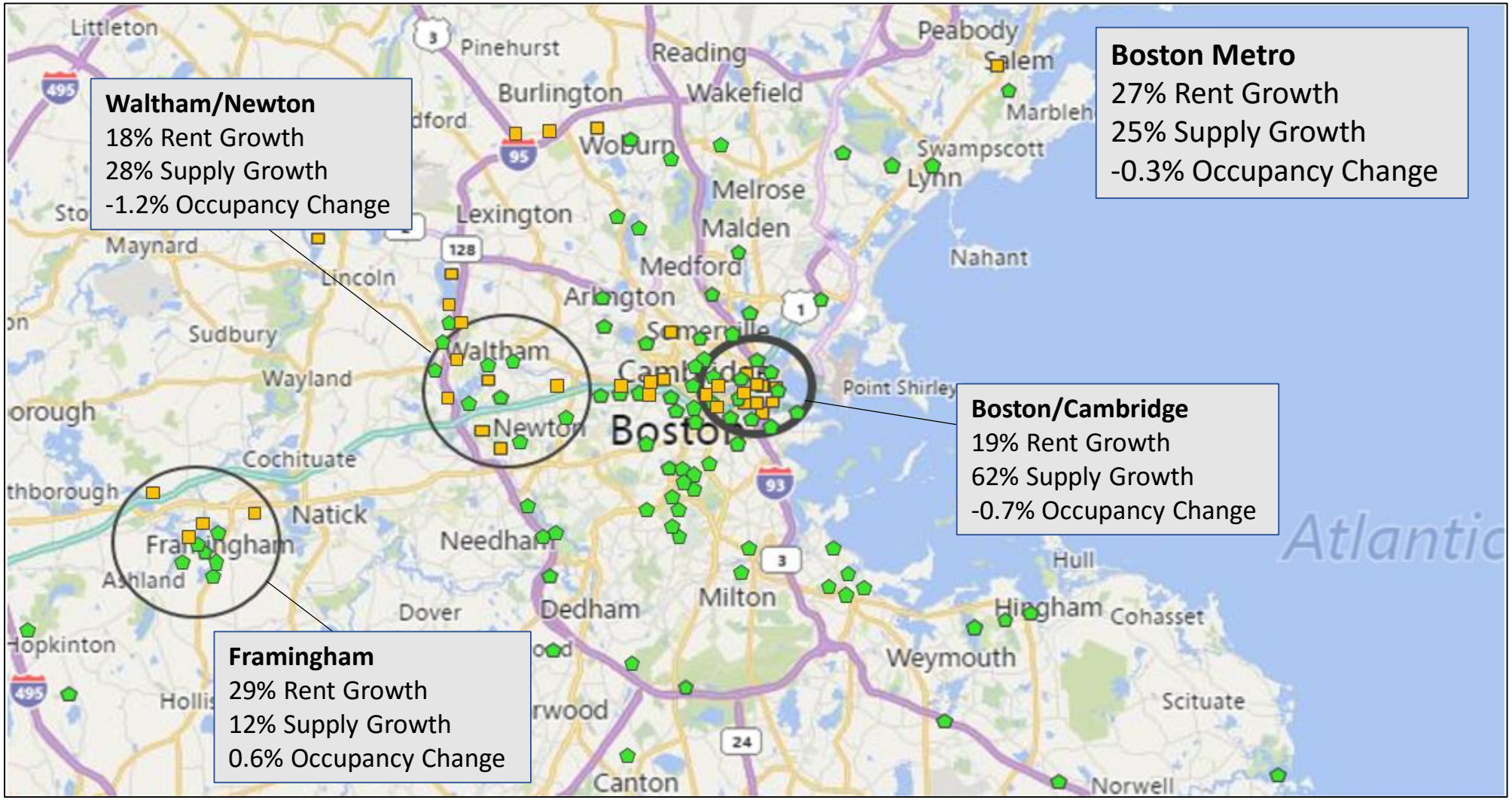
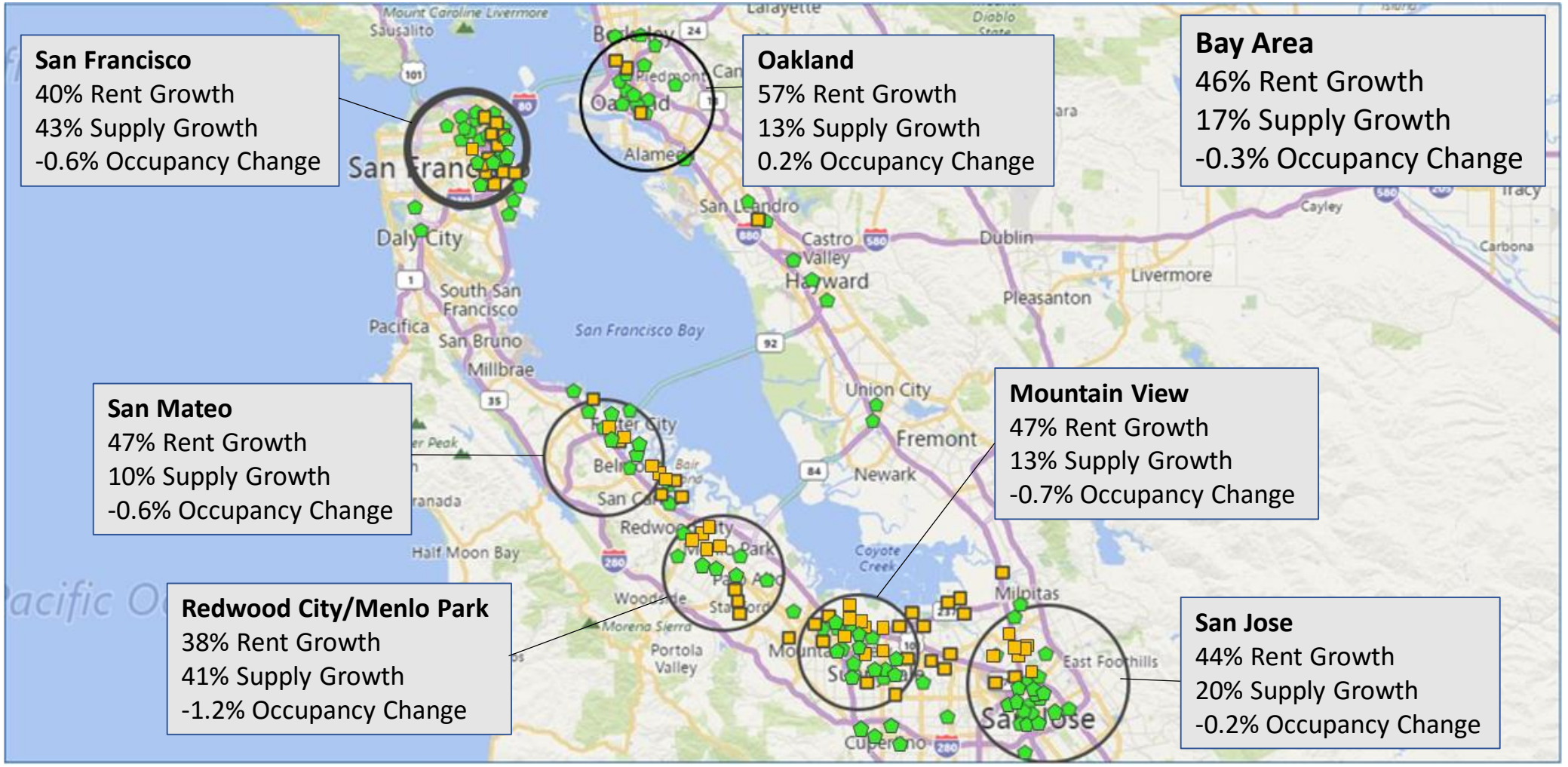
Intellectual Capital Nodes - Boston



Office Development Multifamily Development

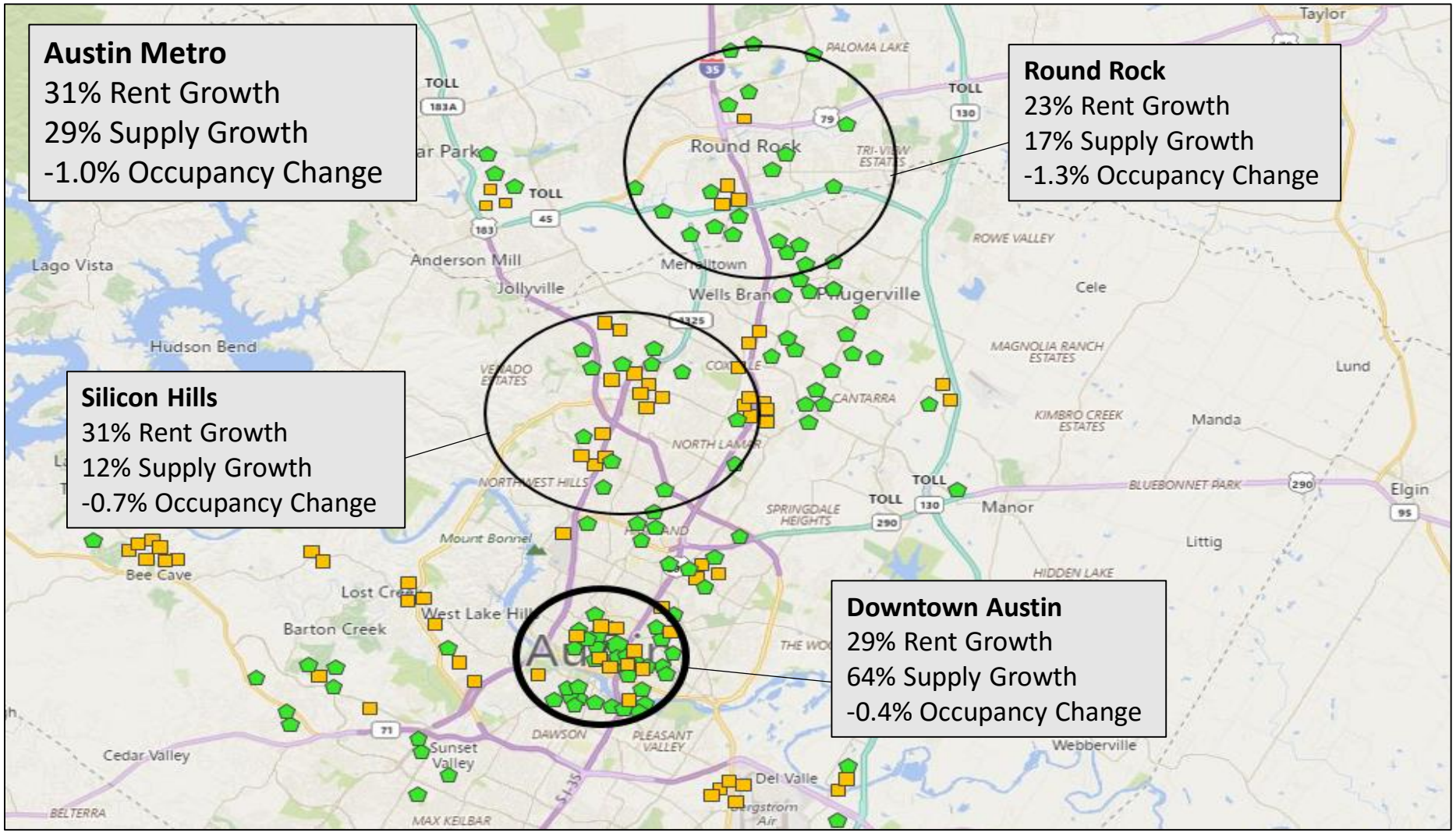
* Multifamily rent and supply growth based on May 2012 through May 2017
* Change in multifamily occupancy based on April 2016 through April 2017
Source: Yardi® Matrix

Intellectual Capital Nodes – San Francisco



* Multifamily rent and supply growth based on May 2012 through May 2017
* Change in multifamily occupancy based on April 2016 through April 2017
Source: Yardi® Matrix

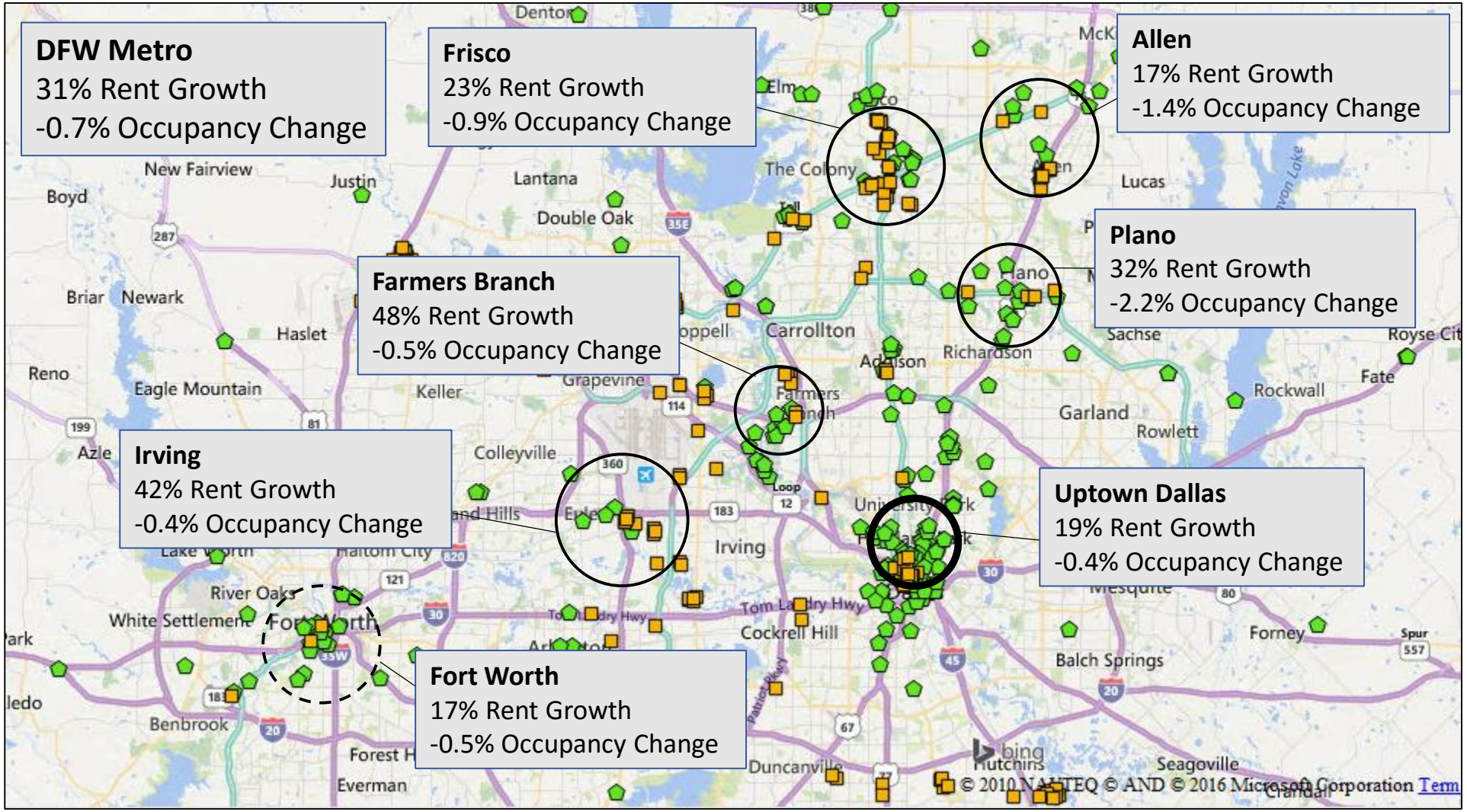
Intellectual Capital Nodes - Austin



* Multifamily rent and supply growth based on May 2012 through May 2017
* Change in multifamily occupancy based on April 2016 through April 2017

Source: Yardi® Matrix

Intellectual Capital Nodes – Dallas-Fort Worth



Office Development Multifamily Development

* Multifamily rent and supply growth based on May 2012 through May 2017
* Change in multifamily occupancy based on April 2016 through April 2017
Source: Yardi® Matrix

Space Utilization is Becoming More Fluid and Flexible

In the future, space will have to be more flexible as the pace of use changes

"Play"

Retail

- Existing lower-end retail will merge with office to salvage value
- More experience-driven and less "things"
- Industrial replaces retail space
- Reimagined malls/entertainment centers/distribution centers

"Work"

Office

- Will merge with retail experiences and short-term living experiences
- Reimagined suburban office parks

"Live"

Multifamily

- Proximity is already important, work and play will become increasingly important in "urban-like nodes" in what has been suburbia
- Flexible use of space and leases

Already Beginning to Happen

Source: Yardi®Matrix

So What? Real Estate Fundamentals

- The next 18-24 months will be a “slow-grind” while office using employment slowly increases
  - New supply in key markets needs to get absorbed
  - Int’l Gateway City out-migration will accelerate as the cycle lengthens
  - International gateway cities are most impacted by federal immigration policy
- Asset value appreciation will be very closely linked to cash flow generation
- Move to suburban “urbanized” nodes already underway
- Operational efficiency should be the main near-term objective in all its forms
  - Marketing Spend, Maintenance Expense, Turn Costs, Energy,
  - Retention, Leasing cycle time and visibility

Source: Yardi®Matrix

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 Electricity

*Electric & Autonomous Vehicles
- Lithium-Ion Batteries
- LIDAR Sensors

IoT/Sensors
- Smart home
  - Amazon Echo
  - Nest Thermostat

Artificial Intelligence/Robotics
- Drones
- Virtual Realty

"Taken-for-Granted" Tablestakes

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

Collaboration
- Mobile apps
- Connectivity and free-up trapped resources

*Focus today on these two

Source: Yardi®Matrix

Technology Disruption Model

Technology

- **Lithium Ion Battery** is a new technology, but it won't lead to disruption on its own
- Converge with other technologies + business model innovation for disruption

Technology Convergence

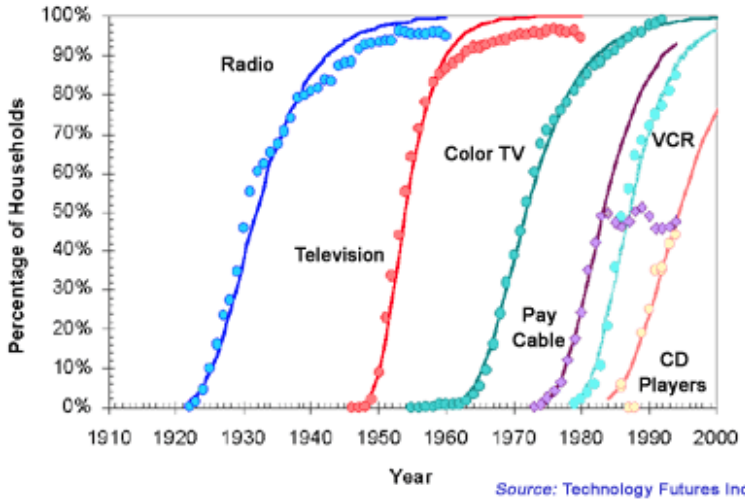
- New functionalities possible when several technologies converge
- **Lithium Ion Battery** + Data Storage + Computing + Digital Imaging + Network Capacity ….
  = **Smartphone**

Business Model Innovation

- Smartphone + Cloud convergence enabled **Uber** (business model innovation)
- Loan financing or cost sharing will drive down current cost of usage

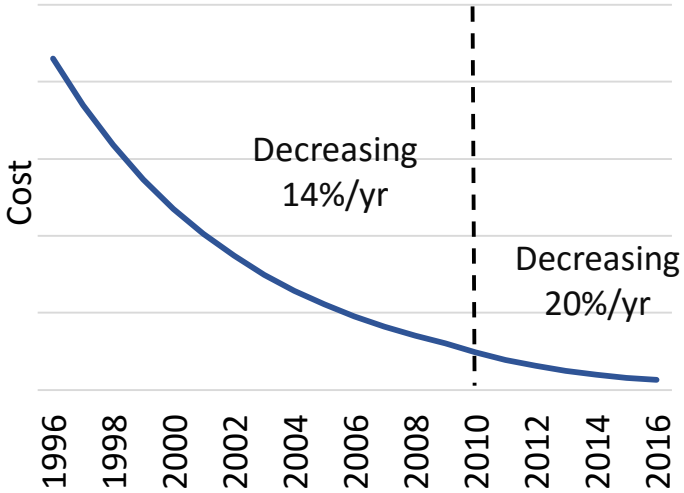
Technological Disruption

- Several technologies + business model innovation converge to enable certain functionality at a certain cost
- Cost reduction will lead to disruption, adapted as an S-Curve



Horse → Car
Telephone → Cellphone
Taxi → **Uber**

Lithium-Ion Cost Curve



Example:

Lithium Ion Battery **(Technology)**

Touchscreen + Computing + Digital Imaging + Lithium Ion Battery = Smart Phone **(Convergence)**

Smart Phone + Cloud = Uber **(Business Model Innovation)**

Uber is a disruption of the taxi business!

Source: Tony Seba, Clean Disruption of Energy and Transportation; Technology Futures Inc.

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Energy Disruption Model

Battery Cost

- Investment in vehicle and grid markets driving down cost of batteries
- Energy storage can lead to disconnection from the grid, avoidance of peak load pricing **(SOLAR)**
- Declining battery costs result in lower-cost electric cars, and vice versa
- Electric vehicles are 10x cheaper to charge/fuel than vehicles with internal combustion engines
- Li-ion battery cost dropping rapidly, 16-20% per year
  - Result of major industries heavily investing, more research and development, more scale

Solar Panels Cost

- Solar PV cells cost ~ $0.35/per watt, and continues to drop
- Solar accounts for 39% of new electricity generation last year, more than any other source
- Grid parity – when solar is as cheap or cheaper than what we pay the utility
- Currently lowest cost for stand alone generation, but next will be new central generation, then individual business generation, then consumer generation
- Eventually, the cost of solar on your rooftop will cost less than transmission, thanks to **STORAGE**

Financing

- Solar-plus-battery systems are long-term assets
  - Upfront capital cost
  - Likely to be financed at some interest rate
  - Paid off in monthly installments
- Landlord can finance cap ex as part of building revenues

Rapid adoption

Source: Tony Seba, Clean Disruption of Energy and Transportation; Rocky Mountain Institute, The Economics of Grid Defection; Barron's

Electricity Cost to End Users

	Generation		Transmission		Total	
Central Plant (Arizona)	$0.20/kWh	+	$0.09/kWh	=	$0.29/kWh	
Solar + Storage at Home (By 2020)	$0.04/kWh	+	$0.03/kWh	=	$0.07/kWh	
Tucson Electric Power	$0.03/kWh	+	$0.015/kWh	=	$0.045/kWh	★
Australia	$0.07/kWh	+	$0.12/kWh	=	$0.19/kWh	

"Post 2020, there may never be another peaker built in the U.S." – NextEra Energy CEO Jim Robo

Source: Tony Seba, Clean Disruption of Energy and Transportation

Solar + Storage: Grid-Scale and Consumer Scale

Grid System

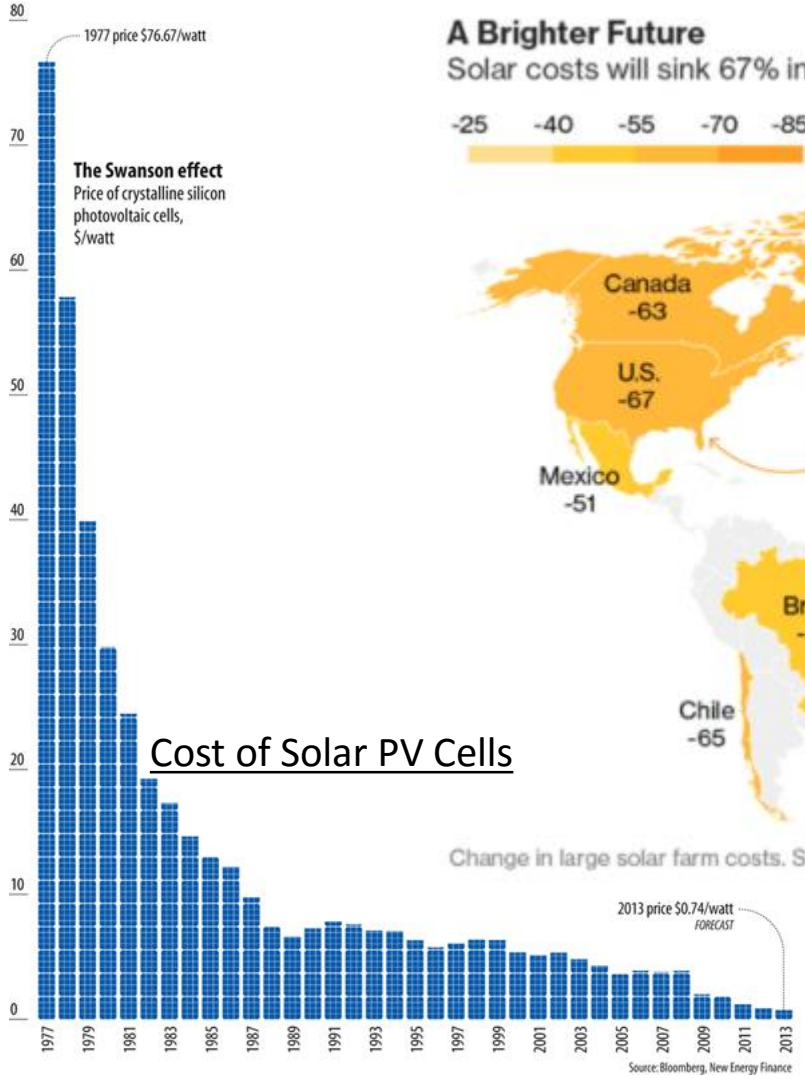
- 396 stacks of Tesla batteries installed in Southern California Edison's Mira Loma substation, with 20 MW of energy storage capacity
- System sucks up electricity from the grid during the day and feeds it back into the system at night
- Can power roughly 15,000 homes over 4 hours
- Estimated cost of roughly $29 million and took just under 3 months to complete
- PG&E's Colusa Generating Station, a 660 MW natural-gas fired power plant, cost roughly $450 million and took 2 years to complete!

Home System

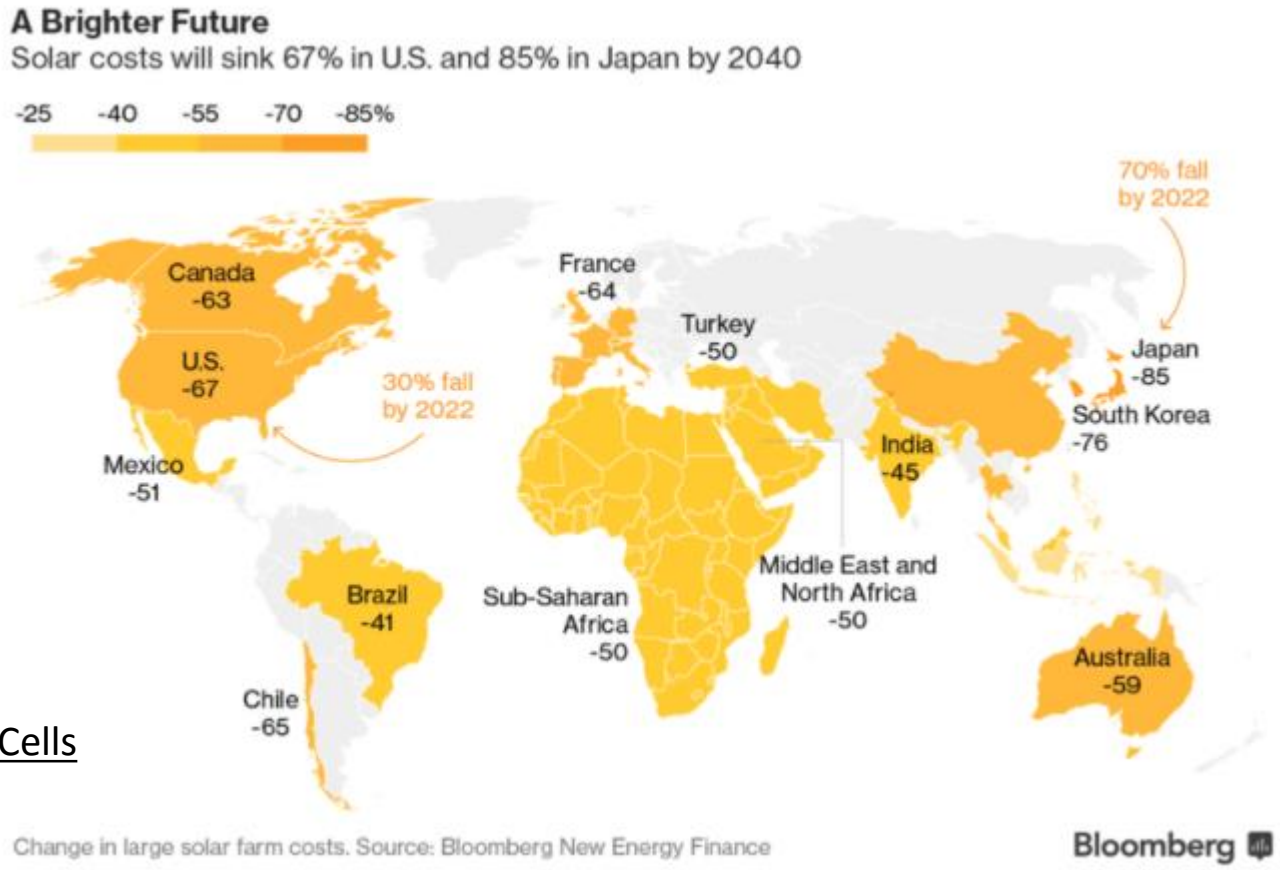
- Home battery (Lithium-Ion)
- Integrates with Tesla Solar
  - Stores surplus energy from solar panels for use at night and during utility outages
  - Uninterrupted service day and night
- Battery can draw electricity from the utility grid when rates are low and store it for later use
- Completely automated and requires no maintenance

Source: nytimes.com; Tony Seba, Clean Disruption of Energy and Transportation; energy.ca.gov; tesla.com; businessinsider.com

Solar Energy is Becoming More Affordable



Cost of Solar PV Cells



Prices could go up, though…

- Chinese control 2/3 of the market
- U.S. companies want to impose tariffs on foreign solar cells and modules
- Solar cells currently cost about $0.35-$0.40/watt
- Tariff of $0.25/watt for solar cells
- Tariffs of $0.32/watt with floor price of $0.74/watt for solar modules
- ITC will vote late October, and Trump administration will decide mid January
- Could result in solar electricity rising 30% if accepted!

Source: Bloomberg New Energy Finance; Tony Seba, Clean Disruption of Energy and Transportation; cleantechnica.com; wsj.com

Solar Will Be Adopted When It's Economical

Disintermediation Starts at Highest Cost

- Islands
- Peak Load Pricing

Copenhagen International School in Denmark

- Building is completely covered by solar tiles
- Provides 300 MWh of electricity per year, accounting for 50% of the school's energy needs

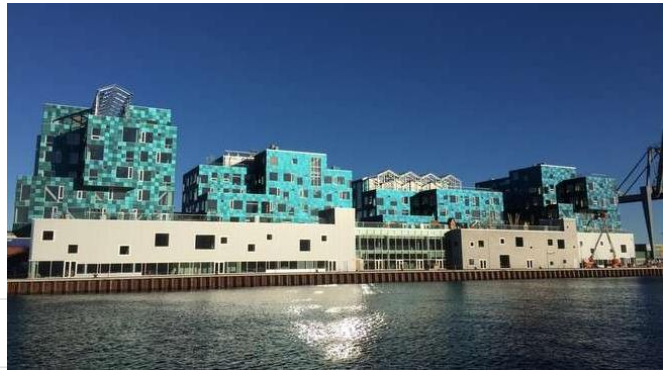
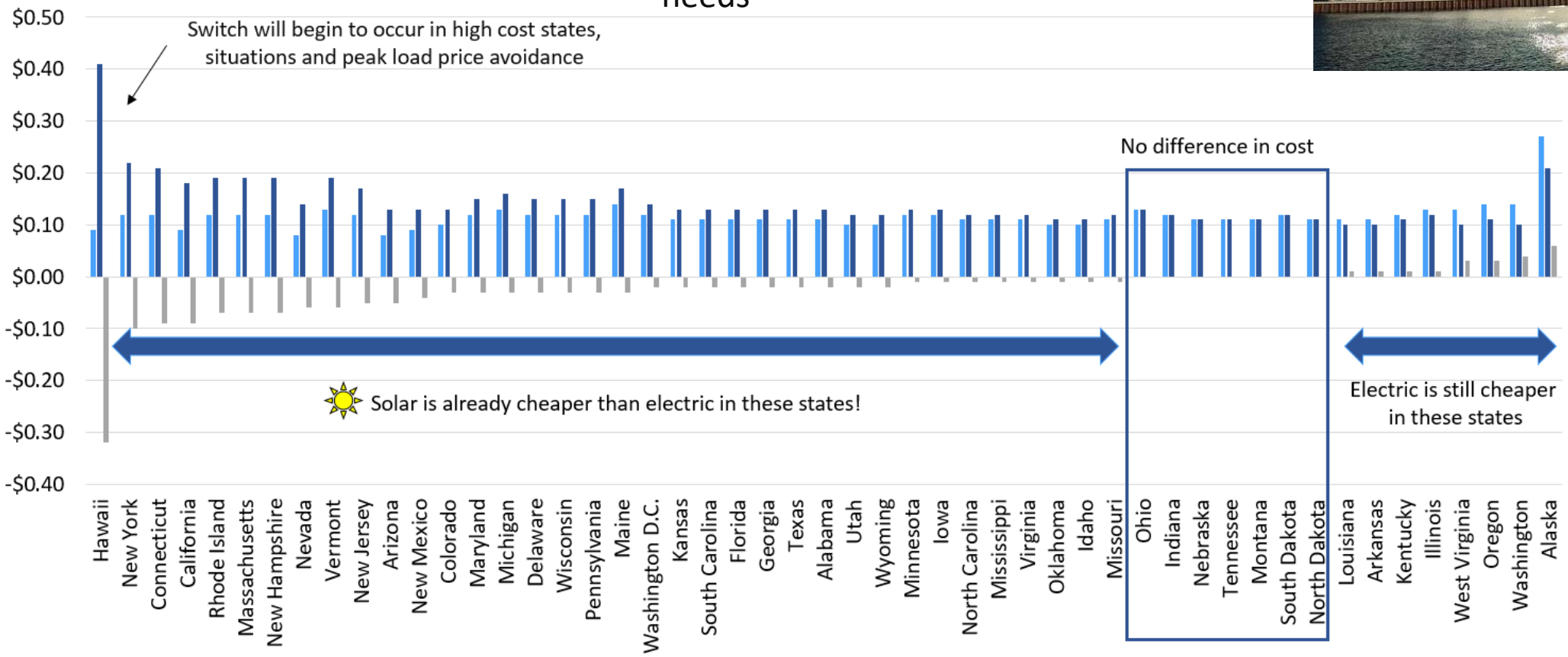


Photo: EPFL



Source: dailyplanet.climate-kic.org; Tony Seba, Clean Disruption of Energy and Transportation; Deutsche Bank

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Further Innovation: Tesla Solar Roof

- No longer need solar panels attached to roof
- Now your actual roof can turn sunlight into electricity with glass solar tiles developed by Tesla
- Integrates with Tesla Powerwall home battery
  - Provides backup power during utility outages and natural disasters
  - Energy collected during the day is stored and made available any time

Switch will first come in business, later among consumers

Available Now

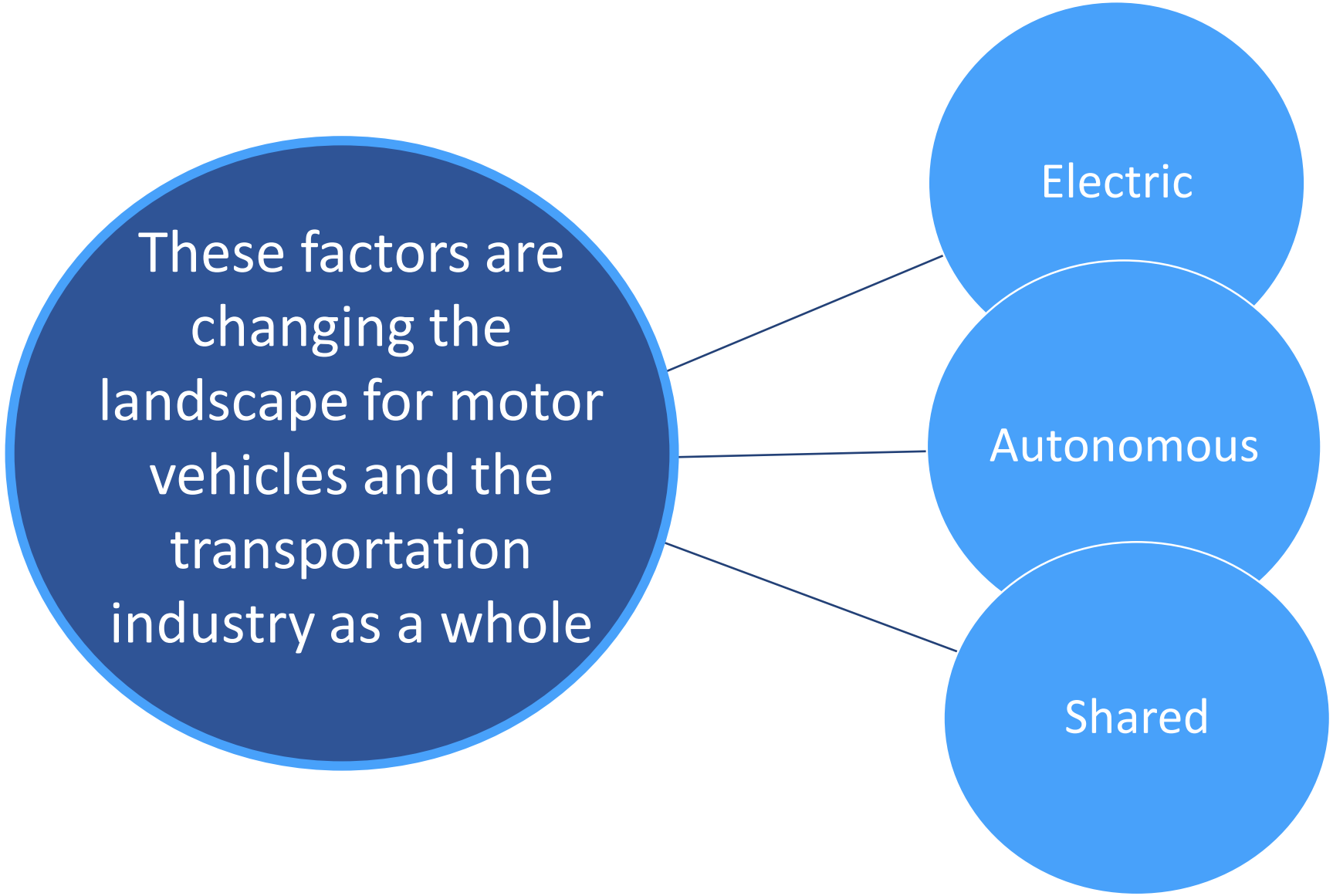
Available Now

Coming in 2018

Coming in 2018

Source: tesla.com; Tony Seba, Clean Disruption of Energy and Transportation

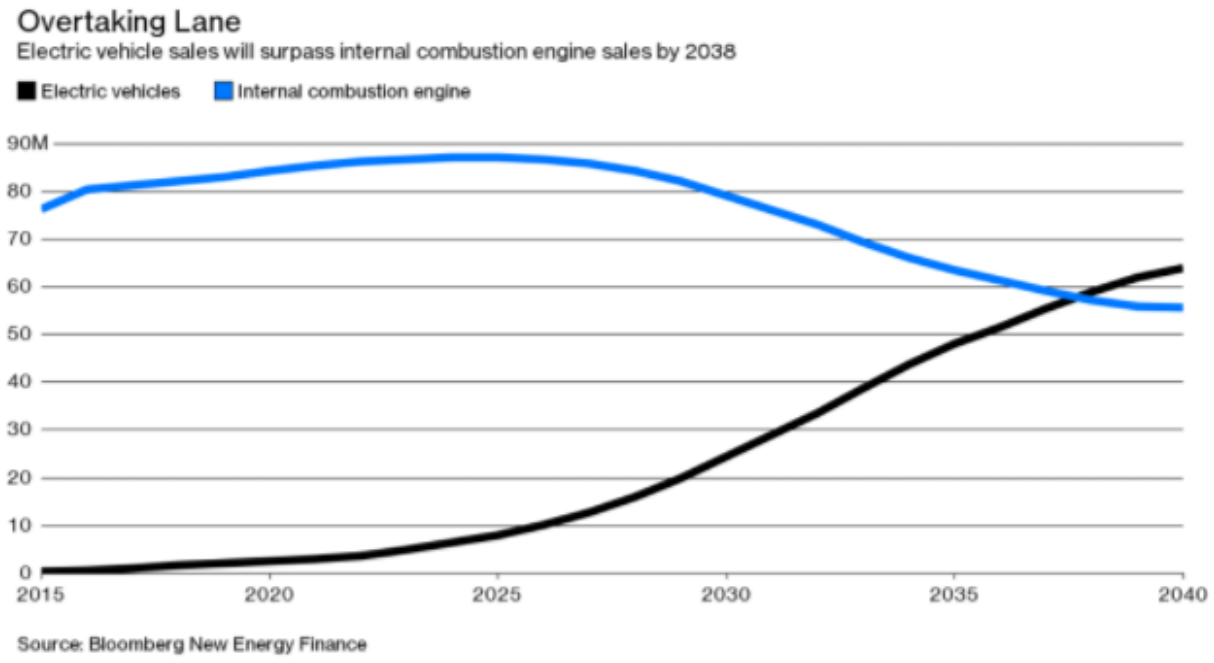
The Consumer Transportation Industry is Changing

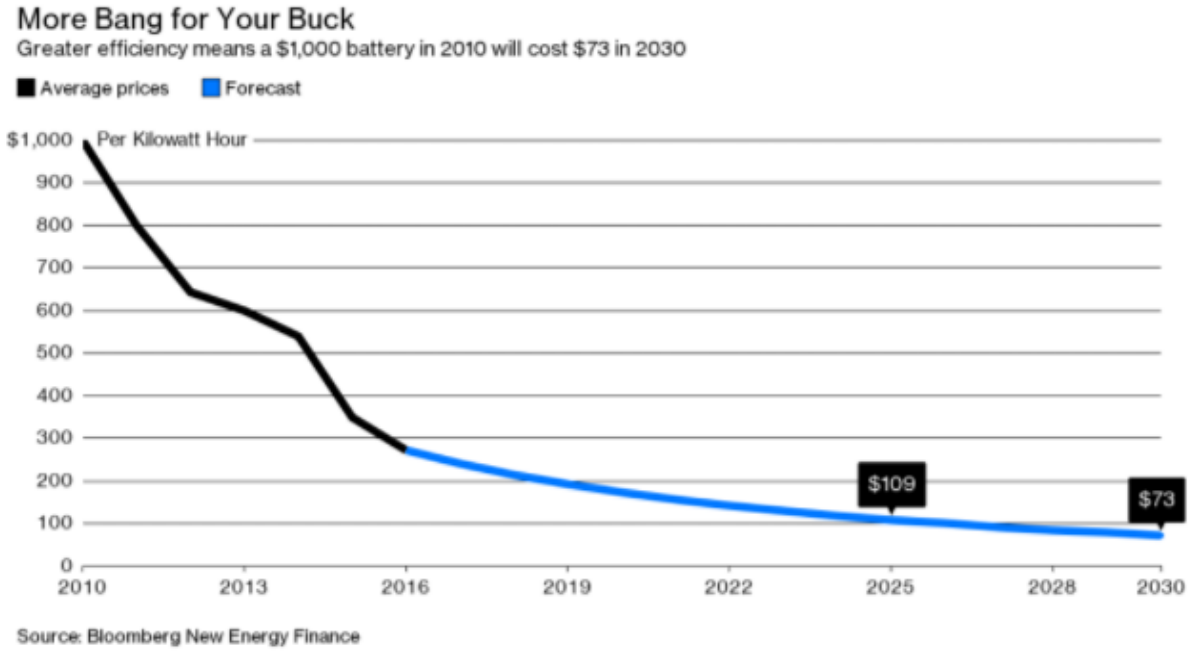


Source: Yardi®Matrix

Electric Vehicles Will be the Standard in Coming Years

- Regulators seeking to reduce automotive CO2 emissions – cost for gasoline cars will increase
- Meanwhile, cost of building cars and Li-ion batteries are falling, making electric vehicles more affordable
- It makes economic sense:
  - 18 moving parts (EV) **vs.** 2,000 (gasoline)
  - 90-95% efficient (EV) **vs.** 17-21% efficient (gasoline)
  - EV is cheaper to fuel, cheaper to maintain, and lasts longer…

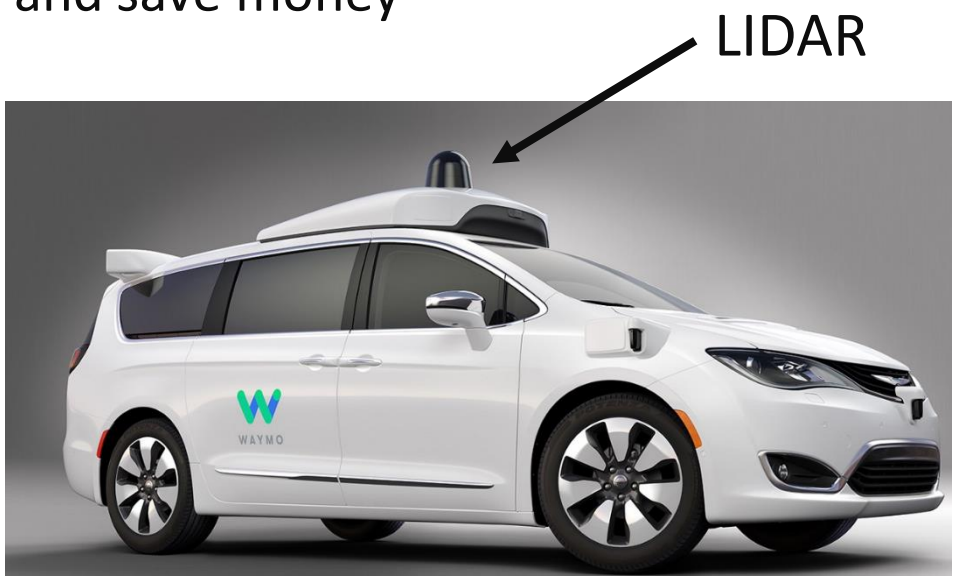




Source: Bloomberg New Energy Finance; Tony Seba, Clean Disruption of Energy and Transportation; Barron's

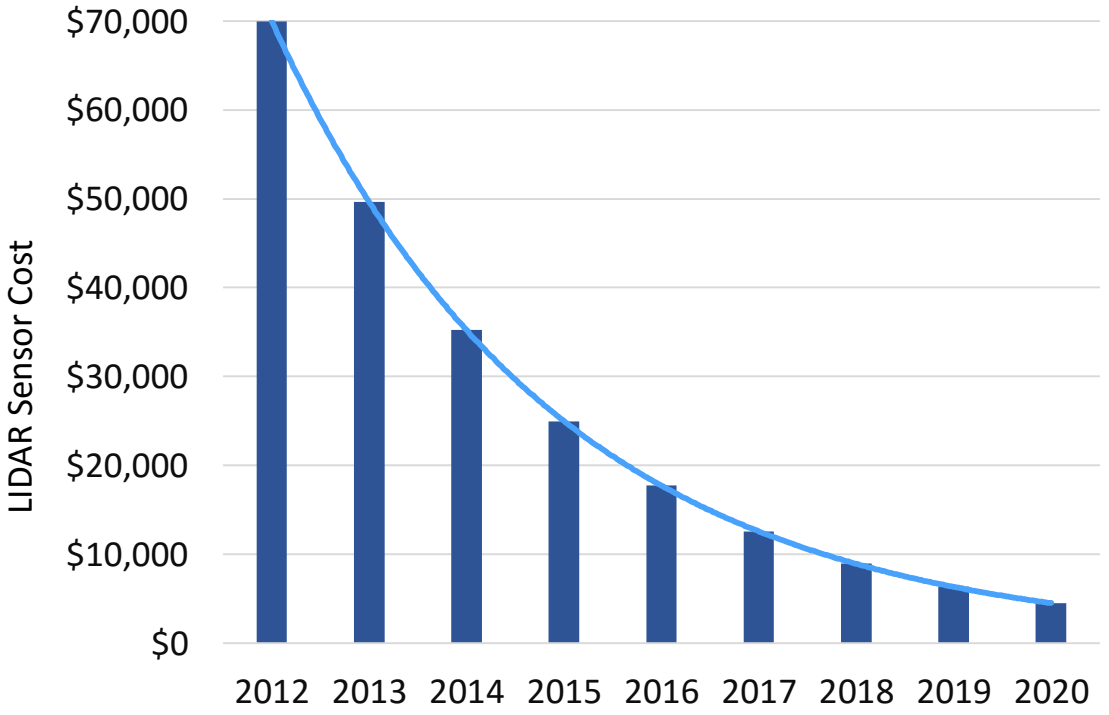
Autonomous Vehicles

- Google's self-driving car project, now 'Waymo', has 3 million miles self-driven
- Nissan, BMW, and Mercedes have pledged to have autonomous vehicles ready by 2020
- Tony Seba: autonomous vehicles will save lives, save time, save space, save energy, and save money



<u>LIDAR (laser + radar)</u>

- Allows car to "see" in 360 degrees
- Most expensive component of autonomous vehicles, but the cost is rapidly decreasing



Source: waymo.com; Tony Seba, Clean Disruption of Energy and Transportation

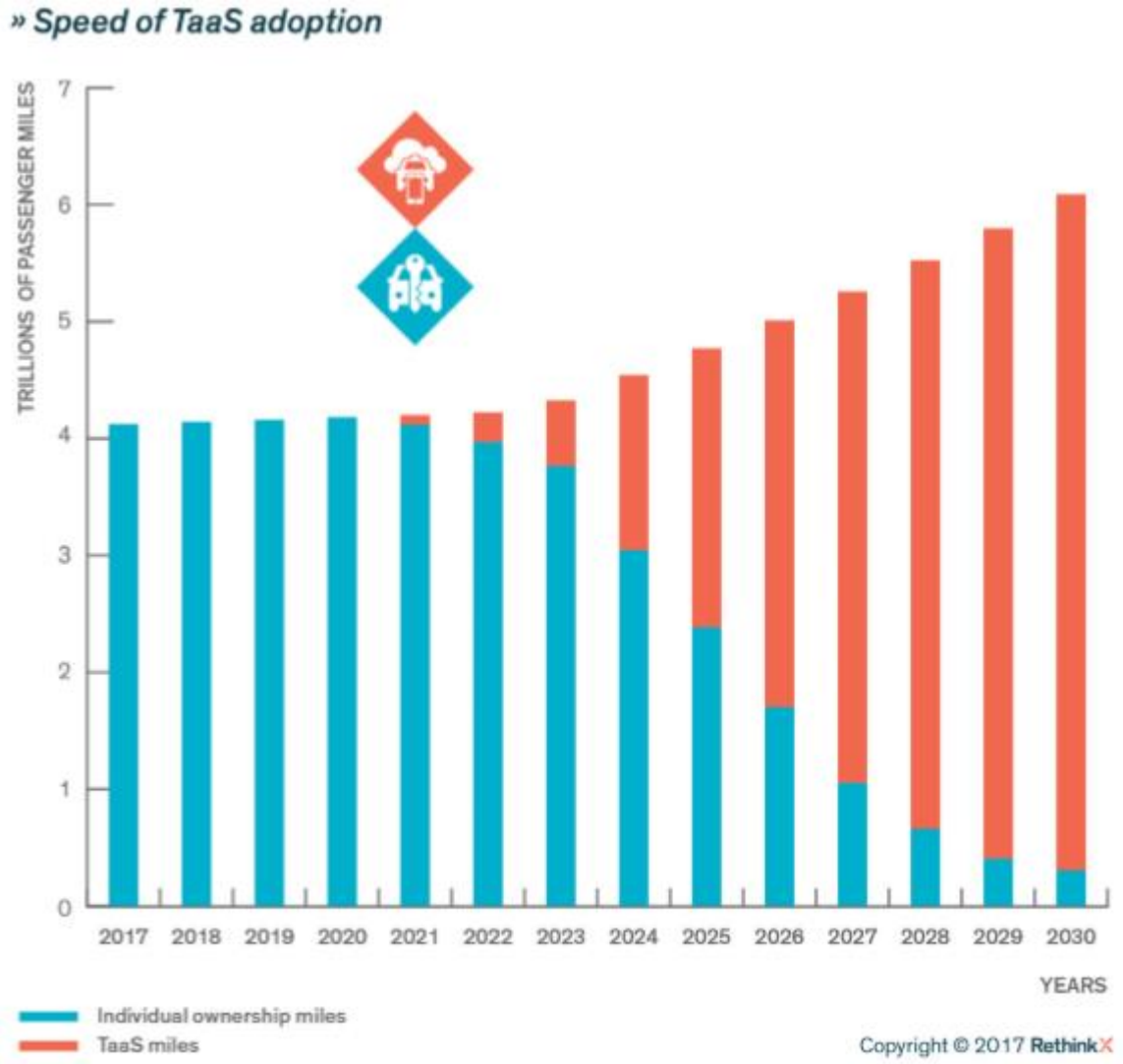
The Growth of Ridesharing Services

UBER

- Started in 2010
- Completed 5 billion trips (May 2017)
- 6 continents, 76 countries, 450+ cities (May 2017)

lyft

- Started 2012
- Provides over one million rides per day (July 2017)
- 360 communities (July 2017)
- Drivers have earned $250 million in tips (June 2017)



Source: lyft.com; uber.com; RethinkX

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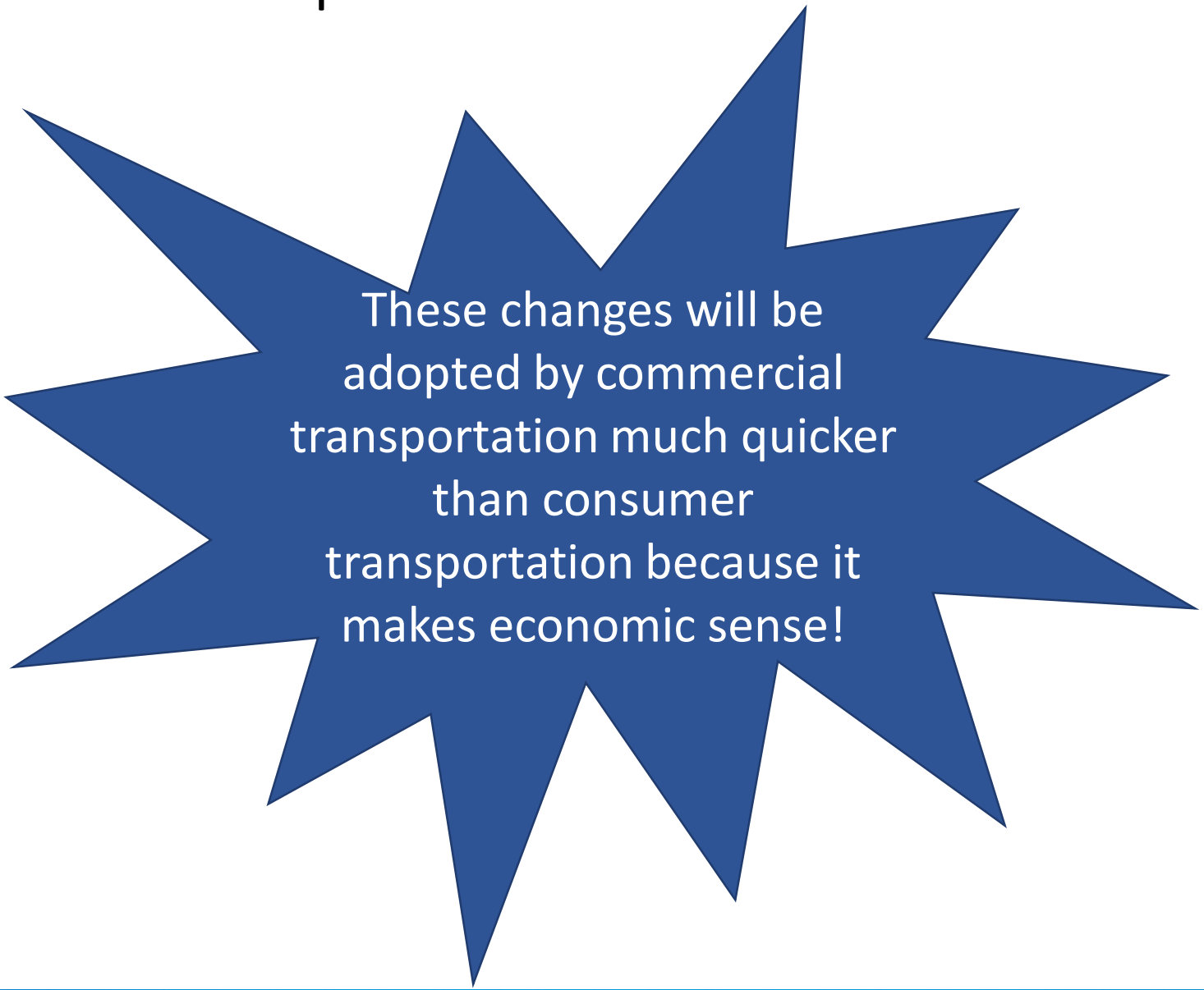
Adoption in Commercial Transportation

- Long haul trucking
- Short haul trucking
- Delivery
- Services
  - Garbage
  - Snow Removal
  - Buses



Source: Yardi®Matrix

So What? Demographics and Technology

- New technologies will be more widespread within the next 10 years
- May not affect you in the next two years, but certainly will over the typical ten year investment period
- Start the process for thinking how these technological disruptors will impact live/work/play environments
  - **You may be forced to take a more active role in the energy utility business**
  - **You may have more land than you think!**
  - **Efficiency is the play for the next 2 years, disruption in the next 10**

Source: Yardi®Matrix

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