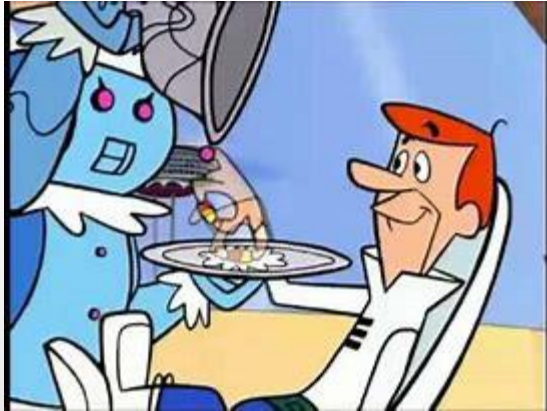


# SC Councils of Governments Annual Meeting 2019

## The Industries of the Future

***November 25, 2019***

***Embassy Suites – Kingston  
Plantation, Myrtle Beach,  
SC***



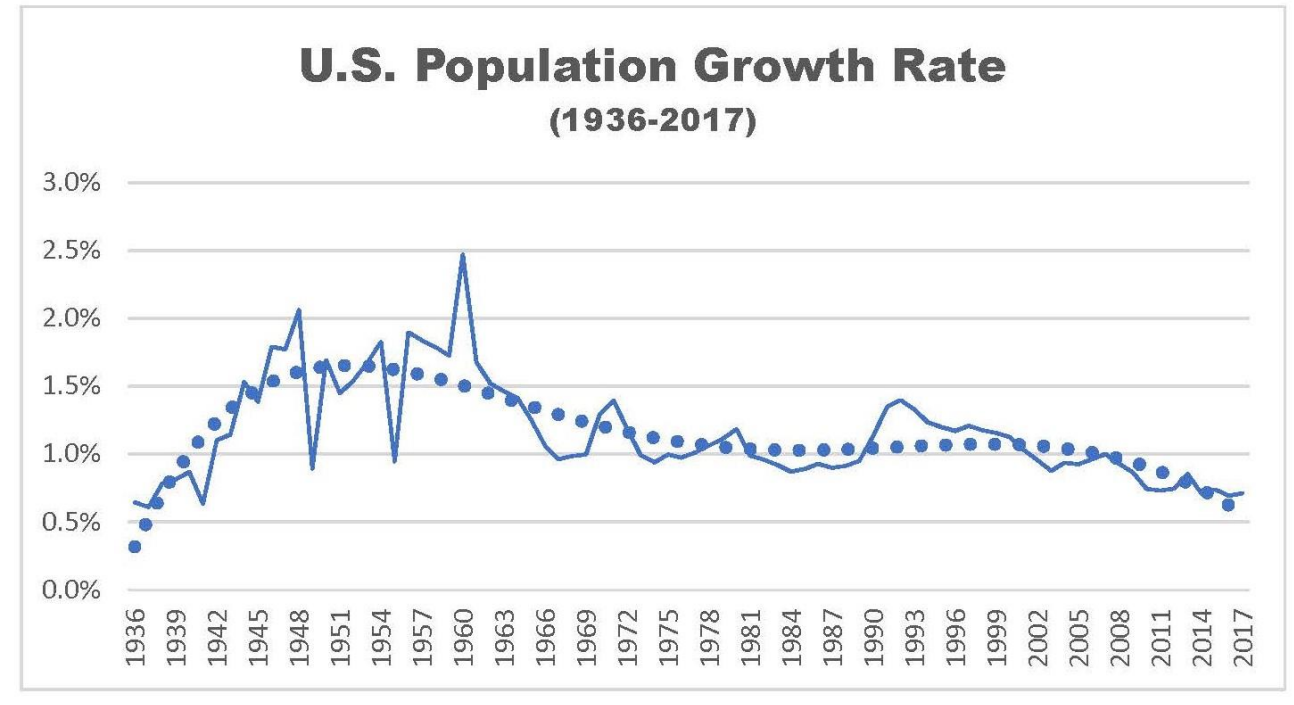
Katie Turner, Budget  
Director, SC House Ways and  
Means Committee

Mike Shealy, Budget  
Director, SC Senate Finance  
Committee



# Population Trends

- ❖ South Carolina's population is growing faster than neighboring states during the decade of the 2010's.
- ❖ Smaller counties (by population) are losing population and bigger counties are gaining population.
- ❖ There are now more South Carolinians over age 65 than ages 5 to 19.

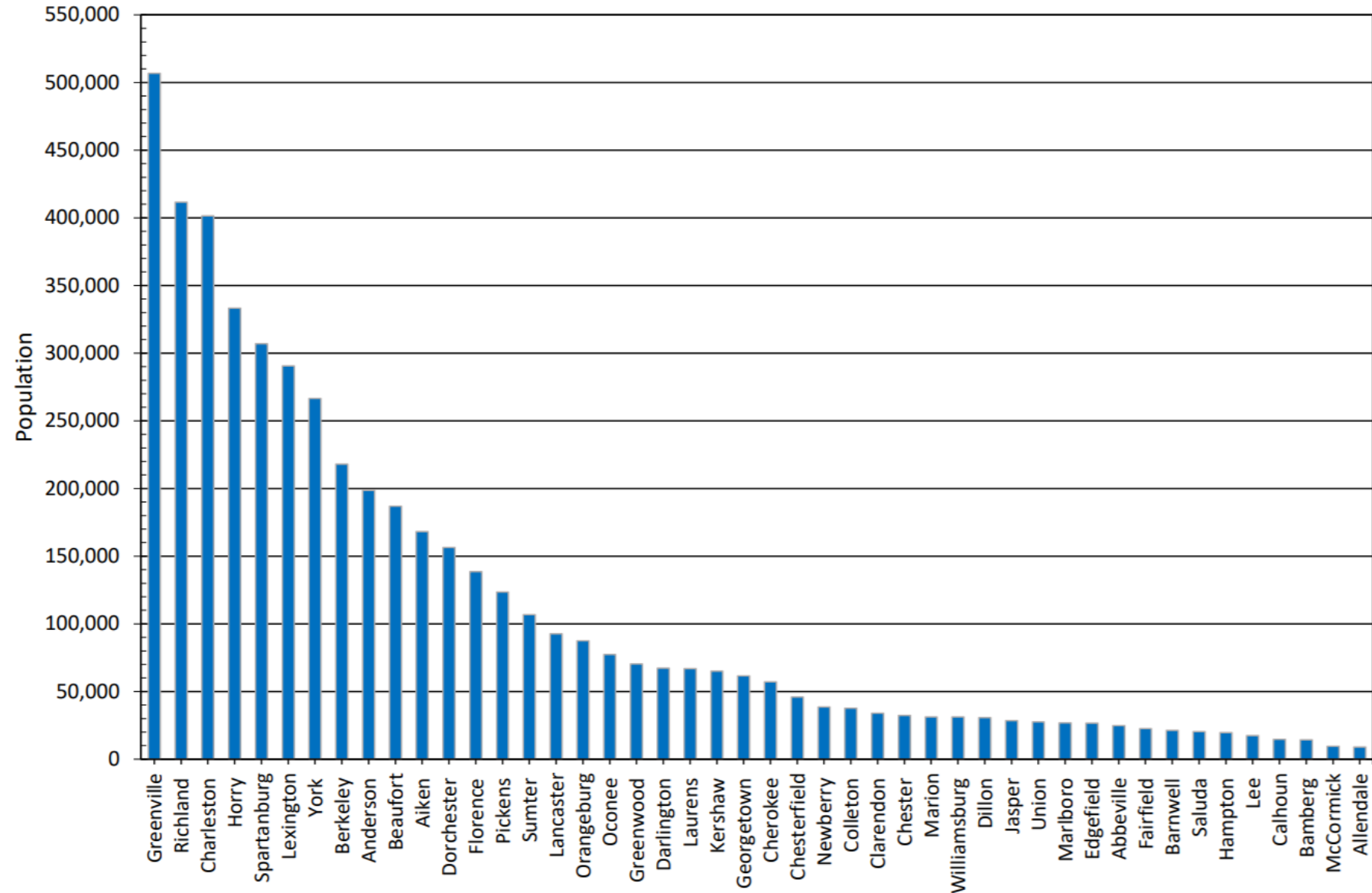


# Population Growth by State Since 2010

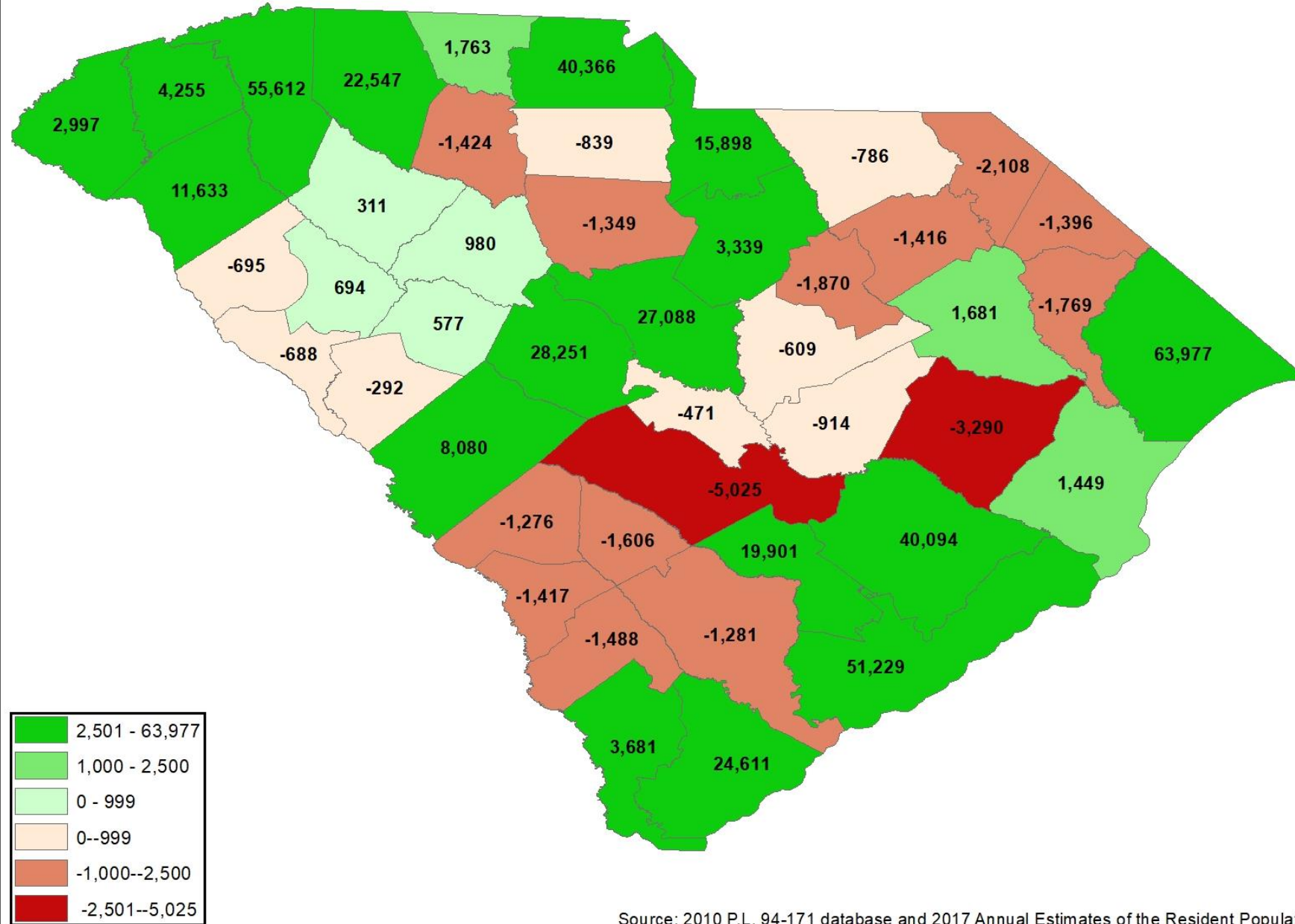
	State	% Growth Since 2010	2019 Population
1	Utah	16.08	3,221,610
2	Texas	15.23	29,087,070
3	Florida	14.86	21,646,155
4	Colorado	14.31	5,770,545
5	Nevada	14.23	3,087,025
6	Idaho	13.97	1,790,182
7	Washington	13.7	7,666,343
8	Arizona	13.54	7,275,070
9	North Dakota	12.77	760,900
10	South Carolina	11.03	5,147,111
11	Oregon	10.64	4,245,901
12	North Carolina	9.65	10,497,741
13	Georgia	9.43	10,627,767
14	South Dakota	9.37	892,631
15	Montana	8.46	1,074,532

## SOUTH CAROLINA POPULATION BY COUNTY

Estimates as of July 1, 2017

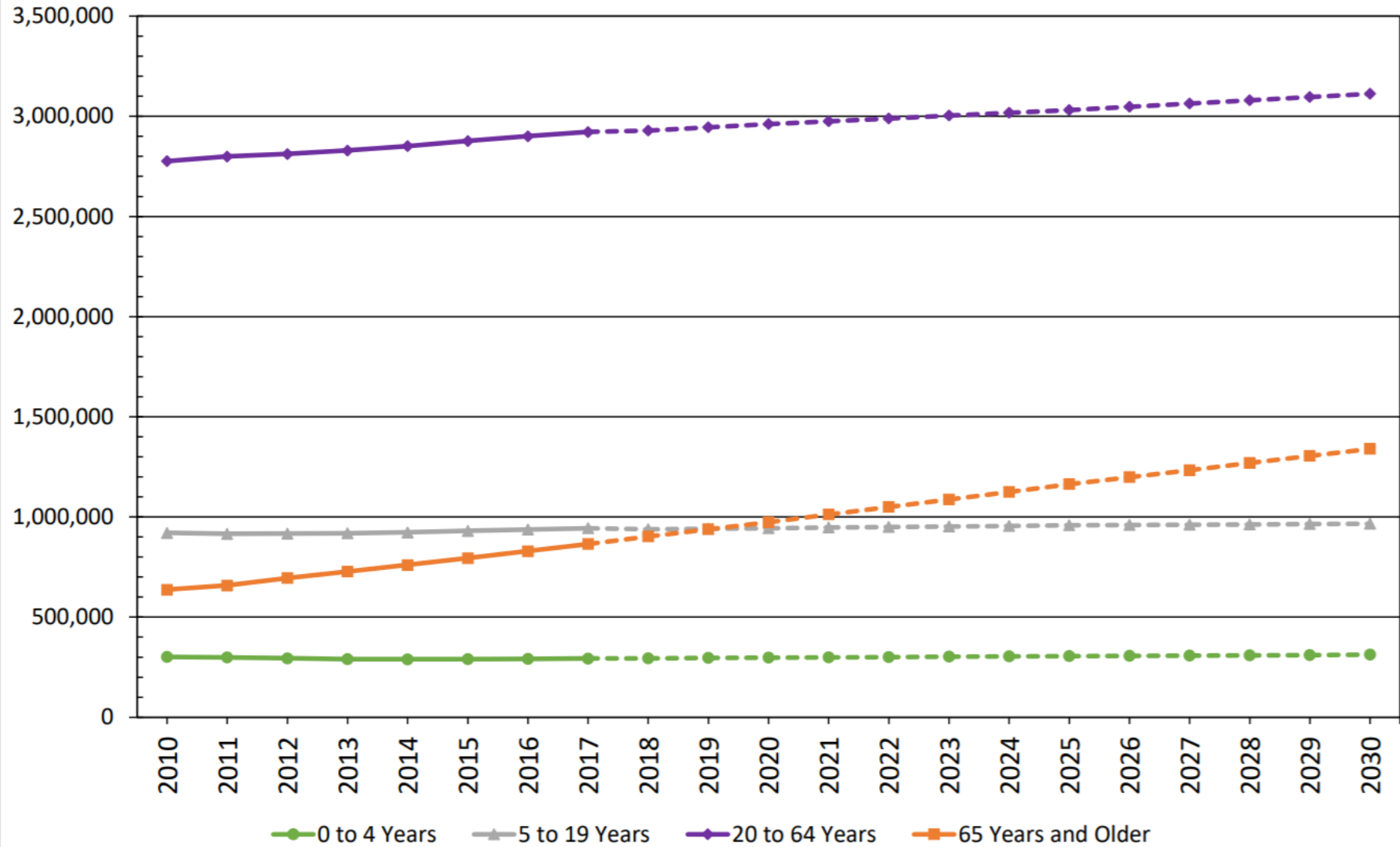


# South Carolina County Population Change 2010 - 2017



Source: 2010 P.L. 94-171 database and 2017 Annual Estimates of the Resident Population

## SOUTH CAROLINA POPULATION BY AGE GROUP 2010 to 2030 Estimates and Projections



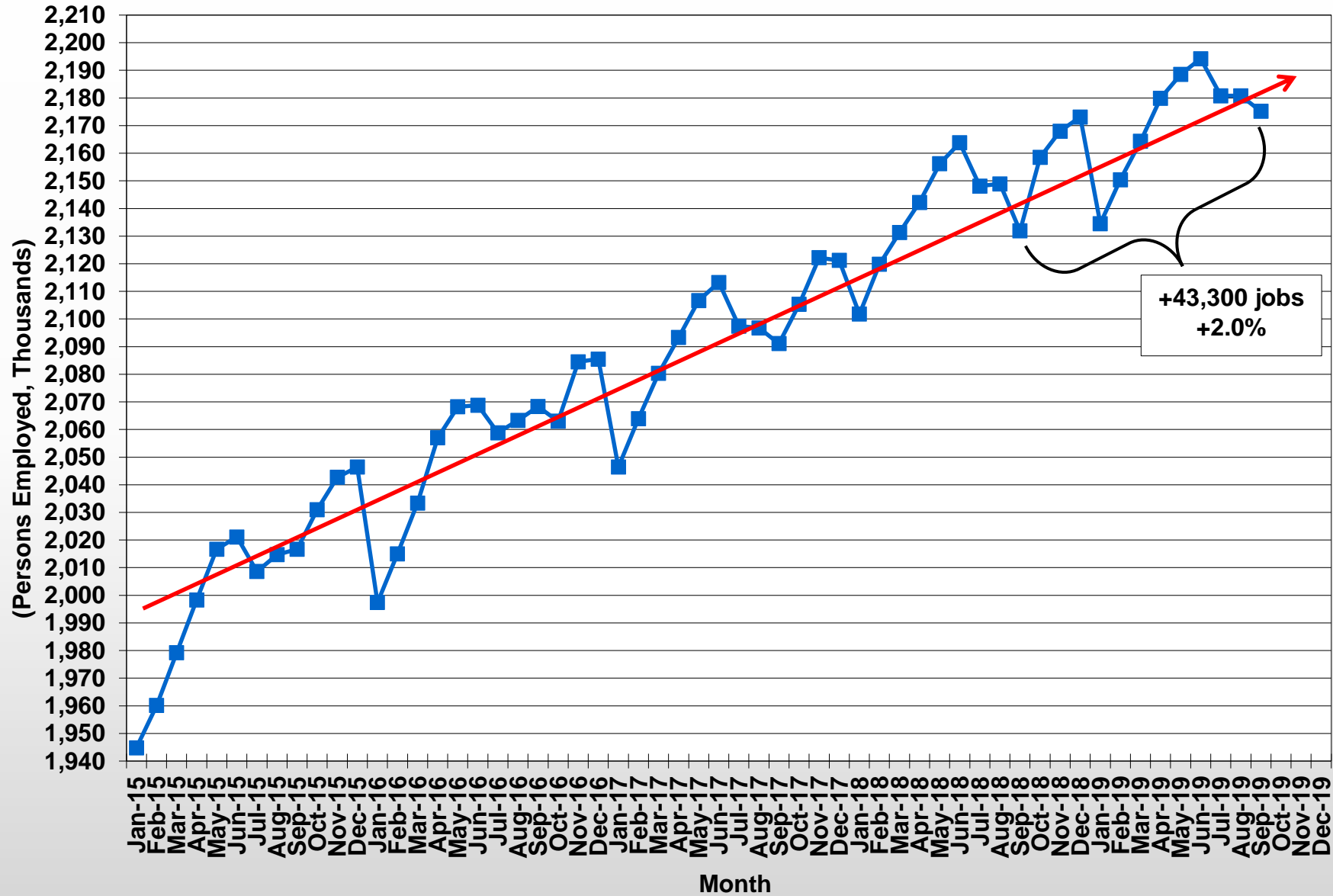
Note: U.S. Census Bureau, population estimates 2010 to 2017; Revenue and Fiscal Affairs Office, population projections 2018 to 2030



# *Economic Indicators*

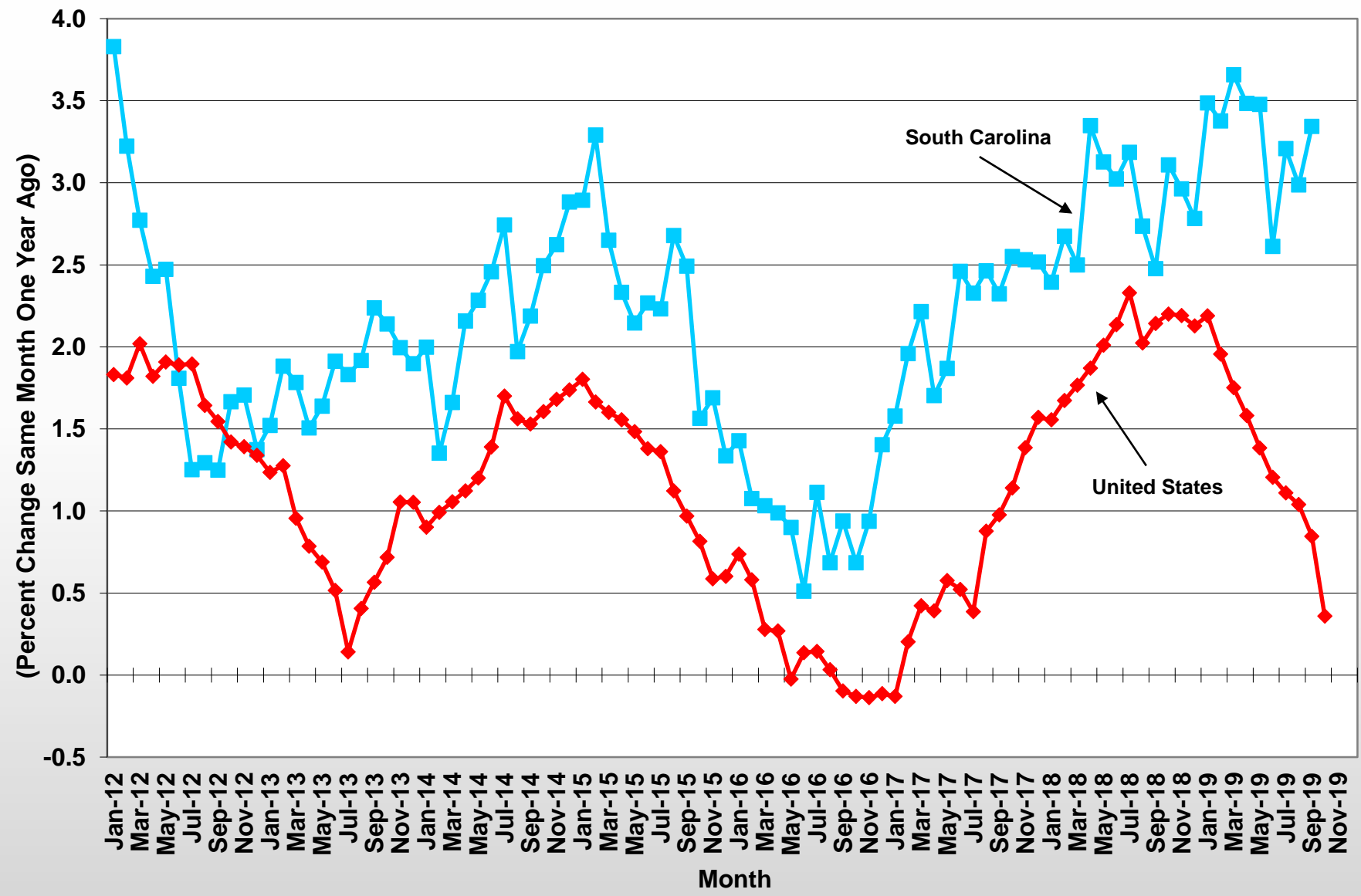


# Total Nonfarm Employment in South Carolina





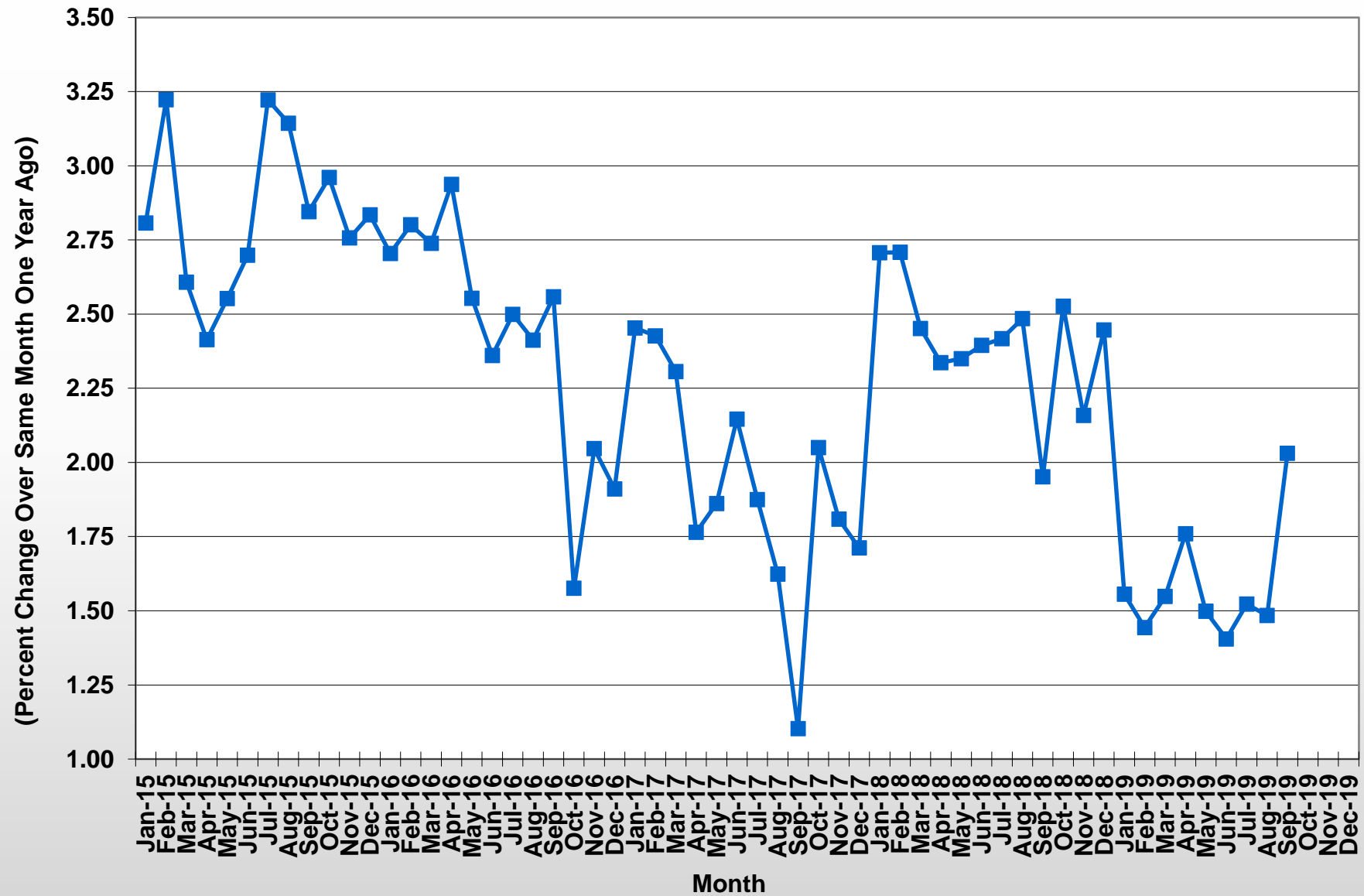
# Growth in Manufacturing Employment in SC and US



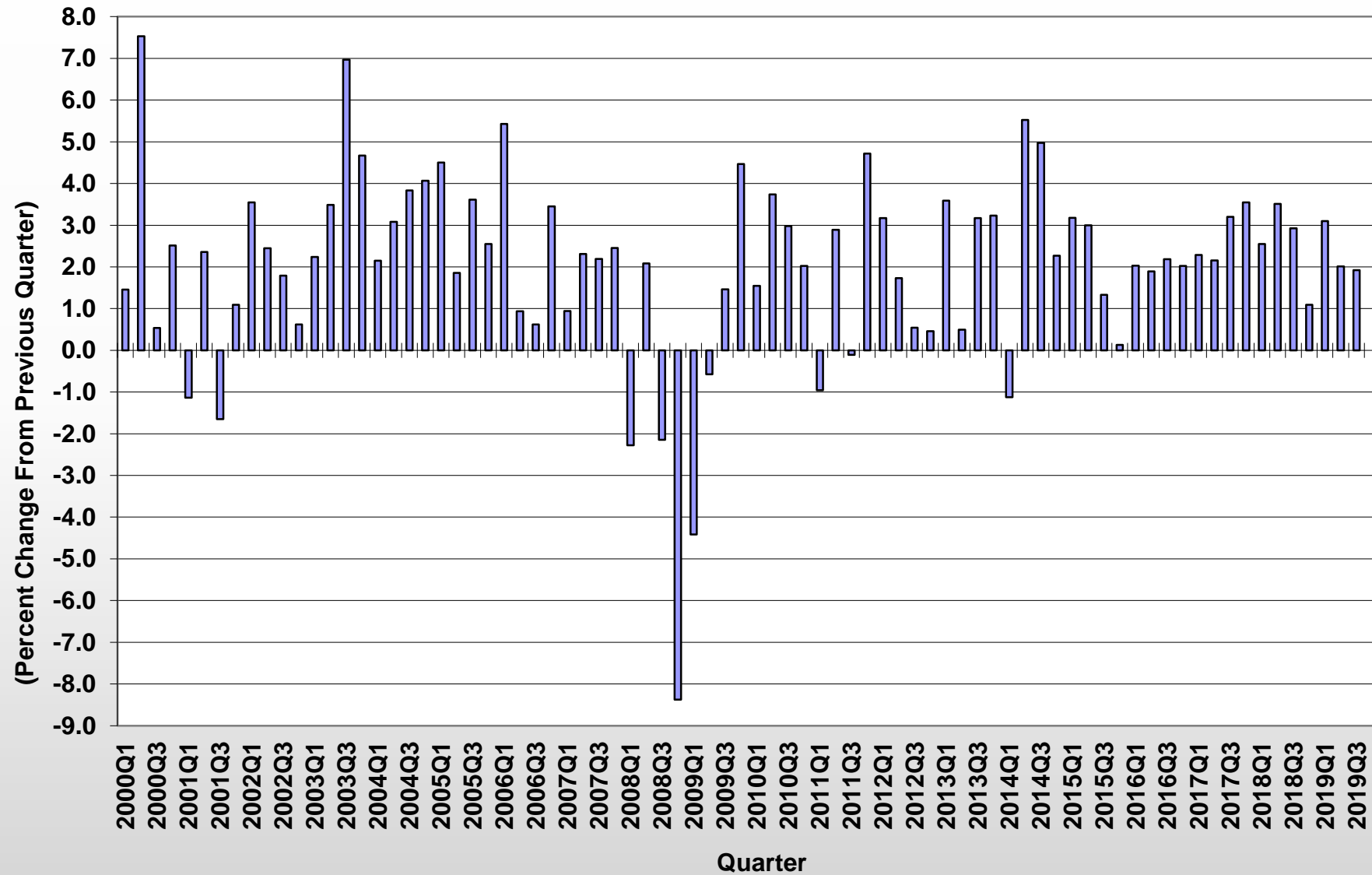
Source: U.S. Department of Labor, Bureau of Labor Statistics, Washington, D.C.  
BEA/RWM/11/01/19

Source: Board of Economic Advisors

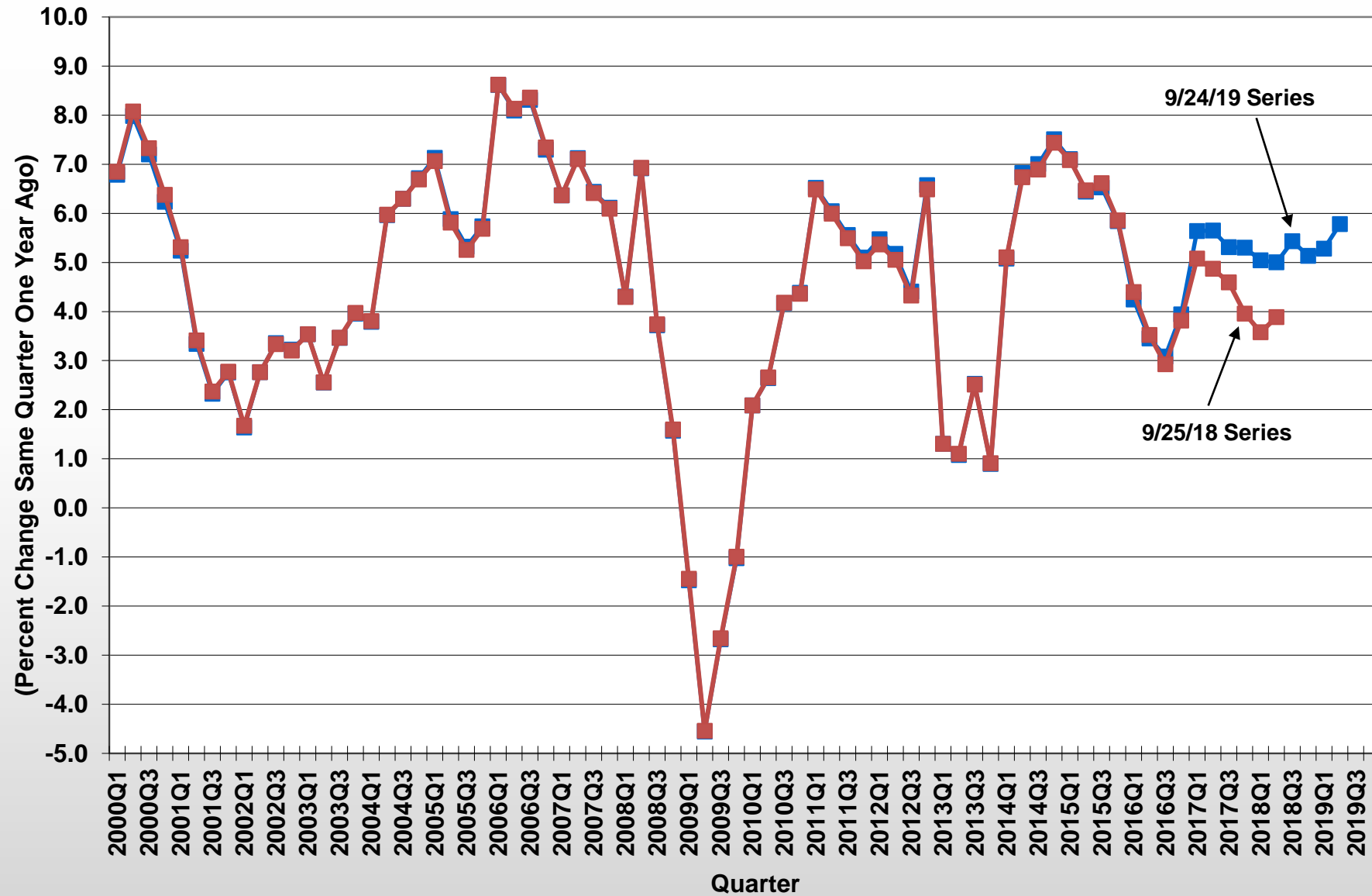
# Total Nonfarm Employment Growth in South Carolina



## Real Gross Domestic Product in the U.S. (2012 = 100.0)



## Growth in Personal Income in South Carolina



# Recession?

Yield Curve Inversion.  
Purchasing Manager's  
Index.

Interest Rate  
Adjustments.

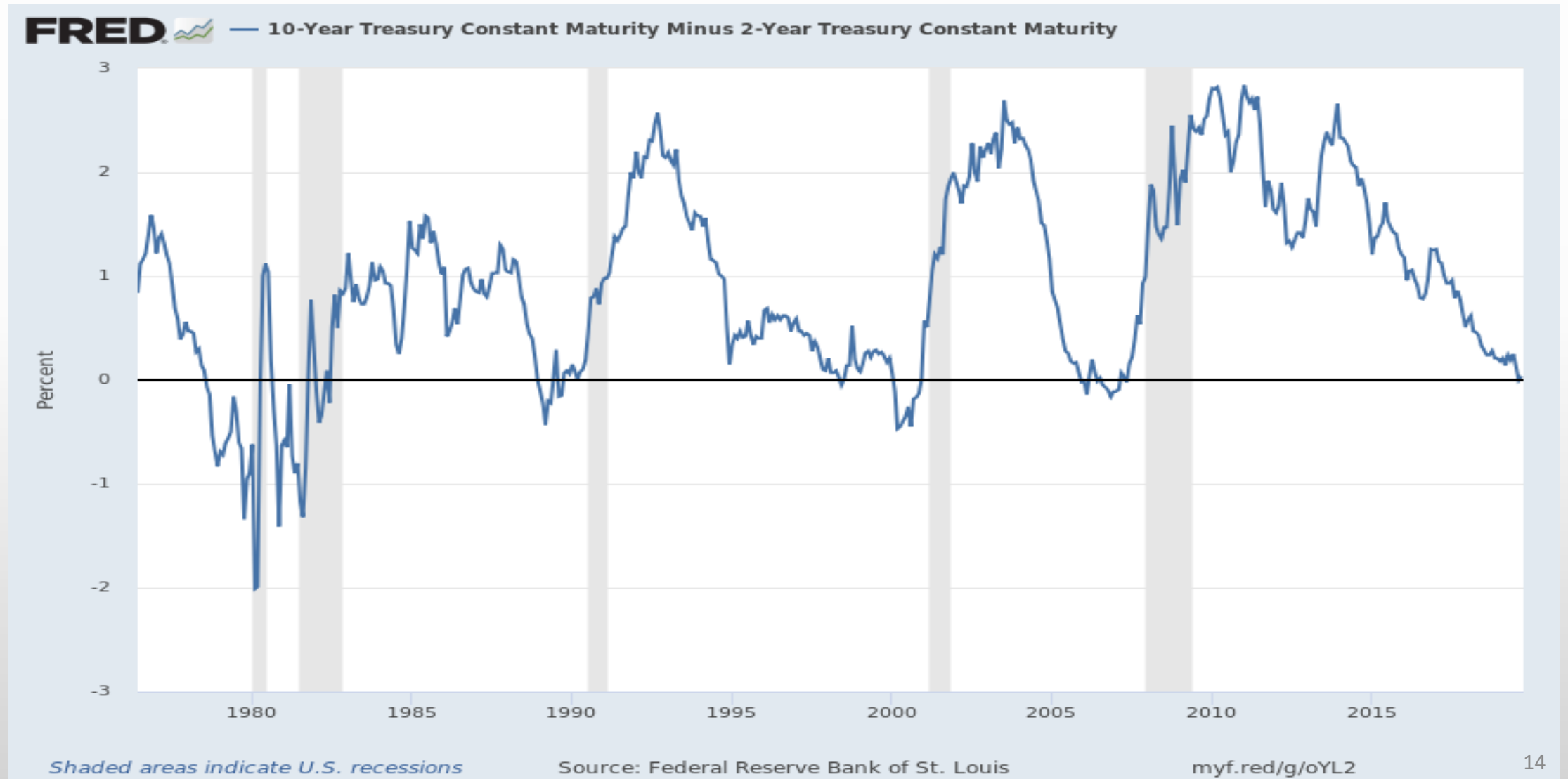
Trade Wars.

The Federal Deficit.



# The Inverted Yield Curve

(an interest rate environment in which long-term debt instruments have a lower yield than short-term debt instruments of the same credit quality)

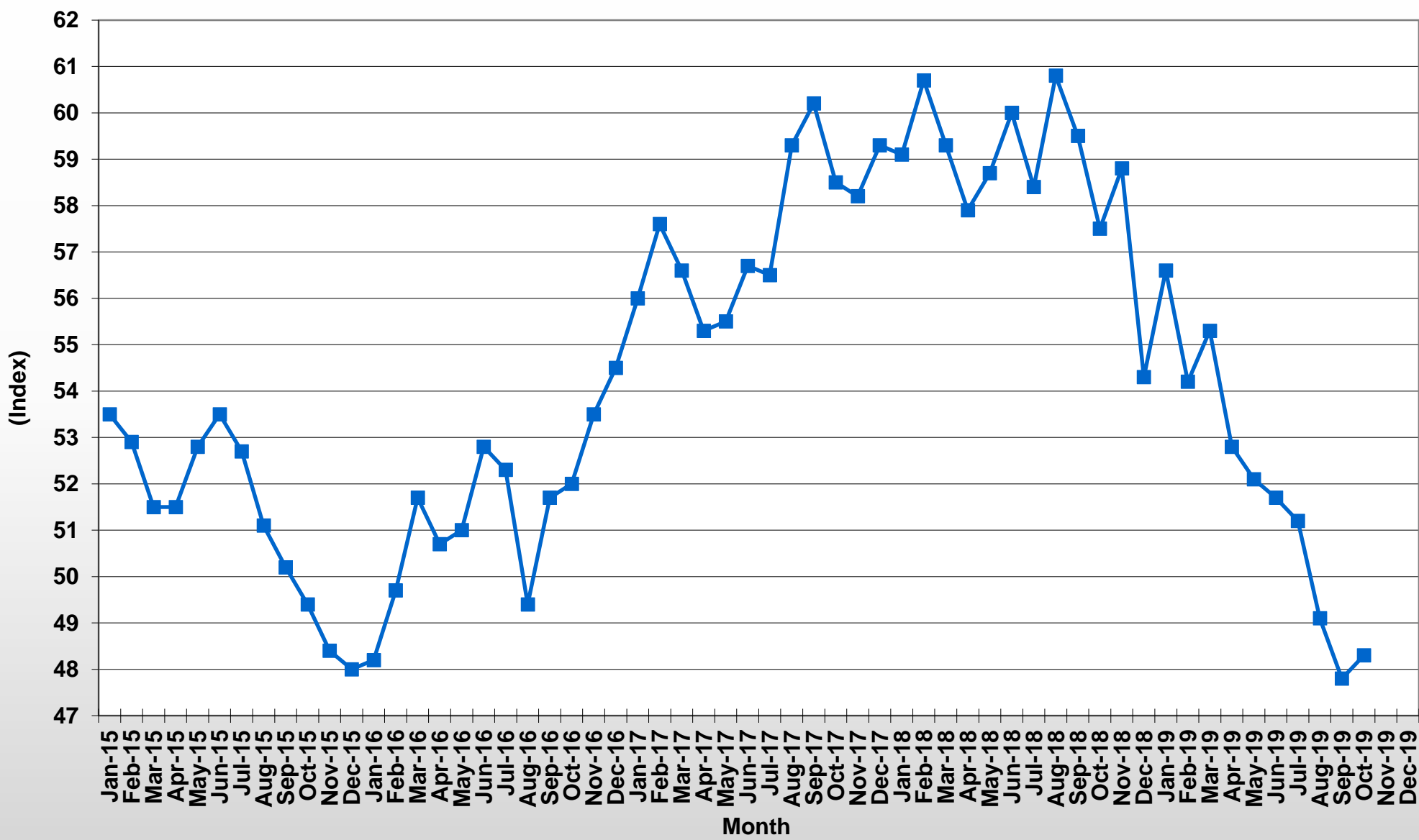




**PMI** is an **index** of the prevailing direction of economic trends in the manufacturing and service sectors.

A number **below 50** suggests decline in markets.

National Association of Purchasing Managers' Index



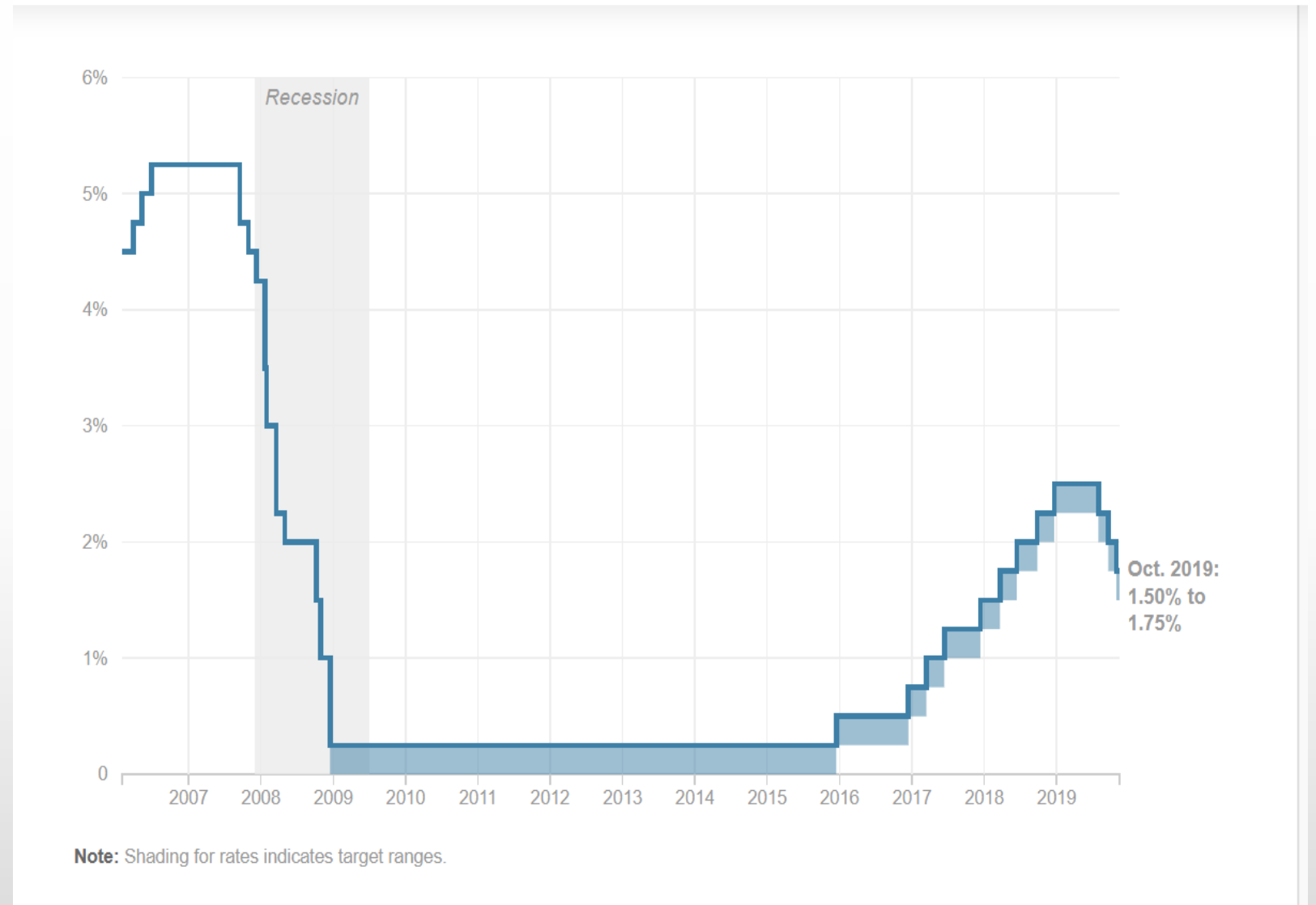
Source: The Institute for Supply Management

S.C. Board of Economic Advisors

# Federal Reserve Bank: Interest Rate Adjustments

The Federal Funds Rate  
has been reduced three  
time in 2019:

August 1 <sup>st</sup>	2.25% to 2.0%
September 19 <sup>th</sup>	2.0% to 1.75%
October 31 <sup>st</sup>	1.75% to 1.5%



# New York Times

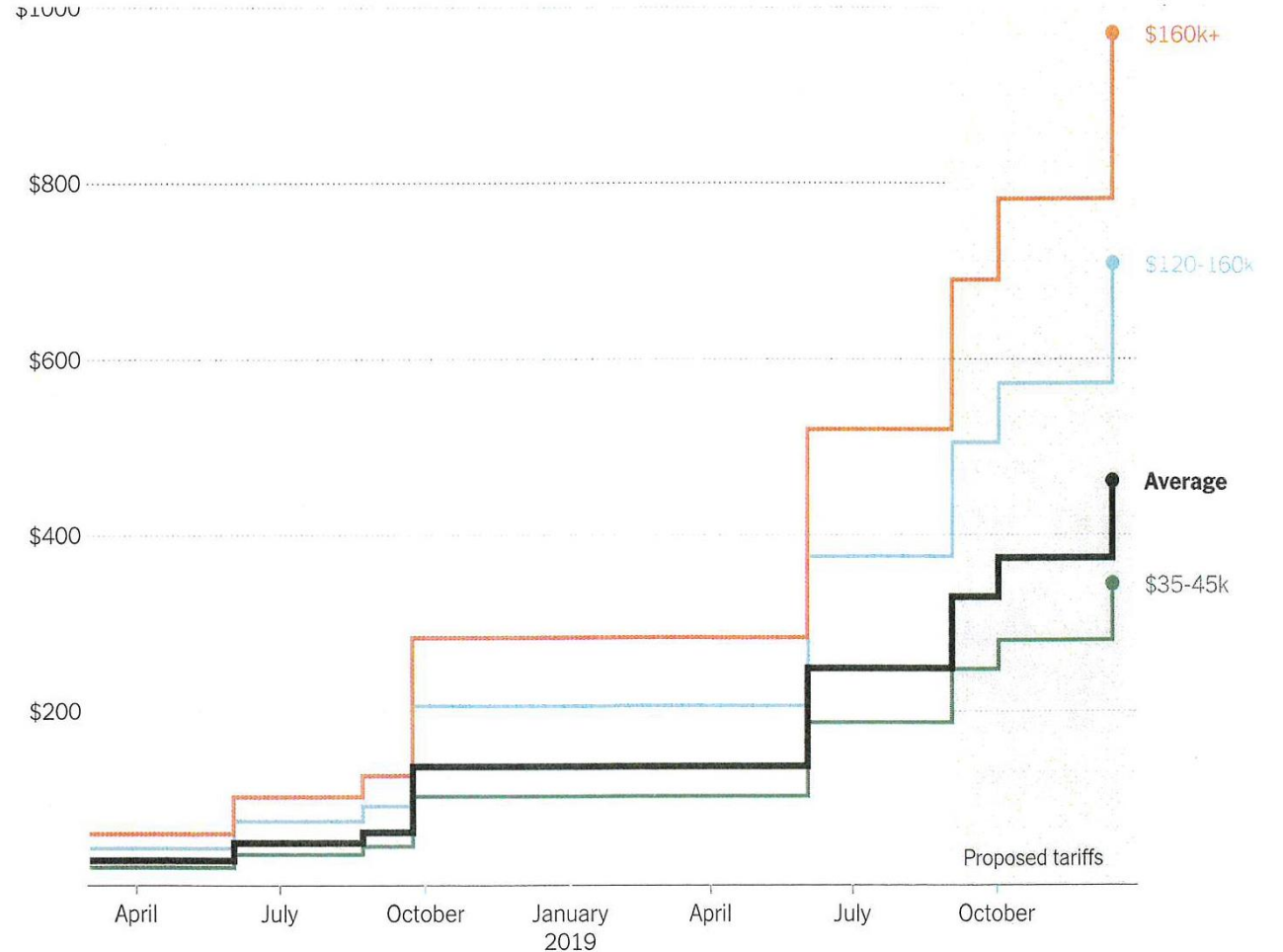
How Much Will the  
Trade War Cost You by  
the End of the Year?

By Quoctrung Bui and  
Karl Russell

September 1, 2019

9/25/2019

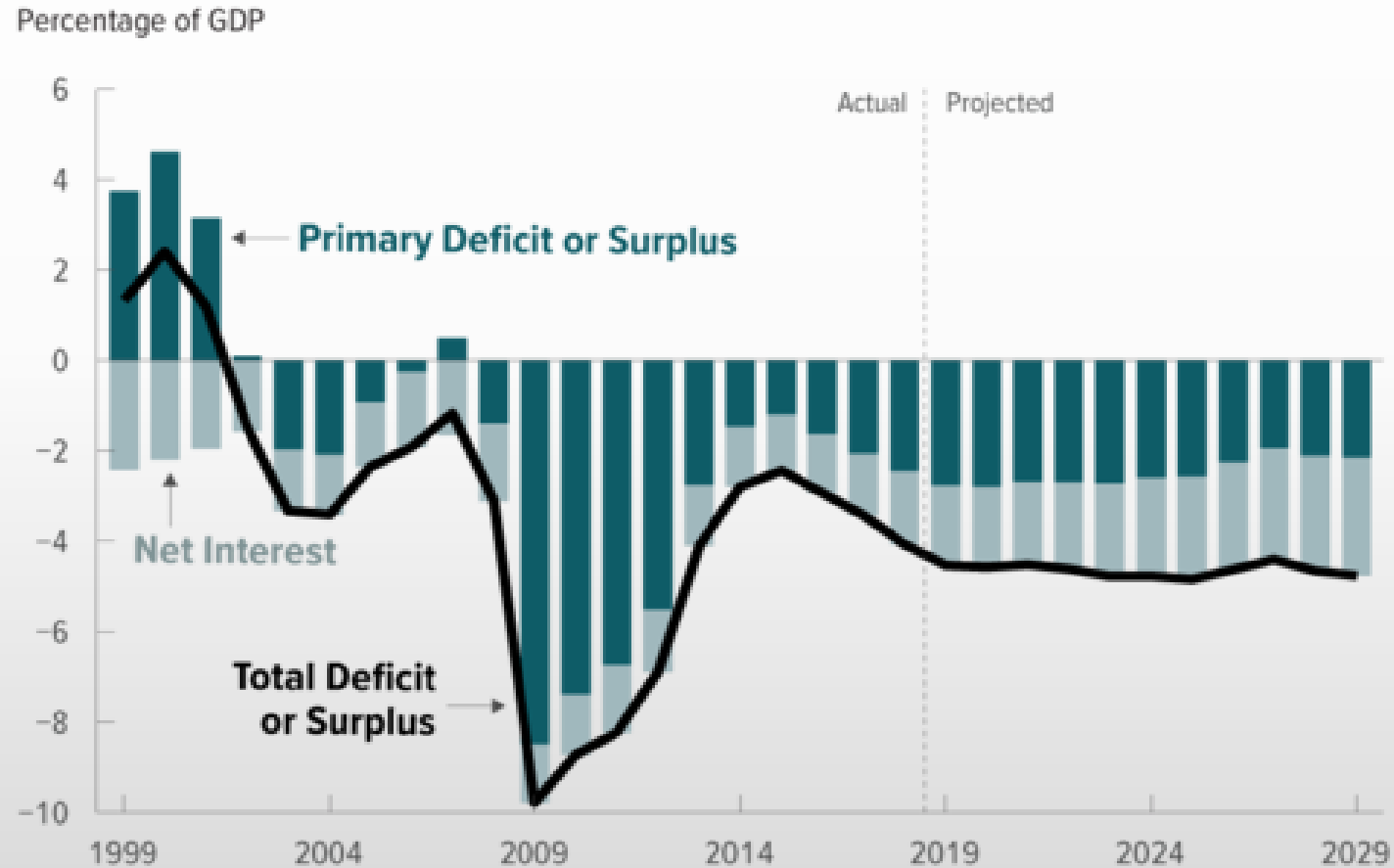
How Much Will the Trade War Cost You by the End of the Year? - The New York Times



Analysis is based on the tariffs' effects on imported goods and goods that use imported components. The estimates are produced by matching customs and detailed supply chain data with consumer expenditure data from 2017.

# The Federal Deficit

Source: Congressional Budget Office, August 21, 2019



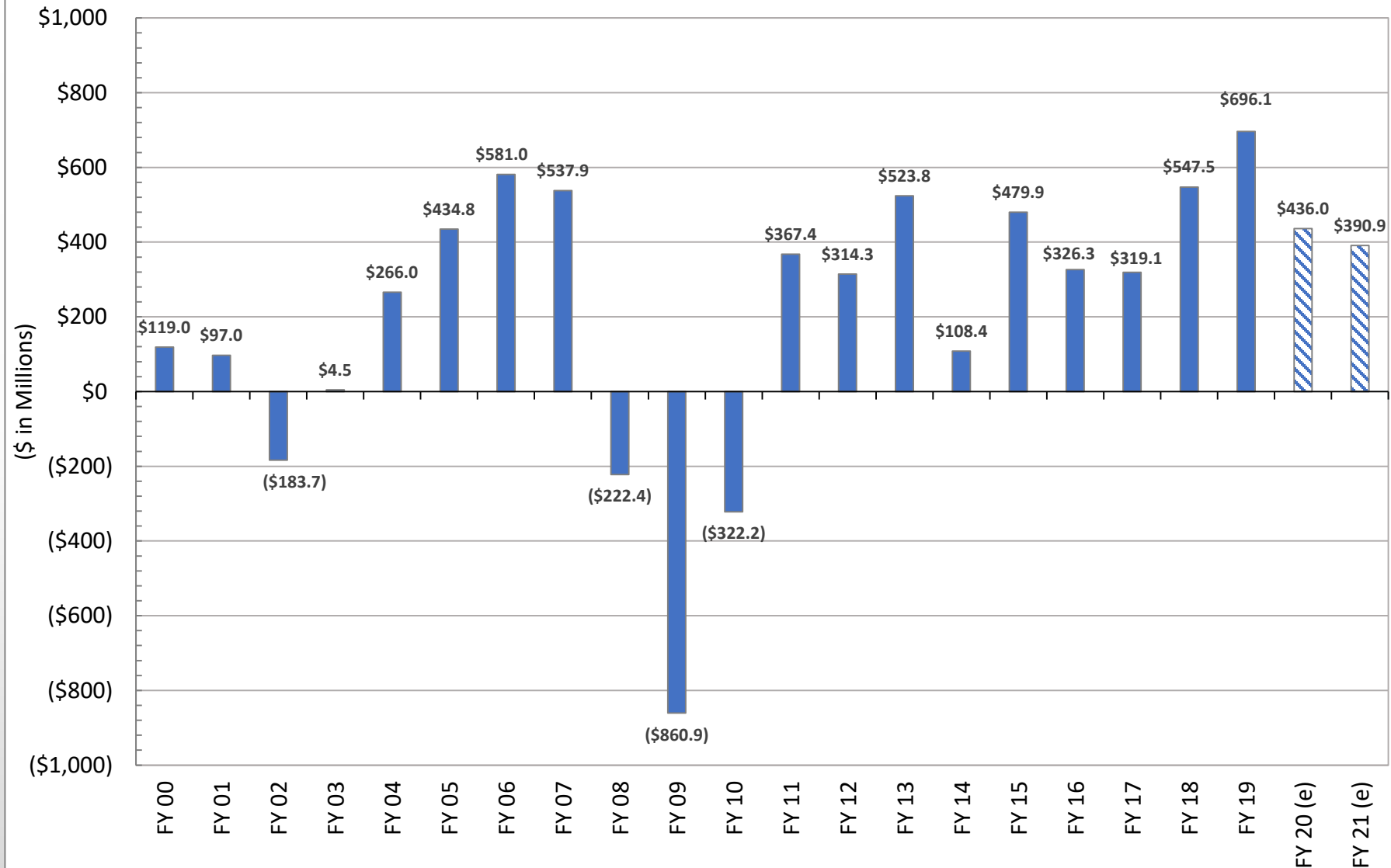
# FY 2020-21 Budget & Revenue Outlook

## FY 2018-19 Budget Surplus

		(\$ Millions)
<b>General Fund Revenue</b>		<b>Net</b>
Revenue Surplus (BEA)		\$407.4
Taxpayer Rebate (Proviso 118.15)	(\$61.4)	
Net Impact of Budgetary Adjustments (Vetoed, Lapses, Open-ended Appropriations, Transfers)	\$3.9	
Funds Available for Contingency Reserve Fund		\$350.0
<b>Other Surpluses</b>		
EIA Revenue over Act		\$3.1
Lottery Revenue over Act*		\$0
<i>*FY 2018-19 Excess appropriated</i>		
Homestead Exemption Revenue over Act**		(\$1.9)
<i>**Shortfall Funded with Prior Year Fund Balance</i>		

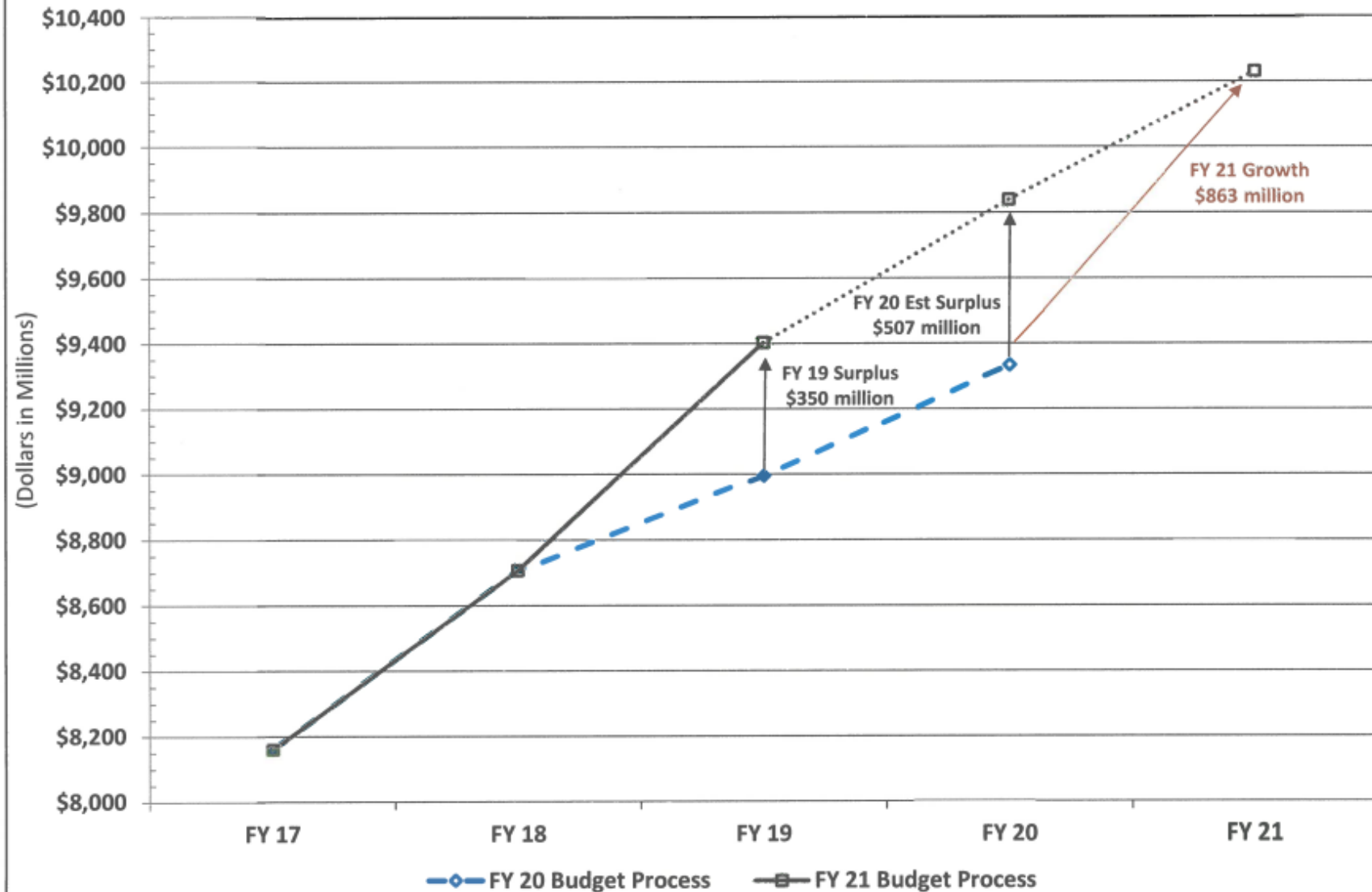


## ANNUAL GROWTH IN GENERAL FUND REVENUE



## FY 2019-20 and FY 2020-21 BUDGET "CATCH-UP"

Compounding Effect of FY 2018-19 Revenue Surplus on FY 2020-21 Appropriation Process



Source: Revenue and Fiscal Affairs Office/FAR/11-6-19

# FY 2020-21 General Fund Outlook

(PRELIMINARY- Dollars in Millions)

<b>BEA Revenue Estimate (11/8/2019)</b>	<b>\$10,229</b>
<b>- Tax Relief Trust Fund</b>	<b>(\$629)</b>
<b>- FY 19-20 Appropriation Act</b>	<b><u>(\$8,737)</u></b>
<b>Estimated “New” General Fund Revenue</b>	<b>\$863</b>
<b>Reserve Fund Contributions</b>	
<b>- Incremental General Reserve Fund (5%)</b>	<b>(\$34)</b>
<b>- Incremental Capital Reserve Fund (2%)</b>	<b>(\$14)</b>
<b>Estimated “New” General Fund Revenue Available for Appropriation (less Reserve Fund Contributions)</b>	<b>\$815</b>

# FY 2020-21 Budget Outlook

(PRELIMINARY- Dollars in Millions)

	<u>Recurring</u>	<u>Non-Recurring</u>
FY 2019-20 Capital Reserve Fund		\$162
FY 2018-19 Contingency Reserve Fund		\$350
Projected FY 2019-20 Surplus (11/8/2019)		<u>\$507</u>
<b>Total</b>		<b>\$1,019</b>
FY 2019-20 HEX Fund Surplus/(Shortfall)		\$8
FY 2020-21 HEX Fund Surplus/(Shortfall)	\$17	
FY 2019-20 EIA Surplus/(Shortfall)		\$31
FY 2020-21 “New” EIA Revenue	\$69	
FY 2019-20 Lottery Surplus		\$7
FY 2020-21 “New” Lottery Revenue	\$7	
<sup>1</sup> FY 2019-20 surplus lottery revenues are first appropriated to cover any shortfalls in LIFE, HOPE, and Palmetto Fellows Scholarships, so this surplus may not be available for appropriation. <sup>2</sup> Lottery revenue is appropriated by proviso on a non-recurring basis. It is listed as recurring to show the net year to year increase in the estimate, excluding surpluses.		

# Budget Decisions in FY2020-21

- Look to the current year's budget as a template for budget decisions for the upcoming session.

# Recurring Items FY2019-20

<b>Revenue: Appropriations Base</b>	<b>\$497 million</b>
<i>Item</i>	<i>Funding (in millions)</i>
Teacher Salaries	\$159
EFA Increase	\$15
State Health Insurance Plan Increase	\$50
Medicaid Maintenance of Effort	\$50
Higher Education Tuition Freeze	\$44
2% State Employee Pay Raise	\$41
Pension Reform Contribution Increase	\$32
Capital Reserve Fund Contribution	\$11
Local Government Fund Increase	\$11
Judicial Salary Increase	\$11
Corrections Hepatitis C Treatment	\$10
DDSN Direct Care Worker Increase	\$10
<b>Residual Balance</b>	<b>\$53 million</b>



# Non-recurring Items FY2019-20

<b>Revenue: Contingency, Capital Reserve Surplus Funds</b>	<b>\$495 million</b>
<i>Item</i>	<i>Funding (in millions)</i>
Higher Education Capital Needs	112
State-Owned Building Maintenance	28
New Statewide Voting System	40
VA Nursing Home State Match	37
Taxpayer Rebate	6
DSS Child Support Enforcement System	29
General Reserve Fund	27
FEMA Hurricane Florence State Match	22
Judicial Case Management System	11
Corrections Prison Safety Upgrades	10
Farmers Flood Relief	25
<b>Residual Balance</b>	<b>\$148 million</b>

# Non-recurring Items, continued

## Proviso 112.1

Item	Funding (in millions)
Commerce	65
State Department of Education	50
Bonus for State Employees	20

## Proviso 118.15

Item	Funding (in millions)
Rebate	61.4

“Education and work are the levers to uplift a people.”

## W.E.B. DuBois

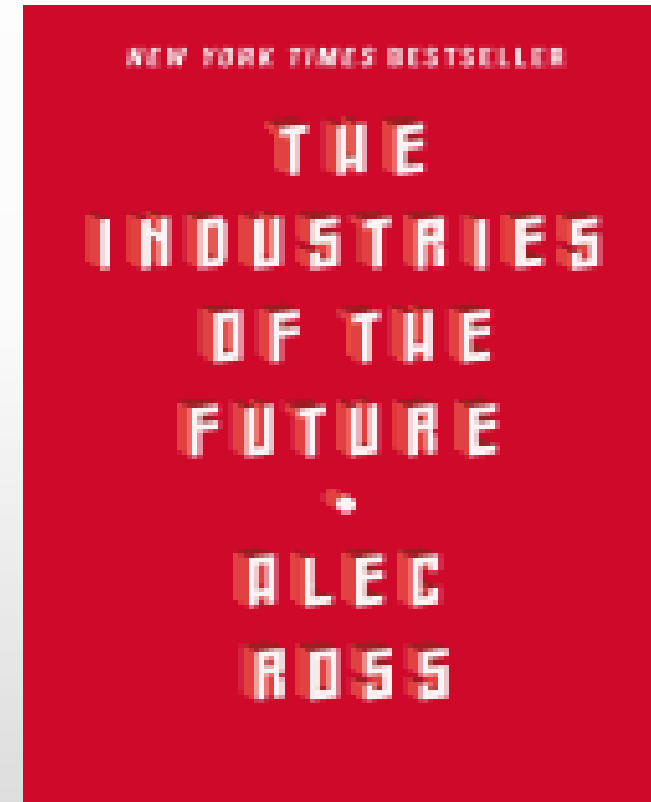
American sociologist, historian, author, editor, activist and co-founder of the National Association for the Advancement of Colored People (NAACP).

# The Industries of the Future

## by Alec Ross

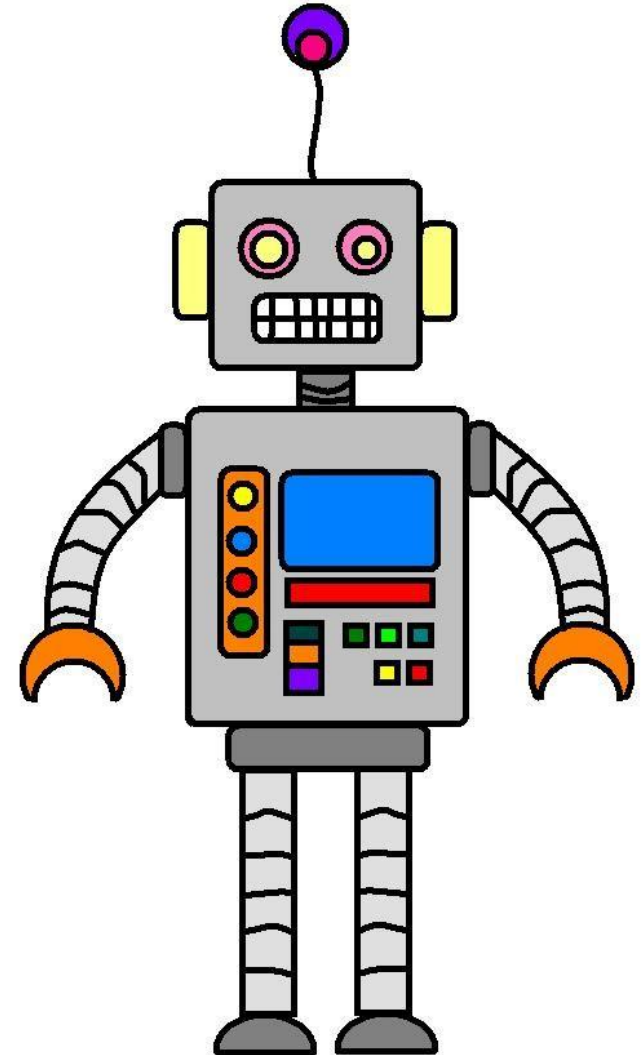
Alec Ross served as a Senior Advisor for Innovation to the Secretary of State for four years. While working for the State Department, he traveled to forty-one countries, exploring the latest advances coming out of every continent.

He is currently a Distinguished Visiting Fellow at Johns Hopkins University and serves as an advisor to investors, corporations and government leaders.



# The Industries of the Future

1. Here Come the Robots
2. The Future of the Human Machine
3. The Code-ification of Money, Markets and Trust
4. The Weaponization of Code
5. Data: The Raw Material of the Information Age
6. The Geography of Future Markets



# The Industries of the Future

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by Alec Ross

- As the technology continues to advance, robots will kill many jobs. They will also create and preserve others, and they will also create immense value – although we have seen time and time again, this value won't be shared evenly. Overall, robots can be a boon, freeing up humans to do more productive things – but only so long as humans create the systems to adapt their workforces, economies, and societies to the inevitable disruption. The dangers of societies that don't handle these transitions are clear.

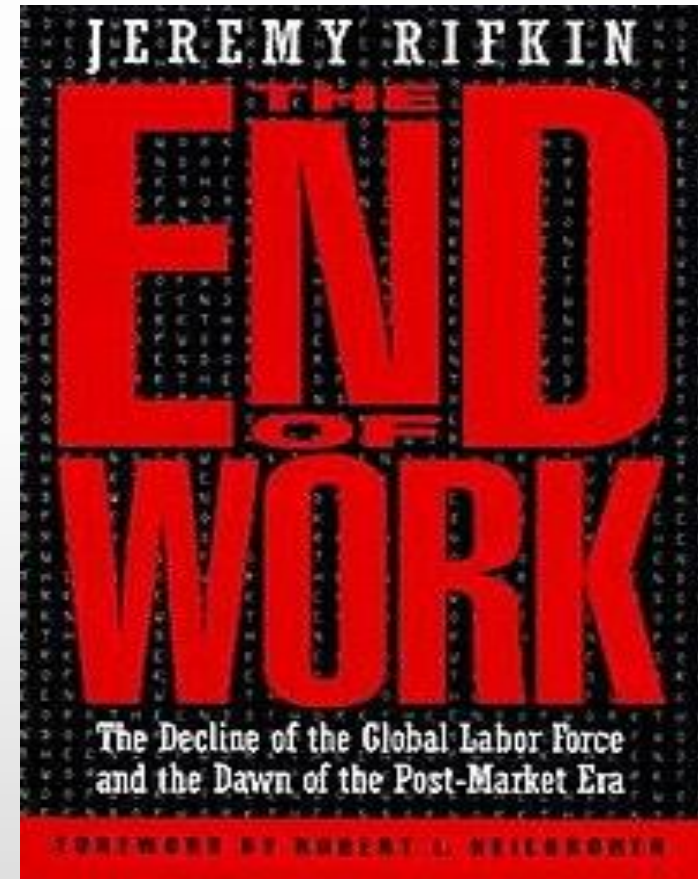


# Jeremy Rifkin

## “The End of Work”

published in 1994

Rifkin argues that we are entering a new phase in history characterized by the steady and **inevitable decline of jobs**. Rifkin says the world is quickly polarizing into two potentially irreconcilable forces: on one side, an **information elite** that controls and manages the high-tech global economy; on the other side is the growing numbers of **displaced workers** who have few prospects and little hope for meaningful employment in an increasingly automated world.



# The Industries of the Future

By Alex Ross

## 1.) Here Come the Robots

# RIBA

(Robot for Interactive Body Assistance)

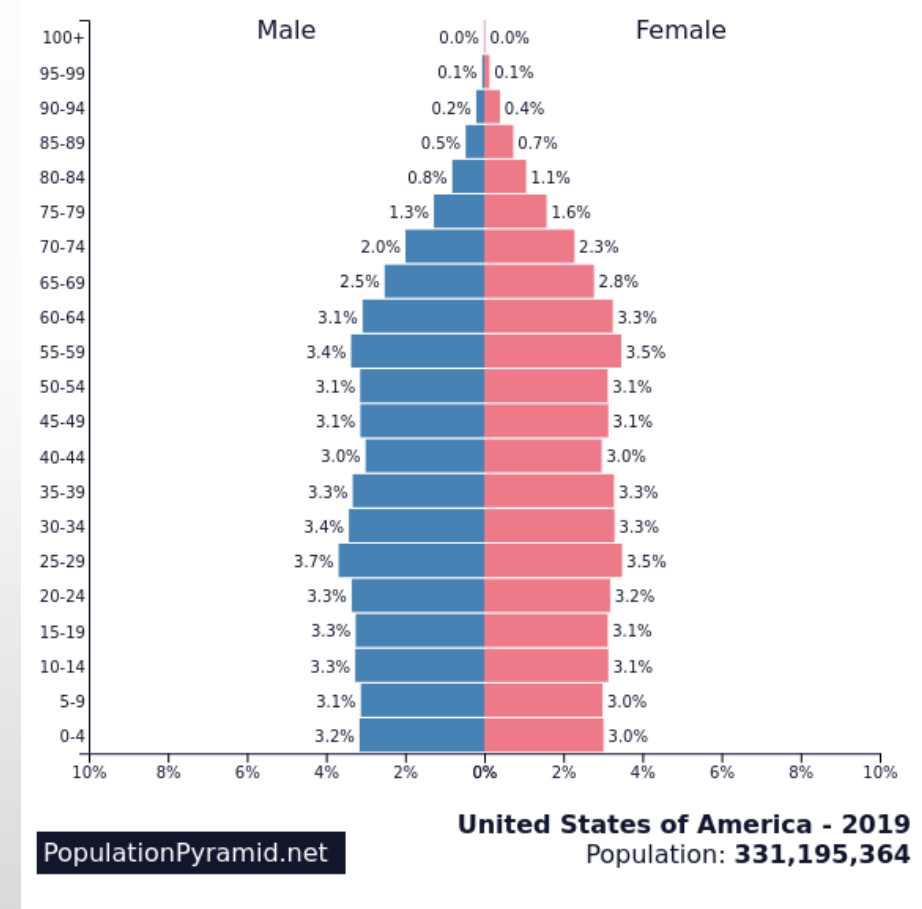
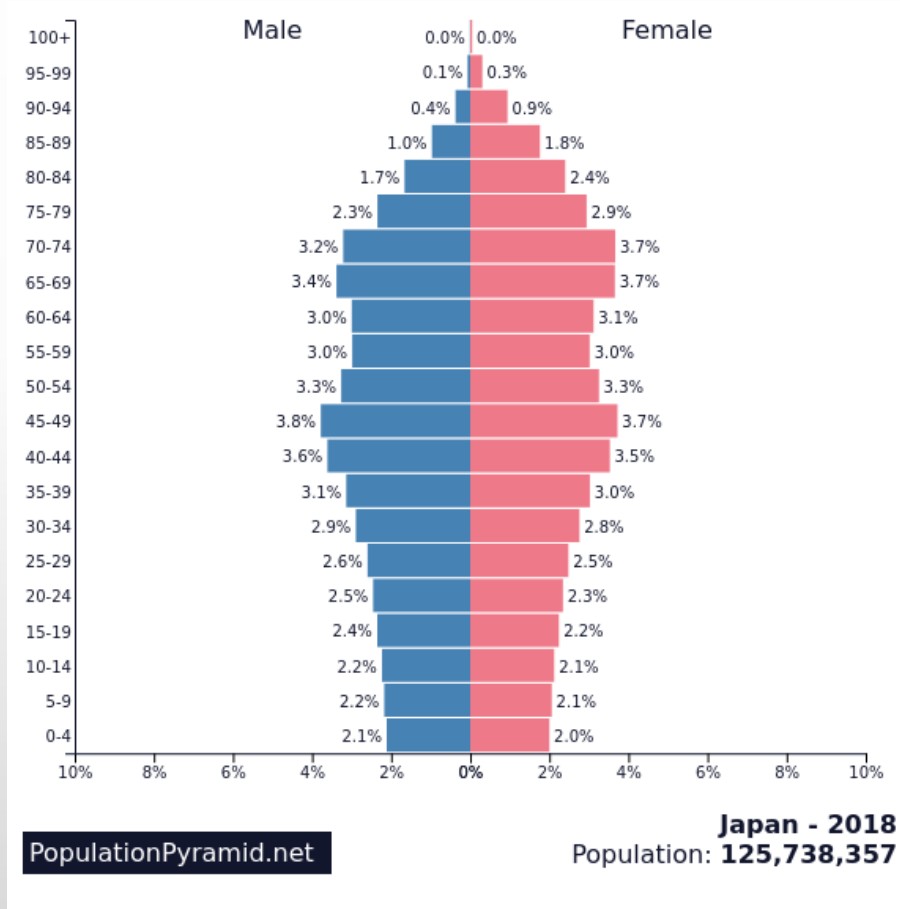
RIKEN-TRI Collaboration Center for Human-Interactive Robot Research(RTC), established as a joint collaboration project by RIKEN and Tokai Rubber Industries, Ltd. (TRI), has developed a nursing-care assistant robot named RIBA (Robot for Interactive Body Assistance).

RIBA is the first robot that can lift up or set down a real human from or to a bed or wheelchair. RIBA does this using its very strong human-like arms and by novel tactile guidance methods using high-accuracy tactile sensors. RIBA was developed by integrating RIKEN's control, sensor, and information processing and TRI's material and structural design technologies.



# 1.) Here Come the Robots – By Necessity

## Population Pyramids – Japan & U.S.



## 1.) Here Come the Robots

“Surprising Ways How Driverless Cars Will Change Our Future” by Rilind Elezaj,  
Machine Design, October 2, 2018

Fewer People Will Own Cars.

Reduced Emissions.

The Evolution of Urban Centers.

More Independence for the Physically Challenged.

Mobile Businesses.

Living Arrangements Farther from Work.



1.) Here Come the Robots

# Intuitive Surgical's da Vinci Robotic Surgery System

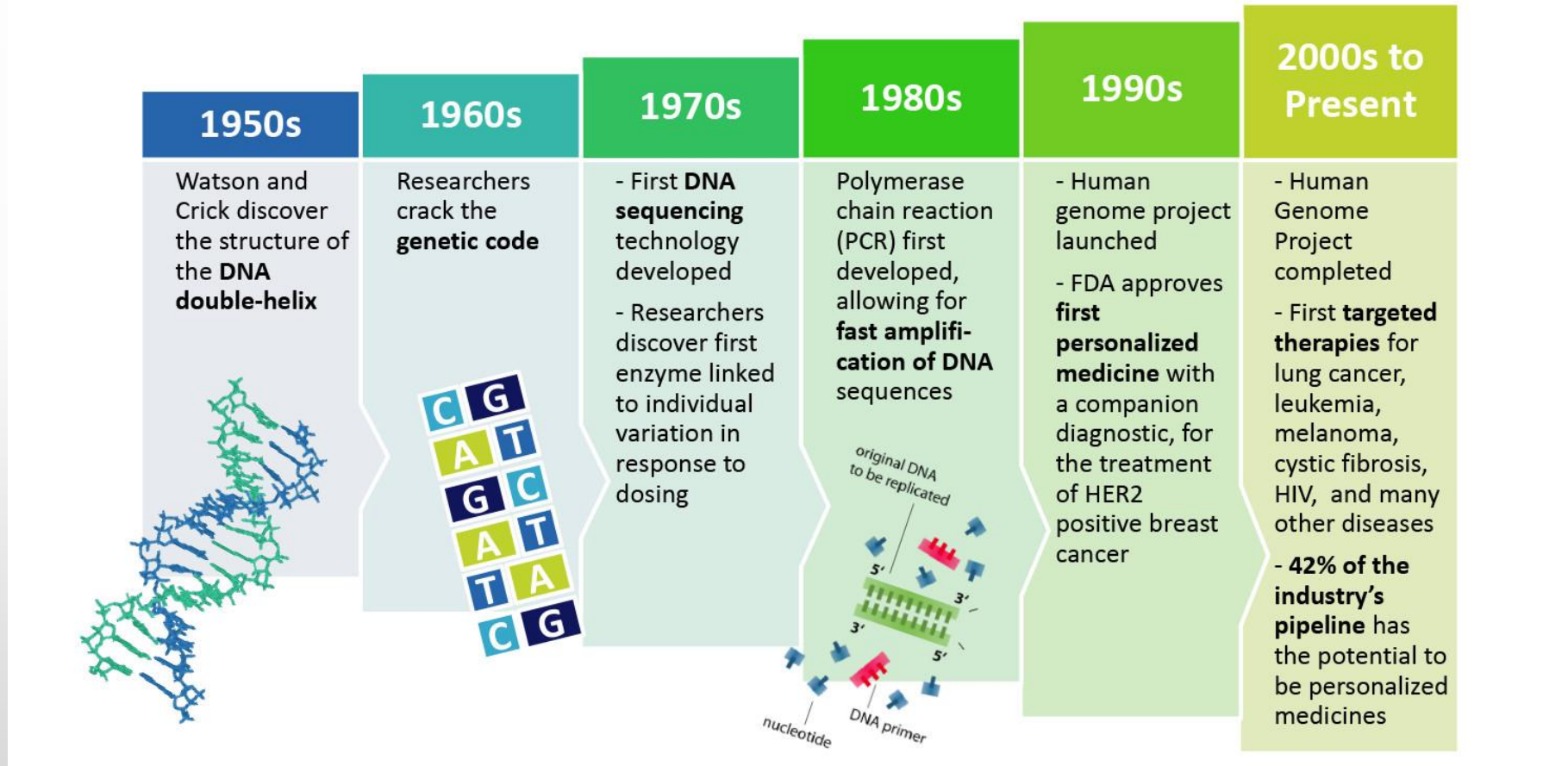
At the head of the surgical robotics race is Intuitive Surgical's da Vinci robot. The da Vinci is the most ubiquitous robot, with more units in operation than any other robotic systems.





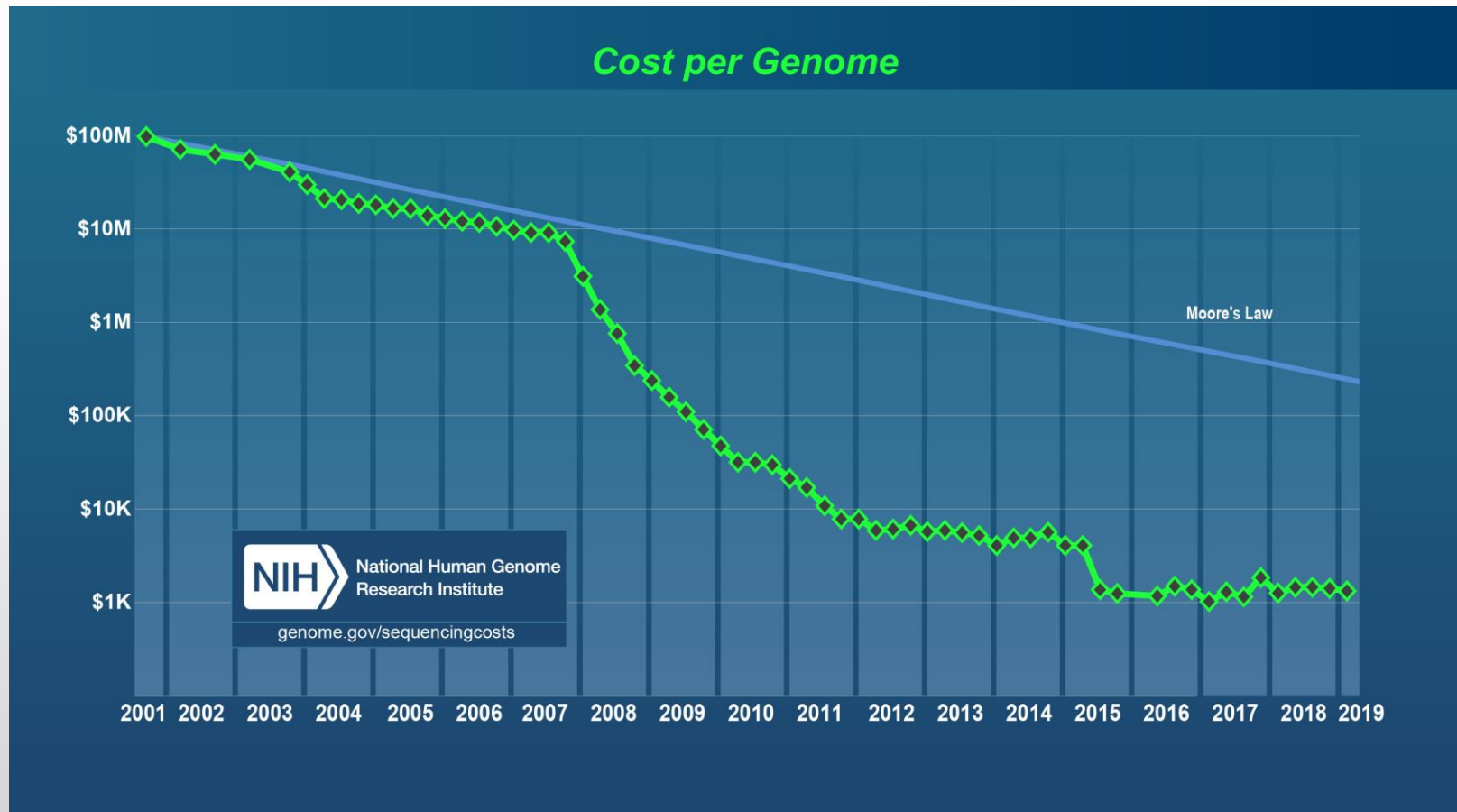
# The Industries of the Future:

## 2.) The Future of the Human Machine, Mapping the Human Genome



## 2.) The Future of the Human Machine: Mapping the Human Genome -

The cost to map a genome has dramatically decreased over the past two decades following the same path as Moore's Law which states that the speed of capabilities of computers will double every two years.





## 2.) The Future of the Human Machine:

### Practical applications



- Liquid Biopsy – A procedure where a blood sample is taken and tested for tiny amounts of tumor DNA.

This helps with diagnostics because trace amounts of disease can be detected earlier.

This also helps with treatment because identification of the specific disease helps identify the best drugs in the best regimen along with chemotherapy and radiation.

- Hacking the Brain – The post SSRI opportunity for innovation in mental illness is through geonomics.
- Innovation for Everybody – Most life science innovation occurs in the US, China and Western Europe. But, mobile phones are bringing low cost effective medical care to low-income areas in Africa and Southeast Asia. Medic Mobile is a 501 public charity technology company specializing in mHealth. Medic Mobile combines SMS messaging, data collection, and analytics for health workers and health systems in hard-to-reach areas with or without internet connectivity.

### 3.) The Code-ification of Money, Markets and Trust.



- Cash, Traveler's Checks, Credit Cards, ATM's, On-Line Banking, eBay, PayPal, Mobile Banking (your phone is now your bank).
- In Africa where war often results in refugees, mobile phones are used to relocate family members. The mobile phone platform is now being used as a type of bank with currency exchange.
- M-Pesa - a mobile phone-based money transfer, financing and microfinancing service, launched in 2007 by Vodafone for Safaricom and Vodacom, the largest mobile network operators in Kenya and Tanzania. It has since expanded to Afghanistan, South Africa, India and in 2014 to Romania and in 2015 to Albania.
- Square, Stripe and Apple Pay reduce the friction involved in money transfers and payments.



Apple Pay is a mobile payment and digital wallet service by Apple Inc. that allows you to make payments in person, through an application or over the web.



# 3. The Code-ification of Money, Markets and Trust.

## The Sharing Economy: Coded Markets of Trust



### Trip Advisor – Guide to Writing Helpful Reviews

1. **Rate and summarize the experience.** *Include an attention grabbing title.*
2. **Cover the five Ws.** *Who, what, when, where and why?*
3. **Highlight the relevant facts.** *Service, location, ambiance.*
4. **Add a helpful tip.** *What do others need to know?*
5. **Provide details.** *Pros, cons and unique details.*
6. **Good grammar goes a long way.** *Spelling and punctuation!*
7. **A photo is worth a thousand words.** *Bring your review to life with a picture.*
8. **Think about your tone.** *Don't turn your review into a rant.*
9. **Review as soon as you can.** *Recent experiences are valued by readers.*
10. **Don't list every little flaw.** *Focus on facts and details, not complaints.*

### 3.) The Code-ification of Money, Markets and Trust.

#### The Sharing Economy: Coded Markets of Trust

- eBay (1996) – According to eBay founder Pierre Omidyar, people on eBay “learned how to trust a complete stranger. eBay’s business is based on enabling someone to do business with another person, and to do that, they first have to develop some measure of trust, either with the person or the system.”
- The development of trust online is a product of algorithms. Despite the distance between participants, it is not blind trust. It is the exact opposite, logging reputations in a two-way rating system of buyer and seller that is monitored by the corporate owners of the platform.





### 3.) The Code-ification of Money, Markets and Trust.

#### The Sharing Economy: Coded Markets of Trust



##### The Shared Economy:

Airbnb (2008) – the company does not own a single hotel room, but it is the world's single largest hotel chain.

Uber (2000) - Uber Technologies, Inc. is an American multinational transportation network company offering services that include peer-to-peer ridesharing, ride service hailing, food delivery, and a bicycle-sharing system.

Important Point – Coded markets like eBay and Airbnb simultaneously concentrate and disperse the market. With coded markets available to even the smallest vendors, a trend has arisen that pushes economic transactions away from physical stores or hotels and towards individual people, as they connect either locally or online. This is how the market is dispersed. The route through which it is dispersed, however, redirects each of those transactions through a small number of technology platforms usually based in California or China. This is how markets are concentrated.

Excerpt from The Industries of the Future, page 93.

# The Industries of the Future

## 4.) The Weaponization of Code

Three main types of Cyberattacks:

Network Confidentiality (Target '13 hack)

Network Availability (DDoS denial of service)

Network Integrity (ransom ware system destruction)



# The Industries of the Future

## 4.) The Weaponization of Code

The Internet of Things (IOT):

1. Internet connected cars on the road
2. Advent of wearable technology
3. Smart controls in our homes
4. Manufacturing



Important Point: The rapid growth of these technologies also create many more new vulnerabilities and openings for cybersecurity hacks.



# The Industries of the Future

## 4.) The Weaponization of Code



- Cybercombat is a distinctively 21<sup>st</sup>-century form of conflict, and the norms and laws that were developed in prior centuries simply do not apply. The weaponization of code is the most significant development in warfare since the development of nuclear weapons, and its rapid rise has created a domain of conflict with no widely accepted norms or rules. Excerpt from Page 142.
- The Cold War did not lack for political and military tension, but it did have a clear set of alliances organized around the binary of the struggle between Communist and Western bloc countries. The Code War has no such simple organization. Excerpt from Page 145.

# The Industries of the Future

## 5.) Data: The Raw Material of the Information Age

The first time a child is handed a phone or plays his first video game, he begins building a stack of personal data that will grow throughout his lifetime, a stack that can be constantly collated, correlated, codified and sold.

*Big data* is a catchall phrase used to describe how these large amounts of data can now be used to understand, analyze and forecast trends in real time. The term can be used interchangeably with *big data analytics*, *analytics* or *deep analysis*.



The Industries of the Future

## 5.) Data: The Raw Material of the Information Age

Universal Machine Translation – instant translation from one language to another. The only translators in ten years are going to be the people who work on the translation software.

Excerpt page 160.





## The Industries of the Future

### 5.) Data: The Raw Material of the Information Age

Precision Agriculture – The promise of precision agriculture is that it will gather and evaluate a wealth of real time data on factors including weather, water and nitrogen levels, air quality and disease – which are not just specific to each farm or acre but specific to each square inch of that farmland. Sensors will line the field and yield dozens of forms of data to the cloud. That data will be combined with data from GPS and weather models. With this information gathered and evaluated, algorithms can generate a precise set of instructions to the farmer about what to do, when and where.

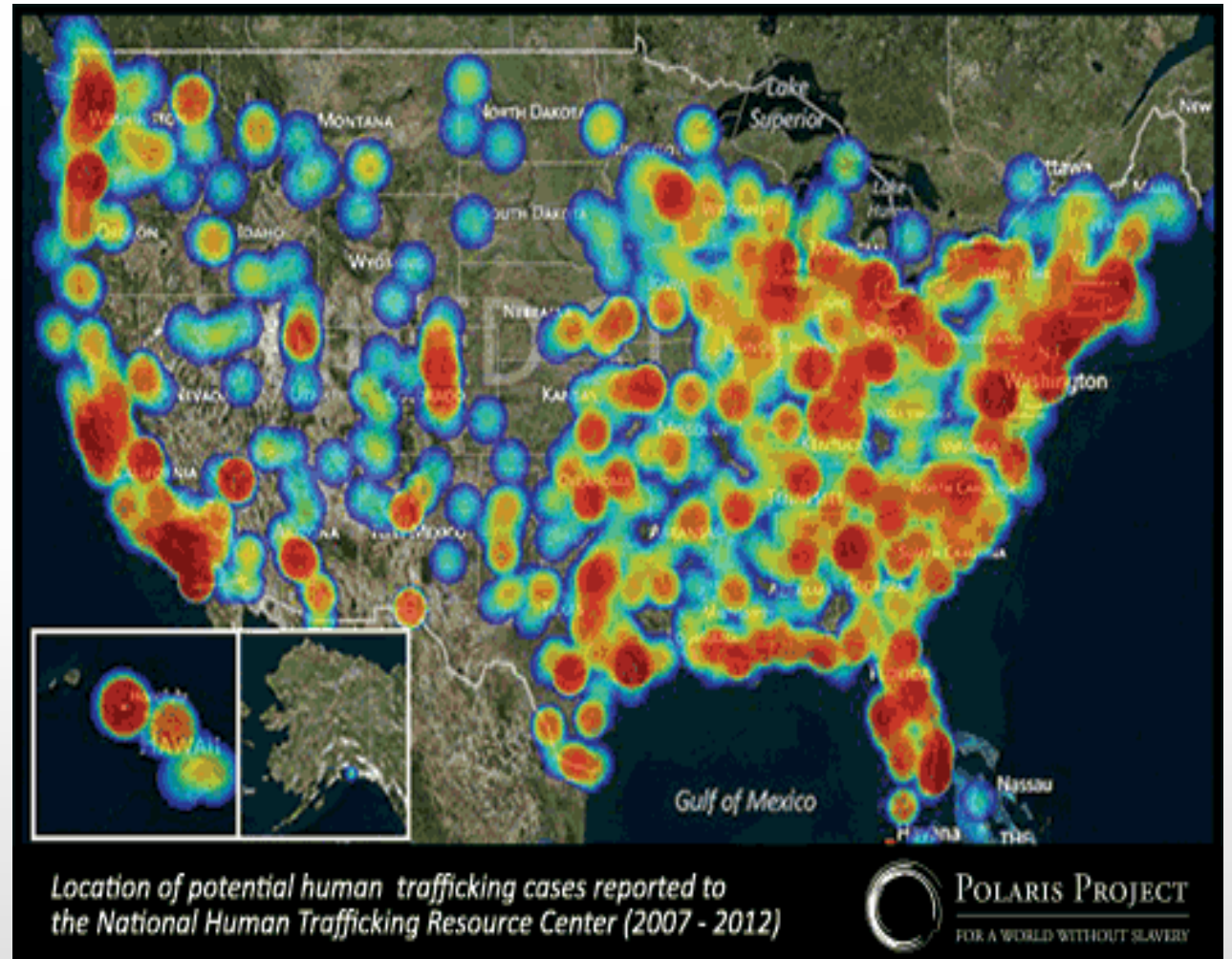
Excerpt, Page 162.



The Industries of the Future

## 5.) Data: The Raw Material of the Information Age

Palantir –it specializes in data management, transforming massive and often messy data into visualized maps and charts.



# The Industries of the Future

## 6.)The Geography of Future Markets

Domain Expertise – deep knowledge about a single industry which tends to concentrate in specific cities and regions.

The principal political binary of the last half of the 20<sup>th</sup> century was communism versus capitalism. In the 21<sup>st</sup> century, it is **open versus closed**.

A crucial factor in countries' success will be their ability to empower their own citizens - and this means all of their citizens. Too often countries still focus only on half – their male population – and ignore and abuse women, even as they hold so much potential.





What  
About  
Jobs?



## “Automation could kill 73 million U.S. jobs by 2030” by Paul Davidson, USA Today 11/28/17

In the U.S., 39 million to 73 million jobs could be destroyed, but about 20 million of those displaced workers can be shifted fairly easily into similar occupations, though they may take on slightly different tasks, the report says. That means 16 million to 54 million workers — or as much as a third of the U.S. workforce — will need to be retrained for entirely new occupations.





# Fastest Growing Occupations 2018-2028

## US Bureau of Labor Statistics

<u>OCCUPATION</u>	<u>% GROWTH</u>	<u>18 MEDIAN PAY</u> <u>(in Thousands)</u>
Solar Panel Installer	63%	\$ 43
Wind Turbine Technician	57%	\$ 54
Home Health Aide	37%	\$ 24
Personal Care Aide	36%	\$ 24
Occupational Therapy Assistant	33%	\$ 60
Information Security Analyst	32%	\$ 98
Physician's Assistant	31%	\$ 109
Statistician	31%	\$ 88
Nurse Practitioner	28%	\$ 107
Speech Pathologist	27%	\$ 78
Physical Therapy Assistant	27%	\$ 58
Genetic Counselor	27%	\$ 80
Mathematician	26%	\$ 102
Operations Research Analyst	26%	\$ 83
Software Developer	26%	\$ 104
Forest Fire Inspector	24%	\$ 40

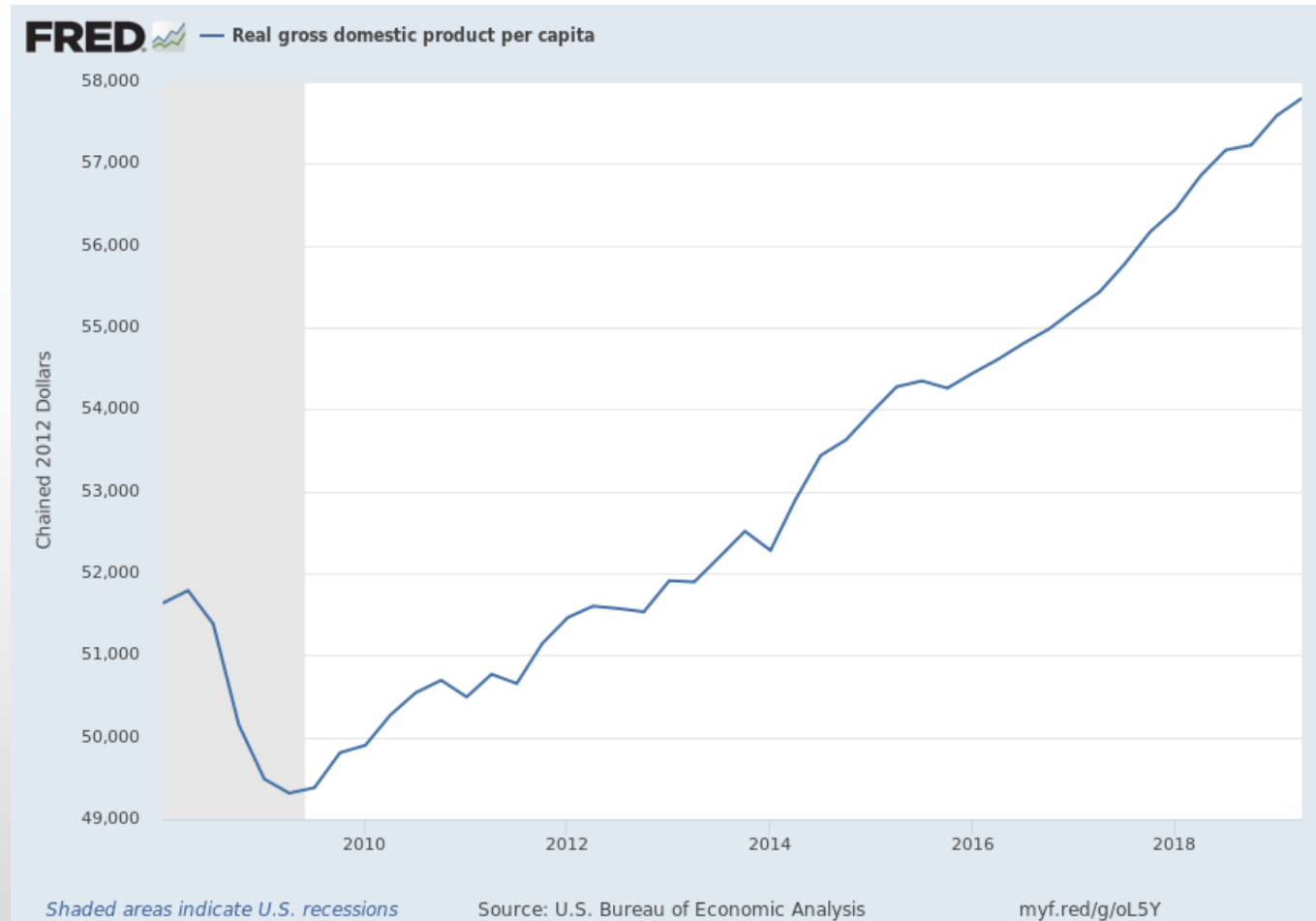
# “WHEN GROWTH IS NOT ENOUGH”

Dr. Ben Bernanke

Remarks delivered on June 26, 2017, at the European Central Bank Forum on Central Banking at Sintra

- Generally speaking, economic growth is a good thing, positively associated with many indicators of citizens’ well-being. More-rapid growth also improves fiscal balances, giving governments greater capacity and flexibility. But, as recent political developments have brought home, **growth is not always enough**. Economic growth almost always involves significant change and the possibly rapid depreciation of some human and social capital. The resulting dislocations can be very difficult to address, likely requiring a mix of top-down, bottom-up, public, and private interventions. But if the resources released by economic change are to be effectively redeployed; if the benefits of growth are to be widely shared; and if economic policy is to be widely perceived as both successful in its own terms and politically legitimate, then making those interventions effective should be a top priority for policymakers.

# Real GDP Per Capita since the Great Recession

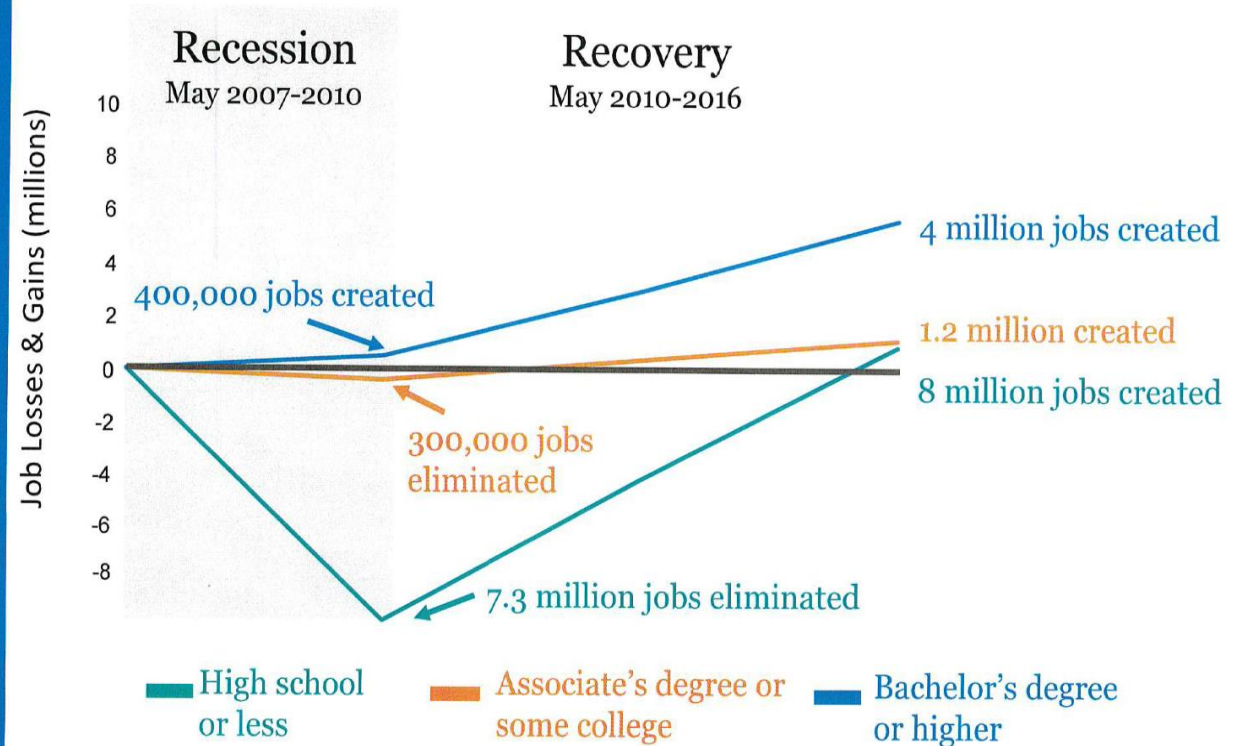


## Available Job Positions Since the Great Recession Based on Minimal Education Level Required

Will there be enough jobs is the wrong question.

Will there be enough people with skills to fill the new jobs is the correct question.

### Available Job Positions by Minimum Education Level Required



SREB

Source: Bureau of Labor Statistics, 2016

Joan Lord, Meagan Crowe | May 2019

8

# “The Once and Future Worker” by Oren Cass

(Senior Fellow at the Manhattan Institute)

- “As an alternative to economic piety and its GDP-based definition of prosperity, I suggest what I call *productive pluralism*: the economic and social conditions in which people of diverse abilities, priorities and geographies, pursuing varied life paths, can form self-sufficient families and become contributors to their communities.”

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Roughly speaking, one-fifth of all students were already off-track and did not join their classmates crossing the stage. Another fifth will move from their senior year to something besides further schooling. The third fifth will enroll in college but fail to complete it. Yet another fifth will complete some form of college but land in jobs that don't require the degrees they just earned. Despite decades of reform in teacher training, student testing, and standards, as well as school choice and hundreds of billions in dollars in new annual education spending, only the final fifth will successfully navigate the path – high school to college to career – that is our education system's ideal.



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Cass’s prescription:

- SC Wins Program
- Transfer Programs
- Career Programs
- Transition Programs

Cass essentially endorses tracking as a way to match students with interest and aptitude.

These types of programs are prevalent within South Carolina’s Technical College System.

# The Take Away

- The industries of the future will bring about rapid change.
- Our lives will be enhanced by the new emerging technologies.
- The education community will play a very important role as these industries will require higher levels of education attainment to participate in the emerging economy.
- The policy goal is to keep in mind the concept of productive pluralism so that every citizen has the opportunity to become a contributor to their community.



# Thank You

“The entrepreneur always searches for change, responds to it, and exploits it as an opportunity.”

Peter Drucker