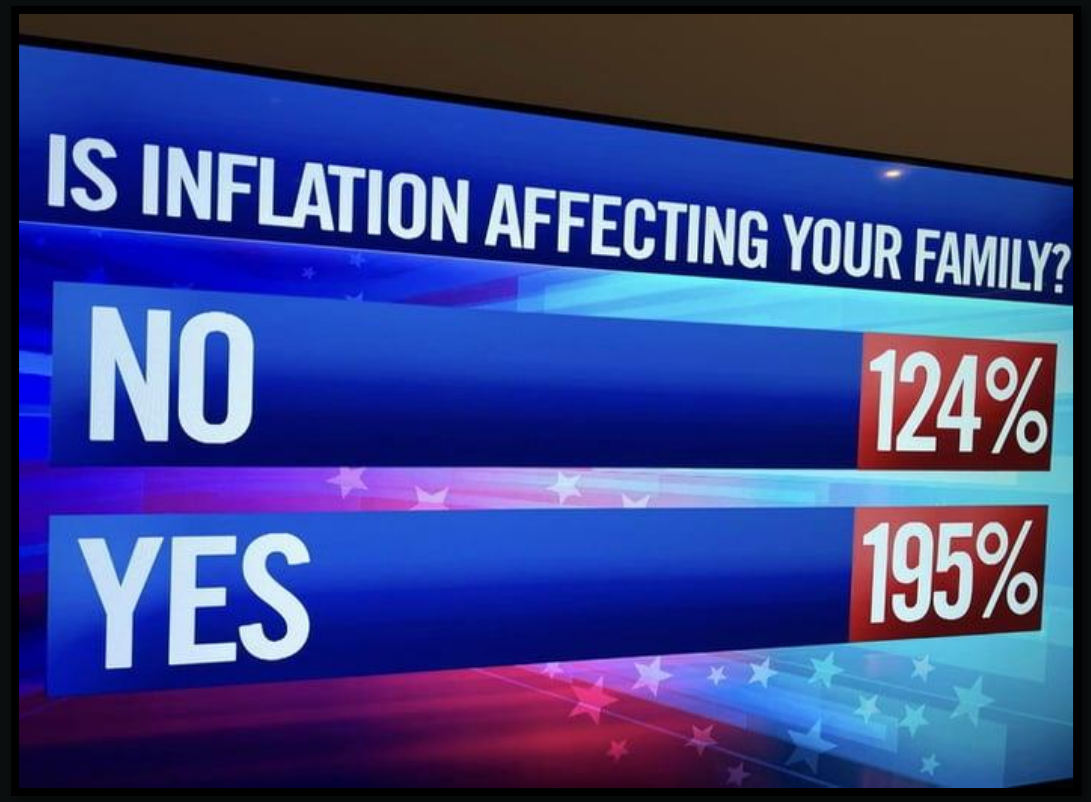


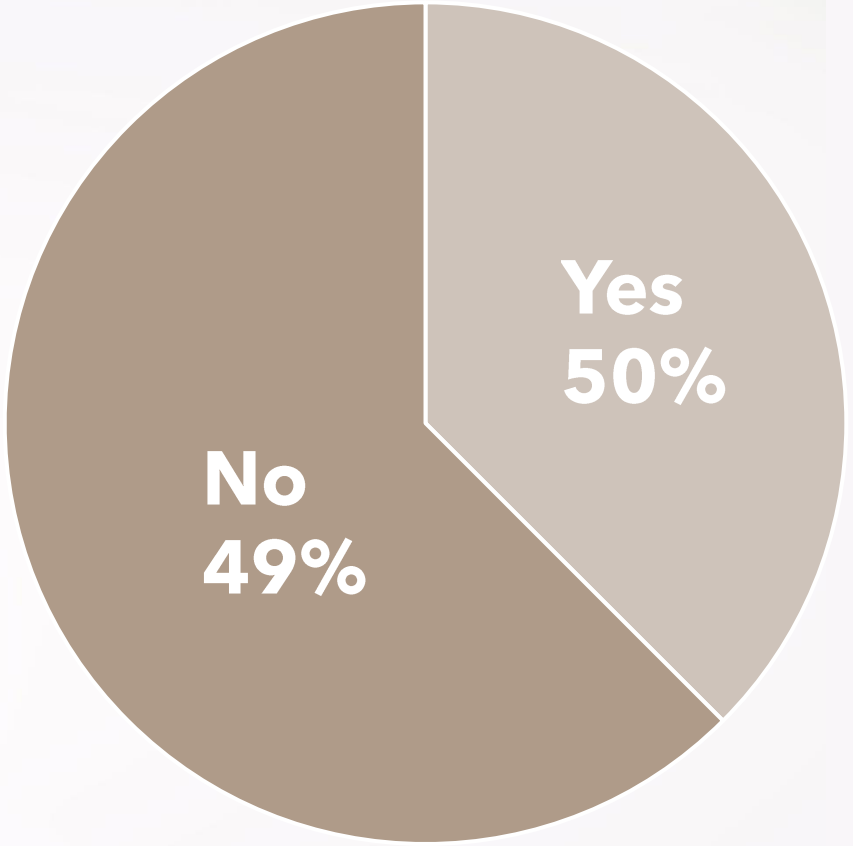
The Untruthful Art:

Five Ways of MISREPRESENTING Data

Alexander Arvidsson | @arcticdba

nordic summit

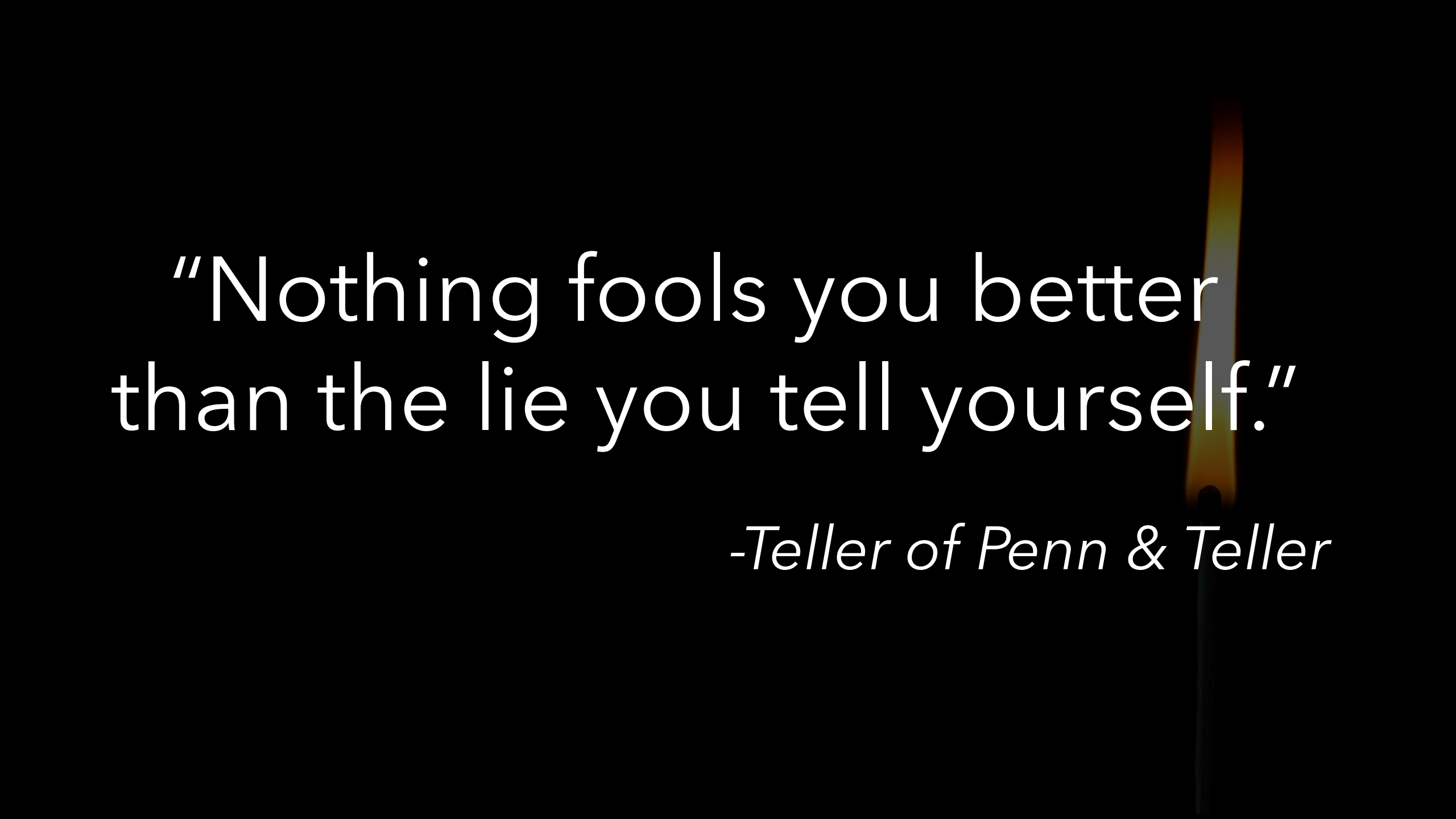
“Last week, we asked whether A levels are becoming harder to pass. You said:”



What **DECEPTION** can look like

How to **SPOT** foul play

What makes the dataviz craft so **DANGEROUS**


“Nothing fools you better
than the lie you tell yourself.”
-Teller of Penn & Teller

Alexander Arvidsson (he/him)

| Data Platform MVP | MCT | Speaker |

KNEE-DEEP IN TECH

MVP Microsoft Most Valuable Professional

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Charter Sponsor

Platinum Sponsor

Organizing Sponsor

Thank you to our Sponsors

Gold Sponsors

Silver Sponsors

Online Sponsors

1

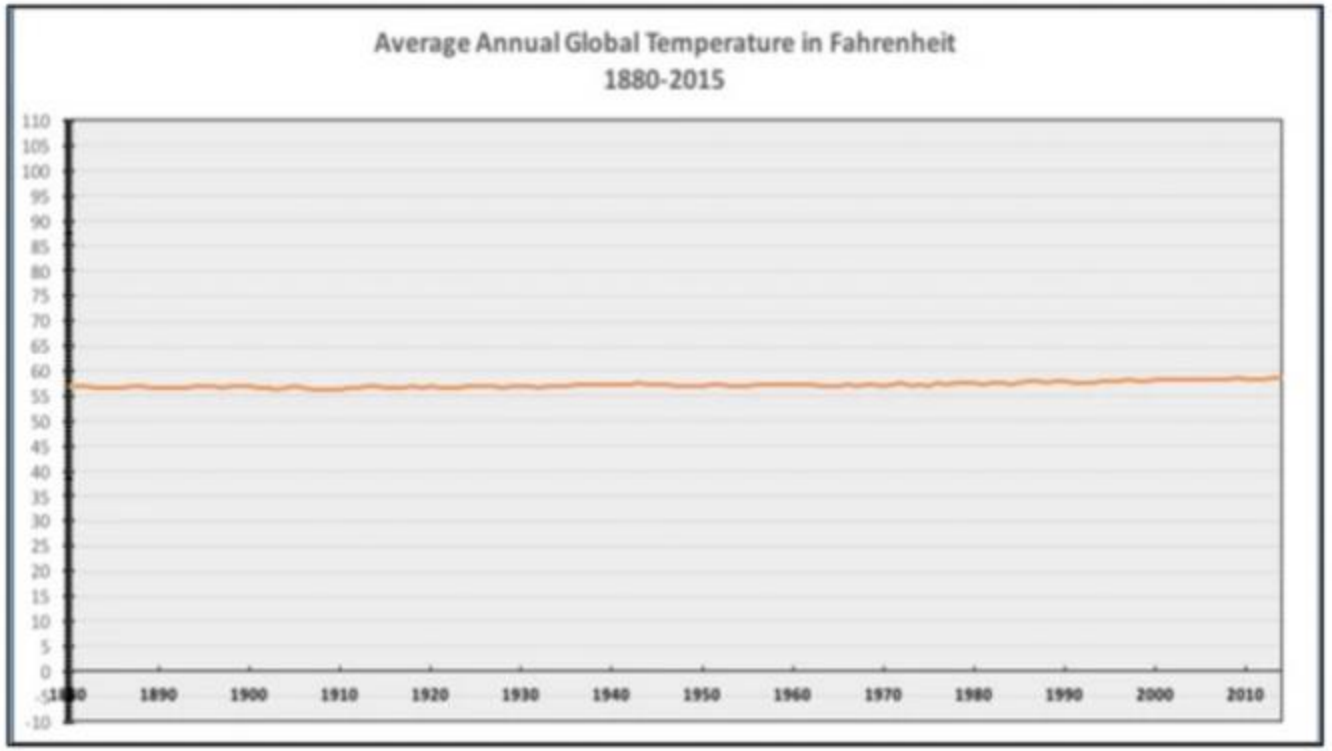
Axis Manipulation

National Review
@NRO

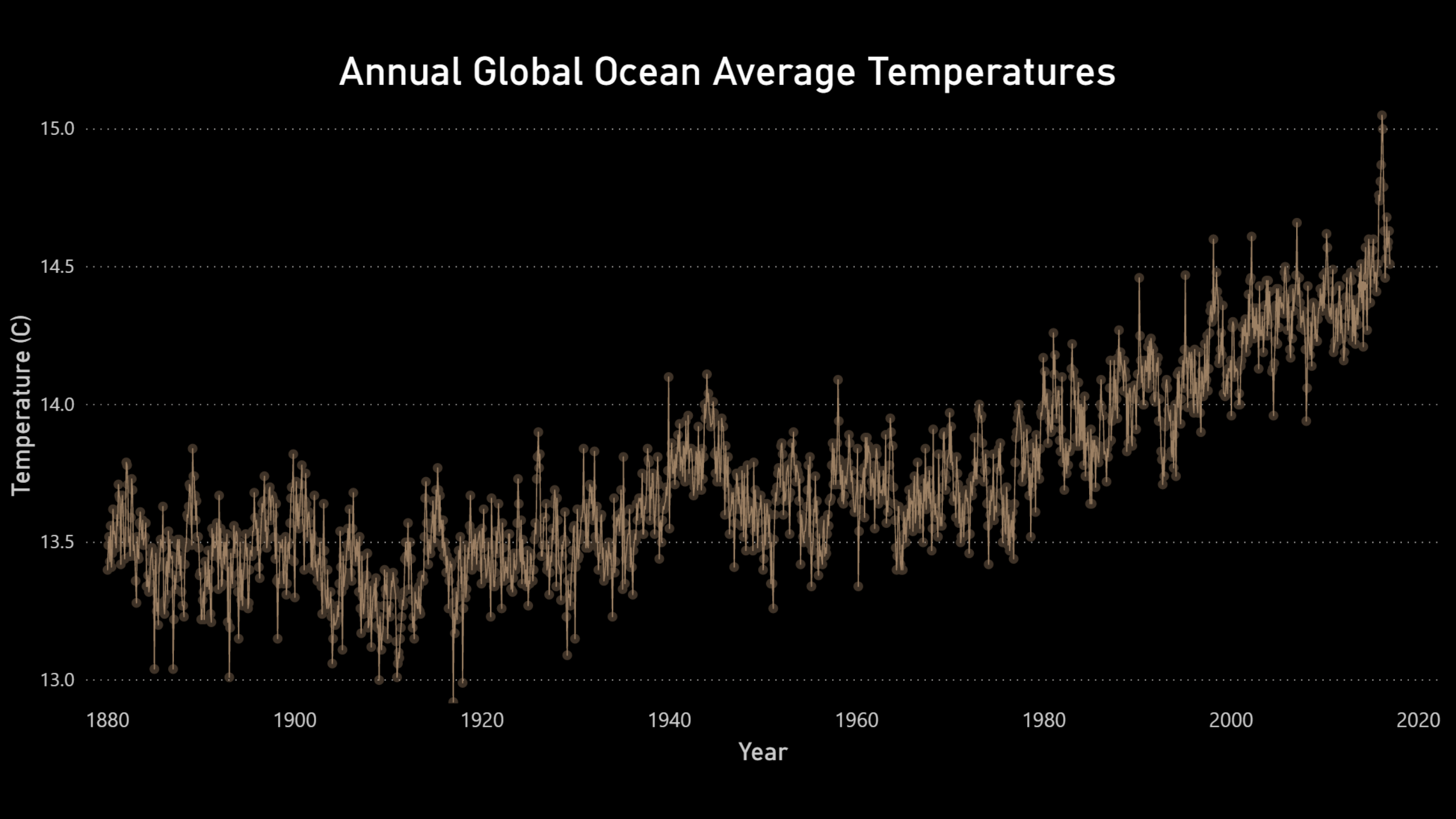
Follow

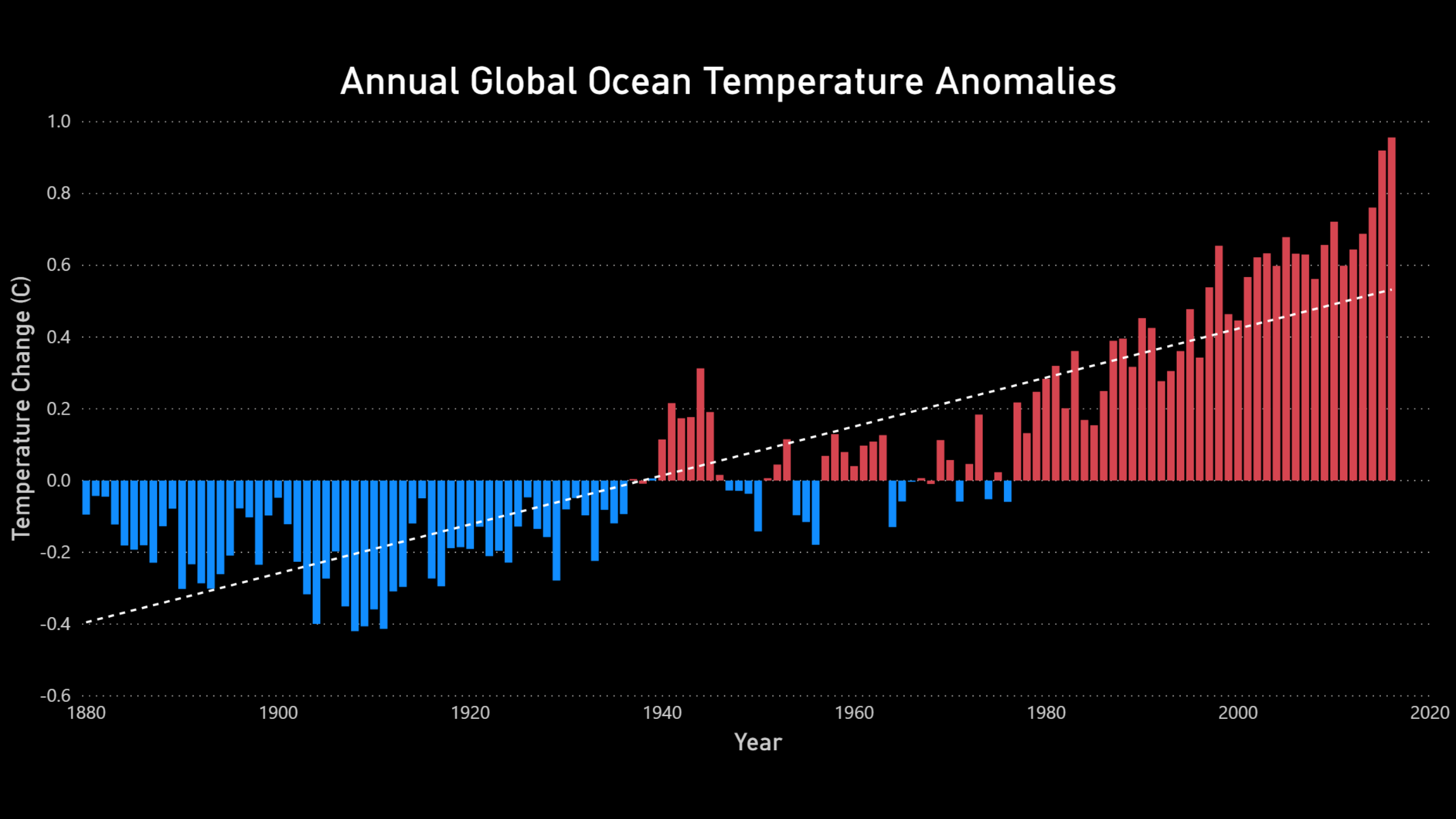
The only #climatechange chart you need to see. natl.re/wPKpro

(h/t @powerlineUS)

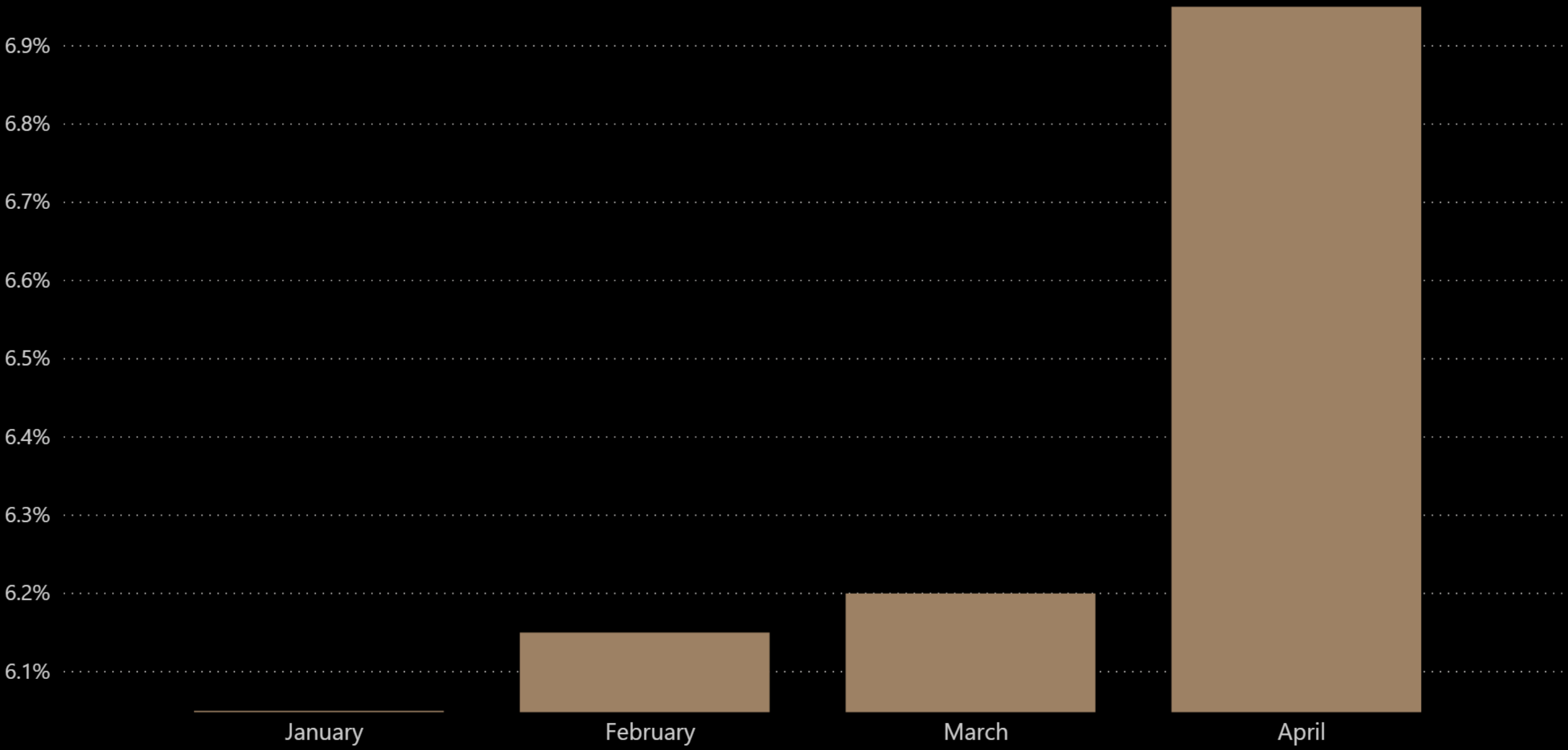


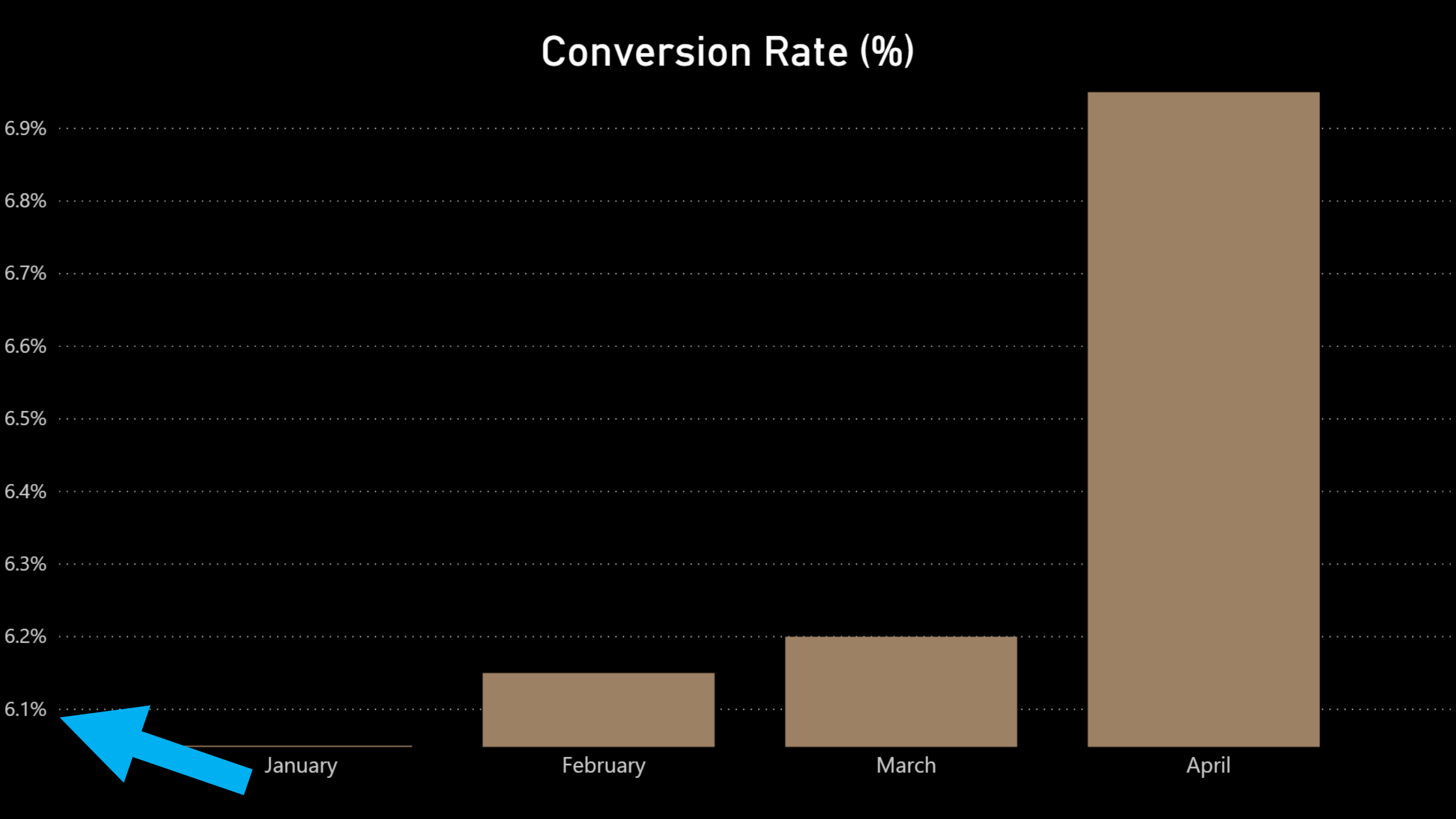
1:36 PM - 14 Dec 2015

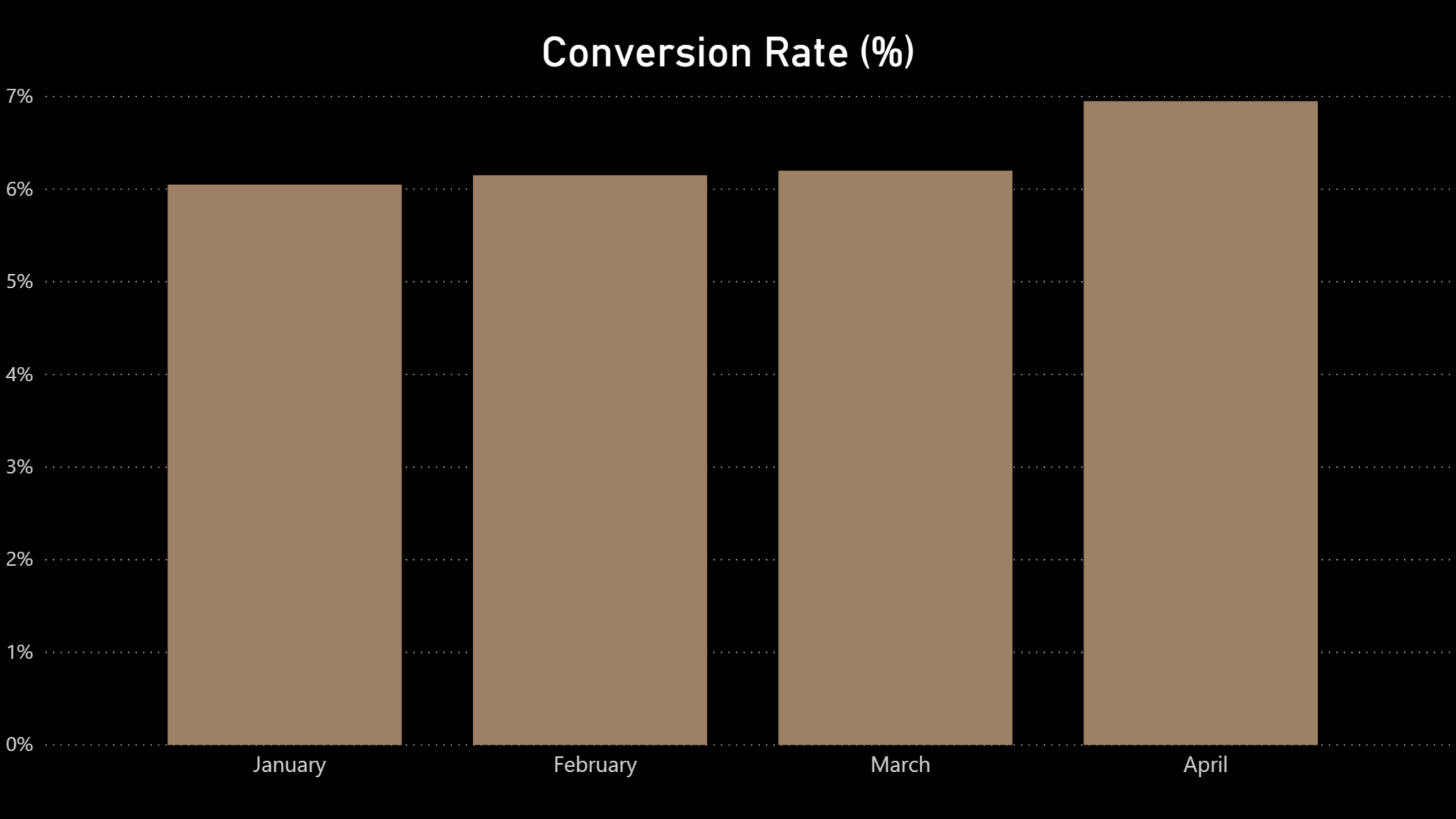

Annual Global Ocean Average Temperatures
15.0
14.5
14.0
13.5
13.0
Temperature (C)
1880
1900
1920
1940
1960
1980
2000
2020
Year

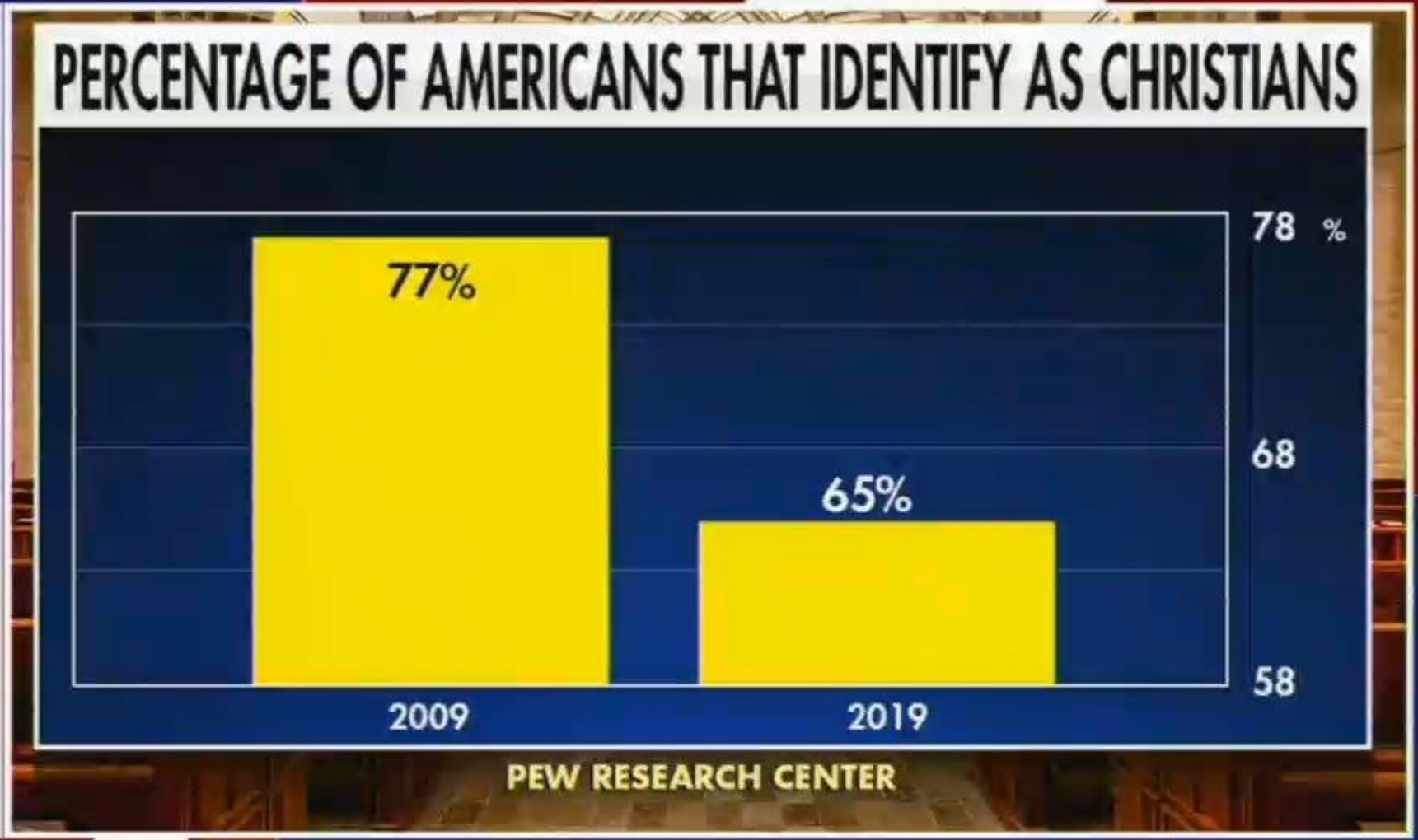

Annual Global Ocean Temperature Anomalies
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
Temperature Change (C)
1880
1900
1920
1940
1960
1980
2000
2020
Year

Conversion Rate (%)




Conversion Rate (%)
6.9%
6.8%
6.7%
6.6%
6.5%
6.4%
6.3%
6.2%
6.1%
January
February
March
April


Conversion Rate (%)
7%
6%
5%
4%
3%
2%
1%
0%
January
February
March
April

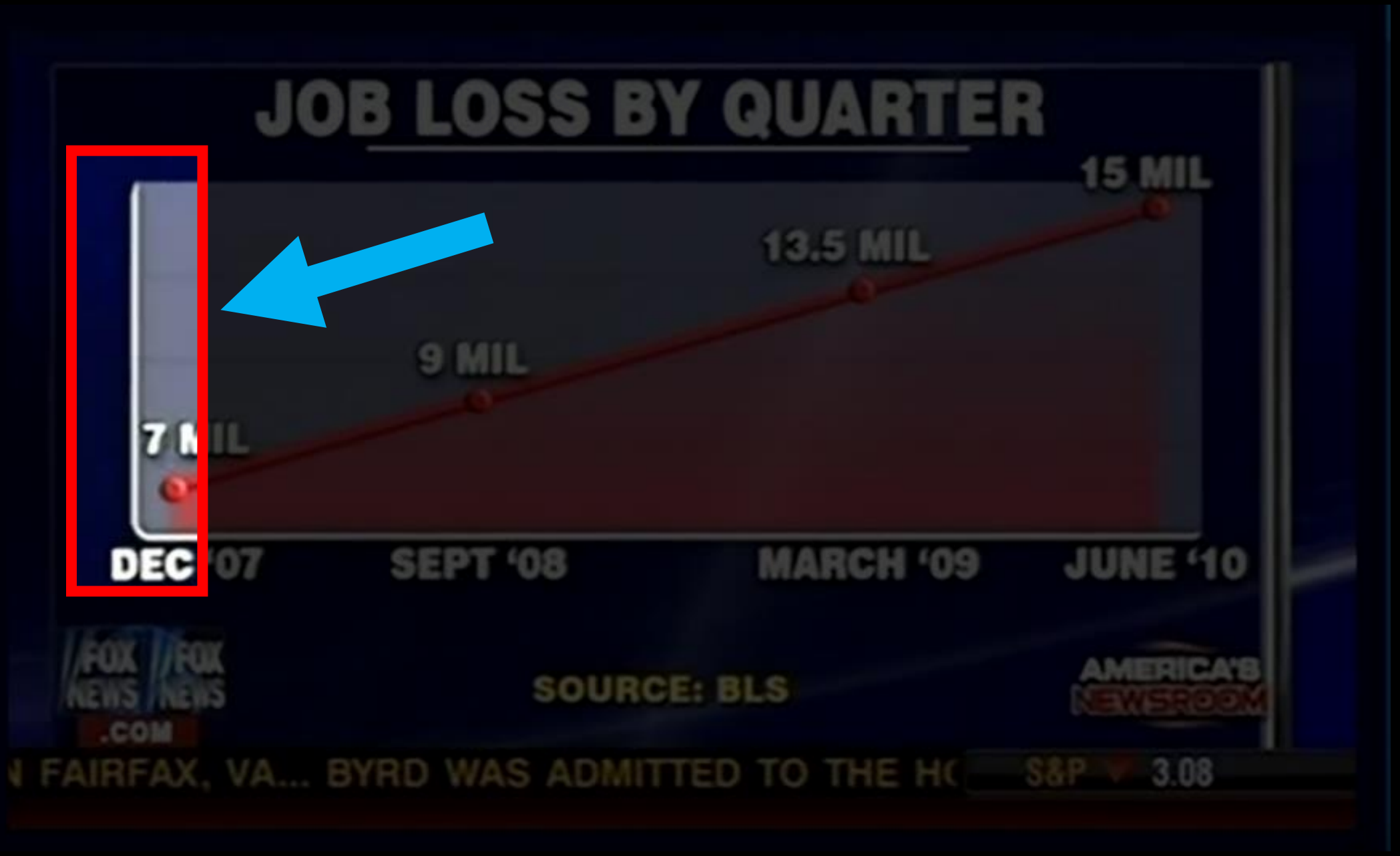


FOX NEWS
8:00 ET

WE USED TO BE AN ENTHUSIASTICALLY CHRISTIAN NATION

TUCKER CARLSON ★TONIGHT★

JOB LOSS BY QUARTER
15 MIL
13.5 MIL
9 MIL
7 MIL
DEC '07
SEPT '08
MARCH '09
JUNE '10
FOX NEWS .COM
SOURCE: BLS
AMERICA'S NEWSROOM
FAIRFAX, VA... BYRD WAS ADMITTED TO THE H
S&P 3.08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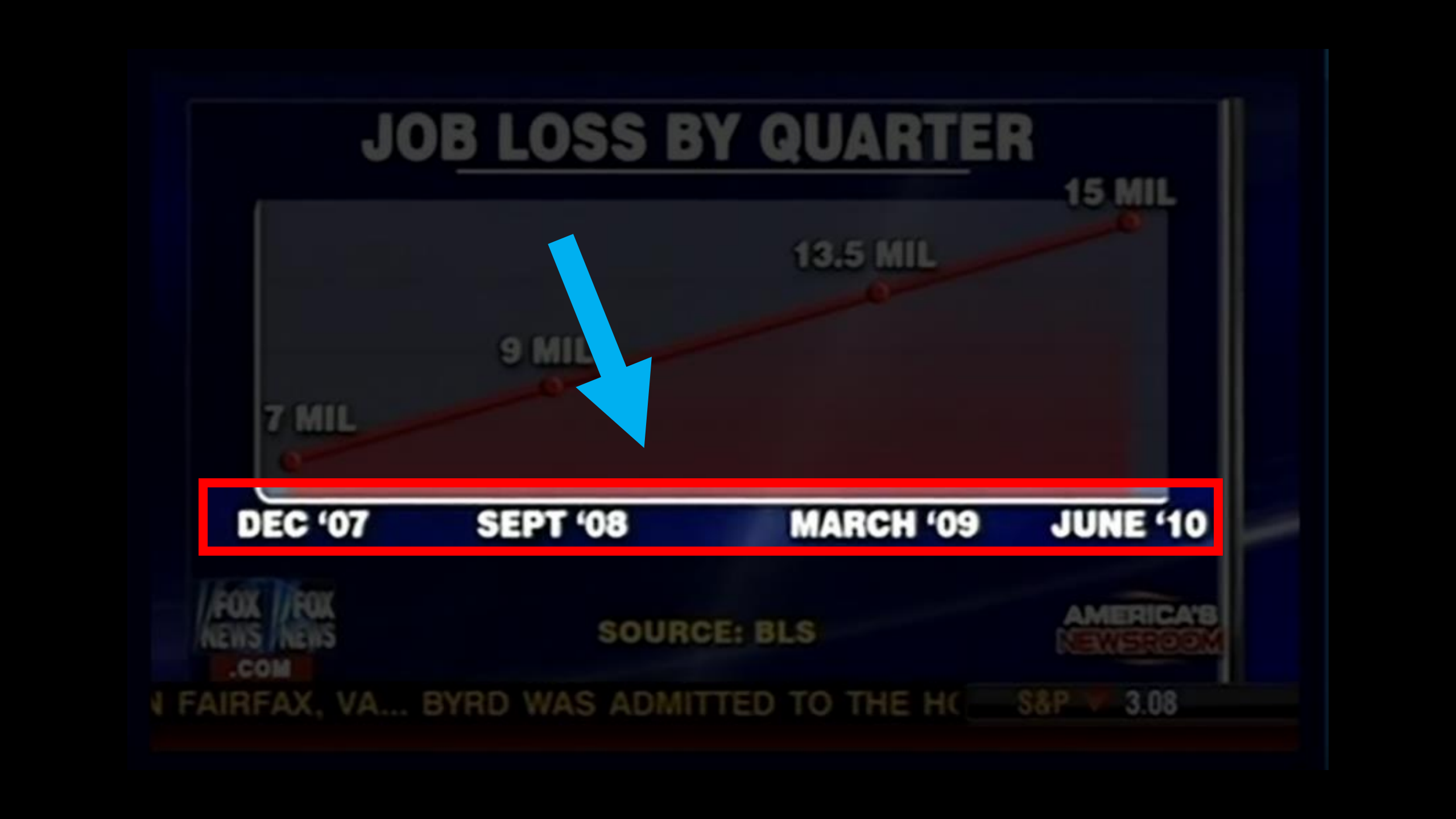
JOB LOSS BY QUARTER
15 MIL
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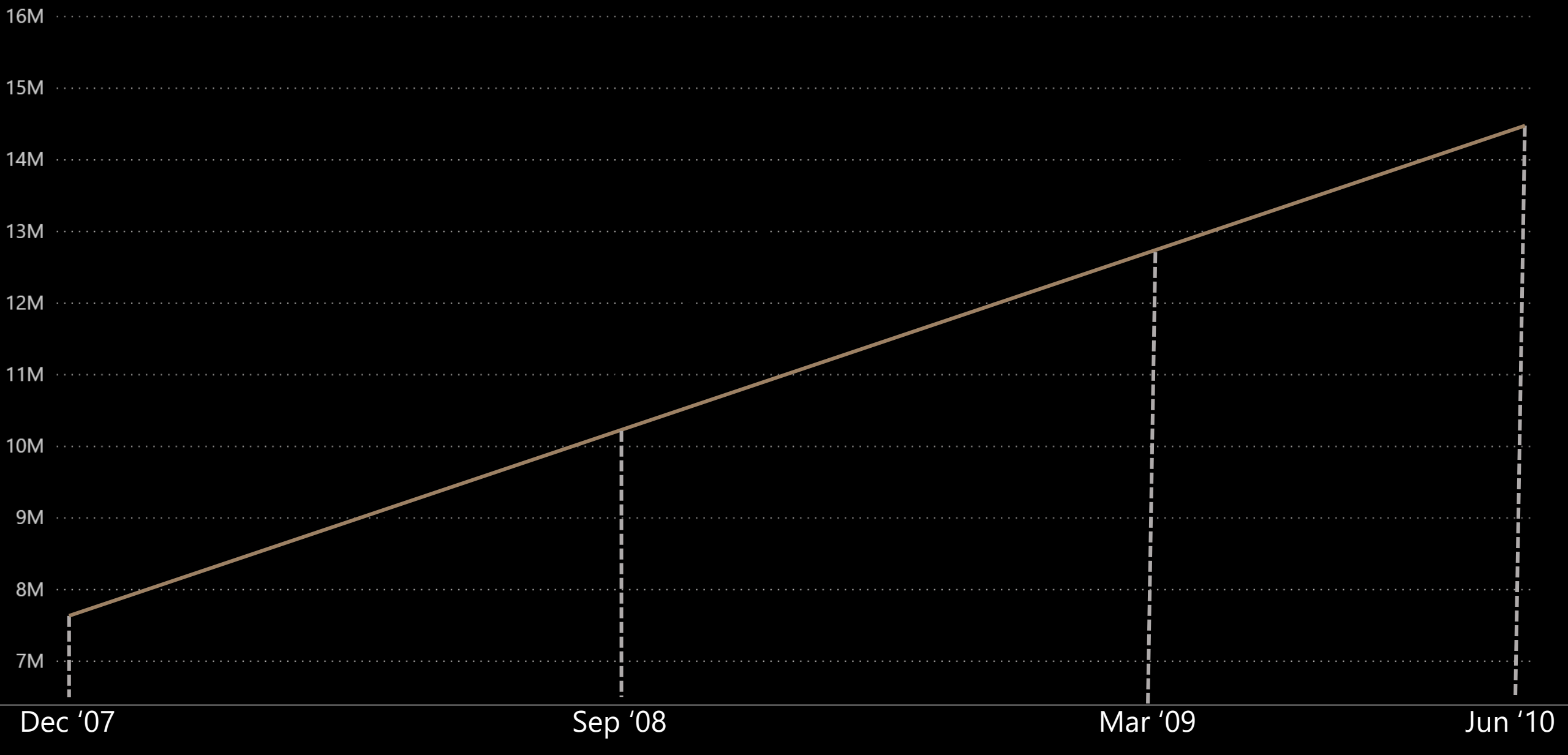
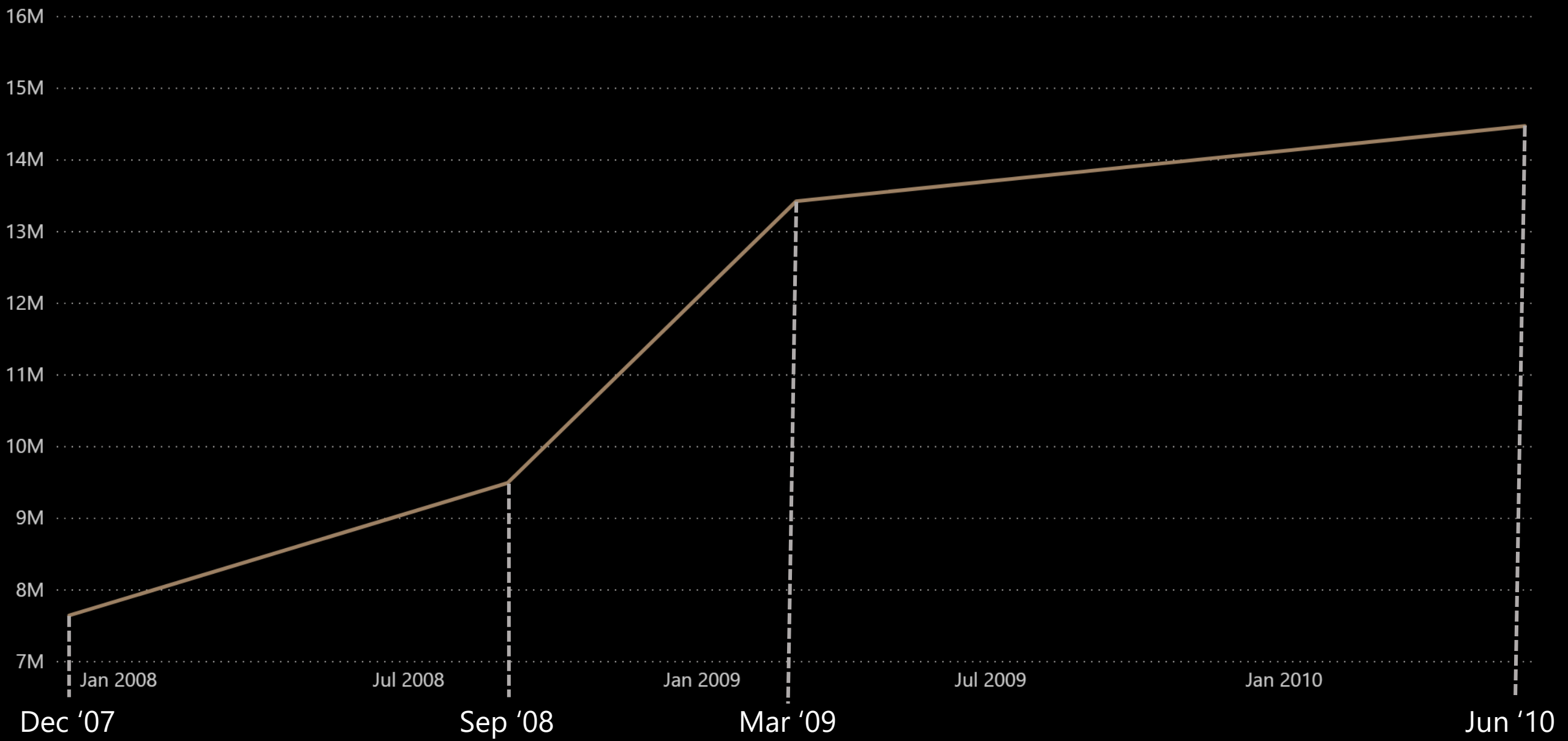
MARCH '09
JUNE '10
FOX NEWS .COM
SOURCE: BLS
AMERICA'S NEWSROOM
FAIRFAX, VA... BYRD WAS ADMITTED TO THE H
S&P 3.08

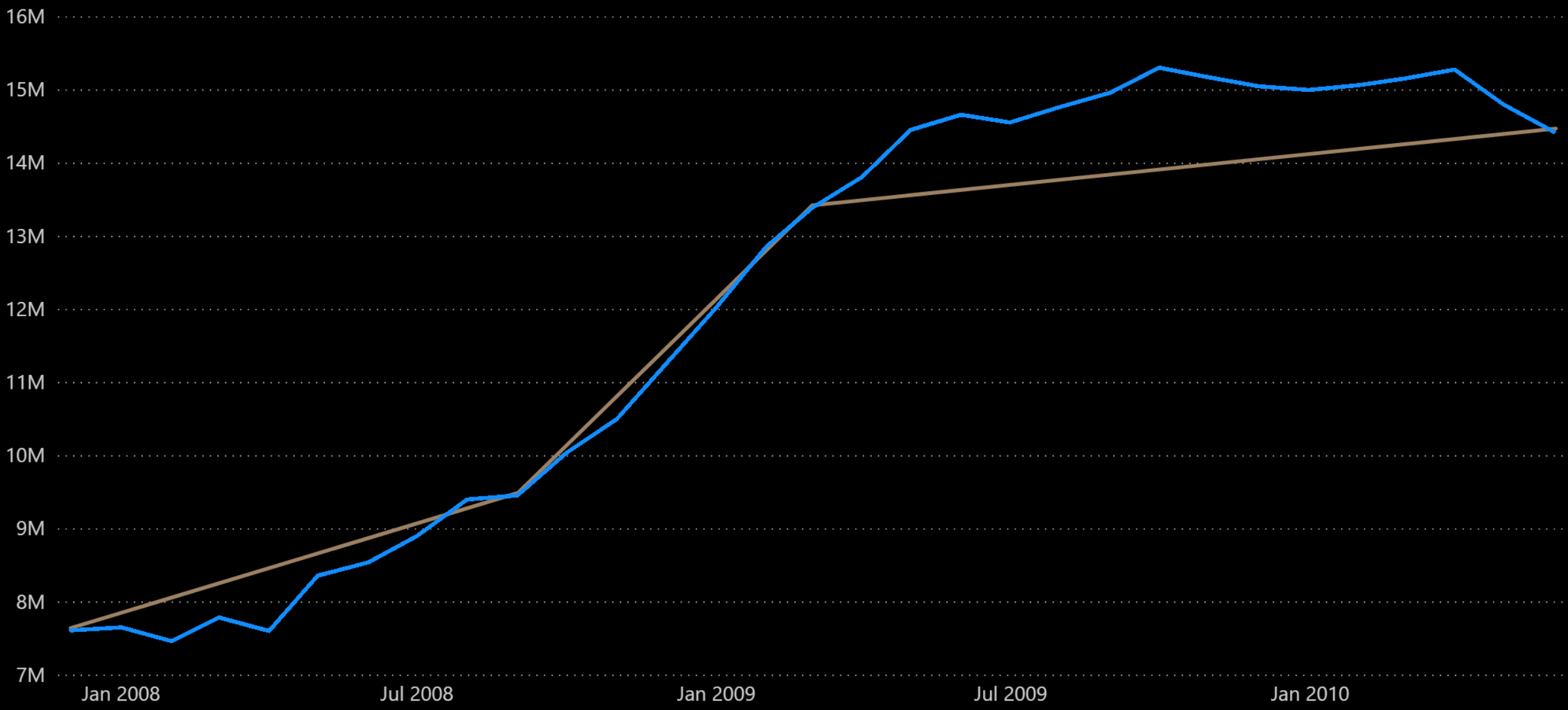
Job Loss Per Quarter



Job Loss Per Quarter

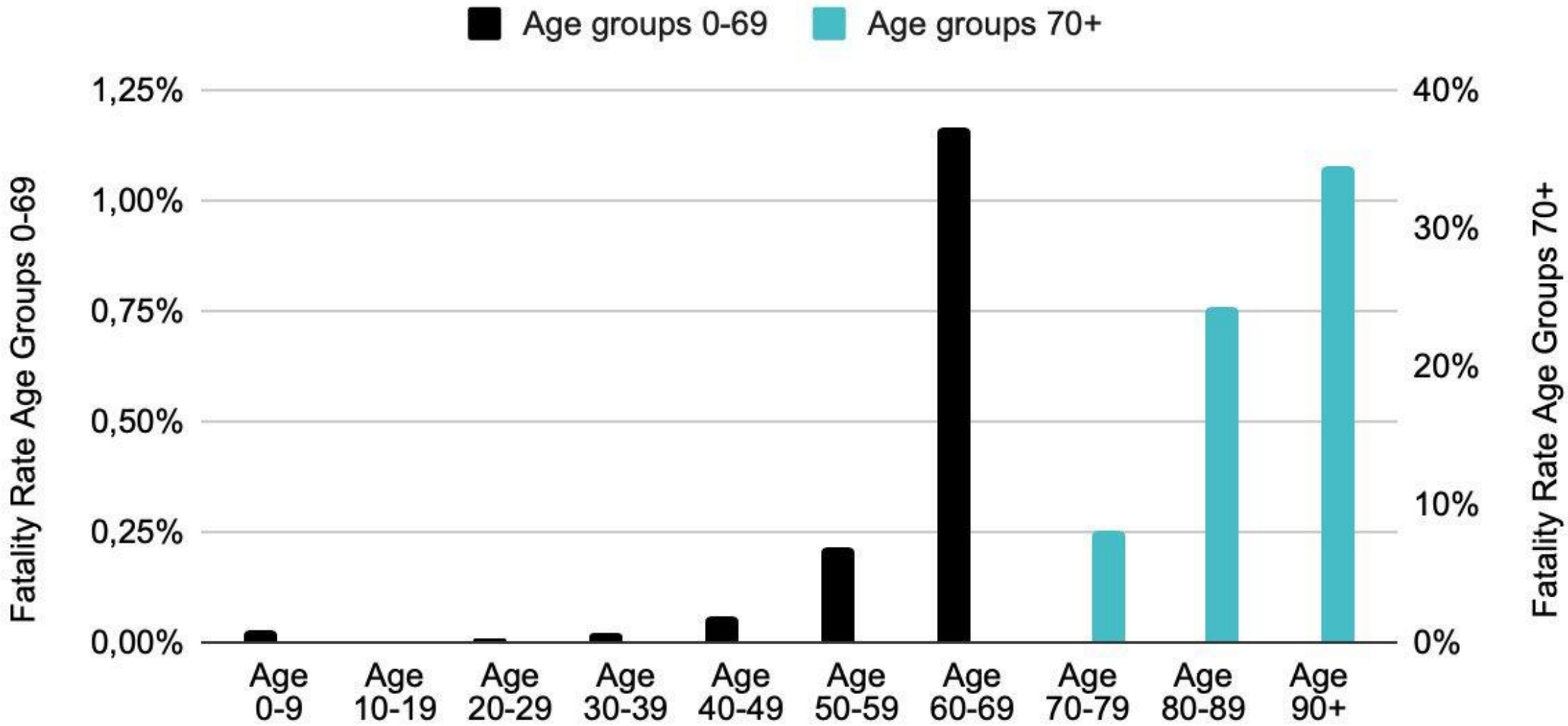


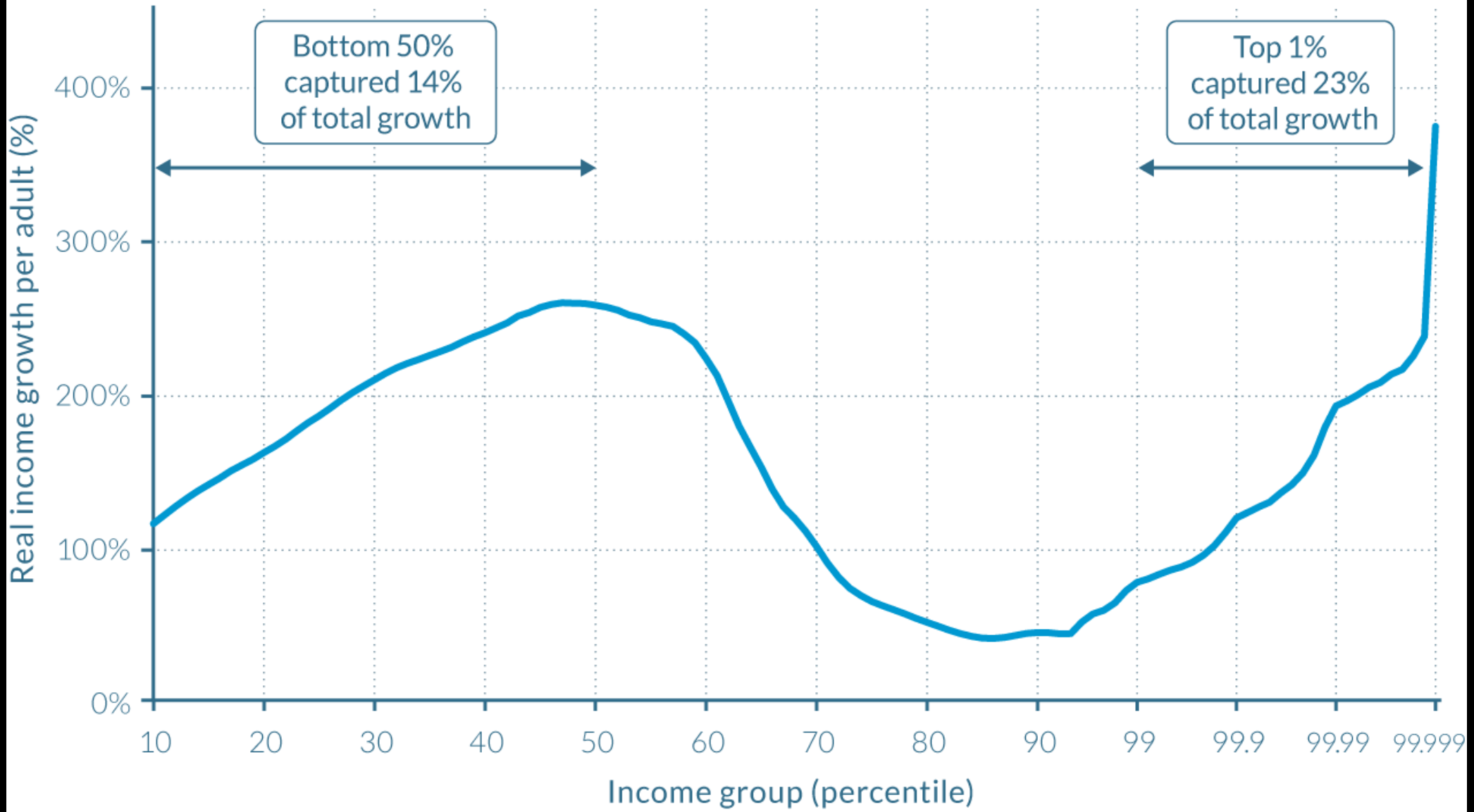
Job Loss Per Quarter



Covid19 fatality rates per age group based on known cases and deaths as reported by FoHM

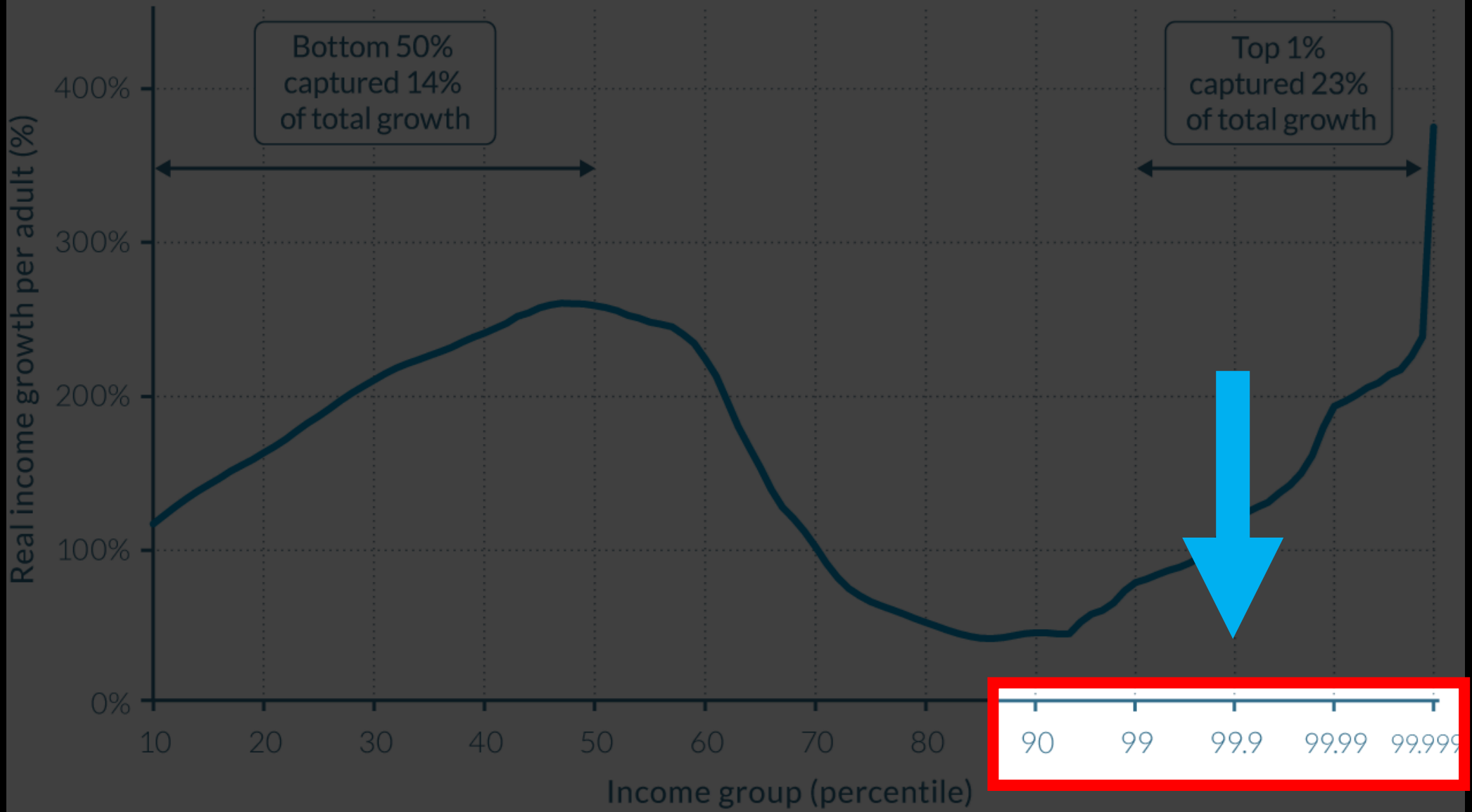
Sweden - updated 28 July





Source: WID.world (2017). See wir2018.wid.world/methodology.html for data series and notes.

On the horizontal axis, the world population is divided into a hundred groups of equal population size and sorted in ascending order from left to right, according to each group's income level. The Top 1% group is divided into ten groups, the richest of these groups is also divided into ten groups, and the very top group is again divided into ten groups of equal population size. The vertical axis shows the total income growth of an average individual in each group between 1980 and 2016. For percentile group p99p99.1 (the poorest 10% among the world's richest 1%), growth was 77% between 1980 and 2016. The Top 1% captured 23% of total growth over this period. Income estimates account for differences in the cost of living between countries. Values are net of inflation.



Source: WID.world (2017). See wir2018.wid.world/methodology.html for data series and notes.

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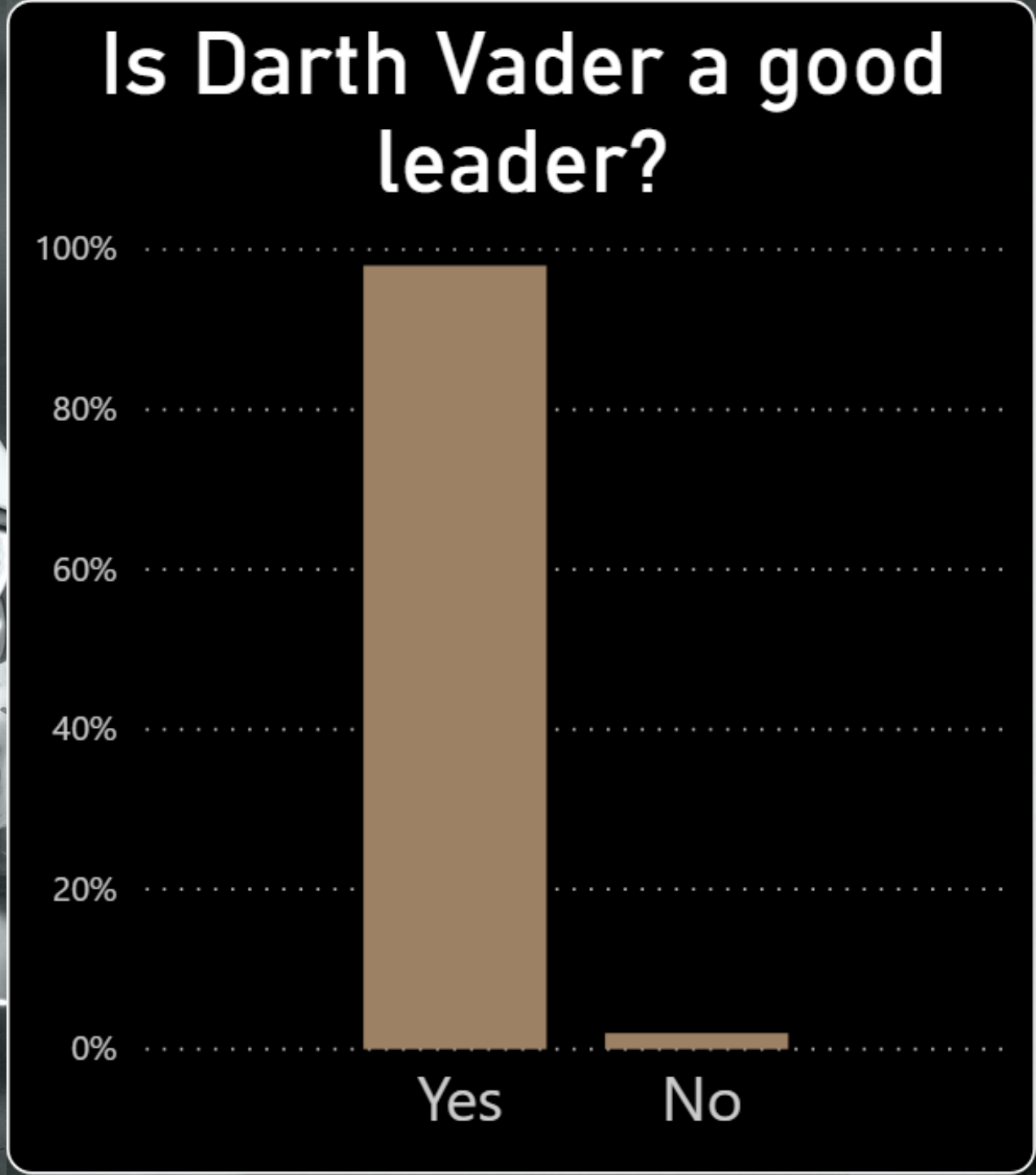
Look at the **SCAFFOLDING**

Bar chart axis should (almost) always include **ZERO**

Axis should not change **SCALES** midstream

2

Cherry Picking


Is Darth Vader a good leader?
100%
80%
60%
40%
20%
0%
Yes
No

Crime > Index by Country > Europe

Europe: Crime Index by Country 2020

Like Tweet

More information about these indices

Select date: 2020

Select display column: Crime Index

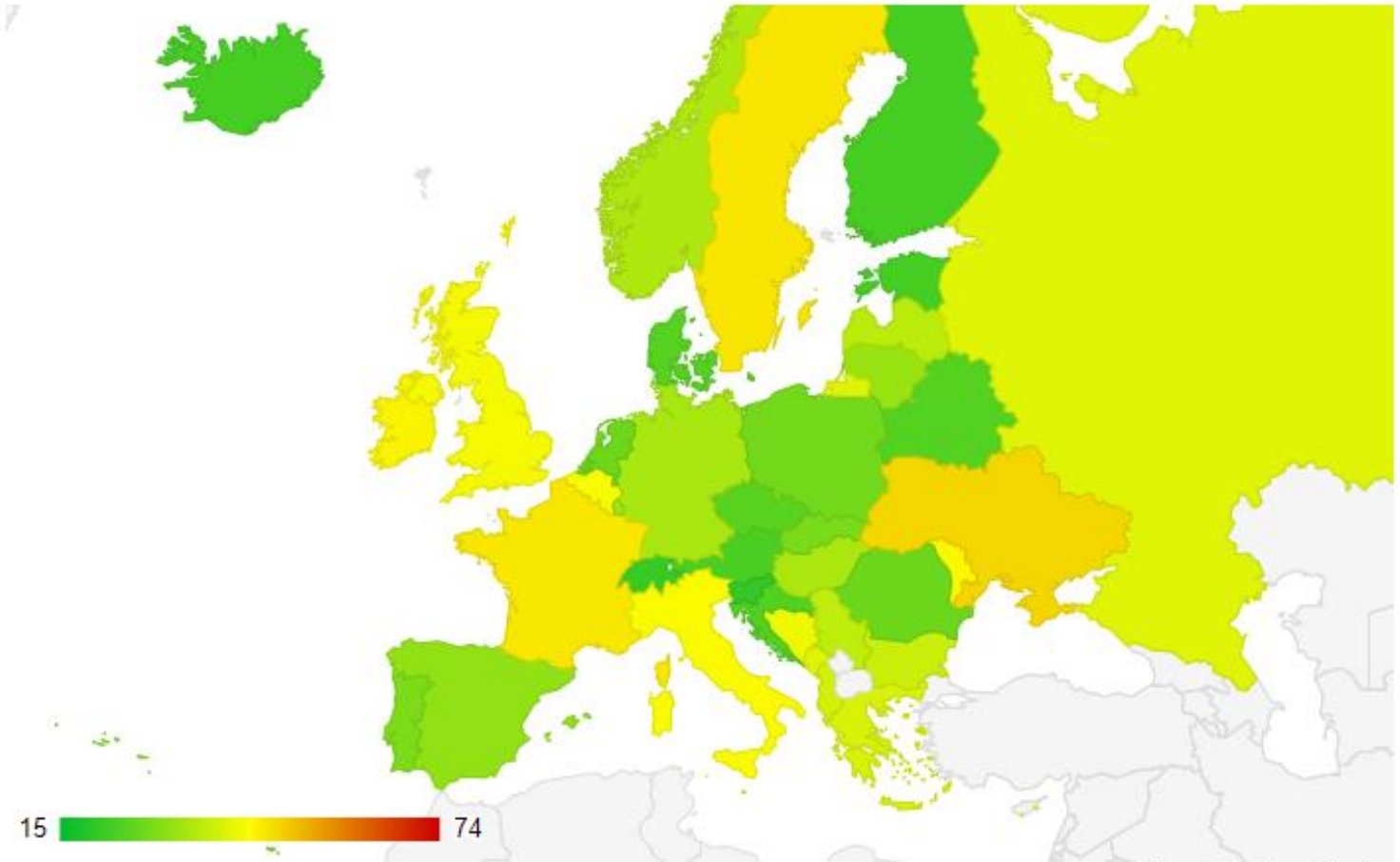


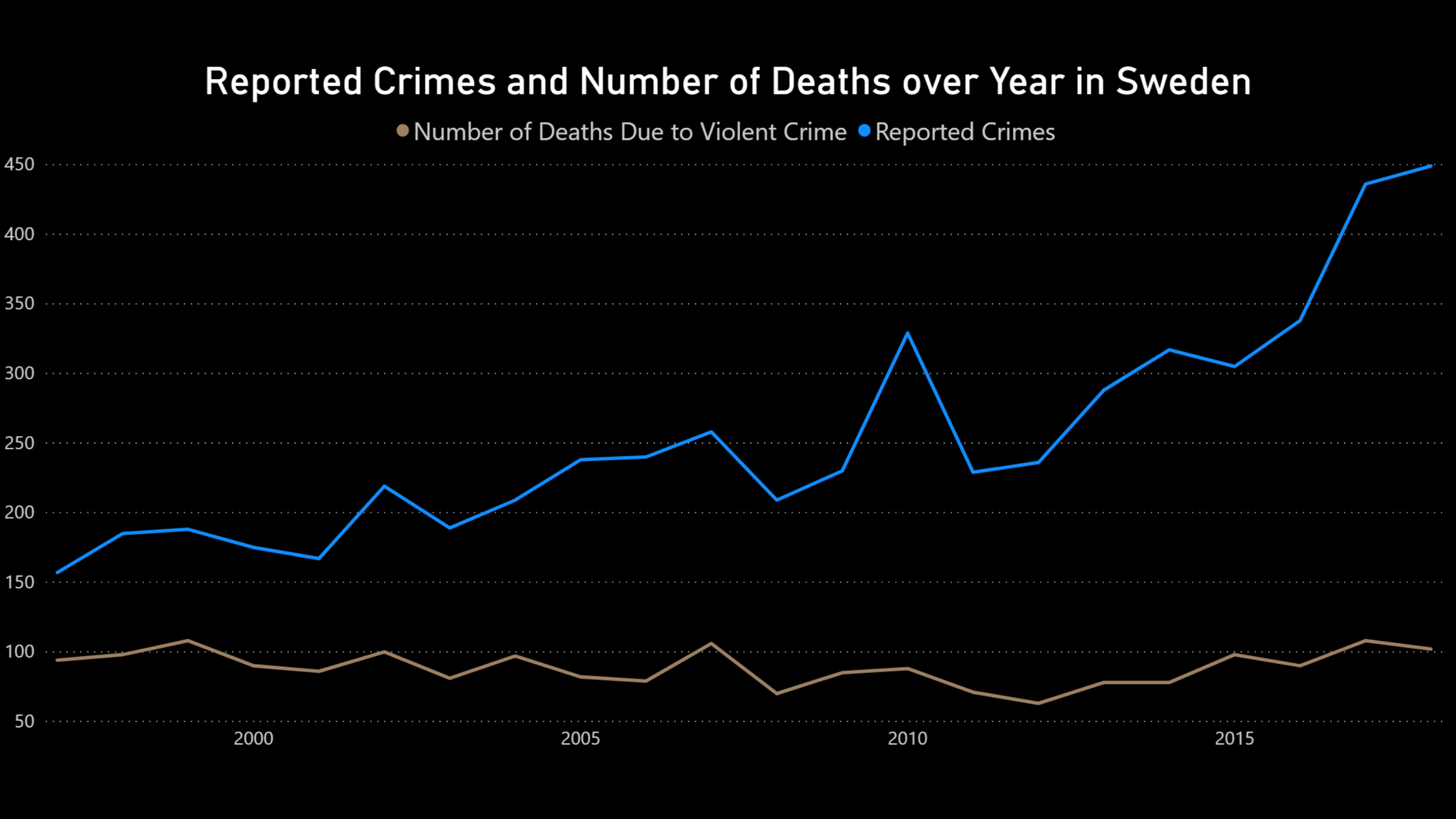
Chart: Crime Index

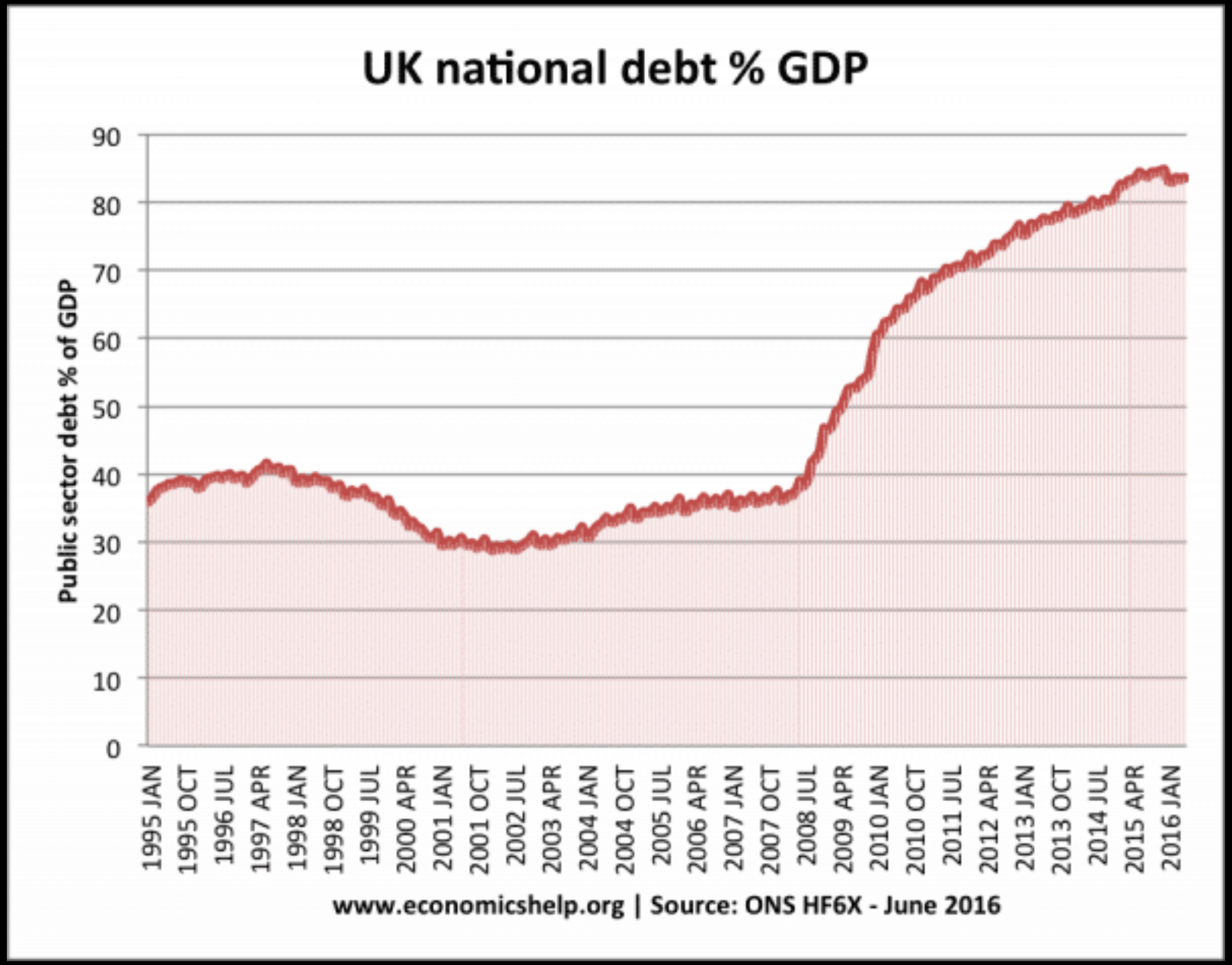
Source: Numbeo.com

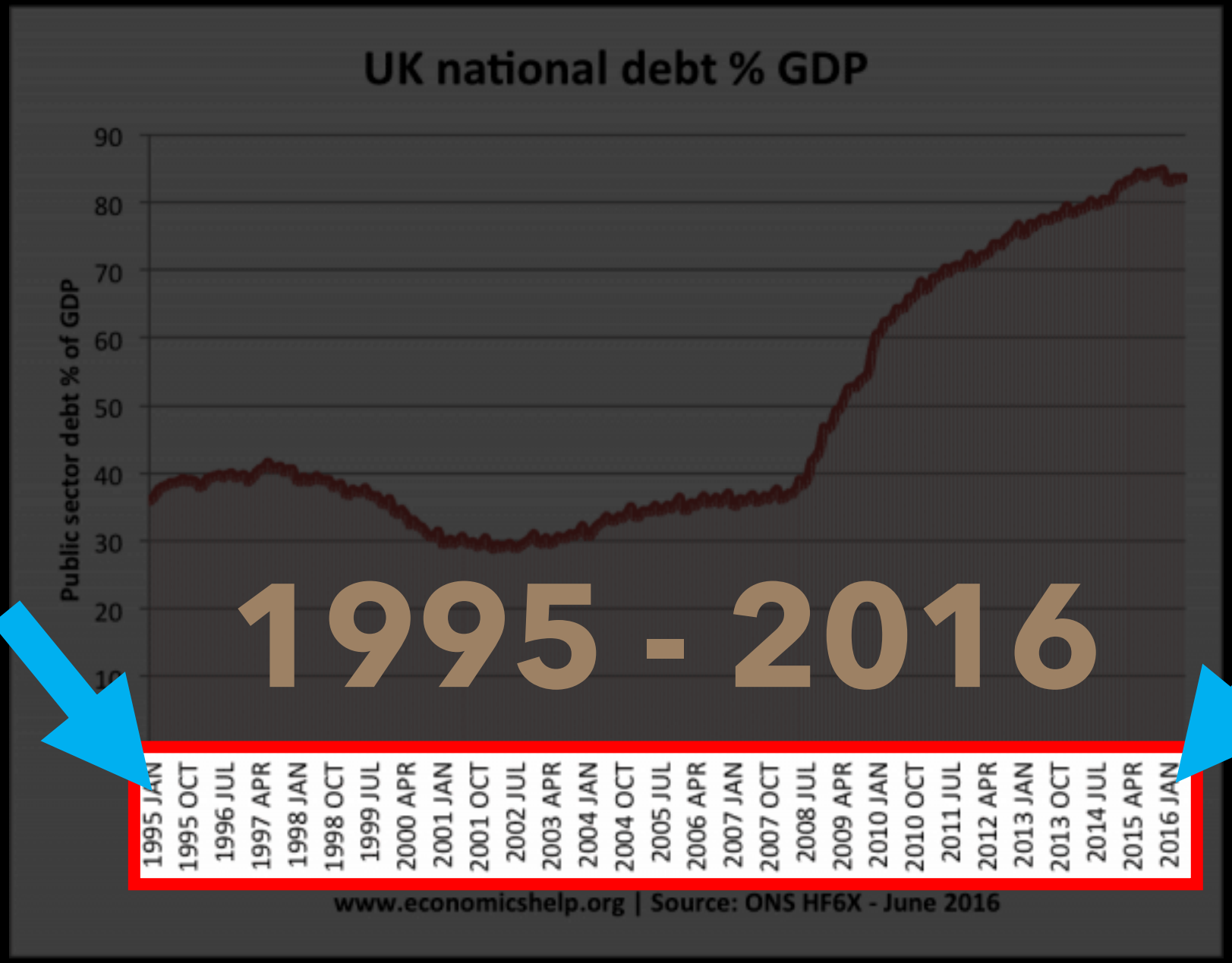
Search:

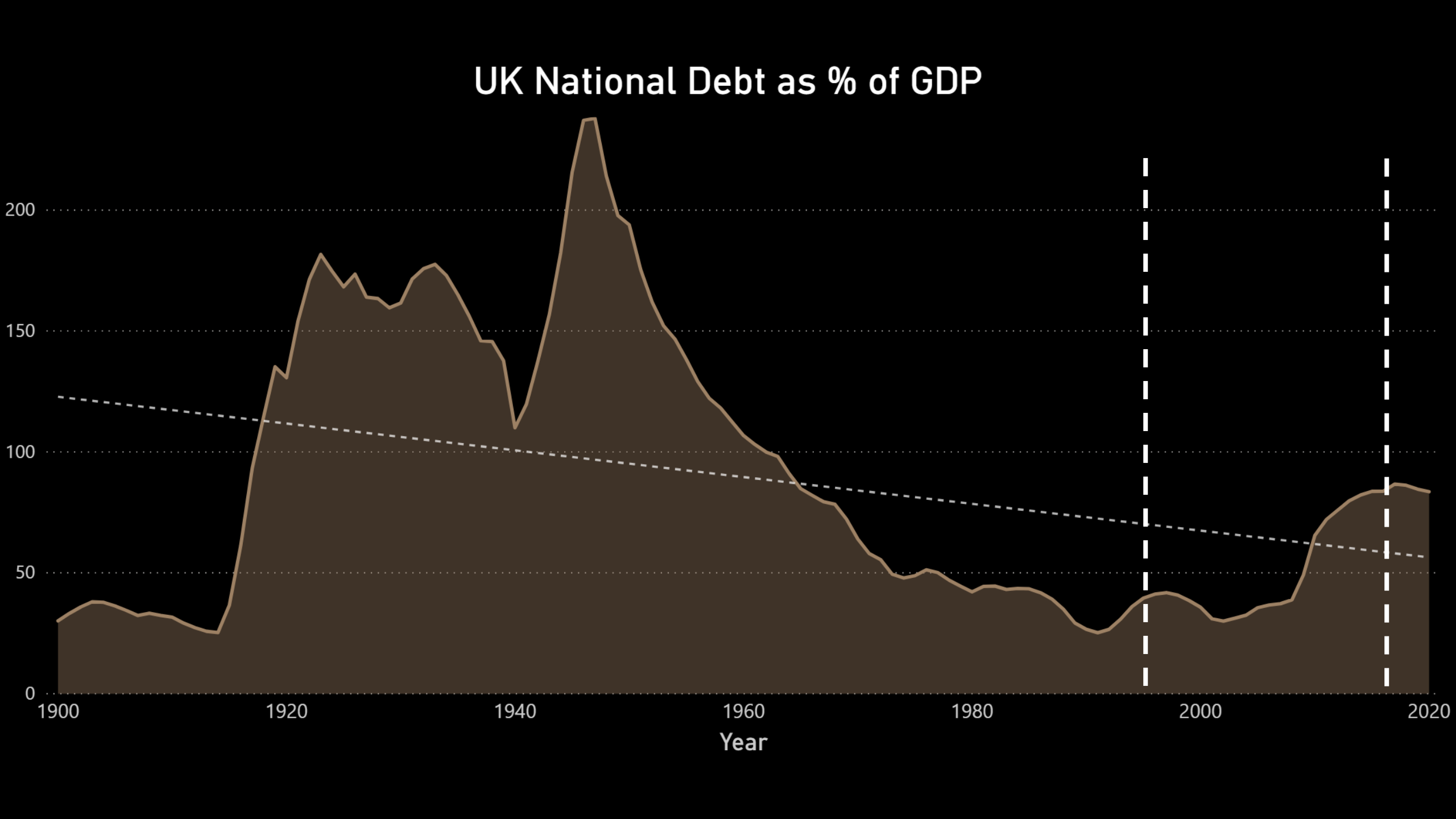
Rank	Country	Crime Index
1	Ukraine	48.85
2	Sweden	47.07
3	France	46.79
4	Ireland	45.43
5	Moldova	44.98
6	Italy	44.26
7	Belgium	43.98
8	United Kingdom	43.71
9	Bosnia And Herzegovina	43.03
10	Montenegro	41.18
11	Russia	41.12
12	Greece	40.32
13	Albania	39.52
14	Malta	39.04
15	North Macedonia	38.67
16	Bulgaria	38.50
17	Serbia	37.41

Source: Numbeo.com


Reported Crimes and Number of Deaths over Year in Sweden
Number of Deaths Due to Violent Crime
Reported Crimes
450
400
350
300
250
200
150
100
50
2000
2005
2010
2015


UK national debt % GDP
Public sector debt % of GDP
90
80
70
60
50
40
30
20
10
0
1995 JAN
1995 OCT
1996 JUL
1997 APR
1998 JAN
1998 OCT
1999 JUL
2000 APR
2001 JAN
2001 OCT
2002 JUL
2003 APR
2004 JAN
2004 OCT
2005 JUL
2006 APR
2007 JAN
2007 OCT
2008 JUL
2009 APR
2010 JAN
2010 OCT
2011 JUL
2012 APR
2013 JAN
2013 OCT
2014 JUL
2015 APR
2016 JAN
www.economicshelp.org | Source: ONS HF6X - June 2016


UK national debt % GDP
Public sector debt % of GDP
90
80
70
60
50
40
30
20
1995 - 2016
1995 JAN
1995 OCT
1996 JUL
1997 APR
1998 JAN
1998 OCT
1999 JUL
2000 APR
2001 JAN
2001 OCT
2002 JUL
2003 APR
2004 JAN
2004 OCT
2005 JUL
2006 APR
2007 JAN
2007 OCT
2008 JUL
2009 APR
2010 JAN
2010 OCT
2011 JUL
2012 APR
2013 JAN
2013 OCT
2014 JUL
2015 APR
2016 JAN
www.economicshelp.org | Source: ONS HF6X - June 2016


UK National Debt as % of GDP
200
150
100
50
0
1900
1920
1940
1960
1980
2000
2020
Year

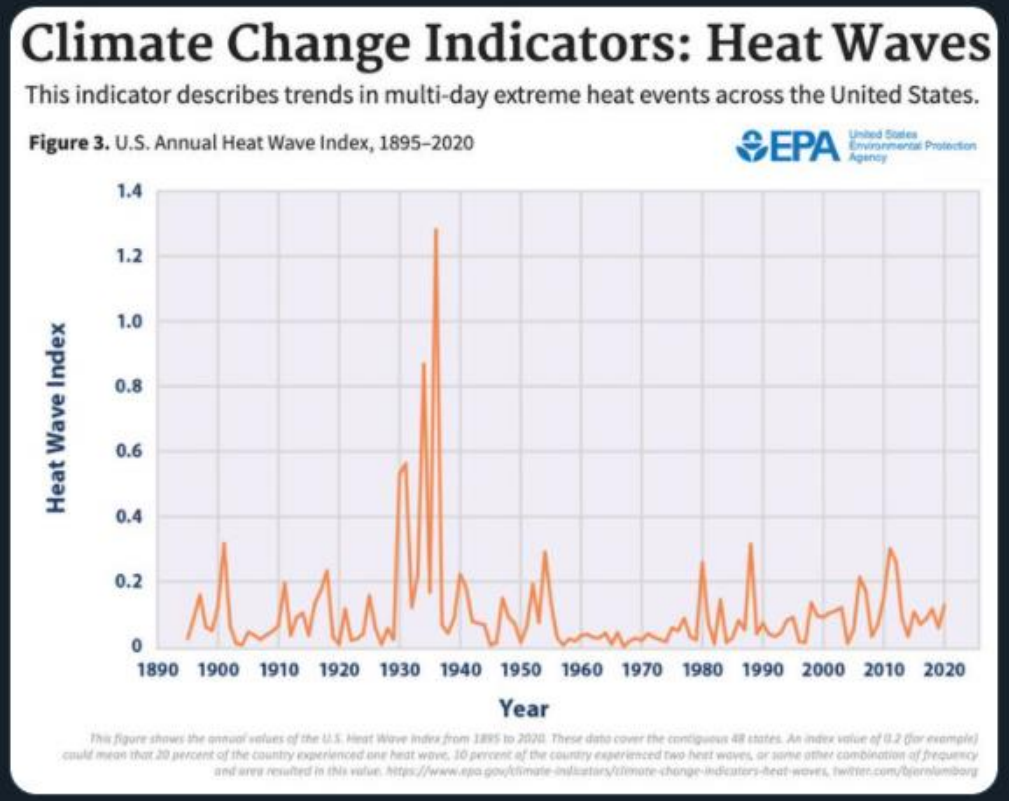
Bjorn Lomborg ✓
@BjornLomborg

US heatwaves 1895-2020

Worst-ever in 1936 en.wikipedia.org/wiki/1936_Nort...

Obviously, doesn't fit the narrative, so very often data started in 1960, ignoring the 1930s, producing a convenient, upward trend
(e.g. nytimes.com/2019/07/18/cli...)

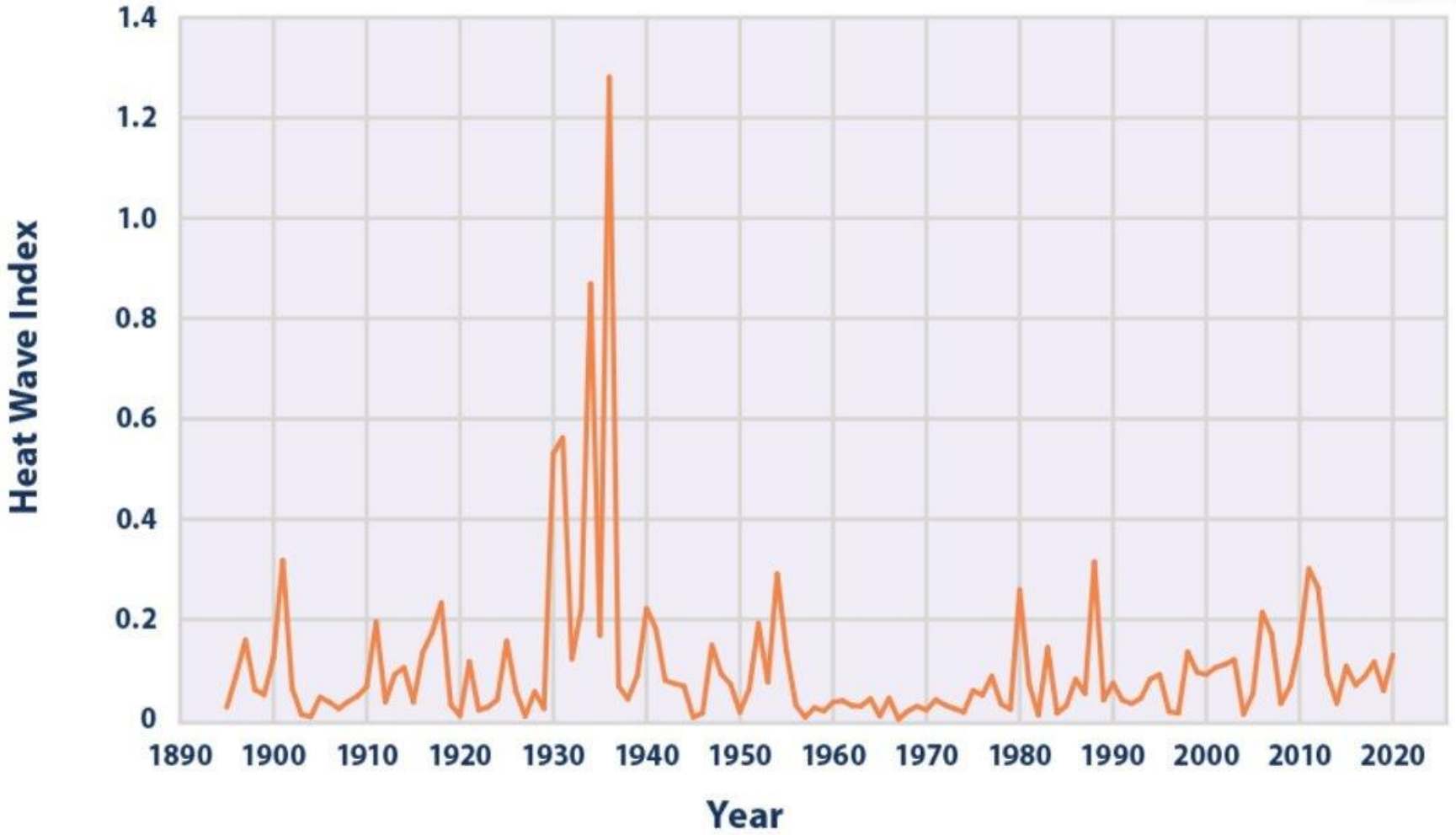
Data from EPA/NOAA, epa.gov/climate-indica...



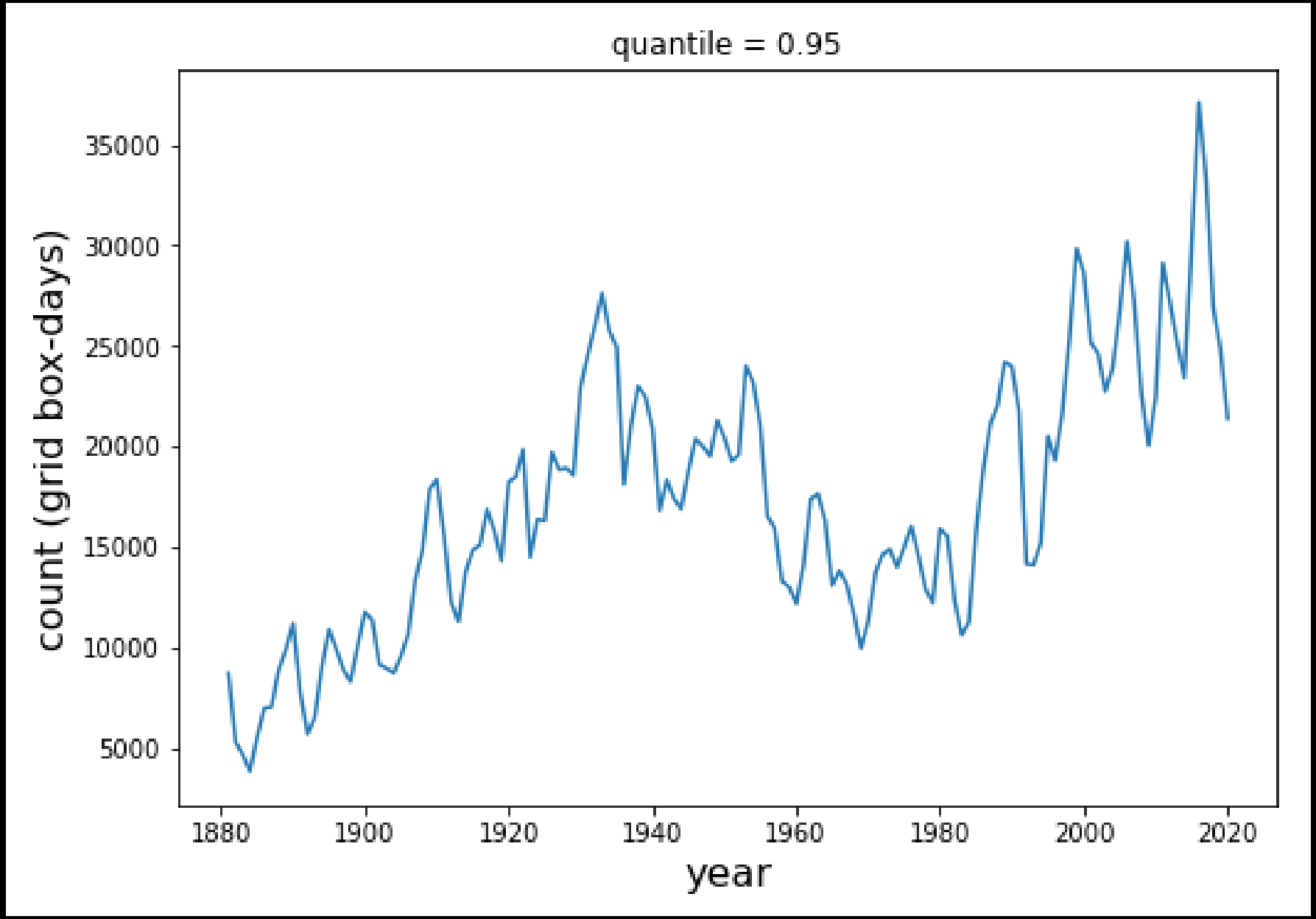
Climate Change Indicators: Heat Waves

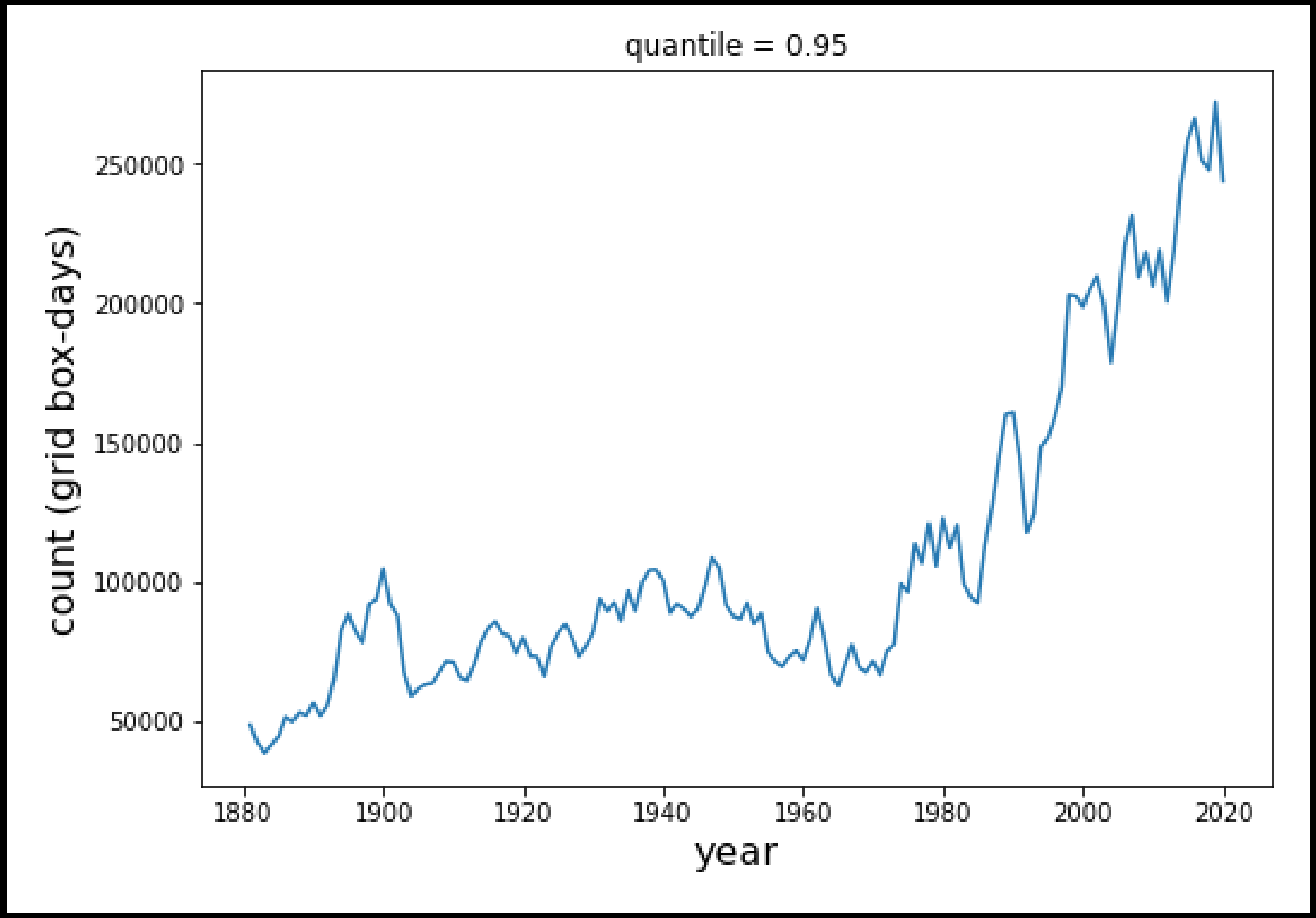
This indicator describes trends in multi-day extreme heat events across the United States.

Figure 3. U.S. Annual Heat Wave Index, 1895–2020



This figure shows the annual values of the U.S. Heat Wave Index from 1895 to 2020. These data cover the contiguous 48 states. An index value of 0.2 (for example) could mean that 20 percent of the country experienced one heat wave, 10 percent of the country experienced two heat waves, or some other combination of frequency and area resulted in this value. https://www.epa.gov/climate-indicators/climate-change-indicators-heat-waves, twitter.com/bjornlomborg


quantile = 0.95
count (grid box-days)
35000
30000
25000
20000
15000
10000
5000
1880
1900
1920
1940
1960
1980
2000
2020
year


quantile = 0.95
250000
200000
150000
100000
50000
count (grid box-days)
1880
1900
1920
1940
1960
1980
2000
2020
year

Look for the **AGENDA**

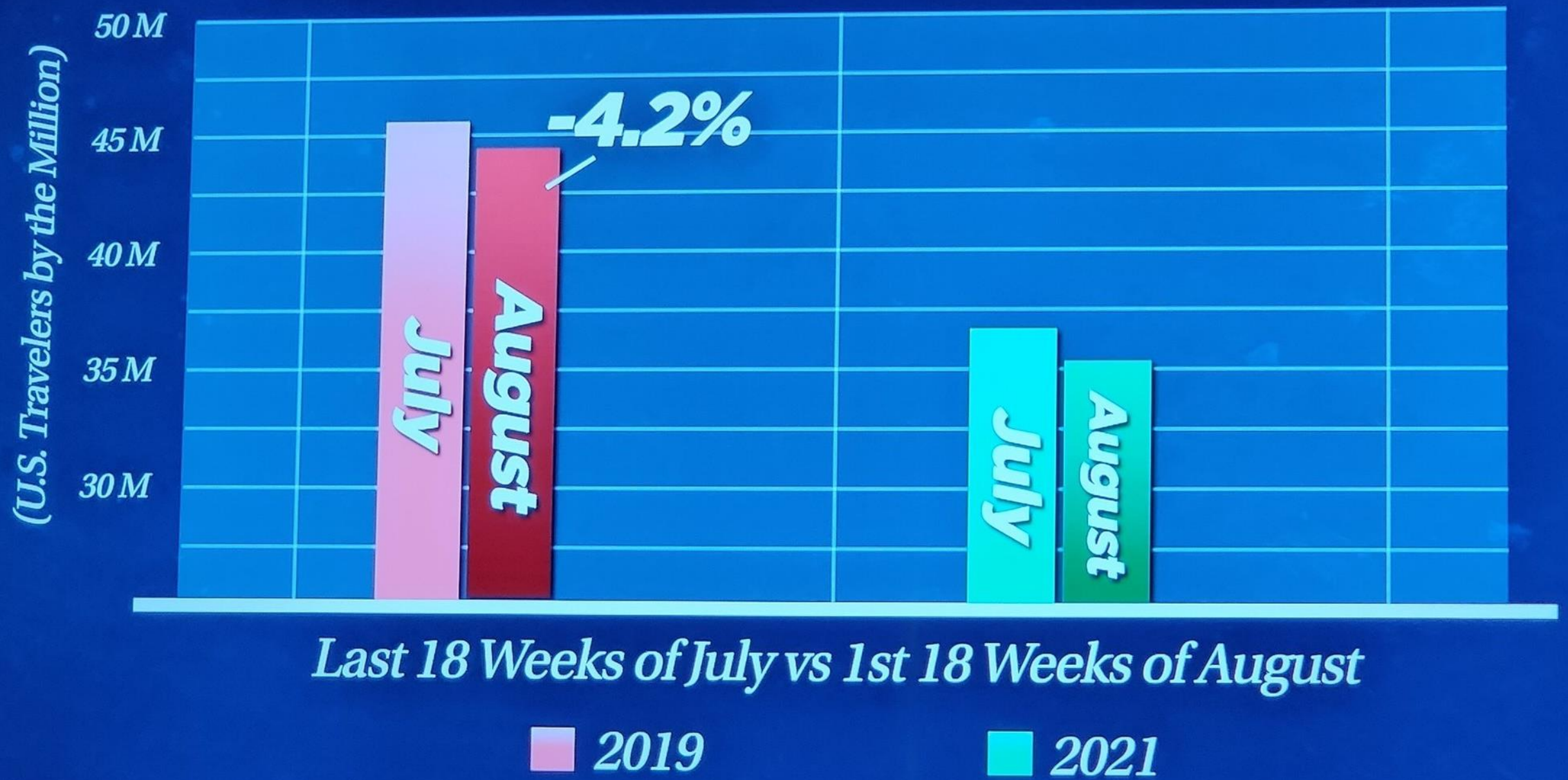
Consider the **RESPONDERS**

Try to examine the **BASE DATA**

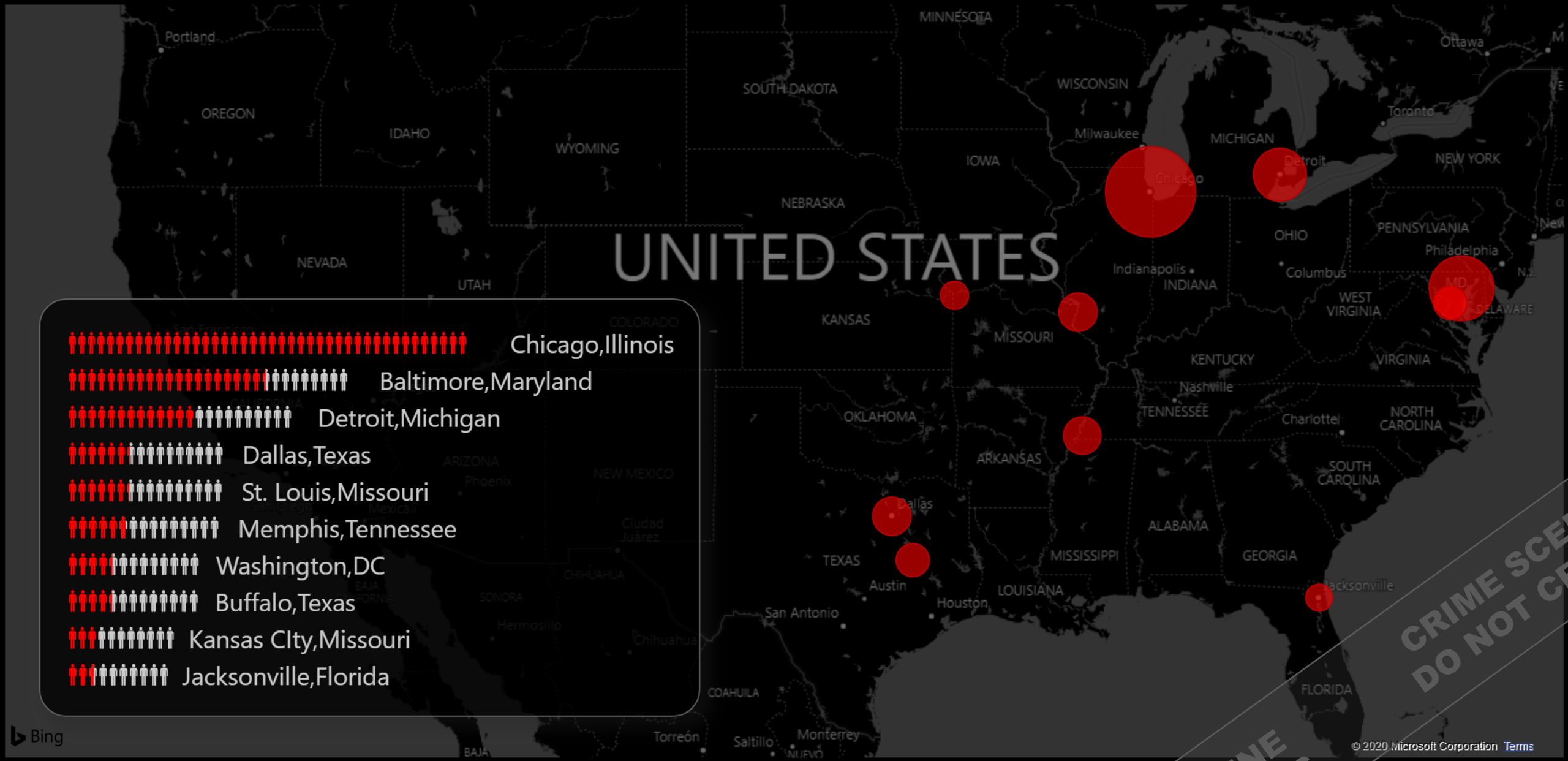
3

Comparisons

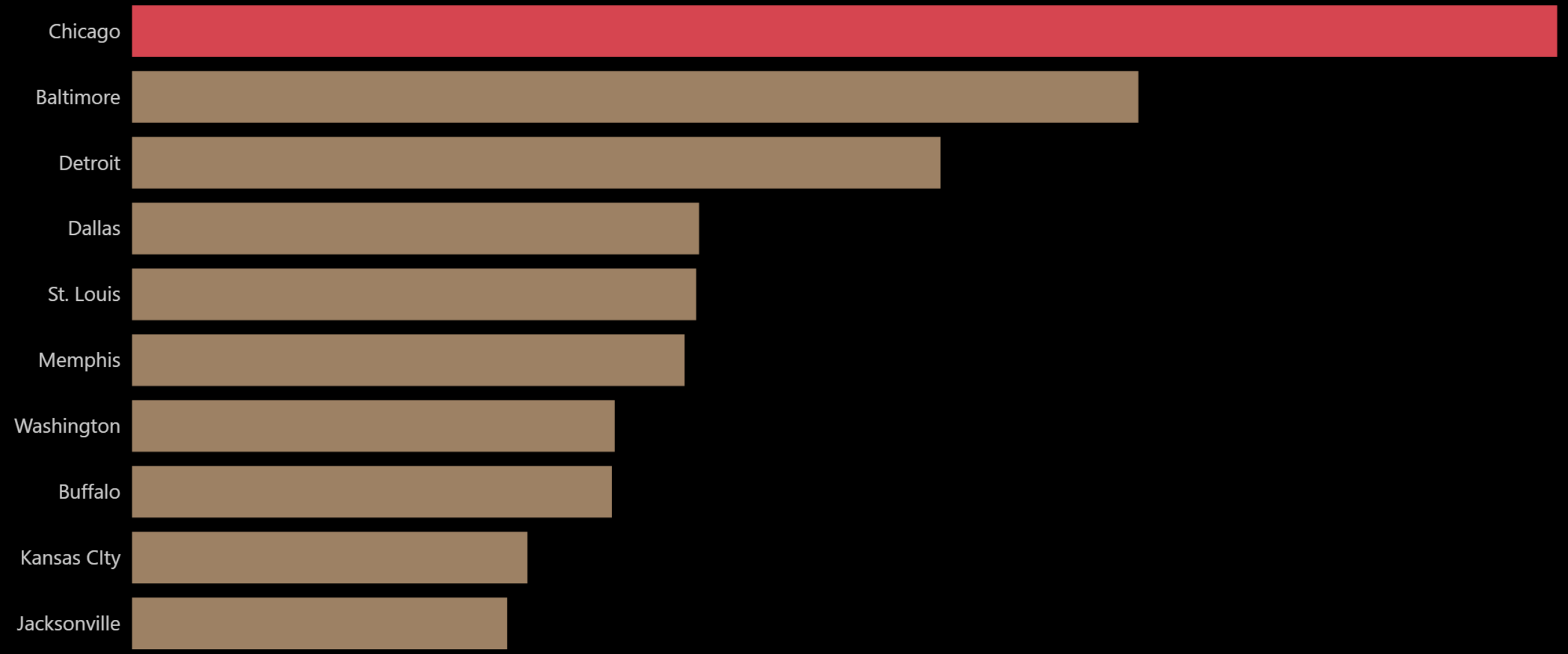
U.S. TRAVEL JULY - AUGUST



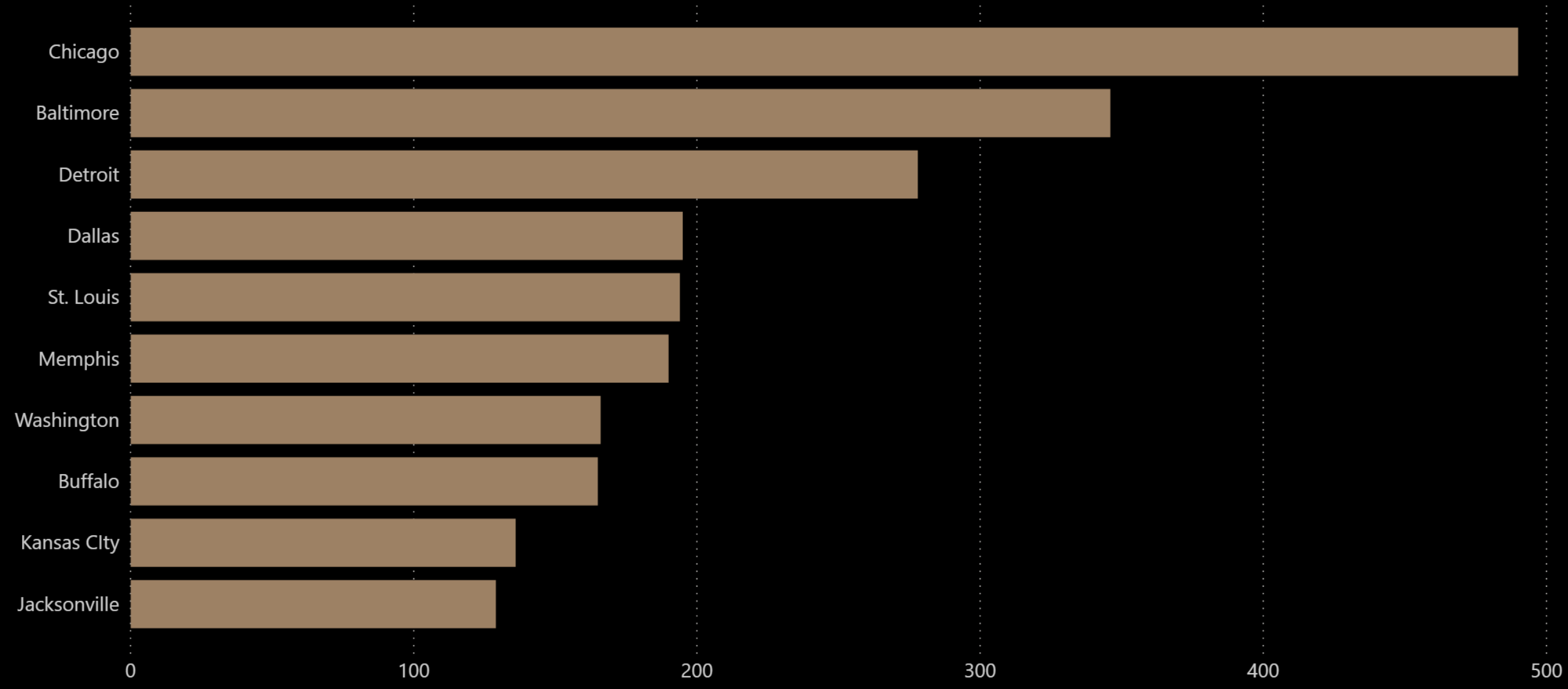
The 10 Most Dangerous Cities in the USA

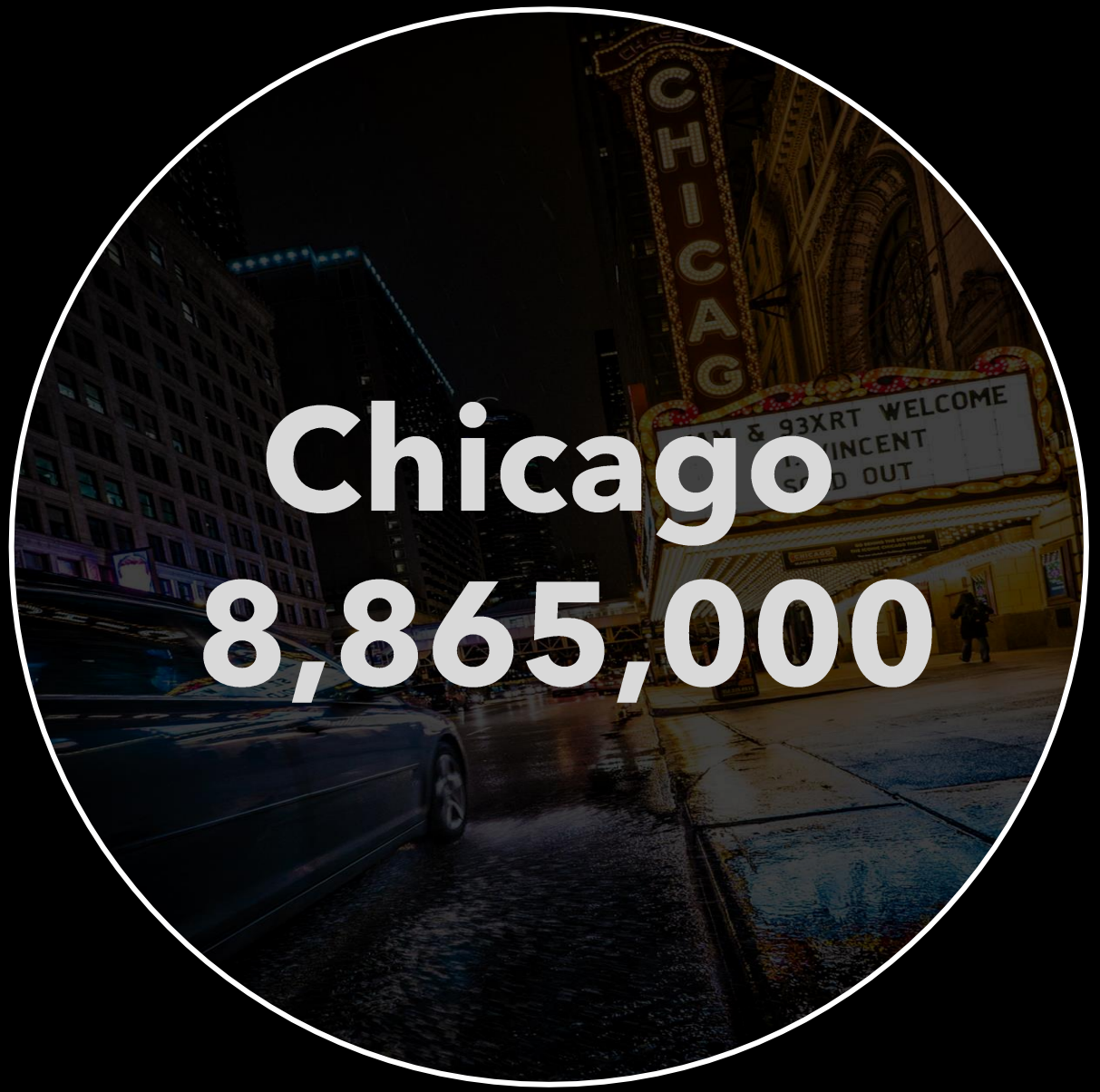


The 10 Most Dangerous Cities in the USA

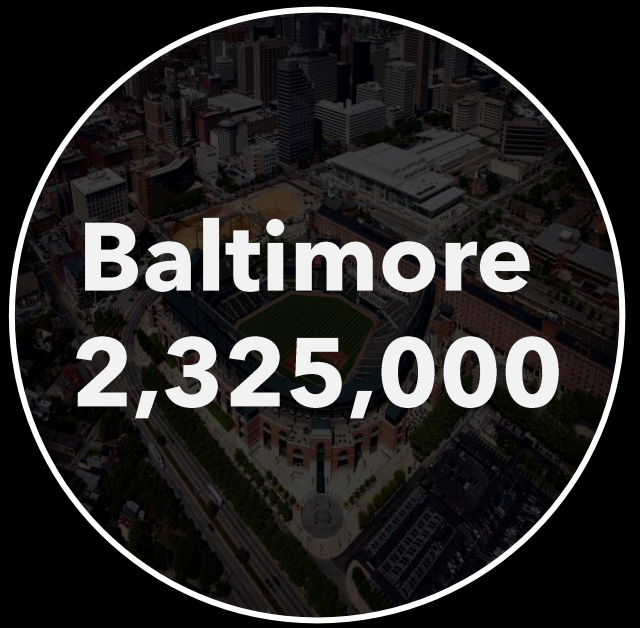


Number of Homicides 2019 by City



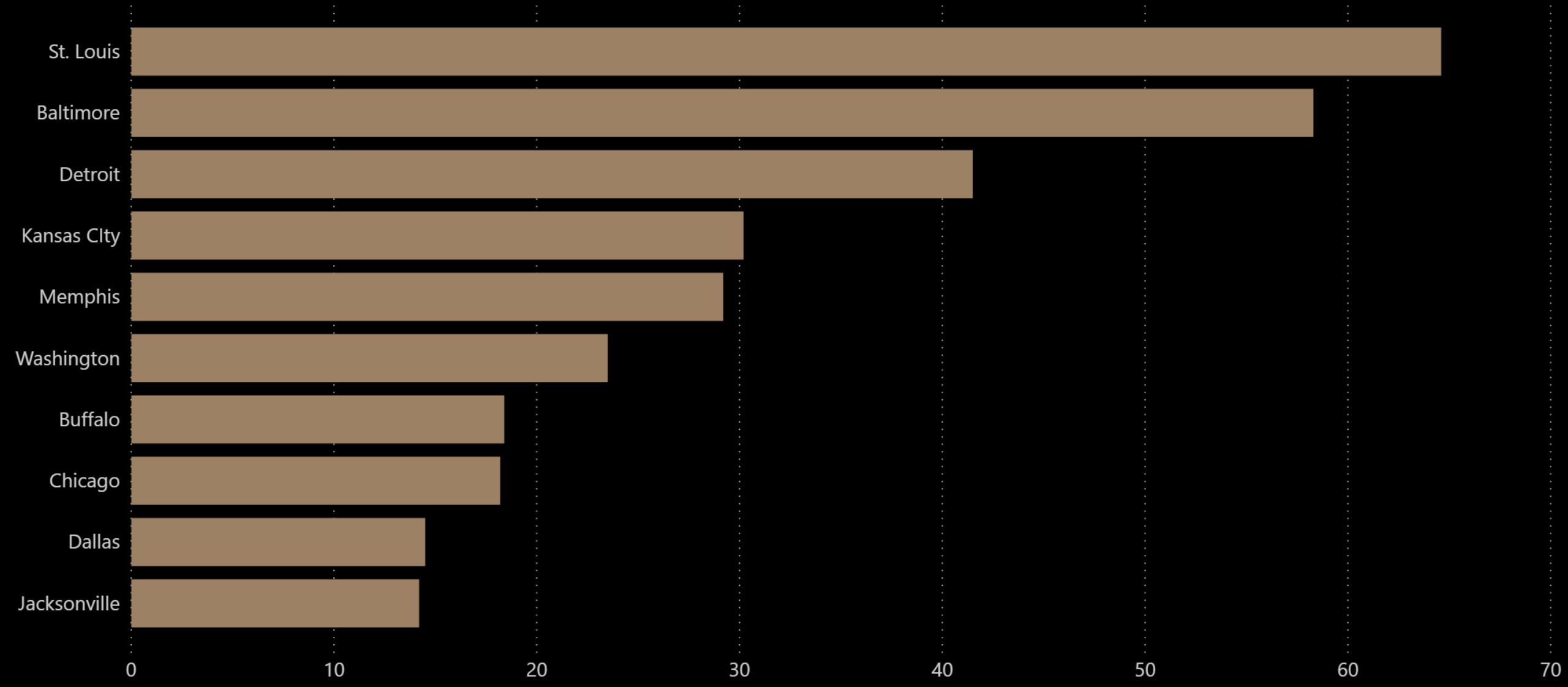


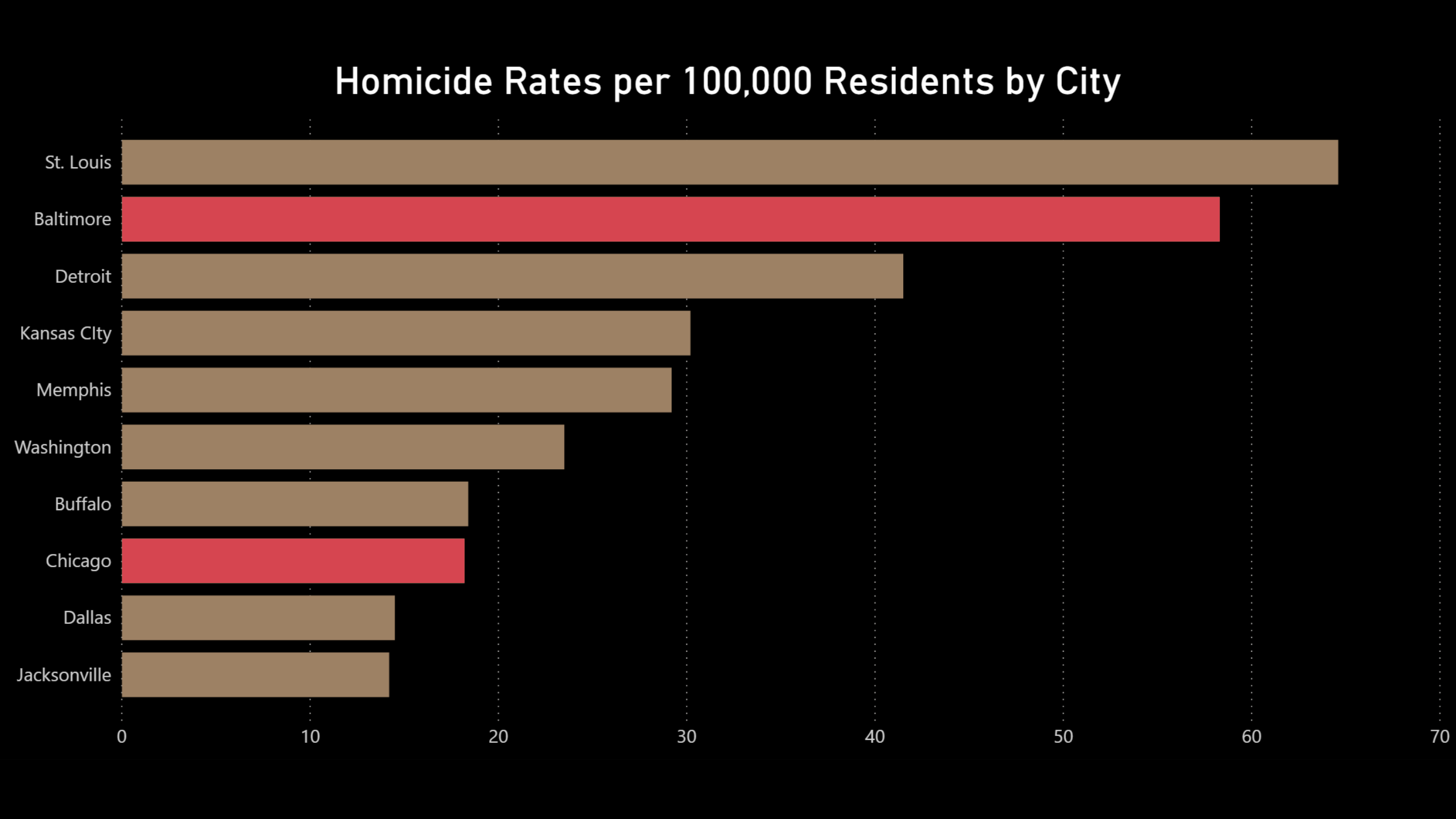
Chicago
8,865,000

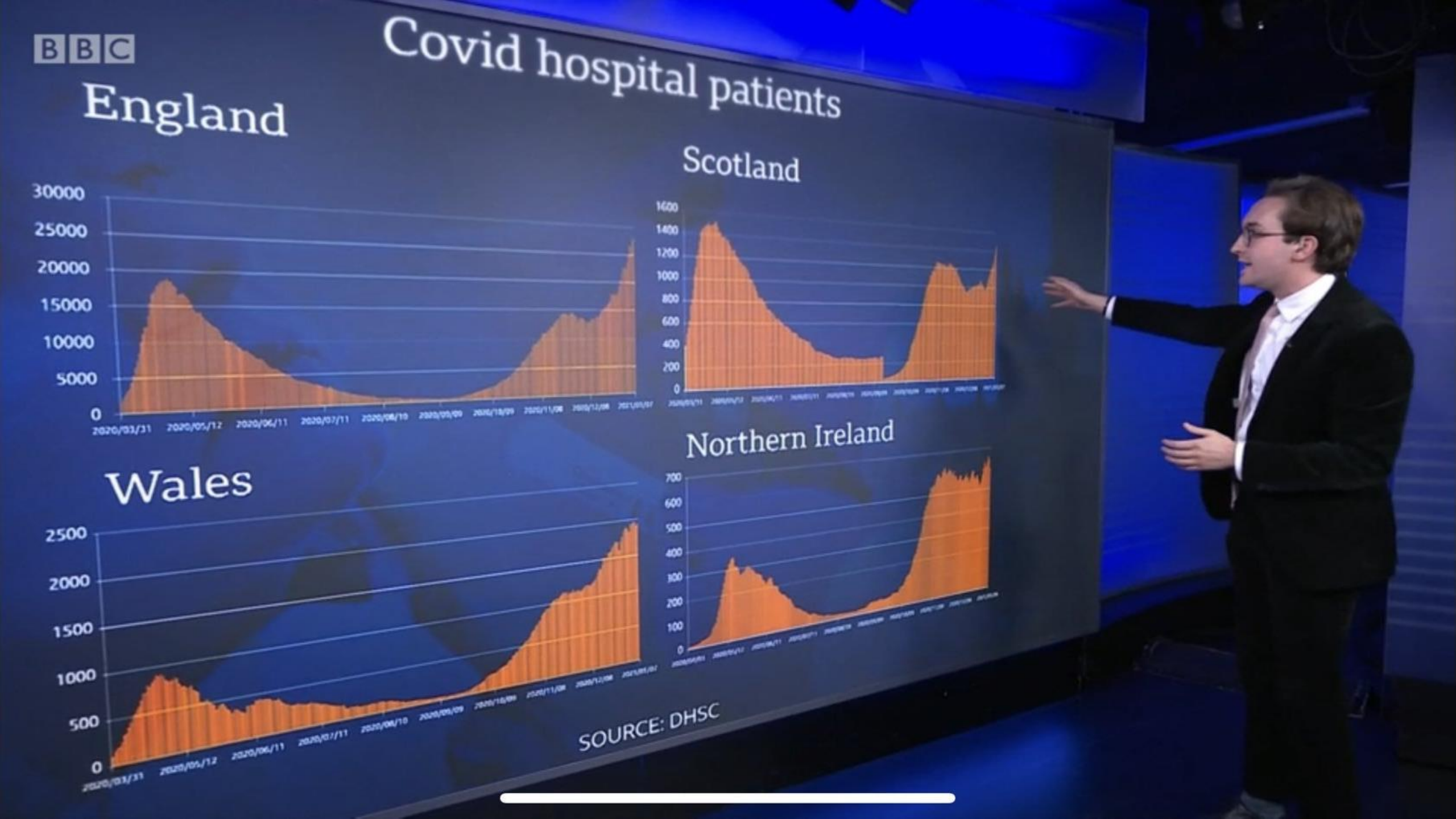


Baltimore
2,325,000

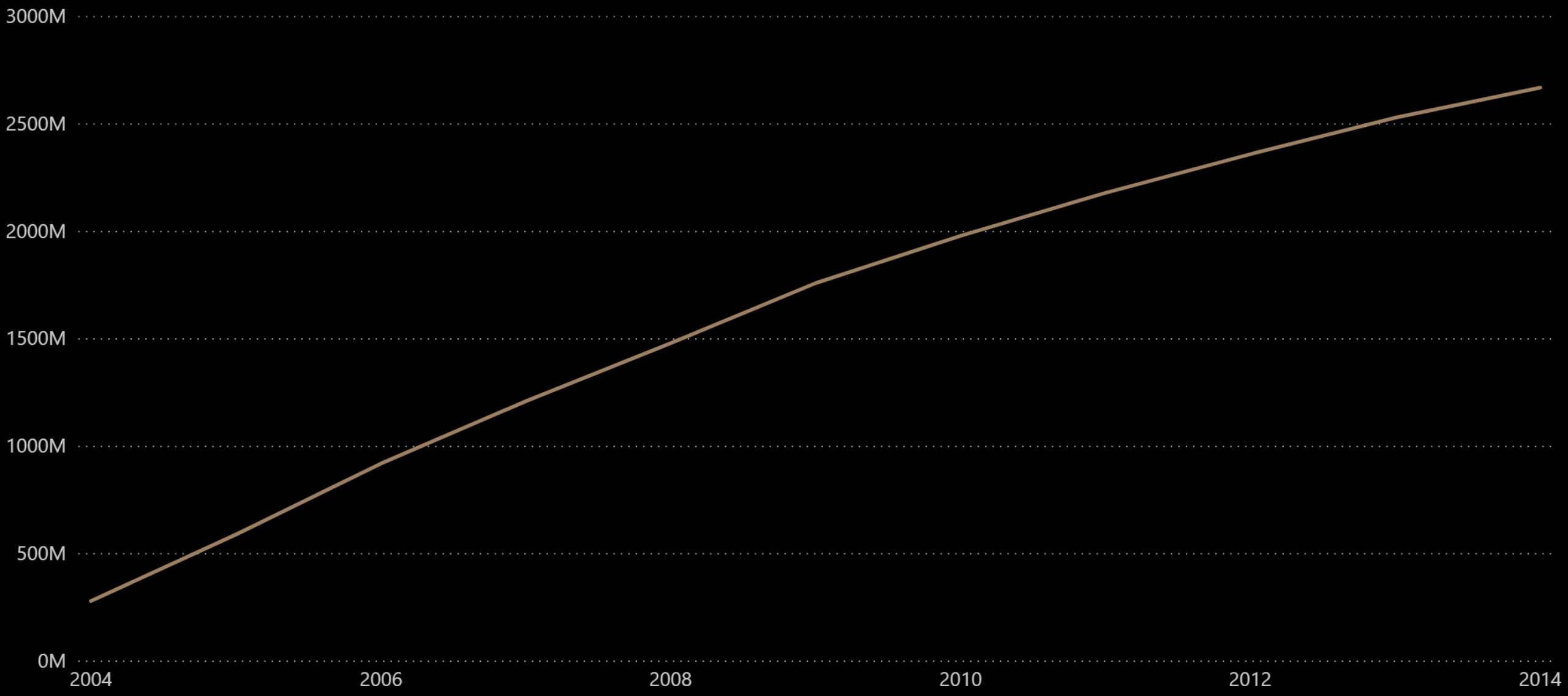
Homicide Rates per 100,000 Residents by City



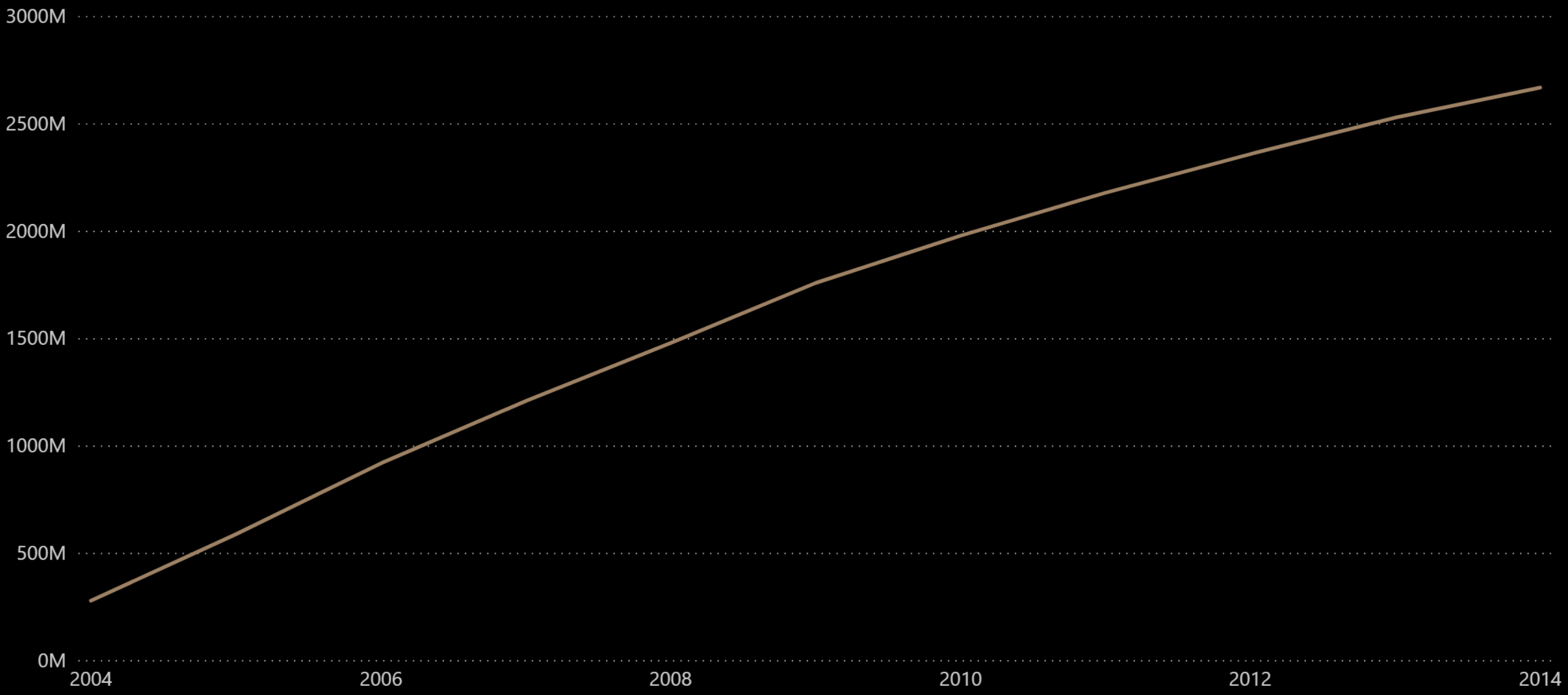

Homicide Rates per 100,000 Residents by City
St. Louis
Baltimore
Detroit
Kansas CIty
Memphis
Washington
Buffalo
Chicago
Dallas
Jacksonville
0
10
20
30
40
50
60
70


BBC
Covid hospital patients
England
30000
25000
20000
15000
10000
5000
0
2020/03/31
2020/05/12
2020/06/11
2020/07/11
Scotland
1600
1400
1200
1000
800
600
400
200
0
Wales
2500
2000
1500
1000
500
0
Northern Ireland
700
600
500
400
300
200
100
0
SOURCE: DHSC

Revenue


3000M
2500M
2000M
1500M
1000M
500M
0M
2004
2006
2008
2010
2012
2014

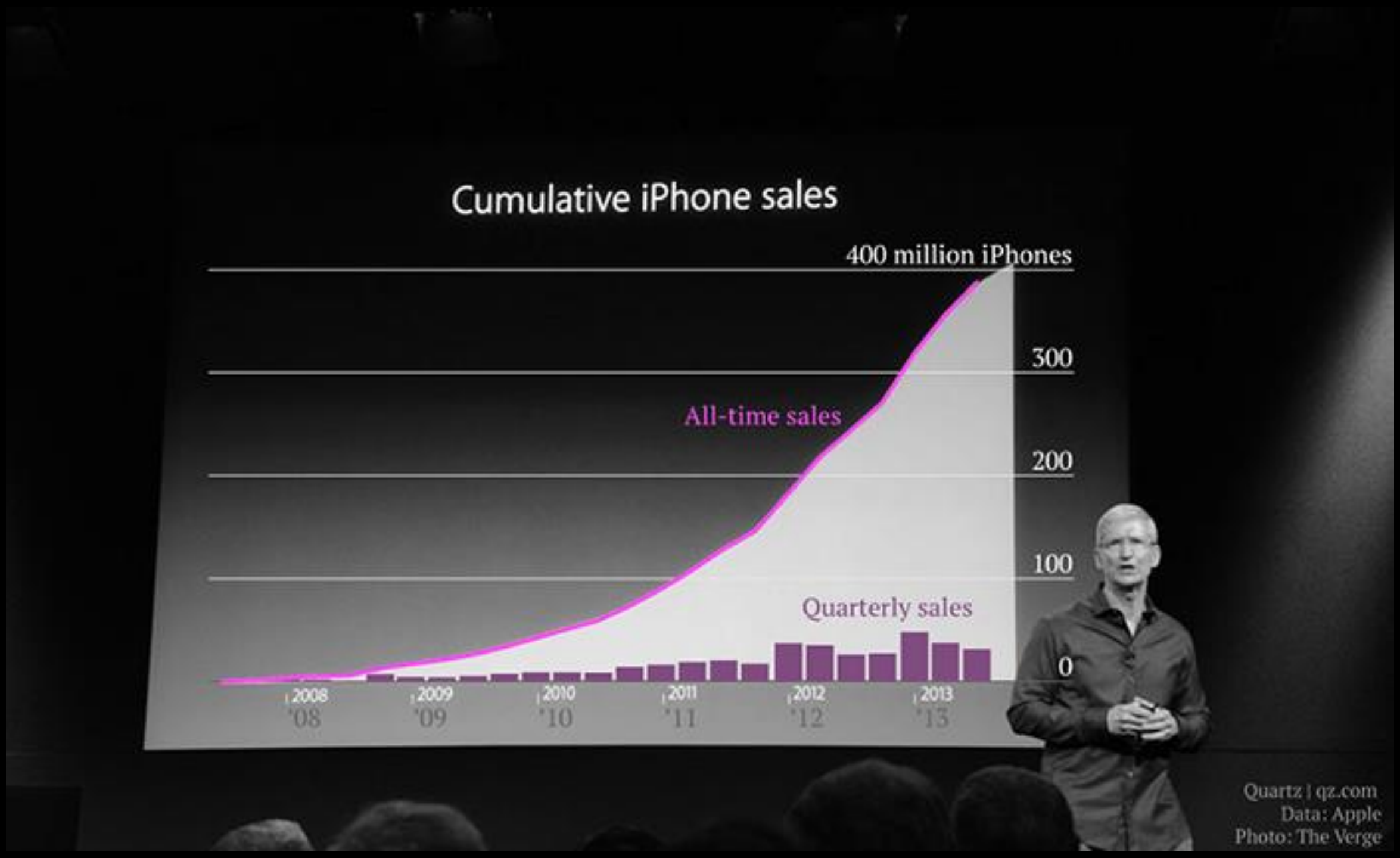
Cumulative Revenue



Revenue

340M
320M
300M
280M
260M
240M
220M
200M
180M
160M
140M
2004
2006
2008
2010
2012
2014

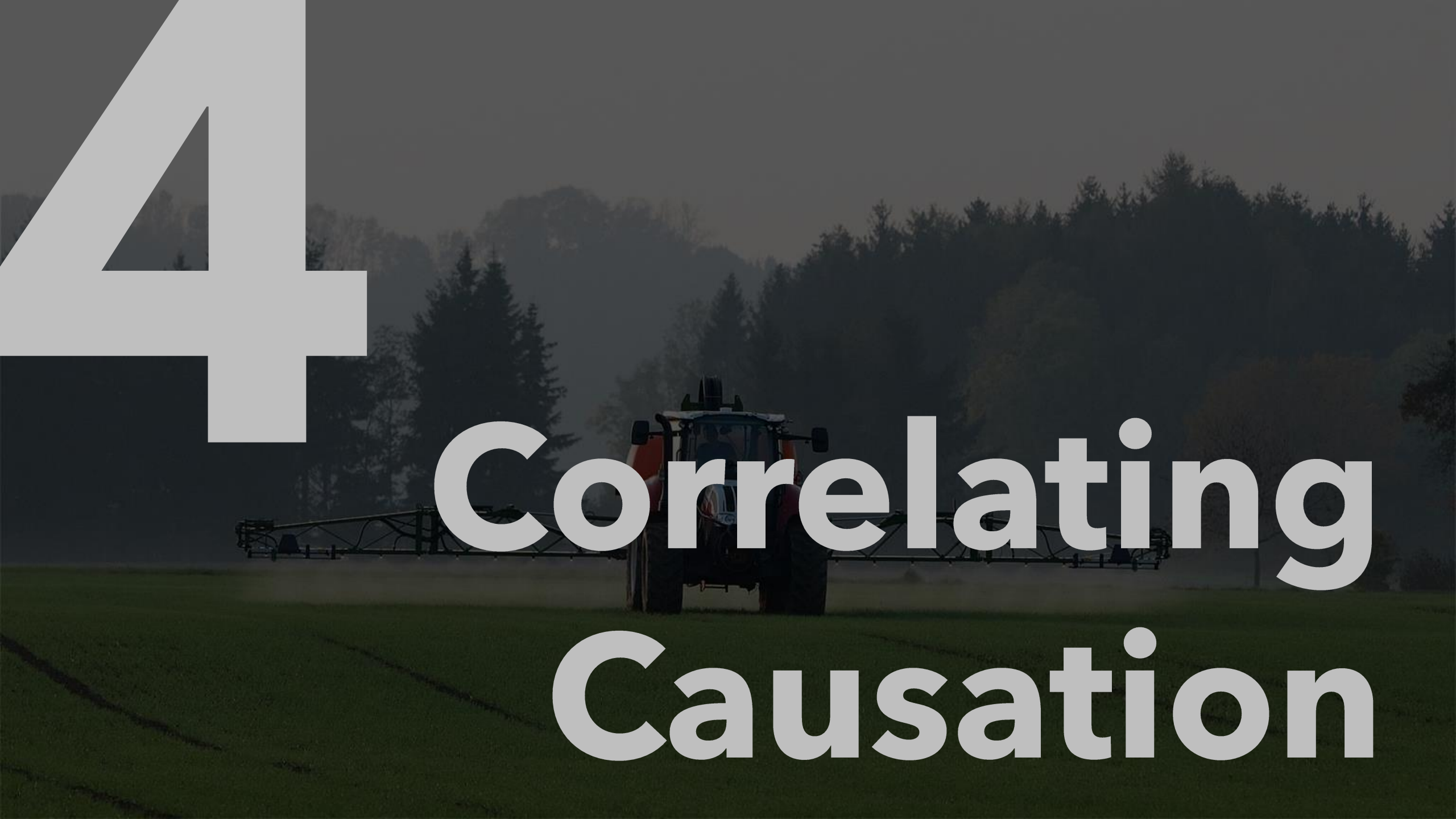
Cumulative iPhone sales
2008
2009
2010
2011
2012
2013


Cumulative iPhone sales
400 million iPhones
300
200
100
0
All-time sales
Quarterly sales
2008
'08
2009
'09
2010
'10
2011
'11
2012
'12
2013
'13
Quartz | qz.com
Data: Apple
Photo: The Verge

Compare **APPLES** to **APPLES**

...compared to **WHAT**?

Consider **ABSOLUTE** vs **CUMULATIVE** increase



4 Correlating Causation

CAUSATION

/kɔːˈzeɪʃ(ə)n/

noun

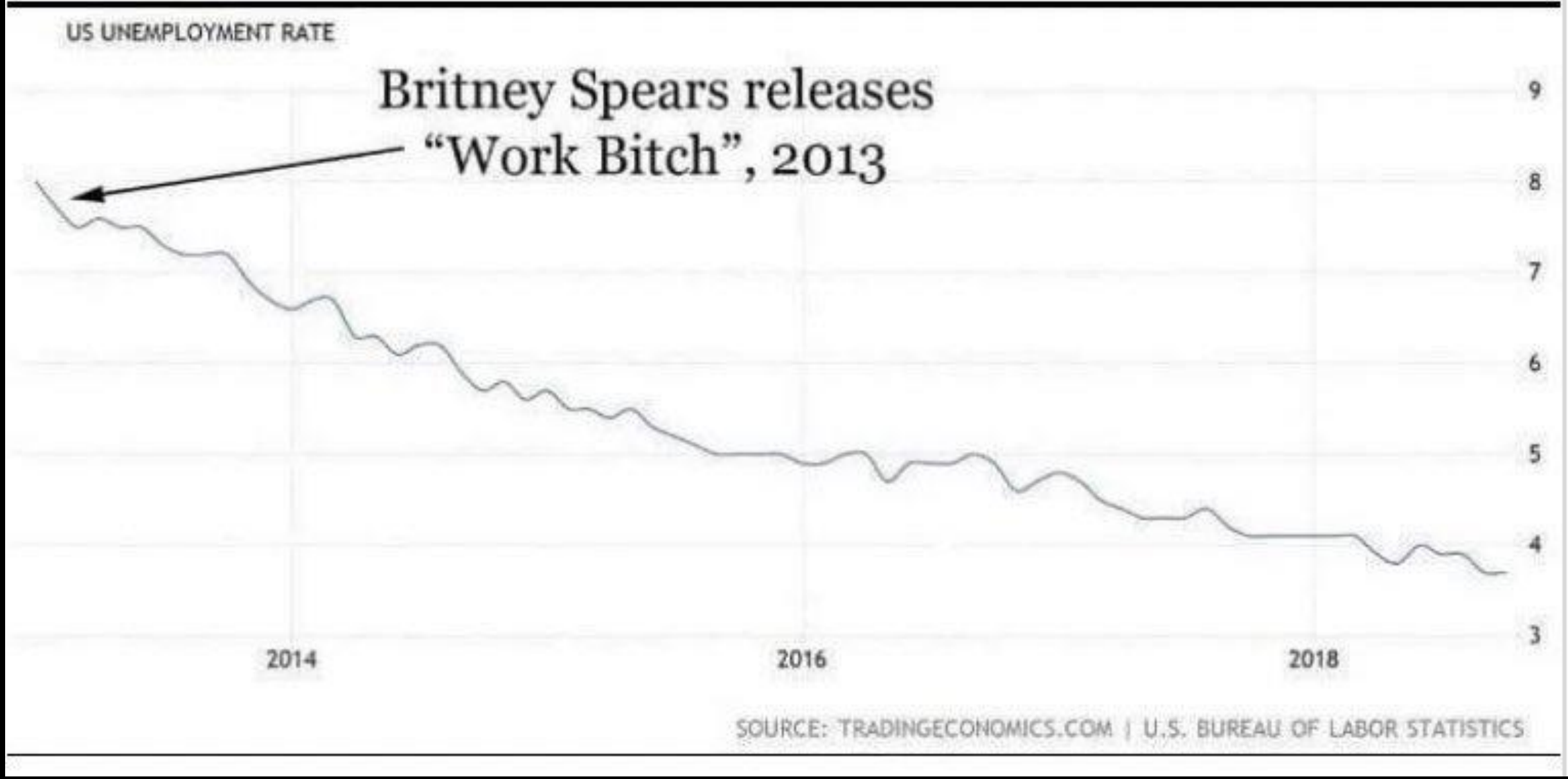
the action of causing something.

"the postulated role of nitrate in the causation of cancer"

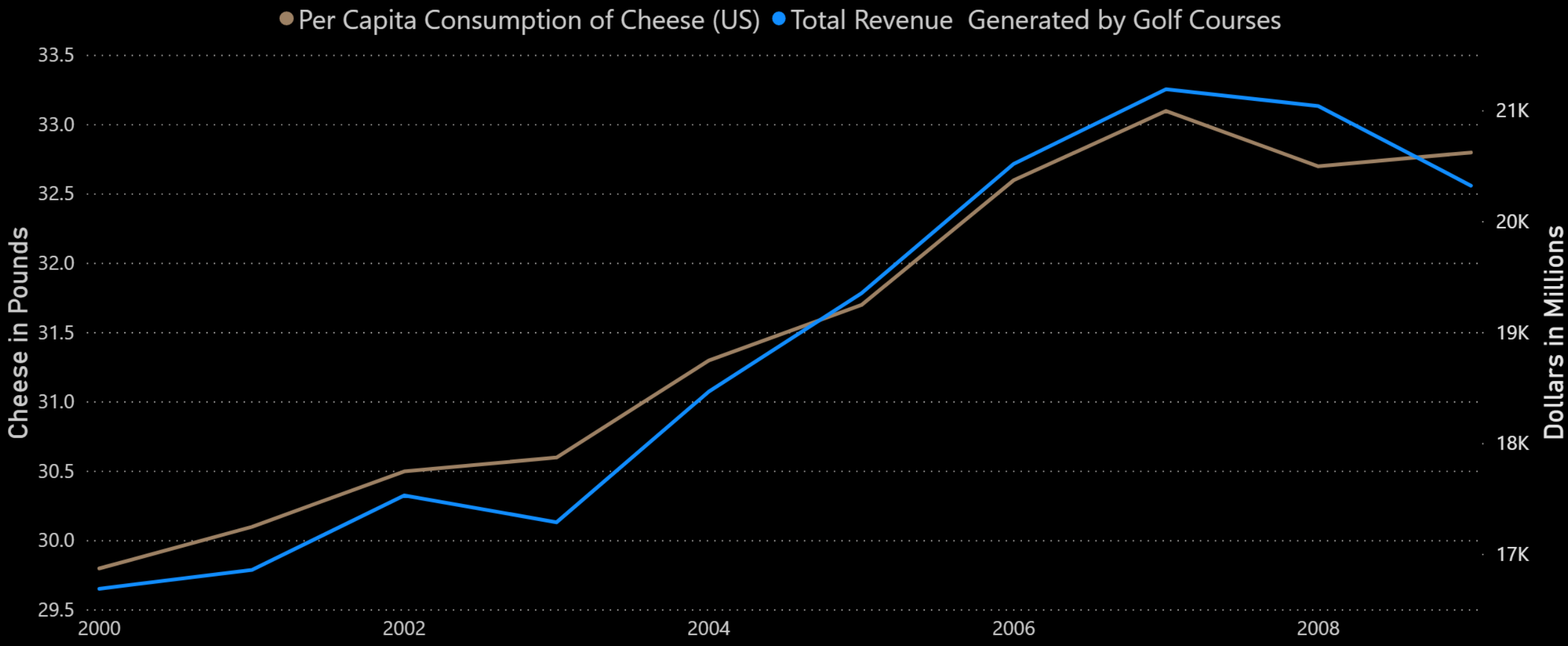
the relationship between cause and effect; causality.

plural noun: **causations**

"a strong association is not a proof of causation"

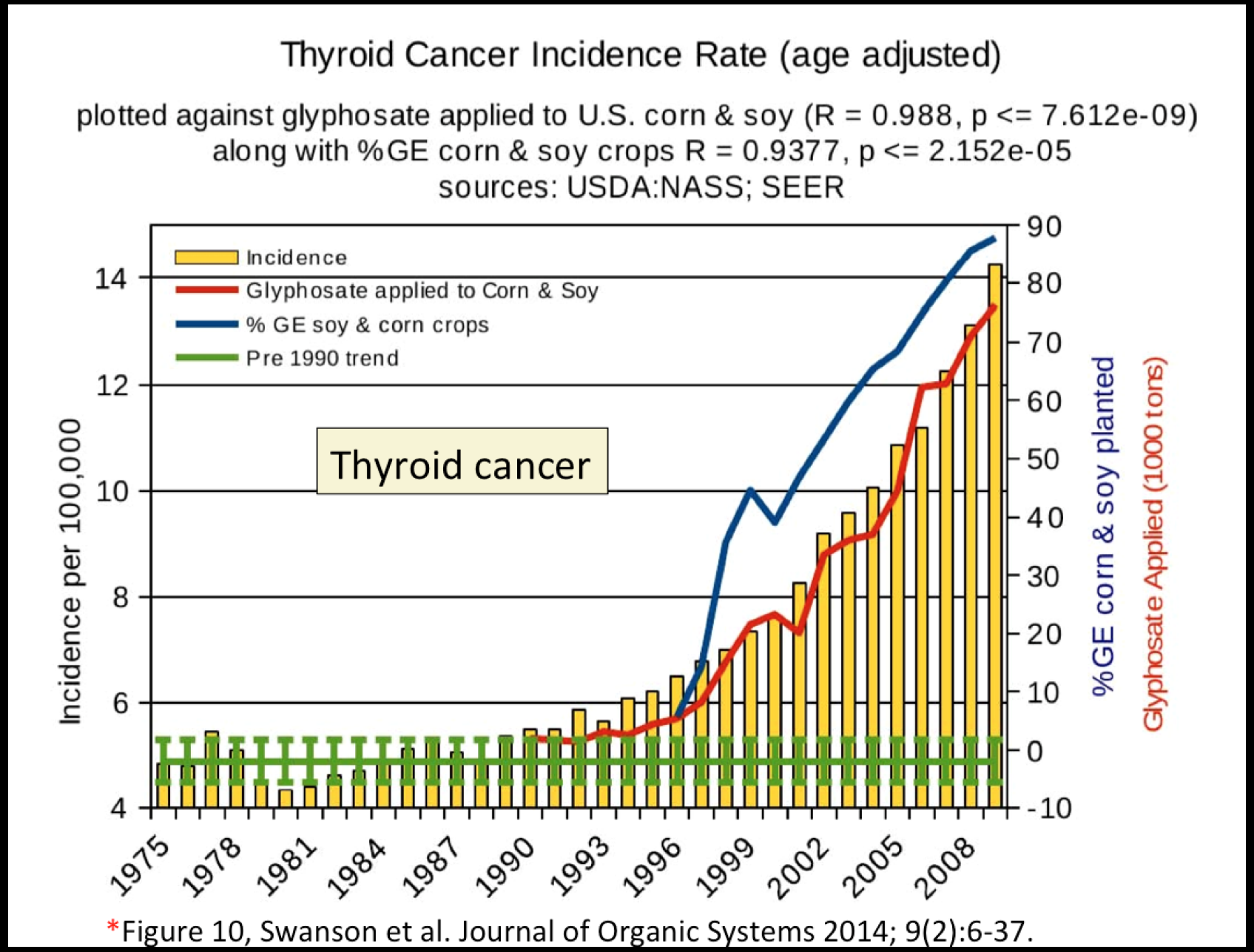

US UNEMPLOYMENT RATE
Britney Spears releases
"Work Bitch", 2013
9
8
7
6
5
4
3
2014
2016
2018
SOURCE: TRADINGECONOMICS.COM | U.S. BUREAU OF LABOR STATISTICS

Per Capita Consumption of Cheese (US) and Total Revenue Generated by Golf Courses by Year



Source: Spurious Correlations website, tylervigen.com

FastAct® TECHNOLOGY
Roundup®
READY-TO-USE
KILLS THE ROOTS GUARANTEED*
WEED & GRASS KILLER III
MATA MALEZAS Y GRAMAS III
• RAINPROOF IN 10 MINUTES
• VISIBLE RESULTS IN 3 HOURS
Keep Out of Reach of Children
CAUTION See back panel booklet for additional precautionary statements.
Mantener Fuera del Alcance de los Niños
PRECAUCIÓN Vea los avisos adicionales de precaución en el panel posterior.
ACTIVE INGREDIENTS
Glyphosate, isopropylamine salt* 2.0%
Pelargonic acid and related fatty acids 2.0%
OTHER INGREDIENTS 96.0%
TOTAL 100.0%
*Contains 0.1 lbs. glyphosate acid equivalent per US gallon.
NET 1.33 GAL (170 FL OZ/5L)



Source: Journal of Organic Systems, 9(2), 2014

THE LANCET

The Lancet, Volume 351, Issue 9103, Pages 637 - 641, 28 February 1998
doi:10.1016/S0140-6736(97)11096-0

This article was retracted

RETRACTED: Ileal-lymphoid-nodular ... nd pervasive developmental disorder i...

Dr AJ Wakefield FRCS [a], SH Murch MB [b], A Anthony MB [a], J Linn... ych [c], AP Dh... MRCPath [a], MA Thomson FRCP [b], P Harvey FRCP [d], A Valentine FRCR [e], SE Davies MRCPath [a], JA Walker-Smith FRCP [a]

Summary

Background

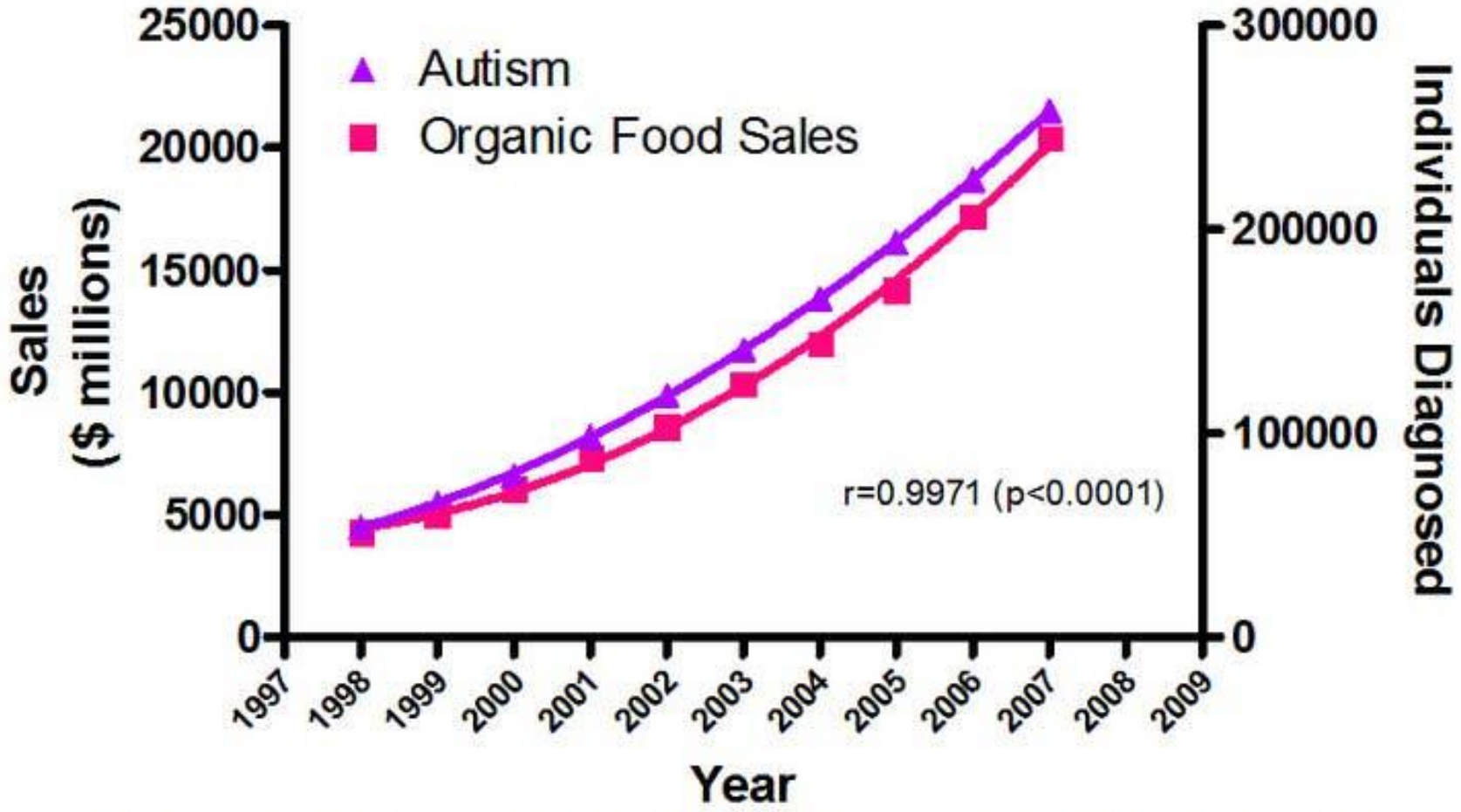
We investigated a consecutive series of children with chronic enterocolitis and regressive developmental disorder.

Methods

12 children (mean age 6 years [range 3–10], 11 boys) were referred to a paediatric gastroenterology unit with a history of normal development followed by loss of acquired skills, including language, together with diarrhoea and abdominal pain. Children underwent gastroenterological, neurological, and developmental assessment and review of developmental records. Ileocolonoscopy and biopsy sampling, magnetic-resonance imagi... (MRI), electroencephalography (EEG), and lumbar puncture were done under sedation. Barium follow-through radiography was done where possible...

RETRACTED

The real cause of increasing autism prevalence?



Sources: Organic Trade Association, 2011 Organic Industry Survey; U.S. Department of Education, Office of Special Education Programs, Data Analysis System (DANS), OMB# 1820-0043: "Children with Disabilities Receiving Special Education Under Part B of the Individuals with Disabilities Education Act

Source: Reddit, /r/skeptic

Just because you **CAN** does not mean you **SHOULD**

SCALE will decide the **CURVE**

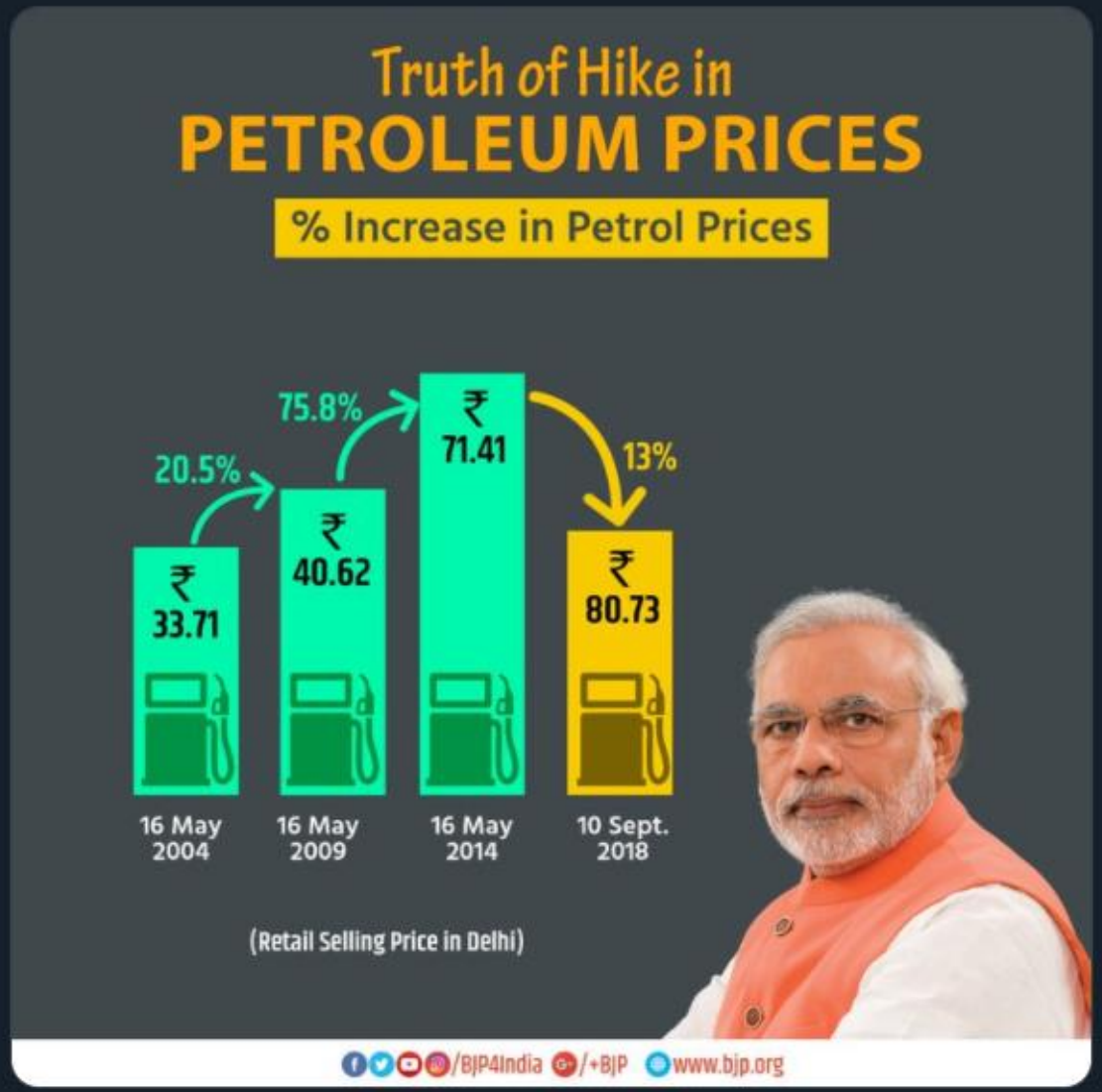
CORRELATION does **NOT** equal **CAUSATION**

5

Purposeful Deception

BJP
@BJP4India

Truth of hike in petrol prices!

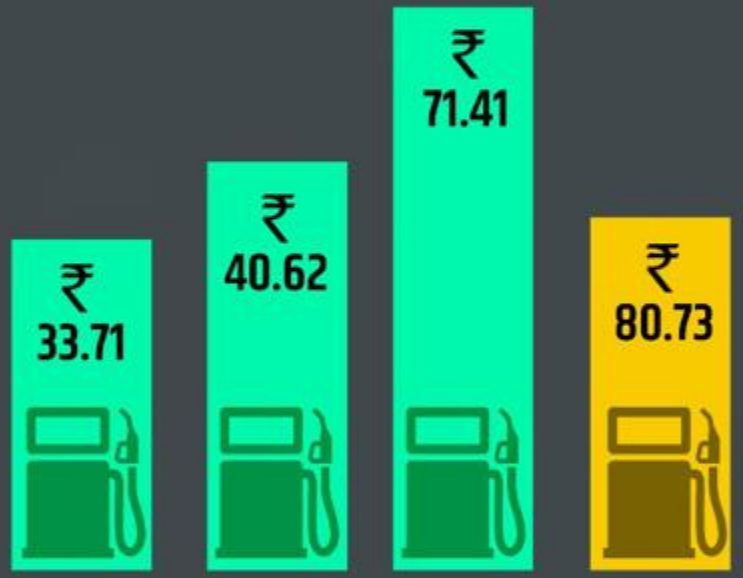


Narendra Modi and 3 others

1:17 PM · Sep 10, 2018 · Twitter Web Client

Truth of Hike in
PETROLEUM PRICES

% Increase in Petrol Prices



(Retail Selling Price in Delhi)

/BJP4India /+BJP www.bjp.org

Truth of Hike in
PETROLEUM PRICES

% Increase in Petrol Prices

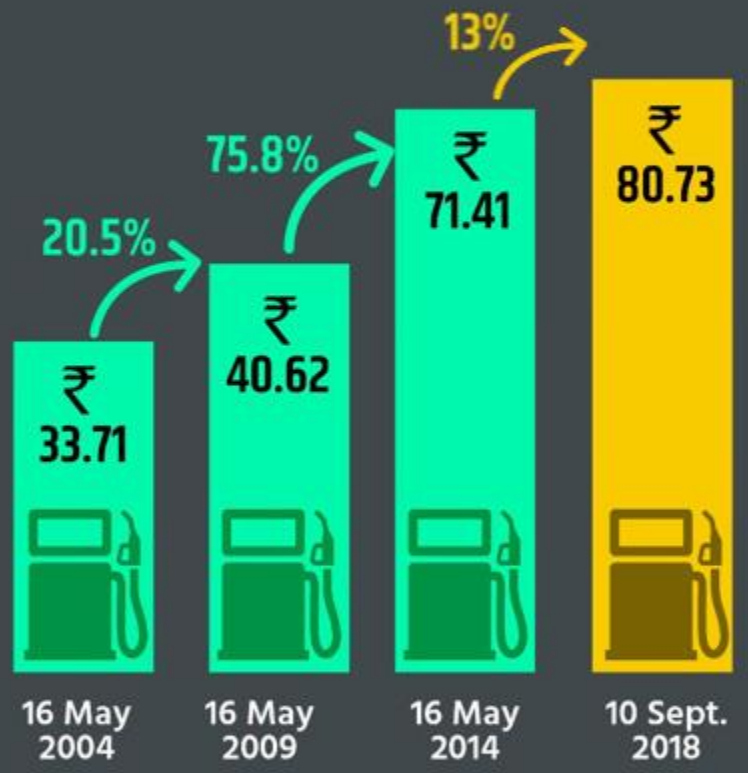
₹ 33.71	₹ 40.62	₹ 71.41	₹ 80.73
16 May 2004	16 May 2009	16 May 2014	10 Sept. 2018

(Retail Selling Price in Delhi)

/BJP4India /+BJP www.bjp.org

Truth of Hike in
PETROLEUM PRICES

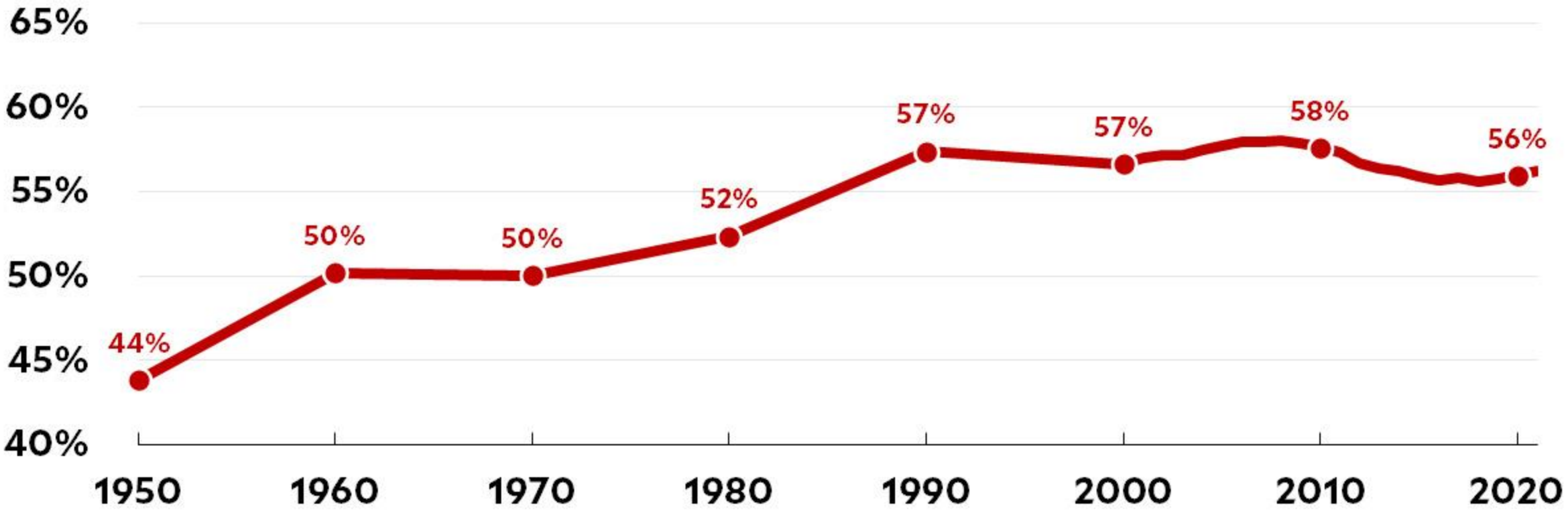
% Increase in Petrol Prices



(Retail Selling Price in Delhi)

Housing Units in the United States

Per adult



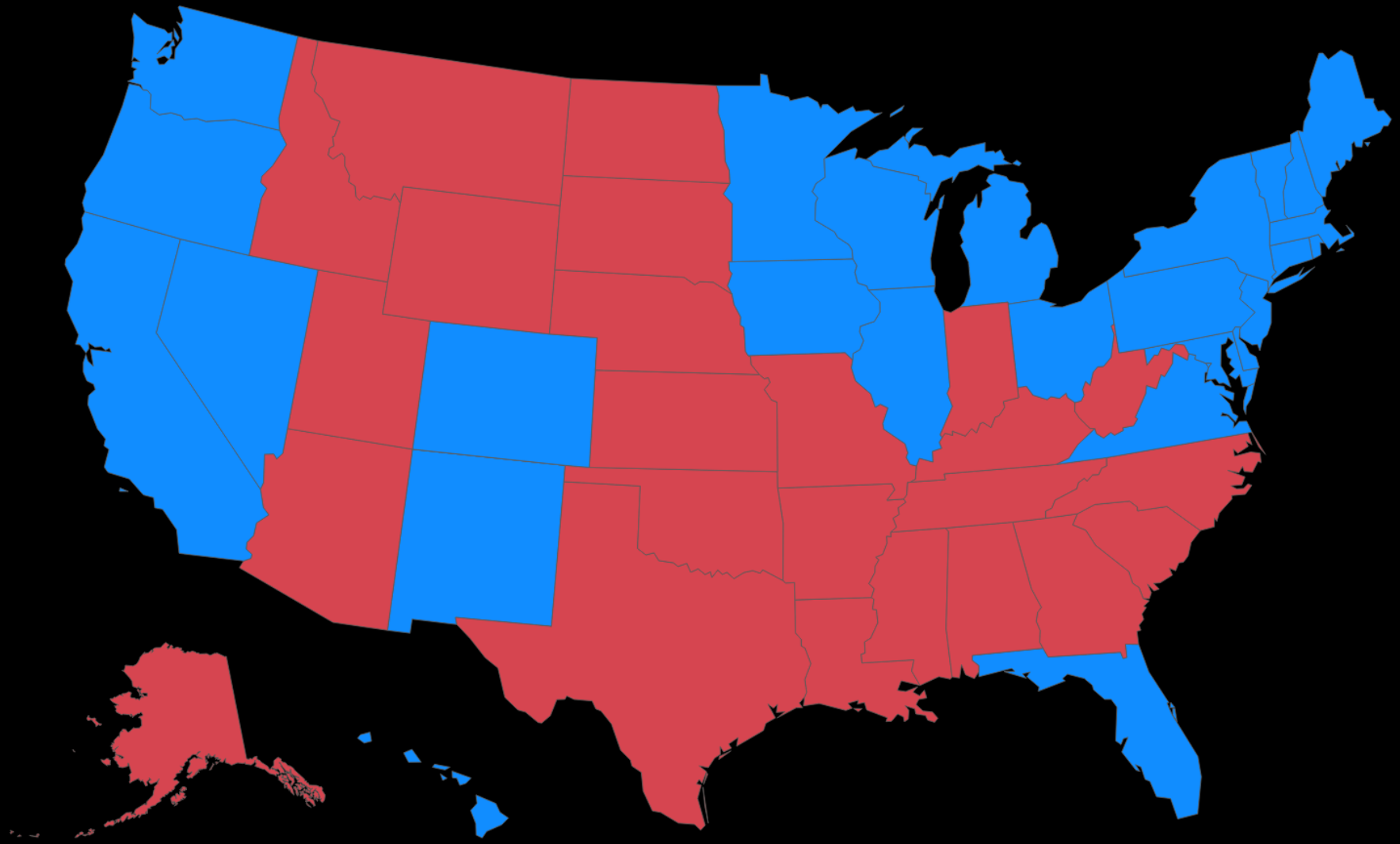
Source: Census Bureau

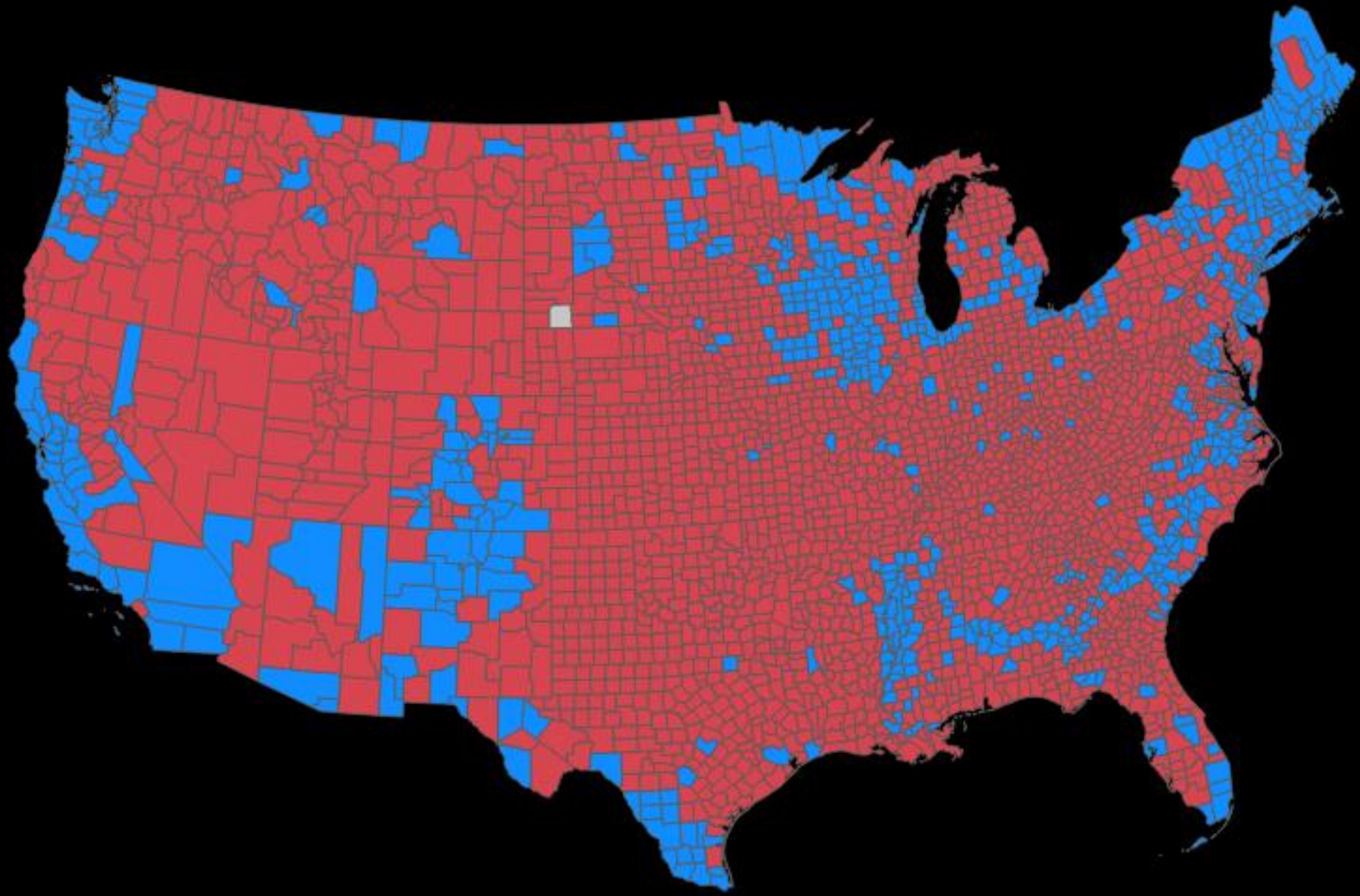
KEVIN DRUM

@awhalefact
*whale in image much closer to camera than the background

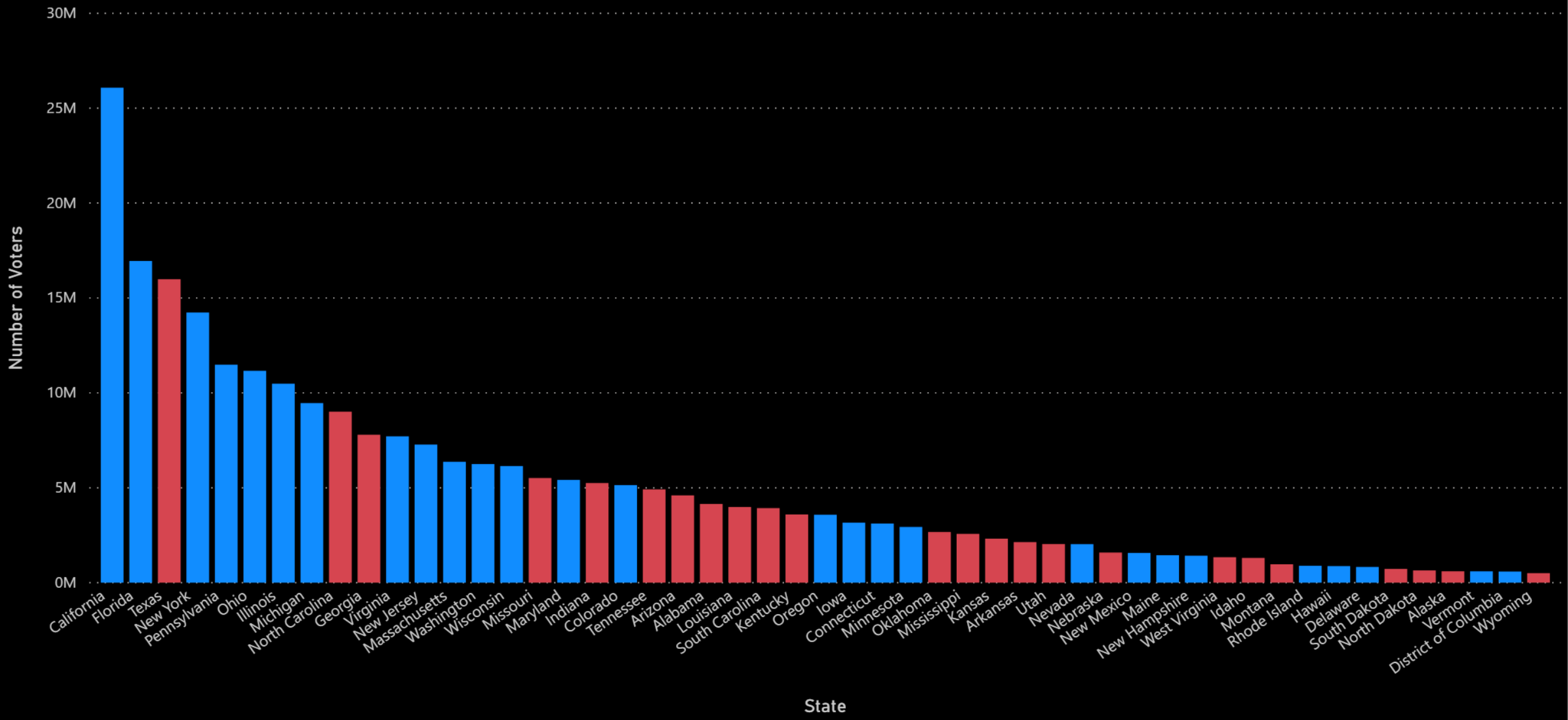
2012 U.S Election

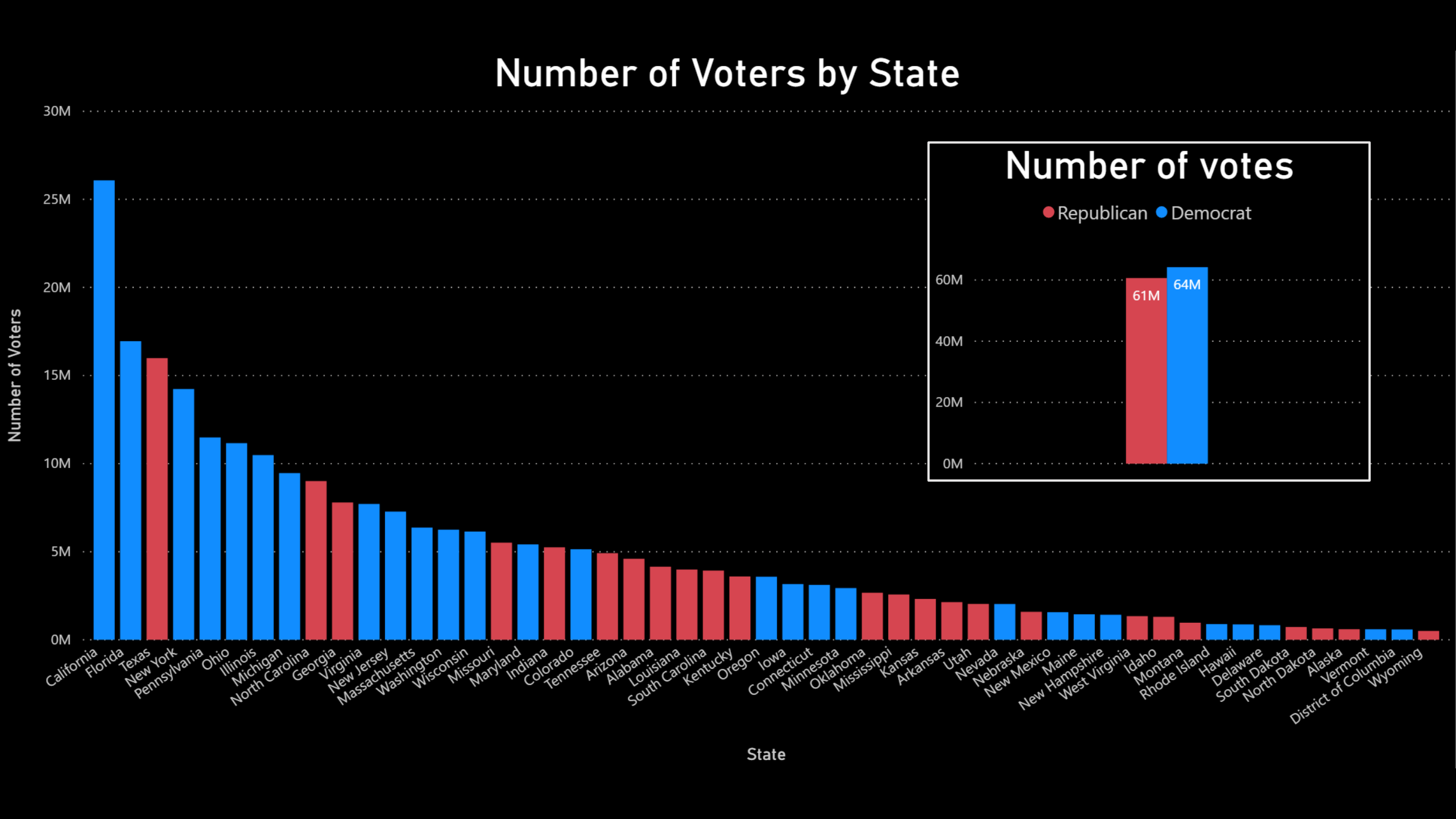
2012 U.S Election





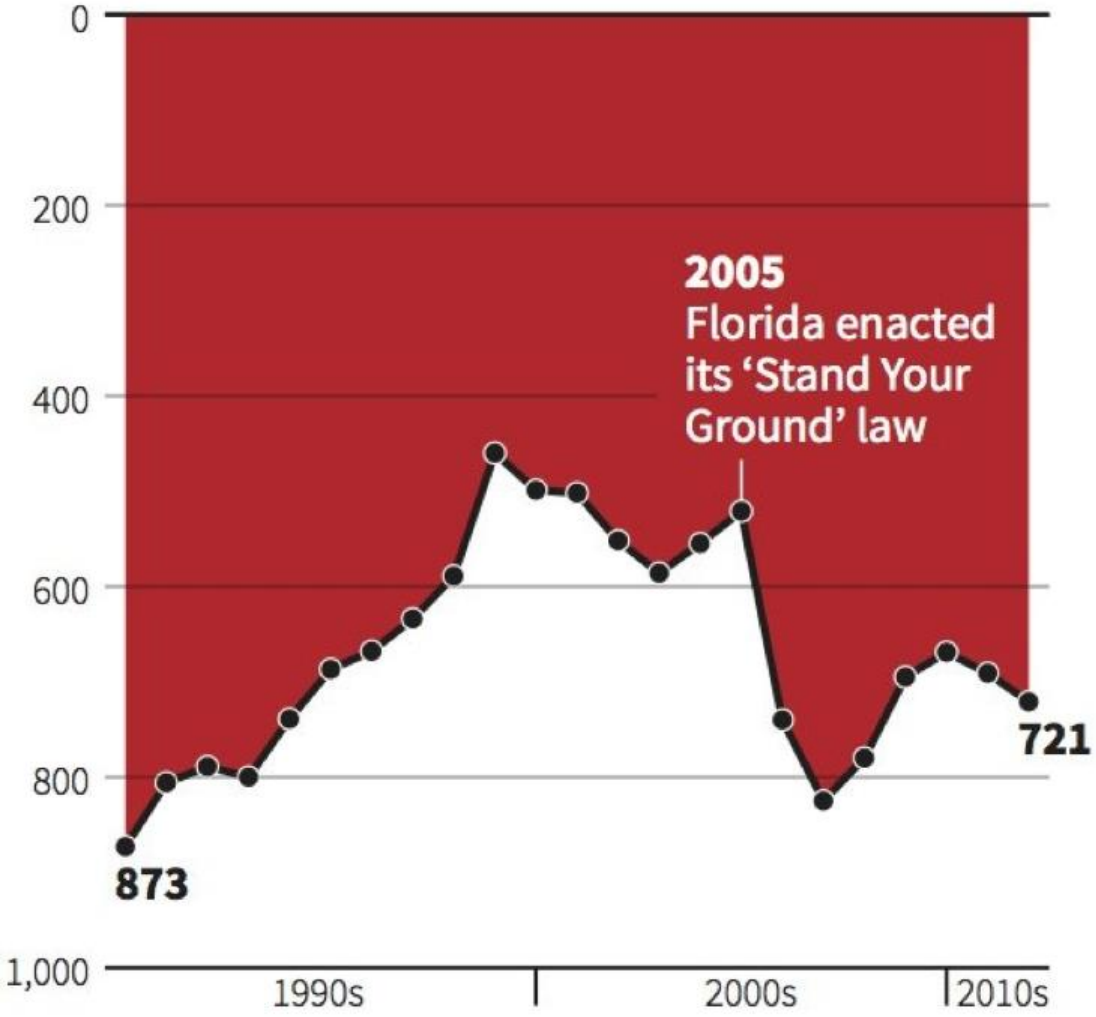
Number of Voters by State




Number of Voters by State
30M
25M
20M
15M
10M
5M
0M
Number of Voters
California
Florida
Texas
New York
Pennsylvania
Ohio
Illinois
Michigan
North Carolina
Georgia
Virginia
New Jersey
Massachusetts
Washington
Wisconsin
Missouri
Maryland
Indiana
Colorado
Tennessee
Arizona
Alabama
Louisiana
South Carolina
Kentucky
Oregon
Iowa
Connecticut
Minnesota
Oklahoma
Mississippi
Kansas
Arkansas
Utah
Nevada
Nebraska
New Mexico
Maine
New Hampshire
West Virginia
Idaho
Montana
Rhode Island
Hawaii
Delaware
South Dakota
North Dakota
Alaska
Vermont
District of Columbia
Wyoming
State
Number of votes
Republican
Democrat
60M
40M
20M
0M
61M
64M

Gun deaths in Florida

Number of murders committed using firearms

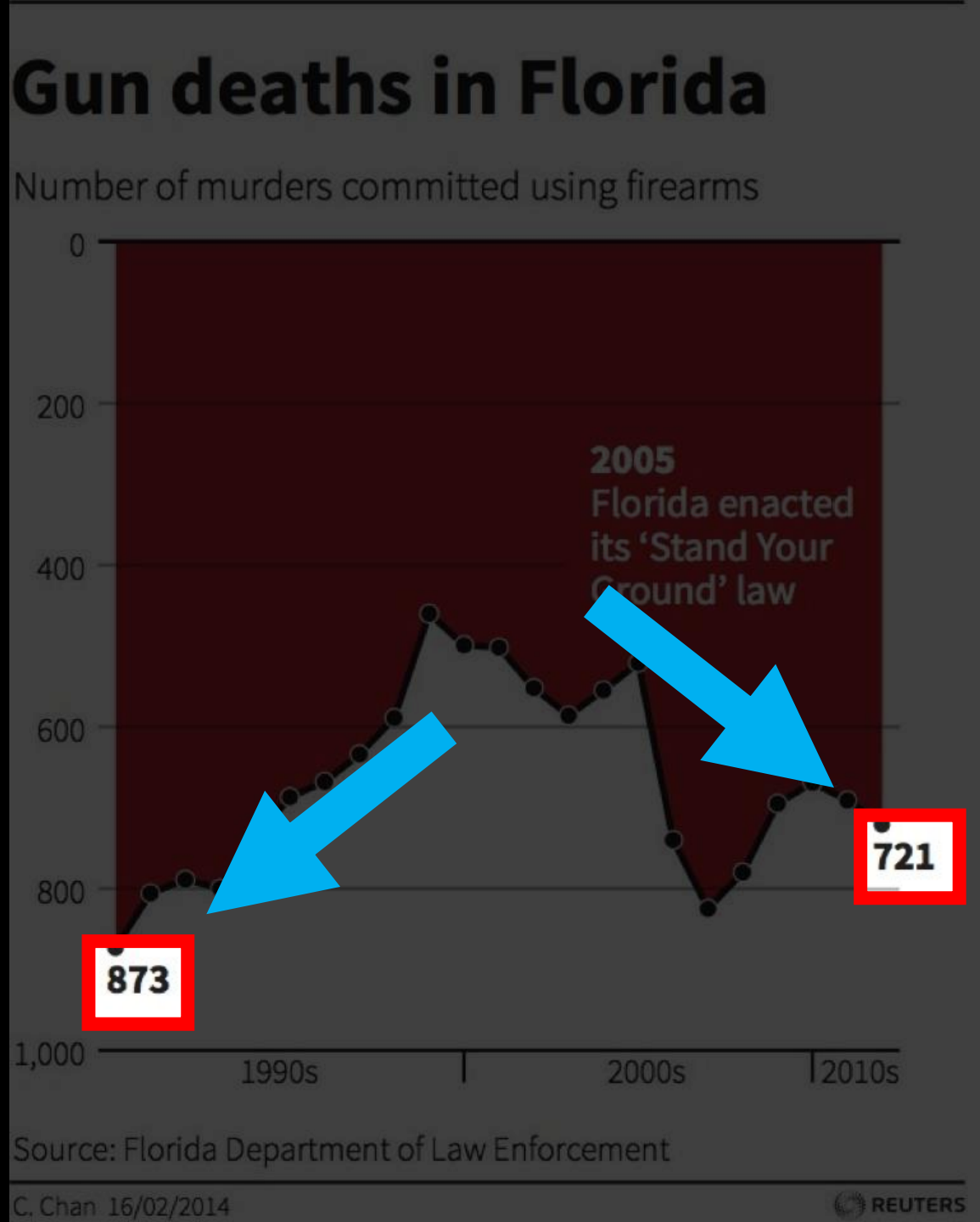


Source: Florida Department of Law Enforcement

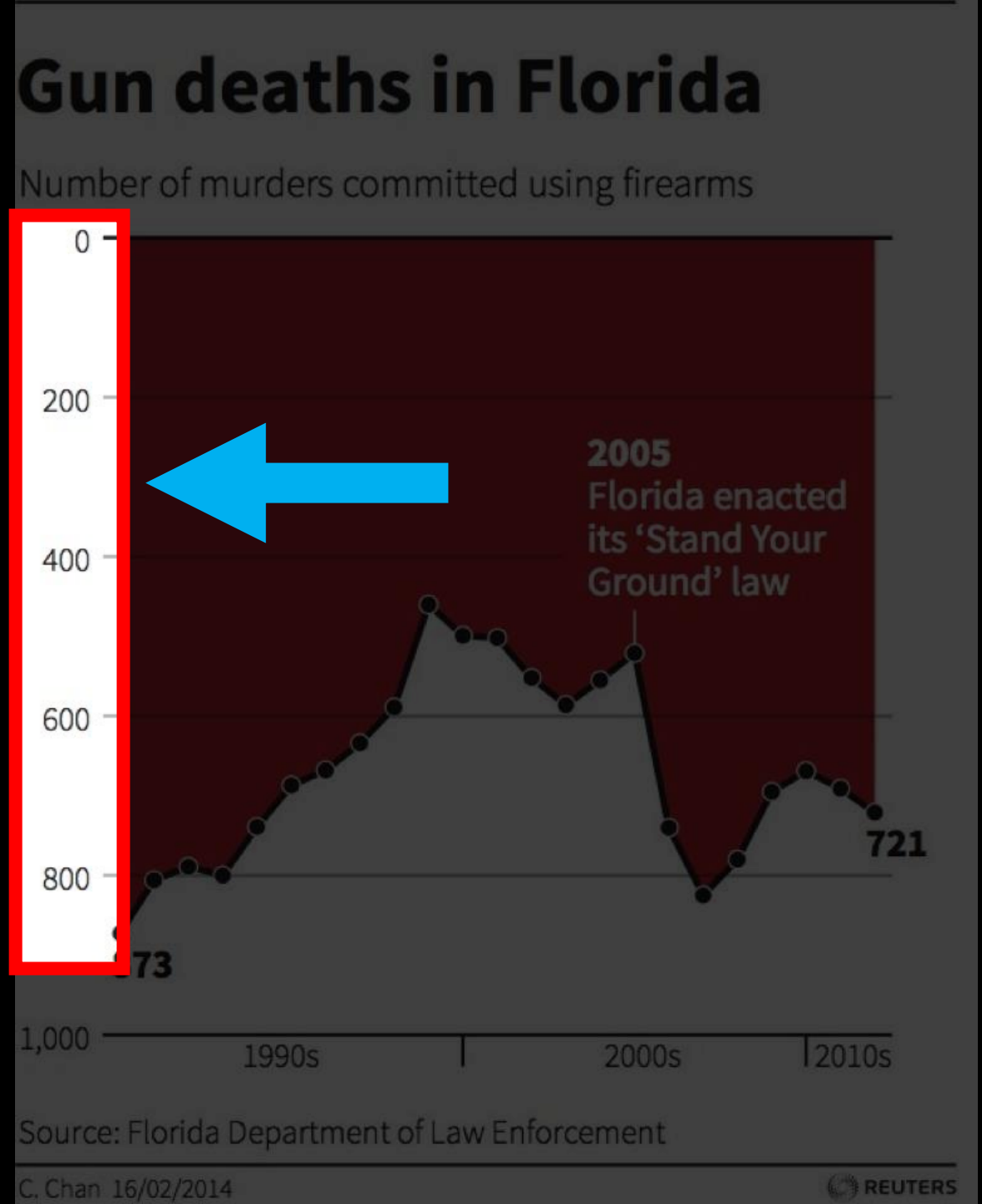
C. Chan 16/02/2014

REUTERS

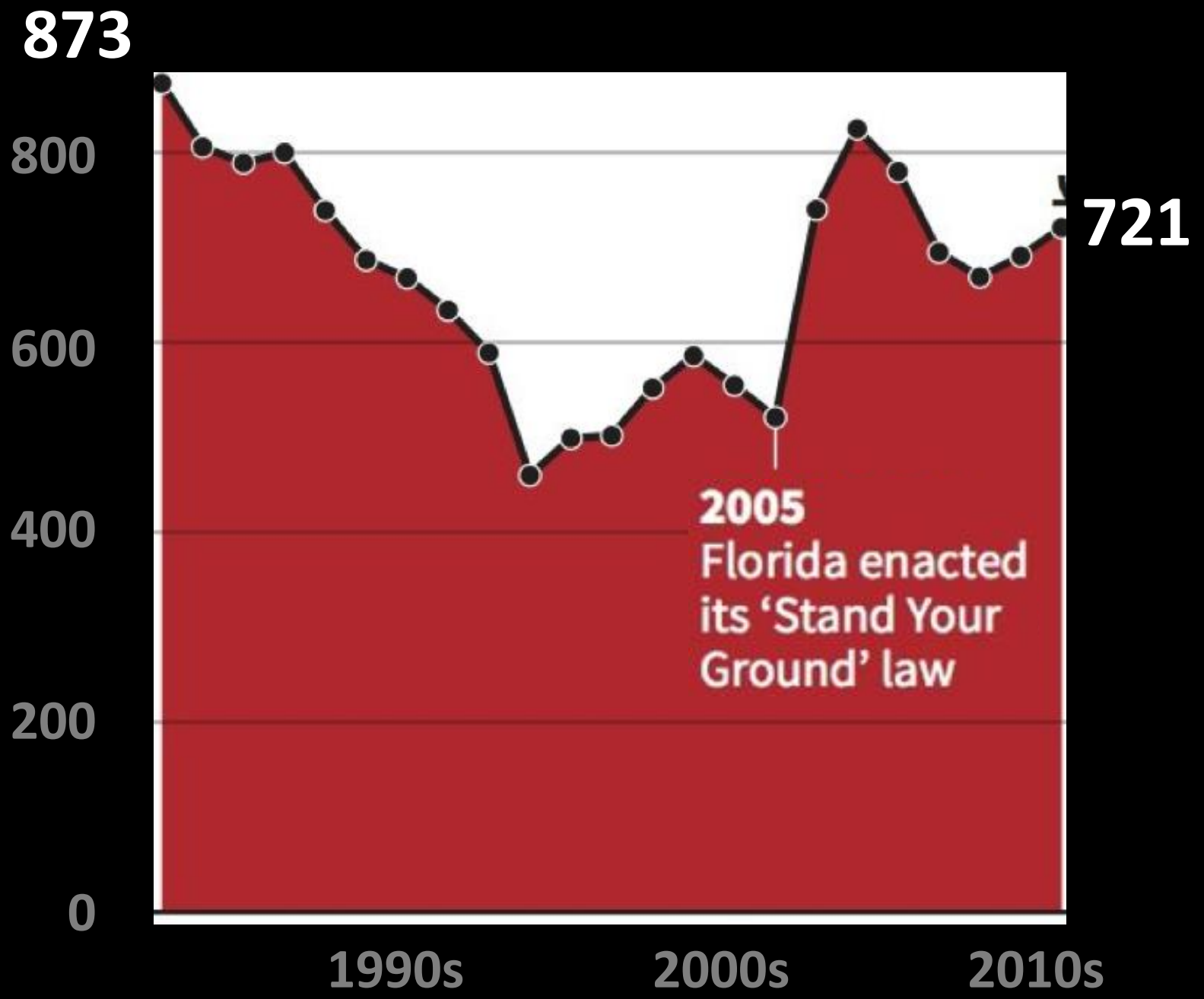
Source: Reuters



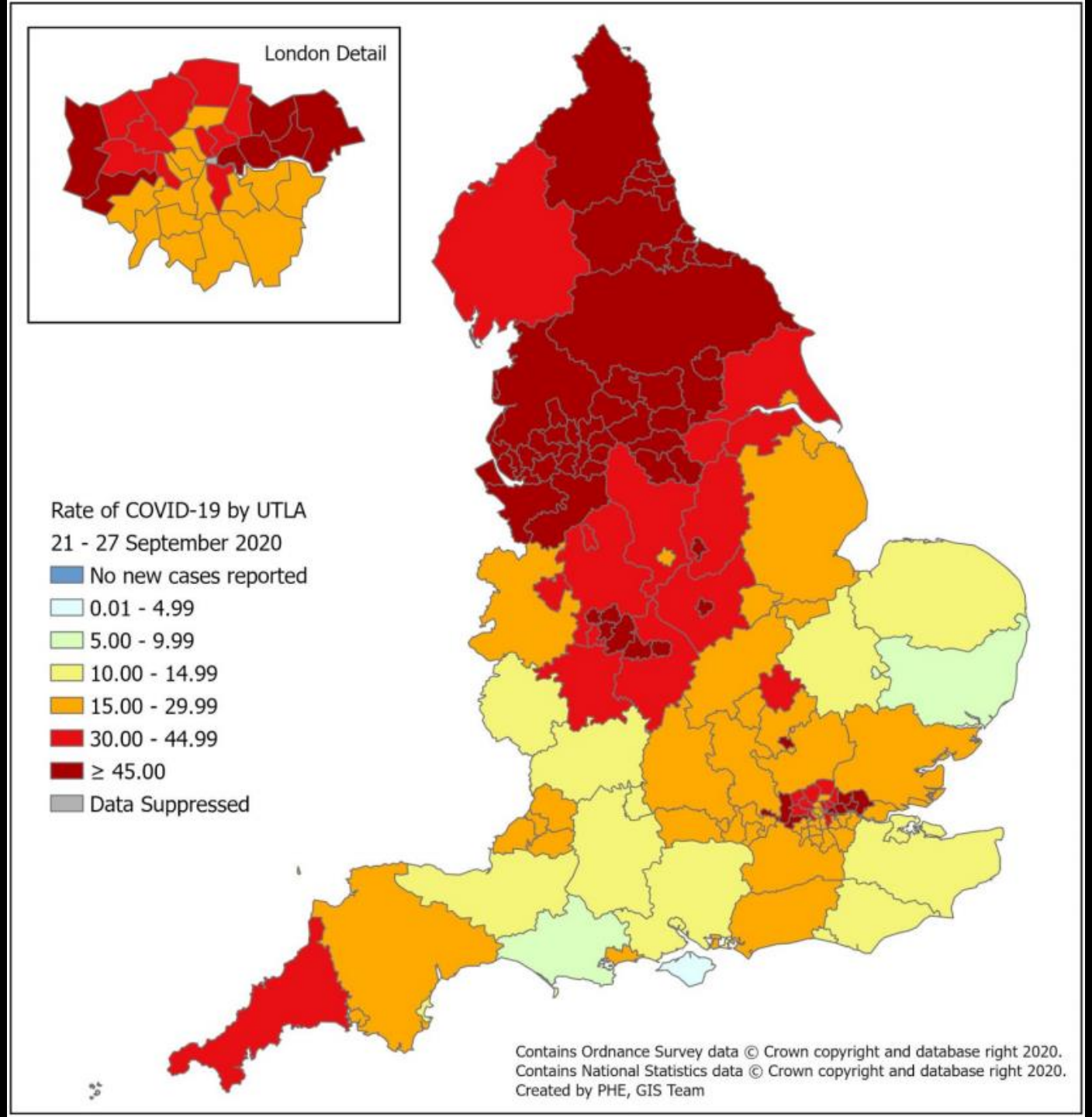
Source: Reuters



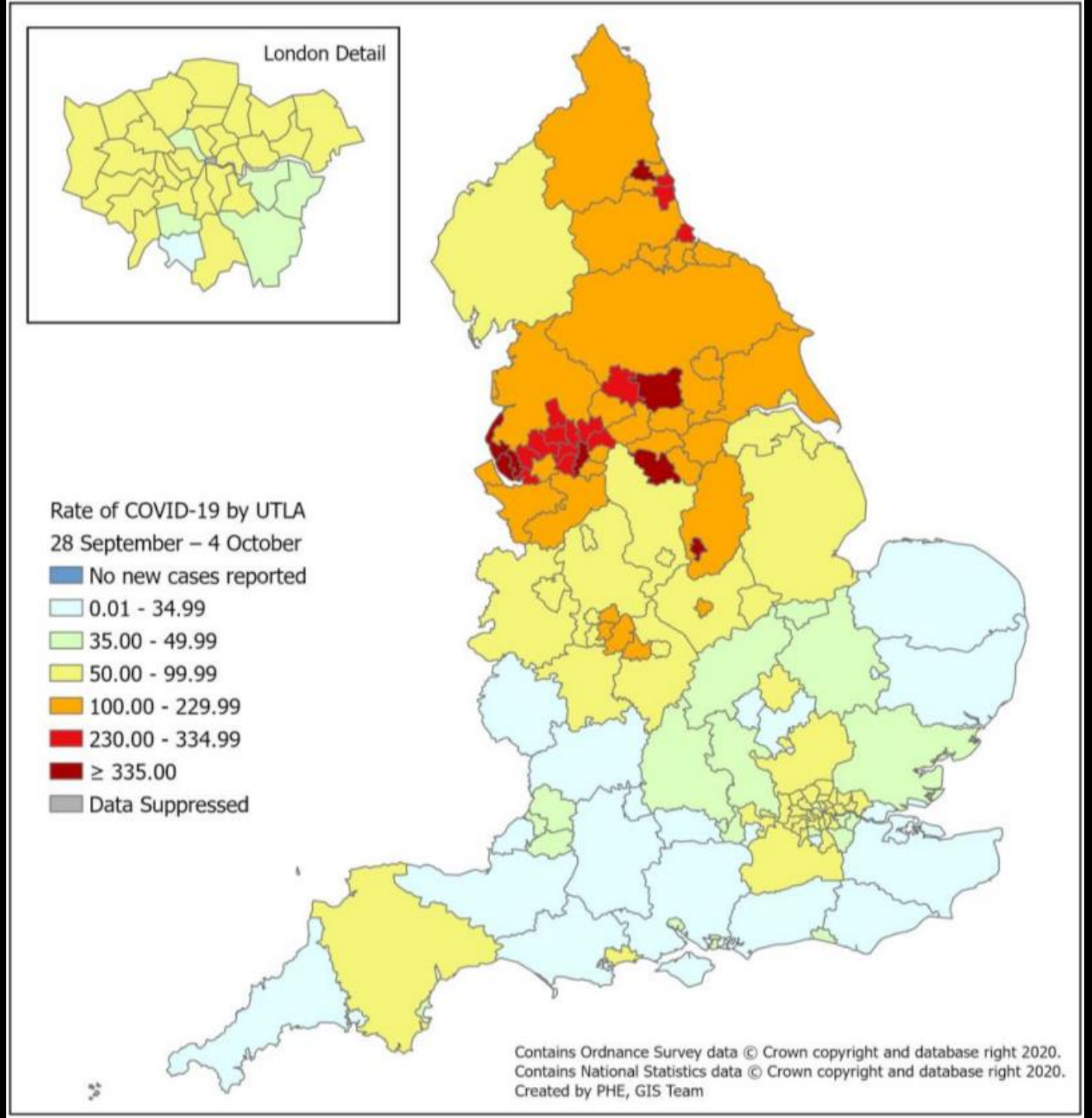
Source: Reuters



Source: Reuters



Source: UK Publishing Service



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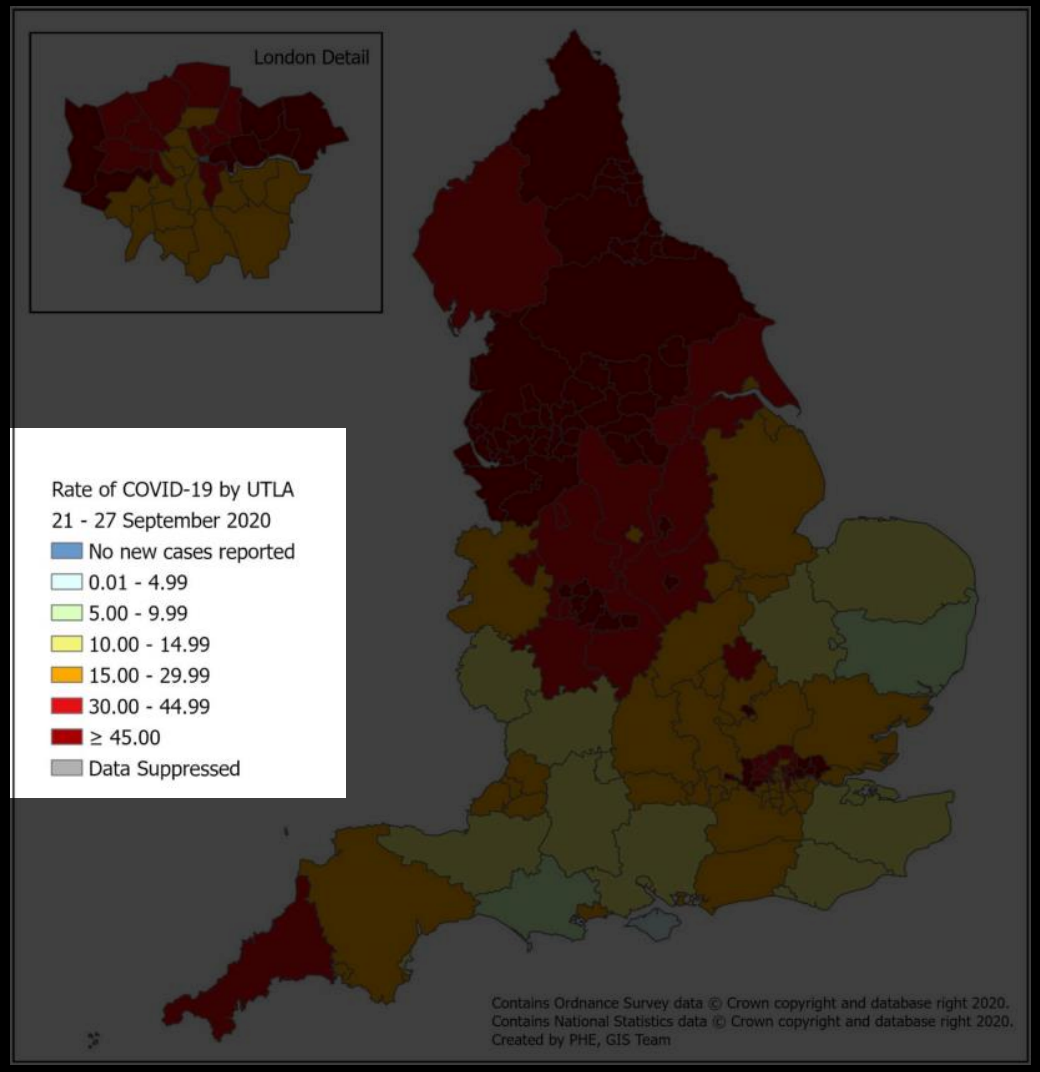
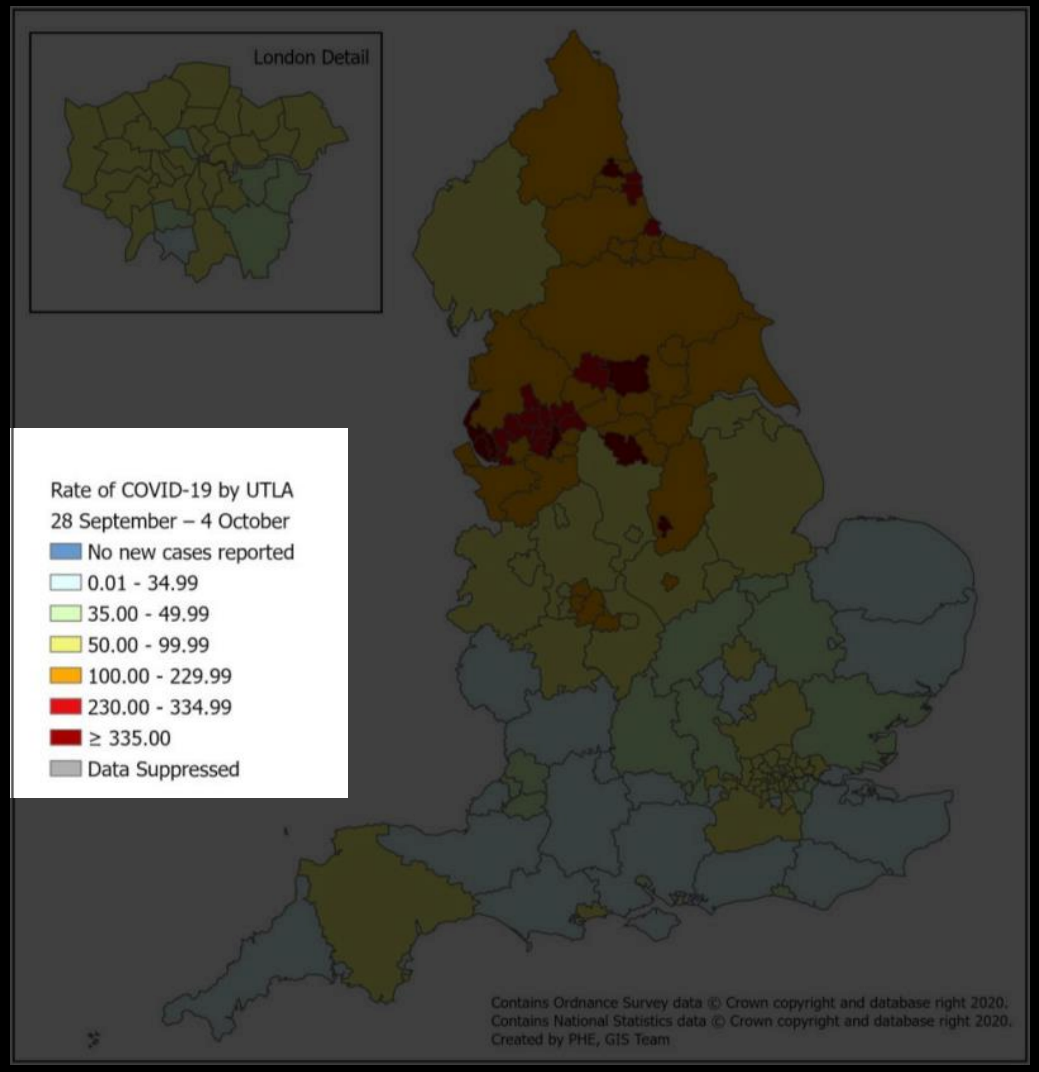




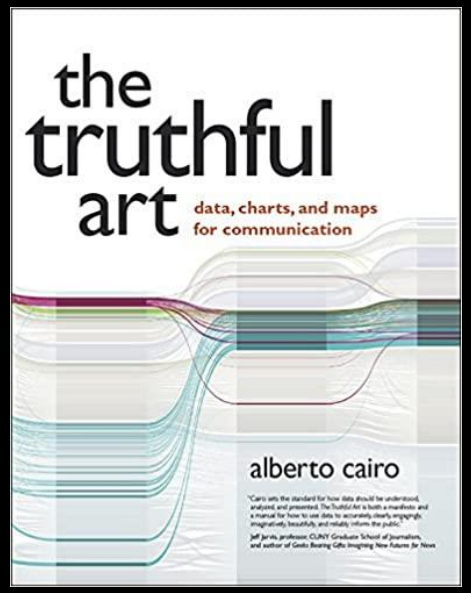
Source: UK Publishing Service

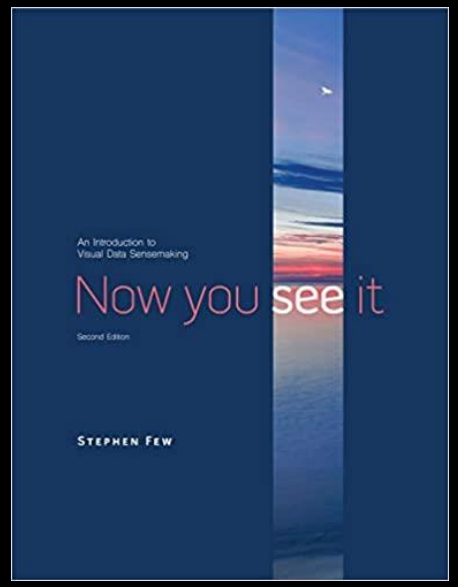
People have a limited
ATTENTION SPAN

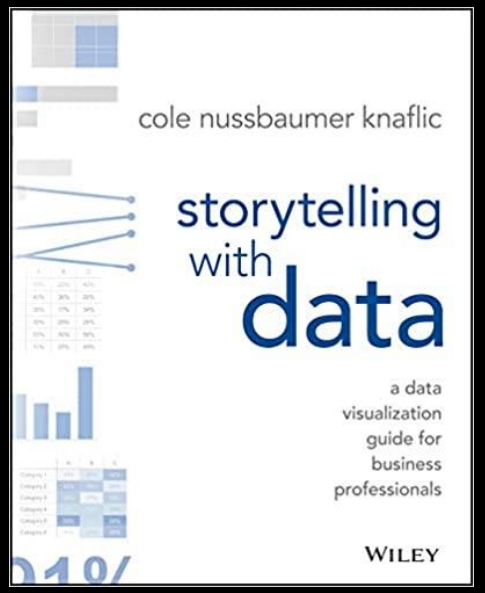
People have a limited
ATTENTION SPAN

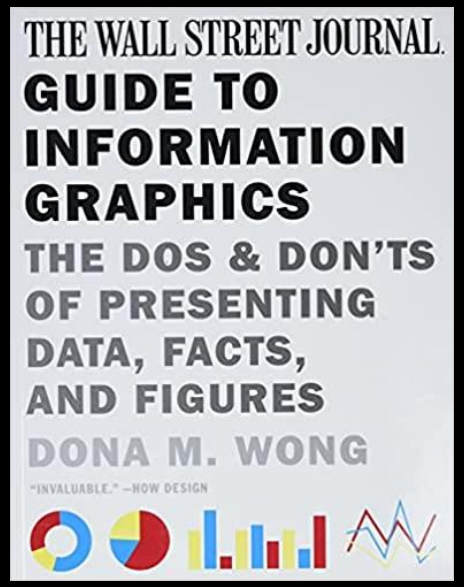
Always be careful with **MAPS**

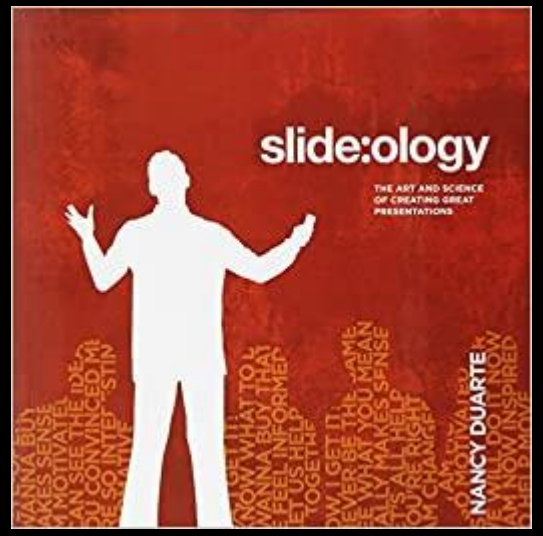
Visuals are **POWERFUL**

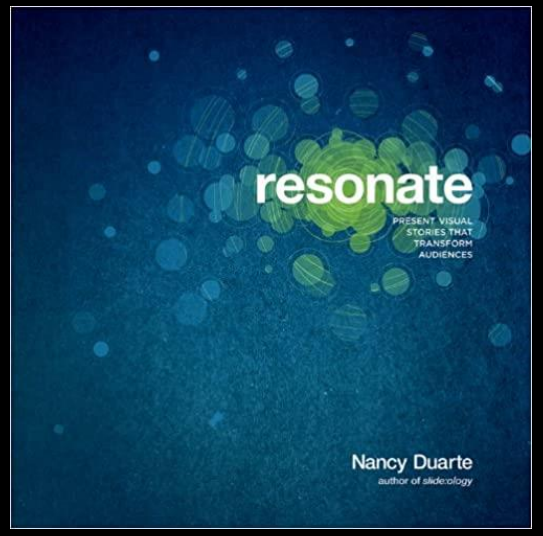

the truthful art
data, charts, and maps for communication
alberto cairo

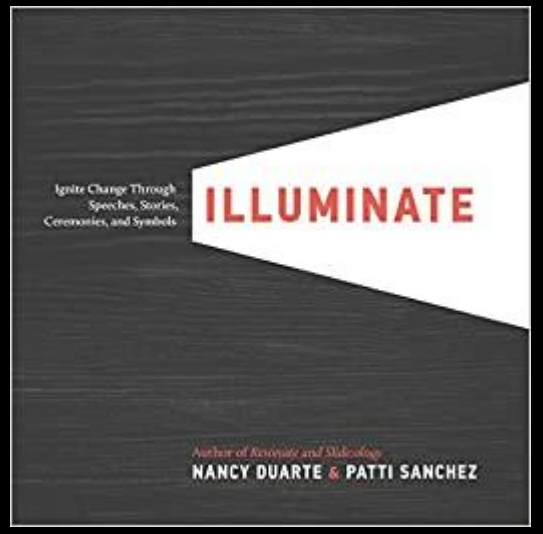

An Introduction to Visual Data Sensemaking
Now you see it
Second Edition
Stephen Few

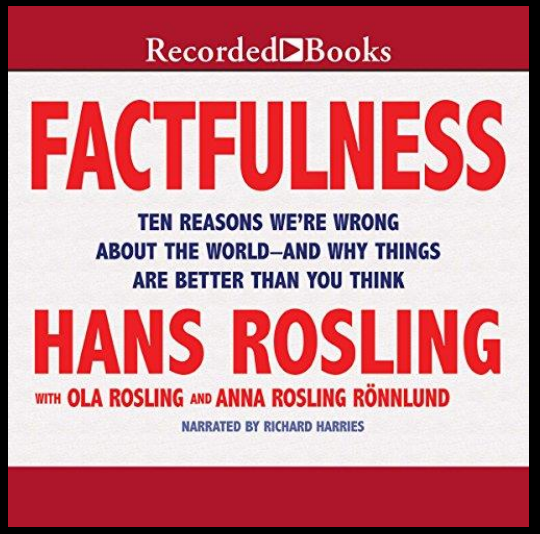

cole nussbaumer knaflic
storytelling with data
a data visualization guide for business professionals
WILEY


THE WALL STREET JOURNAL.
GUIDE TO INFORMATION GRAPHICS
THE DOS & DON'TS OF PRESENTING DATA, FACTS, AND FIGURES
DONA M. WONG
"INVALUABLE." —HOW DESIGN


slide:ology
THE ART AND SCIENCE OF CREATING GREAT PRESENTATIONS
NANCY DUARTE


resonate
PRESENT VISUAL STORIES THAT TRANSFORM AUDIENCES
Nancy Duarte
author of slide:ology

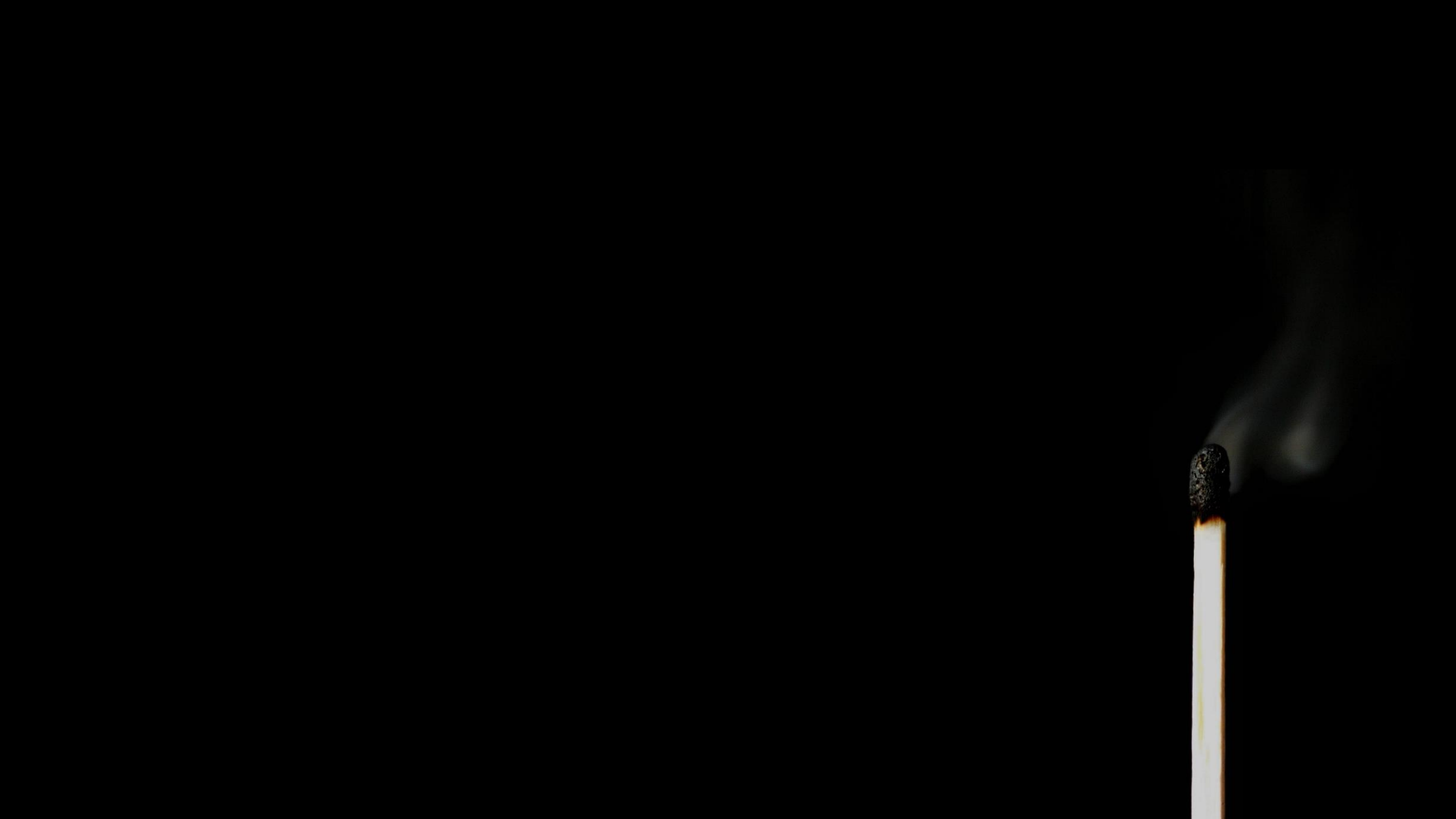

Ignite Change Through Speeches, Stories, Ceremonies, and Symbols
ILLUMINATE
Author of Resonate and Slide:ology
NANCY DUARTE & PATTI SANCHEZ


Recorded Books
FACTFULNESS
TEN REASONS WE'RE WRONG ABOUT THE WORLD—AND WHY THINGS ARE BETTER THAN YOU THINK
HANS ROSLING
WITH OLA ROSLING AND ANNA ROSLING RÖNNLUND
NARRATED BY RICHARD HARRIES

With great
POWER(BI)
comes great
RESPONSIBILITY

We
SEE
what we
WANT
to see

Increasing
DATA LITERACY
is
KEY



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/in/alexanderarvidsson

nordic summit

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