

Silver Summer Series

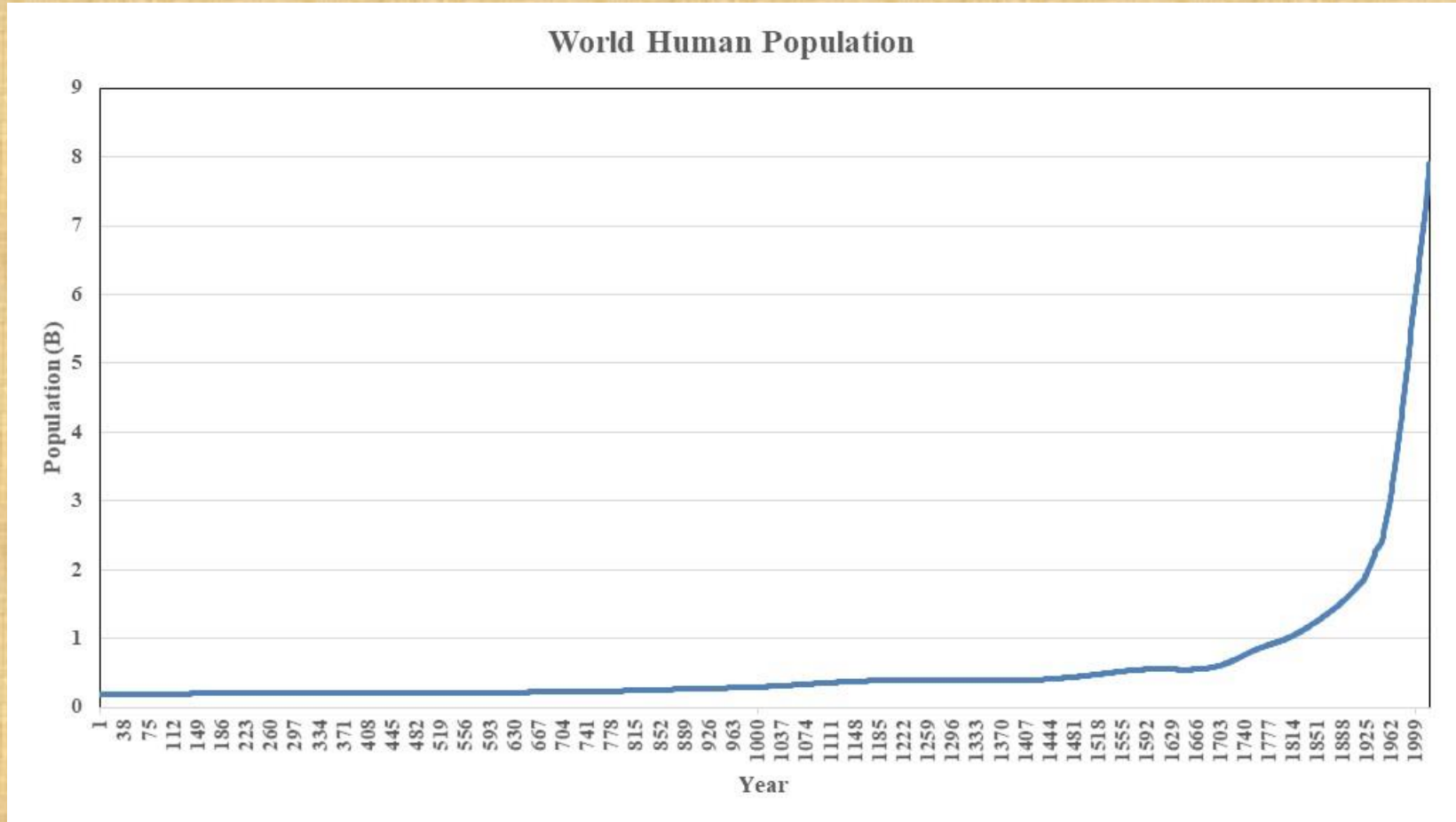
Geological Society of Nevada

August 13, 2021

Overview

- This is a Freak Economics-type talk.
- I initially wanted to talk about the impact of our Federal government on everything. But today's tribalism no longer allows for dialogue and I haven't been trained in making everything neutral, so I would undoubtedly offend more people than I would educate and entertain.
- I think the three events that are impacting the U.S. mining industry the most are:
 - Global Population Growth
 - Climate Change, and
 - The New Society
- This presentation will be posted on the GSN website so that you can see all of the graphs.

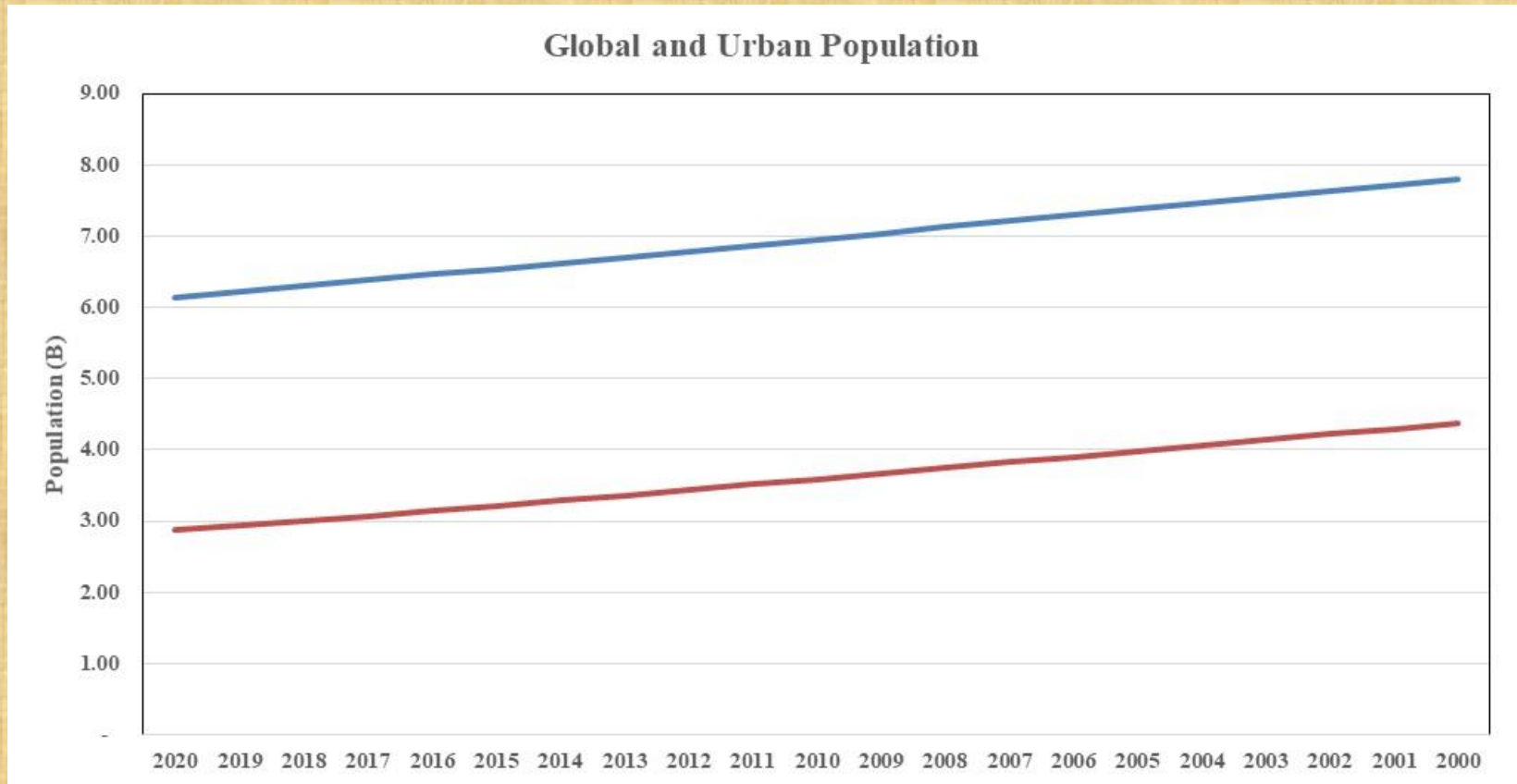
World Human Population



Planet currently has 7.9 billion people and is adding ~84 million people each year.

Reference: 2021 World Population by Country (worldpopulationreview.com)

Global Population



56% of them are urban, up from 47% 20 years ago. Urbanites don't live off the land. They require lots of infrastructure to be happy.

Reference: World Population by Year - Worldometer (worldometers.info)

Urban Heat Islands

- 85% of Americans live in metropolitan areas.
- These urban areas are typically 15-20° F hotter than neighboring areas.
- Higher temps are caused by paved roads, parking lots, and building structures absorbing heat during the day and releasing it at night.
- Heat causes stress in all animals, including humans.
- Why is this important to mining? Because cities aren't going to get smaller, so their impact on the albedo is going to increase.
 - Need more electrification, air conditioners, concrete, asphalt, etc..
 - Need more trucks to deliver food and supplies, and to remove waste.
- Unfortunately, these urbanites tend to be ignorant about issues facing rural areas. This leads to socio-political judgements that adversely impact mining.

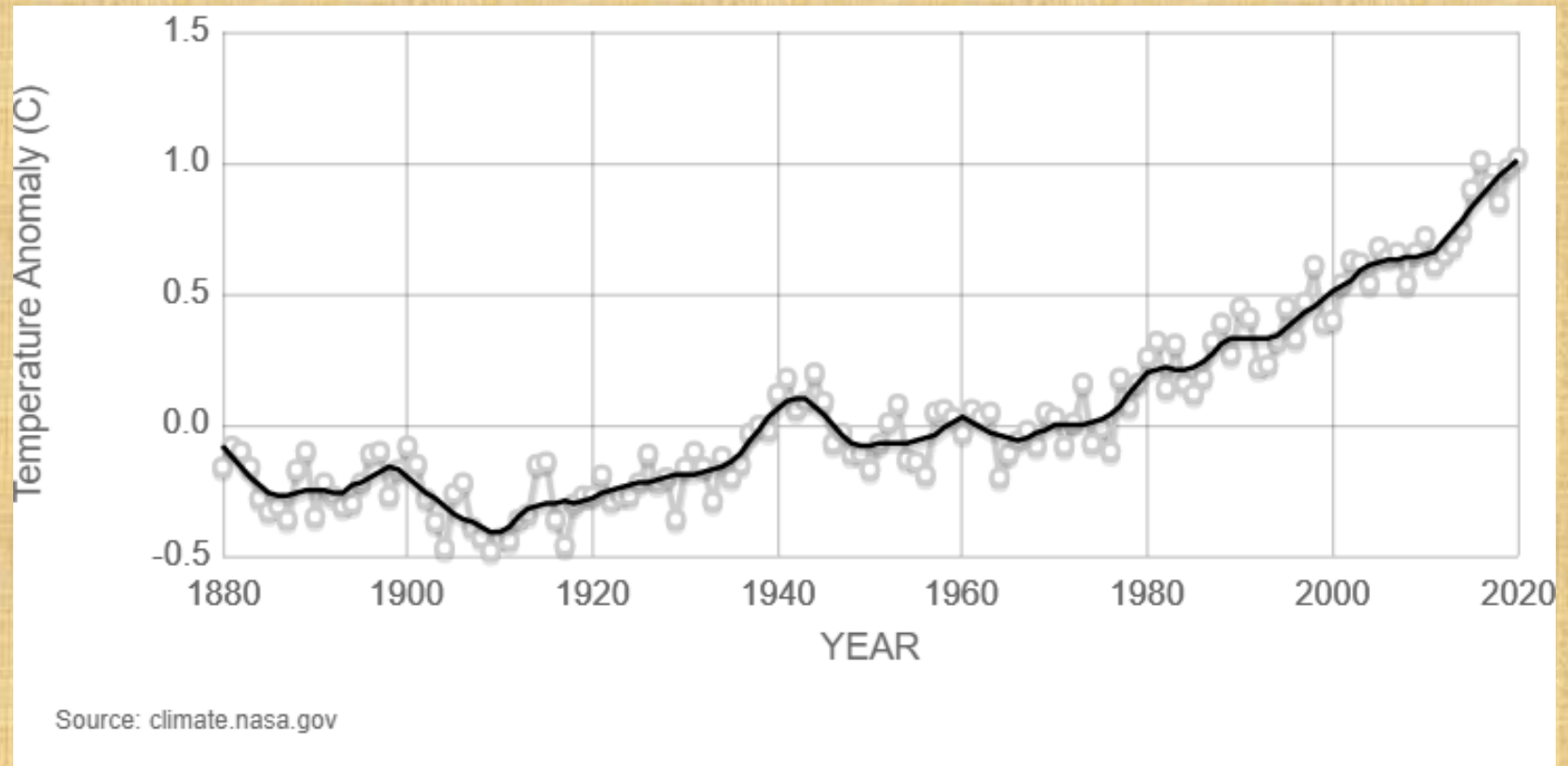
Climate Change - Summary

According to NOAA:

- 2020 was the second-warmest year on record (141 years).
- The 10 warmest years have all occurred since 2005.
- 7/10 warmest years have been since 2014.
- Earth's temperature has risen 0.14°F /decade since 1880
- Earth's temperature has risen 0.32°F / decade since 1981

Regardless of the cause, things are getting toasty!

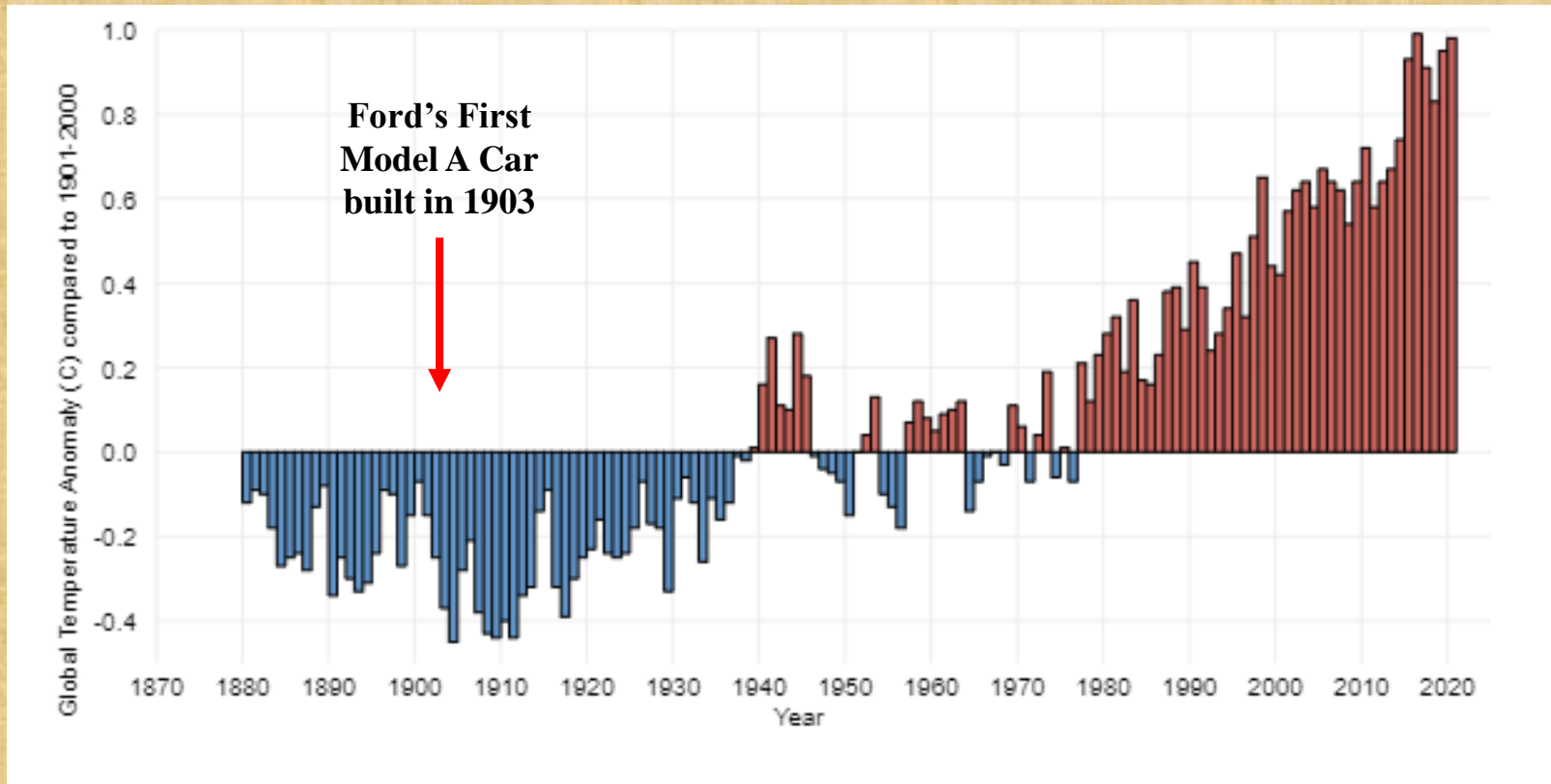
Change in Global Air Temperatures



There is little question that the temperature is rising. Most of the debate on “Why?” is political rather than scientific.

A change of 2°C has a profound impact on the environment.

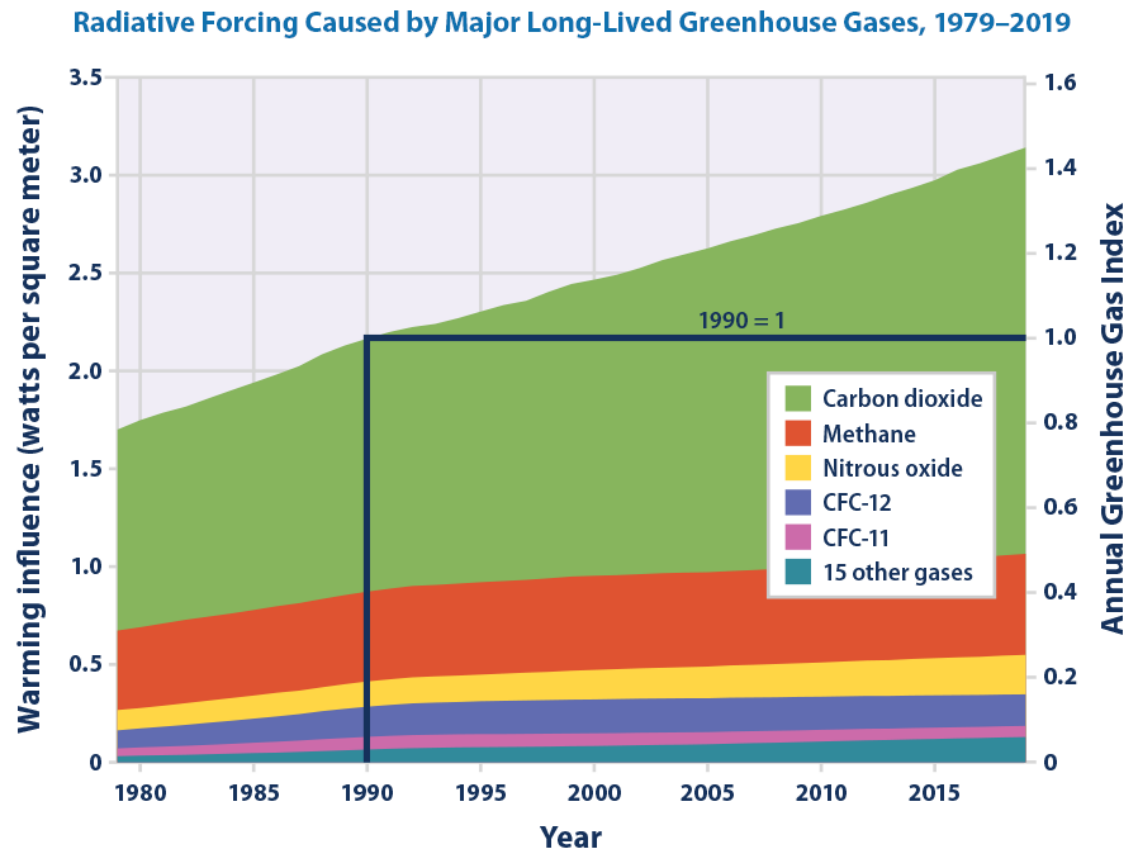
Global Surface Temperatures



Let's blame Ford and his mass production of fossil-fuel vehicles!

Reference: Climate Change: Global Temperature | NOAA Climate.gov

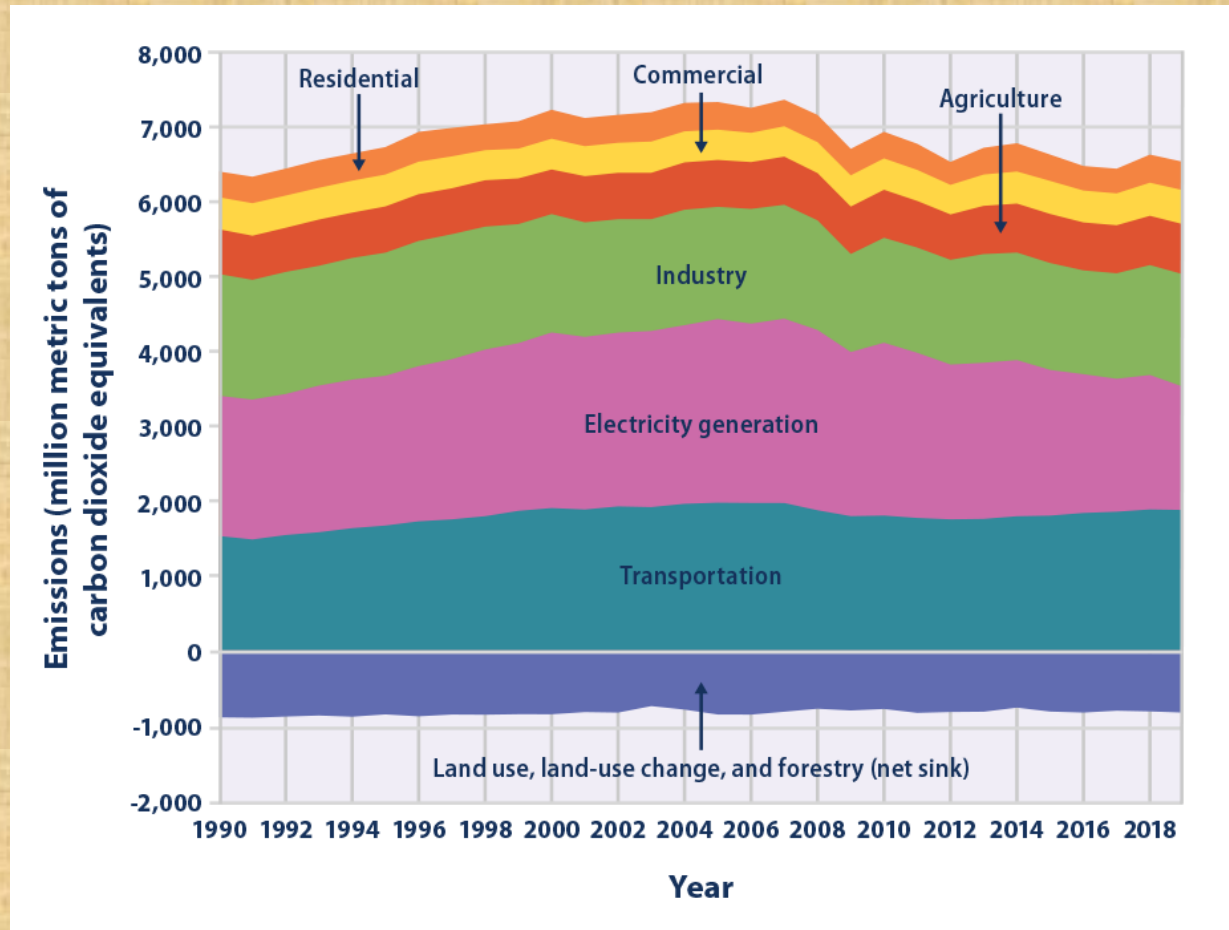
Radiative Forcing Caused by Long-Lived Greenhouse Gases



Data source: NOAA (National Oceanic and Atmospheric Administration). 2020. The NOAA Annual Greenhouse Gas Index. Accessed December 2020. www.esrl.noaa.gov/gmd/aggi.

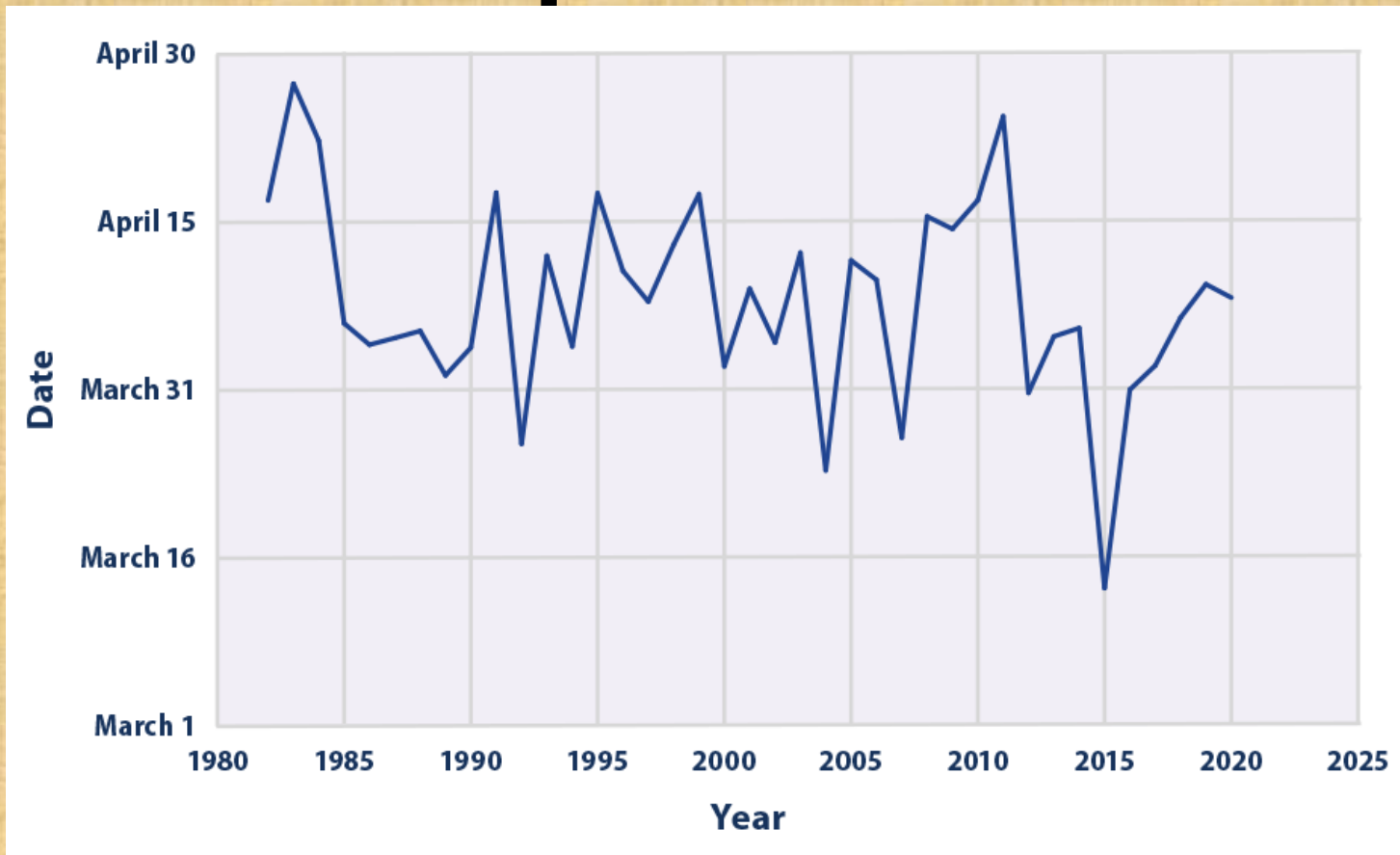
For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

U.S. Gas Emissions



U.S. gas emissions have actually declined in the past 20 years but it is not enough because its impact is cumulative. Note that land use contributions have remained fairly constant and is a net sink. Electricity generation and Transportation are the biggest contributors.

Peak Snowpack Dates

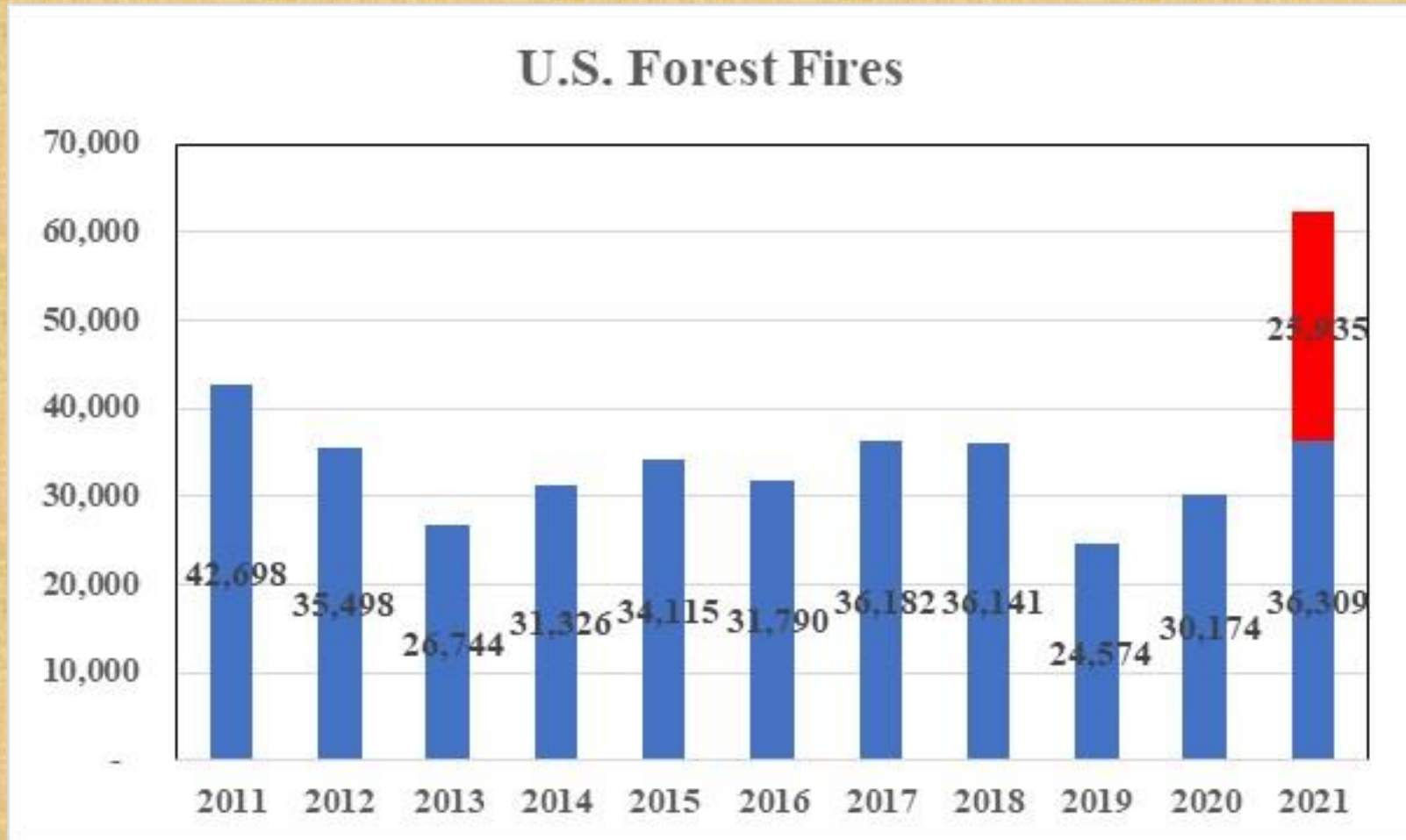


Peak Snowpack in the West has gotten earlier and earlier. Late April in 1980 and Late March to Early April today. This means less water coming into the system.

Drought

- High heat increases evaporation thereby drying stuff out.
- Lake Powell is at 145 feet (33% of design) below Full Pool.
- Dry conditions are accelerating wild fires.
- Colorado and Gunnison rivers in Colorado, and Madison river in Montana closed to fishing due to high water temperatures.
- Drought is a huge issue in the West.
- Flooding is a huge issue in the East.
- The shifting climate patterns have profound influences on food supply, electricity consumption and fishing....

U.S. Forest Fires



Reference: National Fire News | National Interagency Fire Center (nifc.gov)

Why Is This Important To Mining?

- Lithium brines are limited by their basin recharge rates. If less water is coming into the basin, then production must be cut back. This is occurring during a time of unprecedented lithium demand.
- Antofagasta reported a reduction in copper production from Los Pelambres in Chile due to lack of water.
- Desalination plants create their own environmental problems. At best, they are a patch and not a solution.
- Flooding related to abnormally high rainfall, contributed to the collapse of Vale's iron dams in Brazil.
- Philippines has horrible cyclones which regularly interrupts metal production activities.
- There is a limit to how much water miners can recycle despite fine-tuning our use for decades.
- As the West's water supply disappears, there will be water wars. Who ultimately wins? Consuming taxpayers or industry?

Society – An Overview

- The last two years has seen a convergence of multiple macro-structural changes to Society
 - Pandemic
 - Vaccinations and their politization
 - Working at home
 - Electric Vehicles
 - Diversity / Inclusion

Each impacts mining.

The Greatest Plagues / Pandemics

No.	Type	Time Period	Death Toll	Death Toll / Total Pop.
1	Black Death (Bubonic Plague)	1347 - 1351	200 million	52.0%
2	Smallpox	1520	56 million	12.0%
3	Spanish Flu	1918-1919	40-50 million	2.5%
4	Plague of Justinian	541-542	30-50 million	19.0%
5	HIV / AIDS	1981 - Present	25-35 million	1.0%
6	The Third Plague	1855	12 million	1.0%
7	Antonine Plague	165-180	5 million	13.3%
8	COVID-19	2019 - Present	4 million	0.05%
9	17 th Century Great Plagues	1600	3 million	0.5%
10	Asian Flu	1957-1958	1.1 million	0.04%

Recent Pandemics

No.	Type	Time Period	Death Toll
1	SARS	2002 – 2003	770
2	Ebola	2014 – 2016	11,000
3	MERS	2015 – Present	850
4	Covid-19	2019 – Present	4,000,000
5	Swine Flue	2009 – 2010	200,000

U.S COVID-19 Statistics

- U.S. Population: 330,151,000
 - Spending on Covid Research: \$20 billion
 - Government Stimulus Spending: \$2.59 trillion
 - U.S. Covid Infections: 34,861,500
 - % of Infections / Total Population: 10.6%
 - U.S. Covid Deaths: 618,000
 - % of Infected Whom Die: 1.8%
 - % of Covid Deaths / Total Population: 0.20%
-
- Number of Heart Attacks / Year: 1,500,000
 - Number of Cancer Deaths / Year: 600,000

Anti-Vaxxers

1. **Don't know long-term effects.** Vaccines normally show their side effects within 2 months.
2. **The vaccines were approved on an emergency basis and not on full authorization from the FDA.** Full authorization just needs more time to test.
3. **I've had COVID. Don't need the vaccine.** COVID is mutating and vaccine enhances resistance. The Delta variant is 1,200 X more transmissible.
4. **Vaccine will hurt my fertility.** No it won't.
5. **None of your business.** Yes it is. You don't have the right to infect others.
6. **I'm young and healthy. I don't need it.** Young people can be transmitters.
7. **My faith protects me.** Maybe so, but your transmissions doesn't protect others.
8. **I can't afford it. It's FREE!**
9. **COVID shots make you magnetic.** And what's wrong with being magnetic?
10. **I can't get childcare.** That's what grandparents are for...
11. **My political party says I shouldn't get vaccinated so that the other party will look bad.** This one is on the Republicans.

Vaccinations

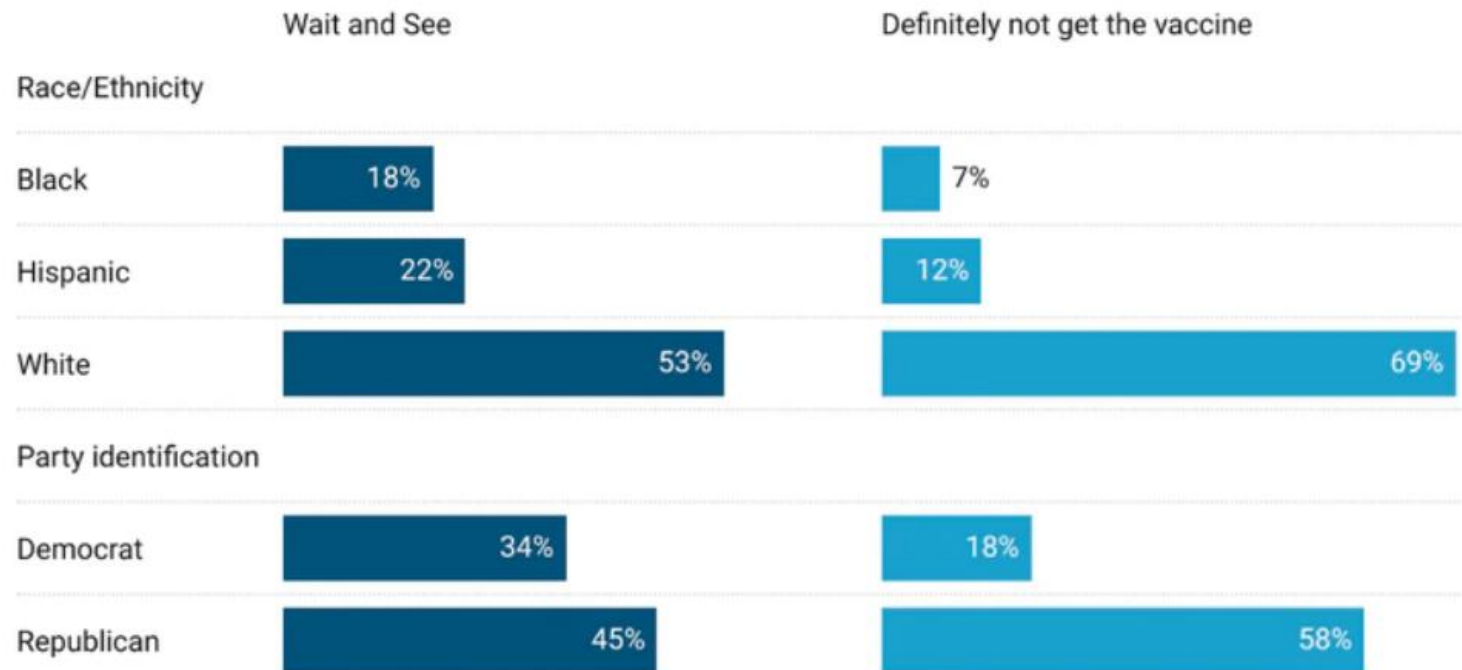
Washington Post – ABC News poll (July 2021)

- 86% Democrats have at least one shot.
- 45% Republicans have at least one shot.
- White Republicans are the major hold-outs.
- Black and Hispanics are the largest “Wait and See” group
- 60% of unvaccinated Americans believe the government is exaggerating the Delta variant.
- >97% of the people currently hospitalized for COVID are not vaccination.
- 99% of recent COVID deaths are unvaccinated people.

This is now a pandemic for unvaccinated people.

Who's Getting Vaccinated?

Whites, Republicans Dominate "Definitely Not" Group, while "Wait and See" is Disproportionately Black, Hispanic



Source: Kaiser Family Foundation

Society

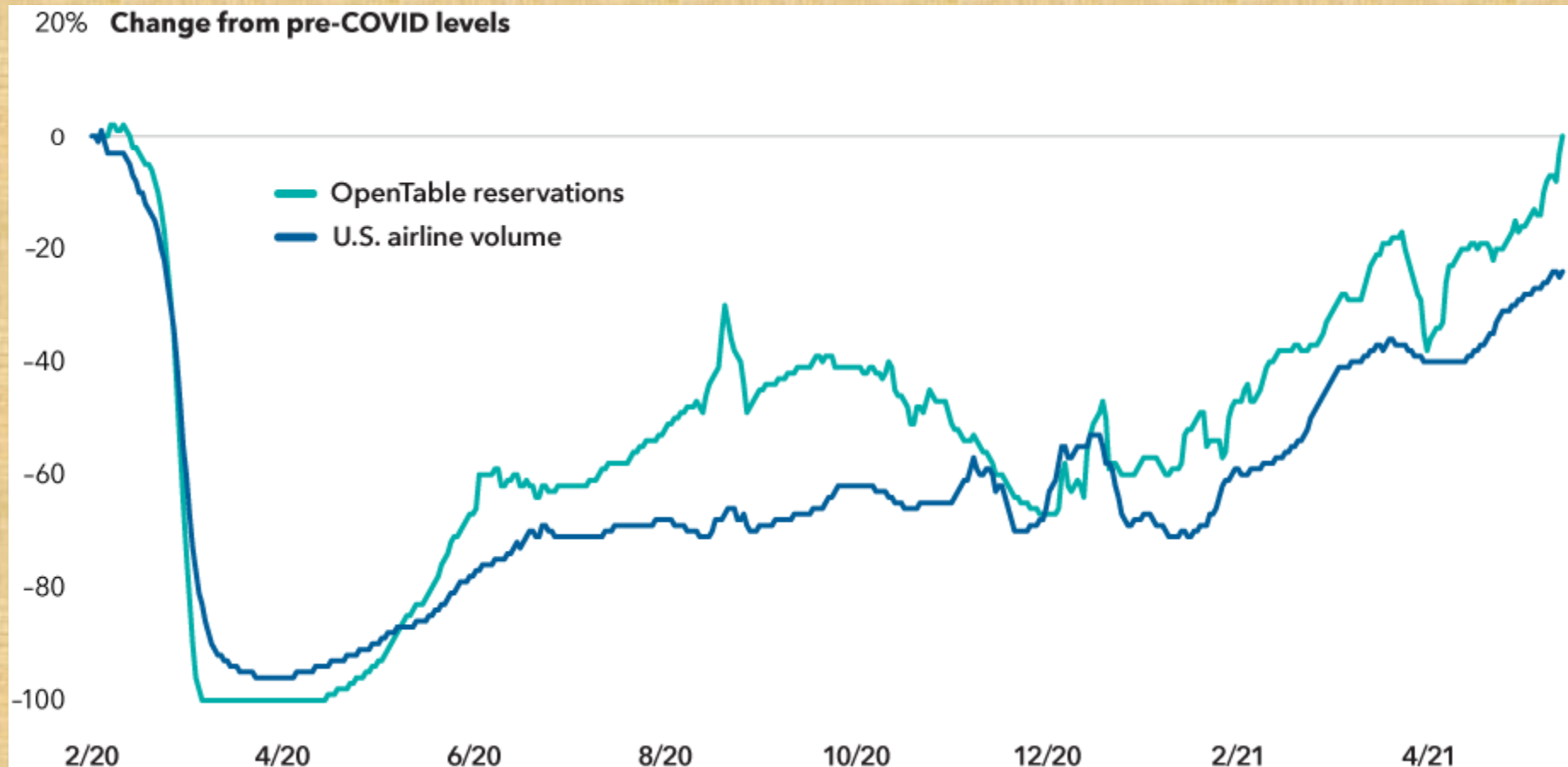
- This is the first recession triggered by retail. Normally industry triggers the recession and retail follows.
- Lots of businesses, especially retail, closed or cutback during the Pandemic.
- Many restarts are slow (Back to normal after Labor Day?)
- Many of these business will not reopen and the new jobs are in the digital industry, not blue-collar.
- But many workers don't want to move to find new jobs. This is called a Labor Mobility issue.
- The U.S. government is providing incentives not to work.
- This has created an imbalance, where there are more jobs than people. Current differential is about 600,000 jobs.
- Curiously, we continue to fight immigration.

Reference: Stores Closing Include Francesca's, Gap, in 2020 ([businessinsider.com](https://www.businessinsider.com))

Rebounding U.S. Economy

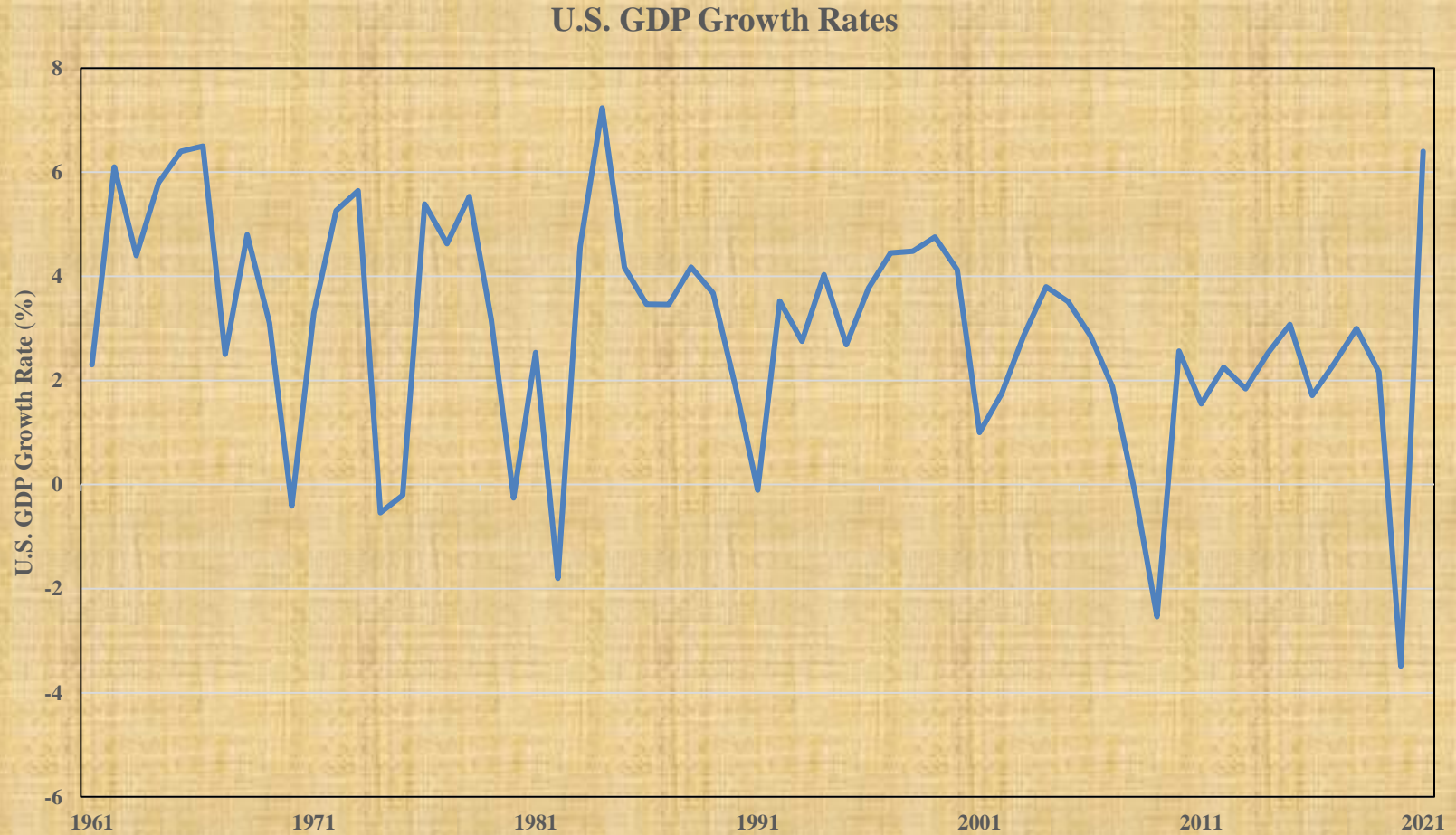
- Restaurant bookings are near pre-Covid levels.
- Air travel bookings has rebounded.
- IMF predicts GDP growth of 6.4% for 2021.
- Interest Rates are being held artificially low.
 - This helps homeowners obtain fundable mortgages
 - Millennials, the largest population set, are spending \$1.2 trillion on home purchases per year
 - Helps the car companies
- Low interest rates has allowed corporation to issue longer-term, lower interest debt.
- U.S. citizens have the highest savings rate (future spending?)
- Will there be a re-equilibration in corporate margins as labor costs go up? How will this impact decision making?

Consumers are Spending!



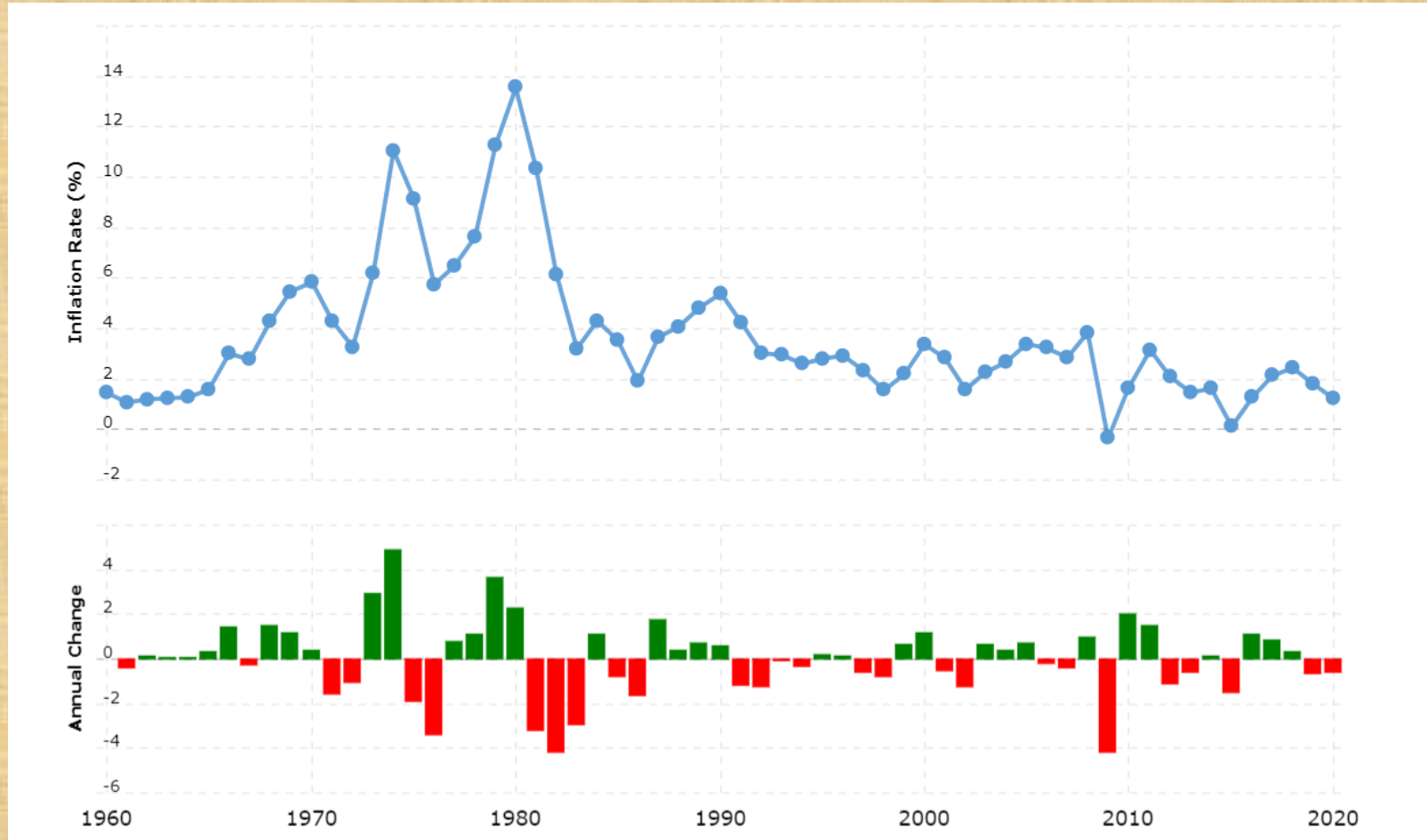
Reference: Midyear Outlook: U.S. looks set to boom, zoom and consume | Capital Group

U.S. GDP Growth Rate



IMF predicts a 6.4% GDP Growth Rate for 2021

U.S. Inflation Rate



“Made in the USA” will be inflationary because U.S. labor costs are so high.

Possible Headwinds

- Rising Labor costs
- And lack of skilled workers
- Young children not getting vaccinated
 - Create Day Care issues.
- Higher taxes on the rich
- Higher energy prices
- Transition to low-carbon fuels is inflationary
- Moderating housing activity
- Unreliable supply chains

Supply-Chain Delays

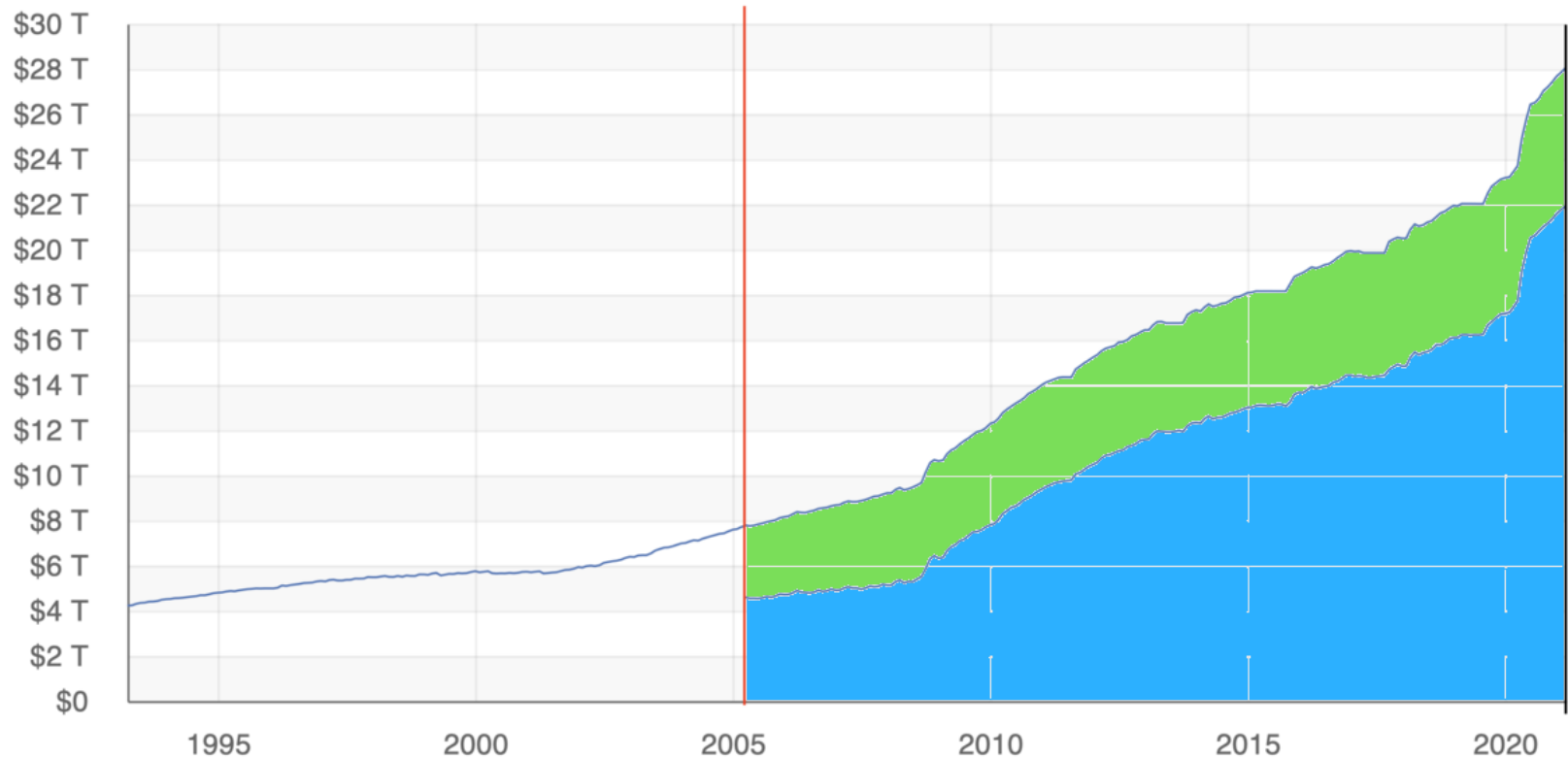
- Foam for furniture and cars currently has a 12-month wait period.
- The lack of computer chips has impacted everyone, especially car manufacturers.
 - Intel CEO says there will be gross oversupply in two to three years as all manufacturers overbuild new capacity to plug this gap.
- My new garage door spring won't be here until January.
- Gasoline shortages in Colorado due to the loss of U.S. refinery capacity and lack of truck drivers.
- Lumber prices rose more than 4X
 - Closing / Reduction of mills reduced lumber output
 - Lumber prices have come down 40% since January.
 - Lack of truckers are part of the problem.

Things will / are re-equilibrating but it will take time.

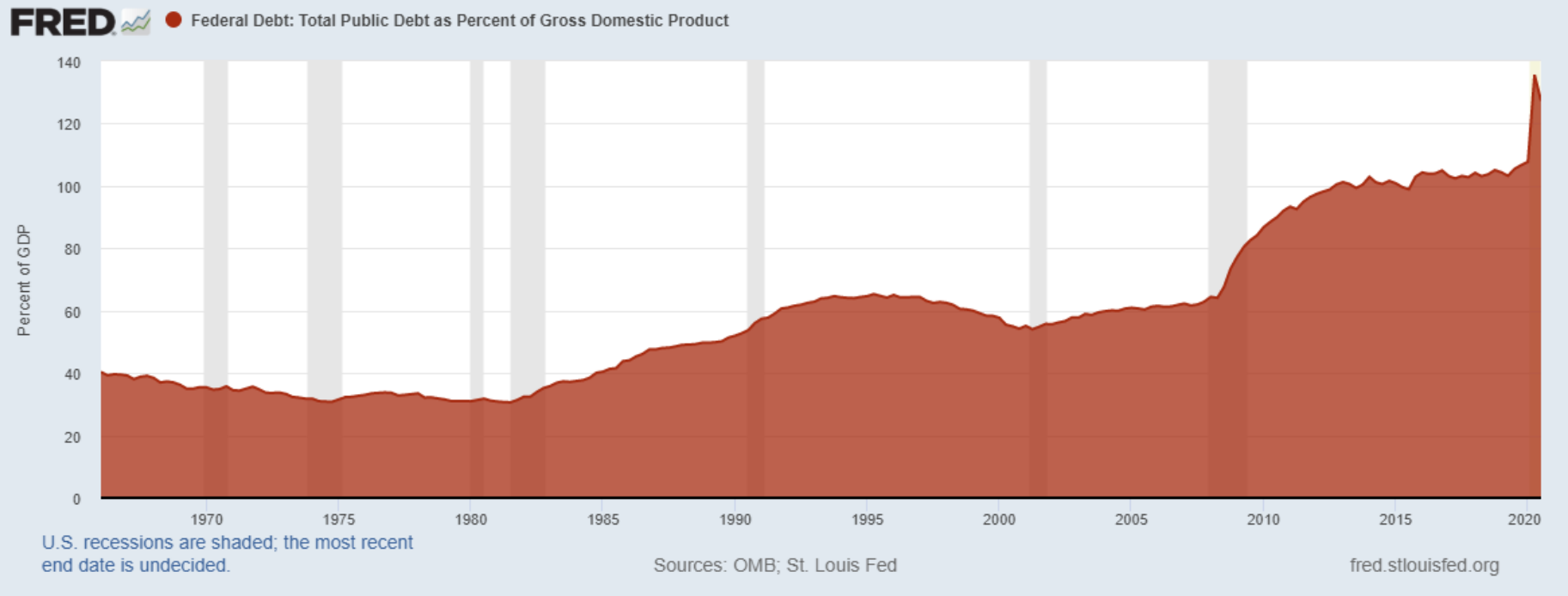
U.S. Debt is about \$28 Trillion

1993 - 2021 | Complete Table (as of March 2021)

Public Debt Intergovernmental Holdings



National Debt is 135% of GDP



Working at Home

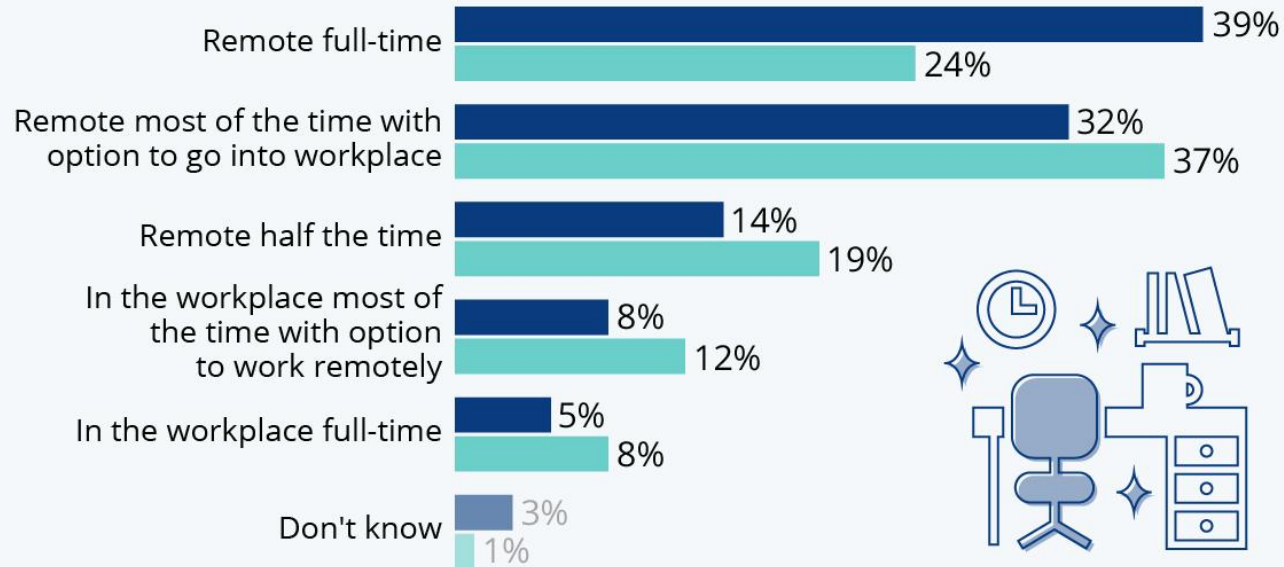
- For those of us whom are consultants, our response to working at home is “Duh?”
- A recent study¹ found:
 - 80% want to stay home until Pandemic is over.
 - 24% would like to work at home full-time,
 - 37% want an option to come or go from the office,
 - 12% want to work at the office most of the time.

¹ – www.yougov.com

Remote Workers Reluctant to Return to the Workplace

Preferred post-pandemic working environment for U.S. employees currently working from home

- U.S. adults working from home
- U.S. adults who started working from home during the pandemic

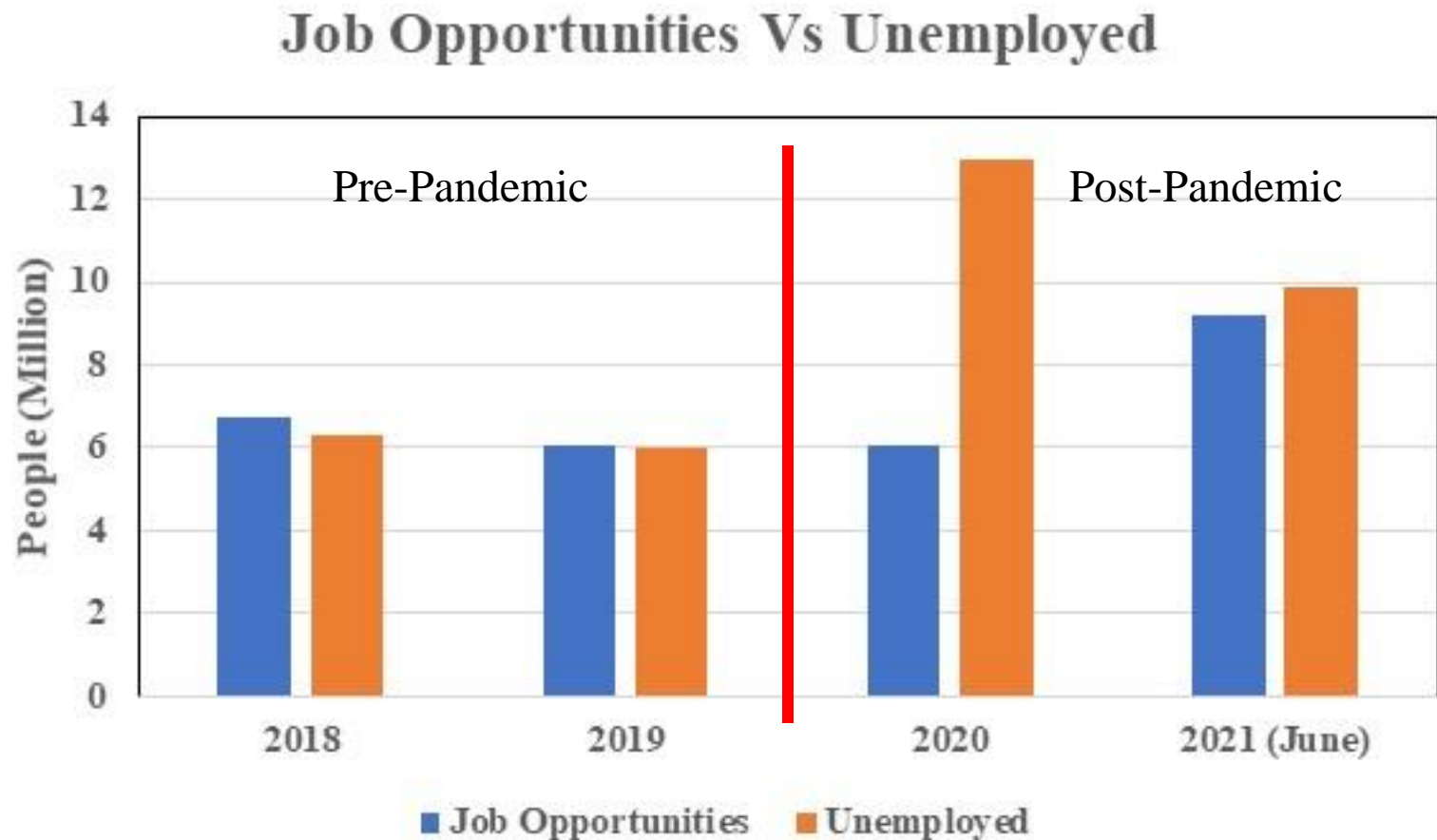


Based on a survey of 538 Americans currently working from home, conducted on Jan. 12, 2021

Source: YouGov



Job Opportunities Vs Unemployed



Reference: U.S. Department of Labor Statistics

Electric Vehicles



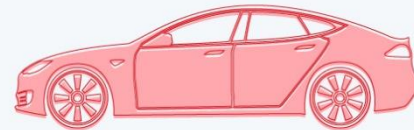
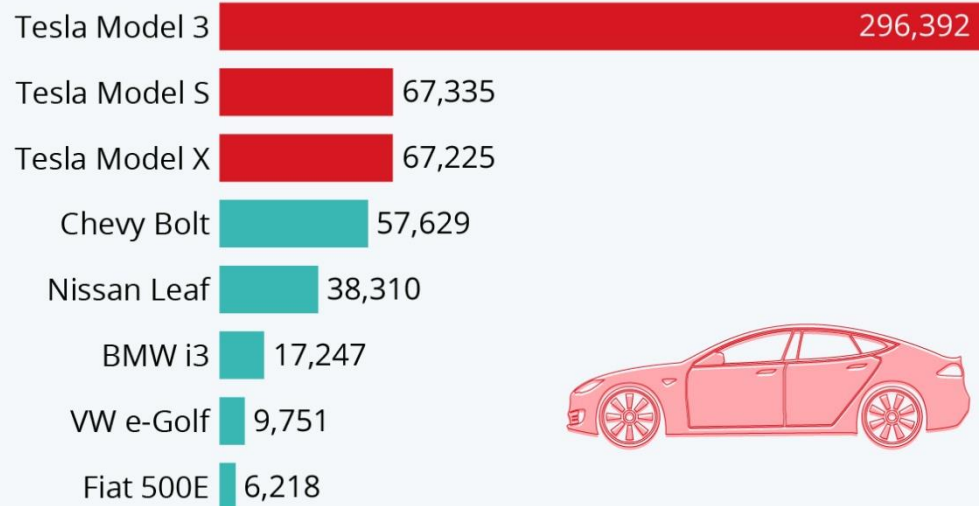
The United States produces about 17 million vehicles each year¹, yet only produces 186,000 electric vehicles. Lots of runway left for the battery metals and copper. Tesla has a 77% market share and is worth more than all the other car companies combined!

Reference: North American vehicle production | Statista

Electric Vehicles

Tesla Dominated American EV Sales Over The Past 3 Years

Total electric vehicle sales by model in the U.S.
over the preceeding 3 years*



* As of May 2021

Source: BuyAutoInsurance.com



Social Issues

- Losing weight
 - No longer use Aunt Jemima, Uncle Bens, Mrs. Butterworth, Eskimo Pie, Cream of Wheat, Land O' Lake butter or Chiquita bananas.
 - Don't drink Dixie Beer
 - Won't go to Big Boy, Sambos, Five Guys or Pizza Guy
- Don't listen to Dixie Chicks or Lady Antebellum
- No more Jeep Cherokees
- Don't follow any sports team with an indigenous person as their mascot
- Don't buy insurance from Mutual of Omaha
- Don't ski Squaw Valley or fish for Squawfish (now Pike Minnow)
- My Master bedroom is now called an "Owner's bedroom" because Master connotates slavery and male dominance.
- Won't move to my new house with Two Men and a Truck.
- Disney quit saying "Ladies and Gentlemen"
- Dr. Suess discontinued six of its books.
- Using teeth whitener is racist? Really?

Is Crypto a Threat to Gold Prices?

- Gold has historically been a store of wealth.
- Cotton bales took 6 months to get paid, so merchants used gold as the interim store of value.
- Paper currency replaced coins.
- Credit cards replaced paper currency.
- Crypto currency is replacing credit cards.
- Crypto is a \$4 billion business. Gold mining is \$180 billion.
- But gold prices continue to go up....

Therefore, Crypto is probably not a threat to gold prices.
Although Crypto and Gold investors are both speculators.

U.S. Gold Transactions

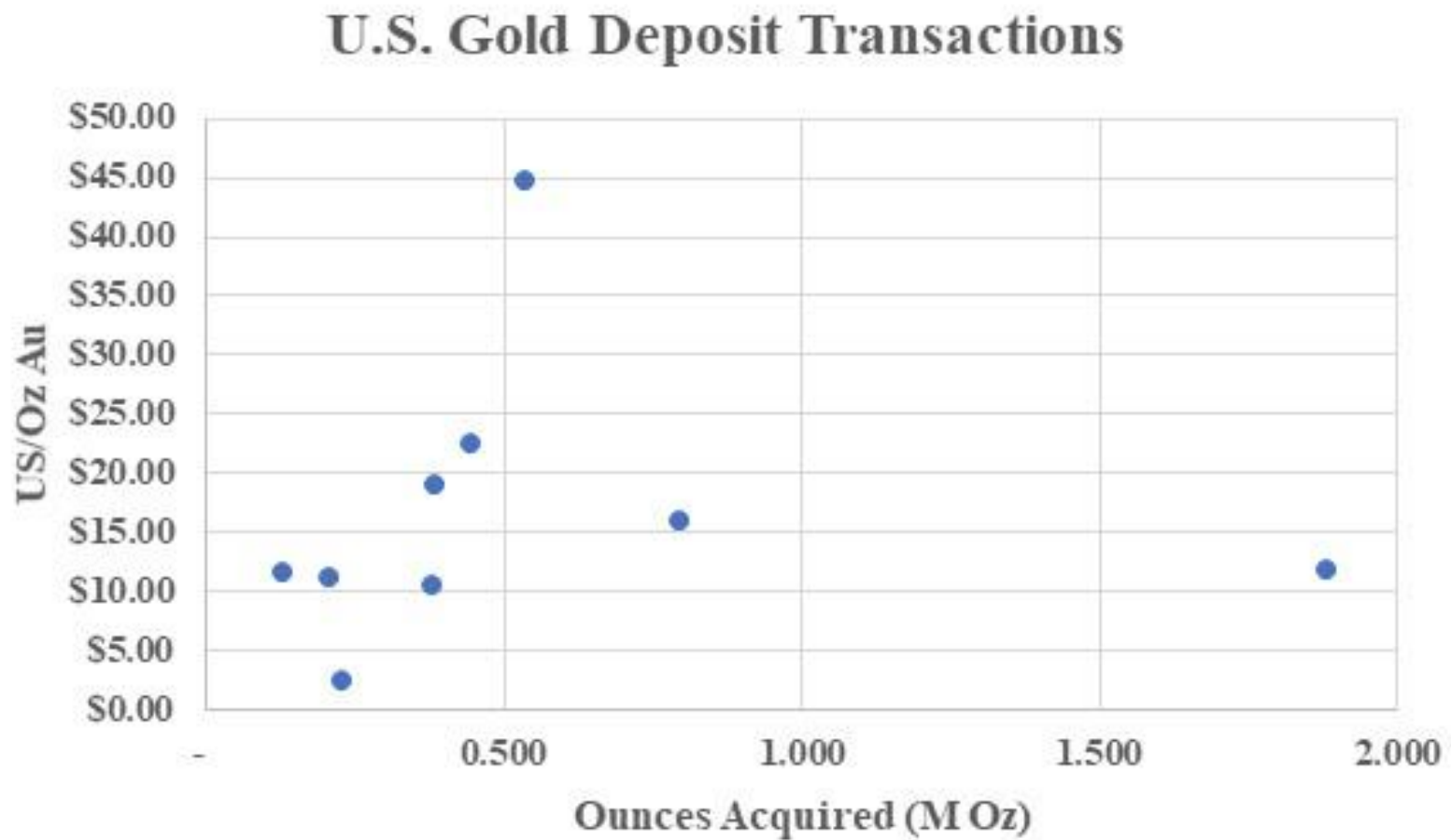
Asset	Completion Date	Acquired M Oz Au eq. ³	Total Price (US\$ M)	Unadjusted US\$/Oz Au ¹	Risk-Adjust US\$/Oz ^{1,3}
Atlanta, Nv	4/7/2021	0.539 / 0.309	\$24.090	\$45	\$78
Bruner, Nv	Open	0.445 / 0.203	\$10.000	\$22	\$49
Freemont, Ca	7/4/2021	0.795/ 0.266	\$12.723	\$16	\$48
Gabbs, Nv	5/17//2021	1.881 / 0.188	\$22.172	\$12	\$118
Jerritt Canyon, Nv ²	4/30/2021	1.612 / 1.325	\$589.310	\$366	\$445
Limousine Butte, Nv ²	6/25/2021	0.230 / 0.166	\$0.550	\$2	\$3
Newsboy, Az	6/10/2021	0.209 / 0.140	\$2.333	\$11	\$17
Sandman, Nv	12/14/2020	0.382 / 0.174	\$4.000	\$10	\$23
Toiyabe, Nv	4/22/2021	0.130 / 0.065	\$1.490	\$11	\$23
Tonopah, Nv	Cancelled	0.384 / 0.192	\$7.280	\$19	\$38

¹ – Purchase Price / (Measured + Indicated + Inferred Resources)

² - Breakout of the value of the plant and equipment was not available, so the price per ounce is probably overstated.

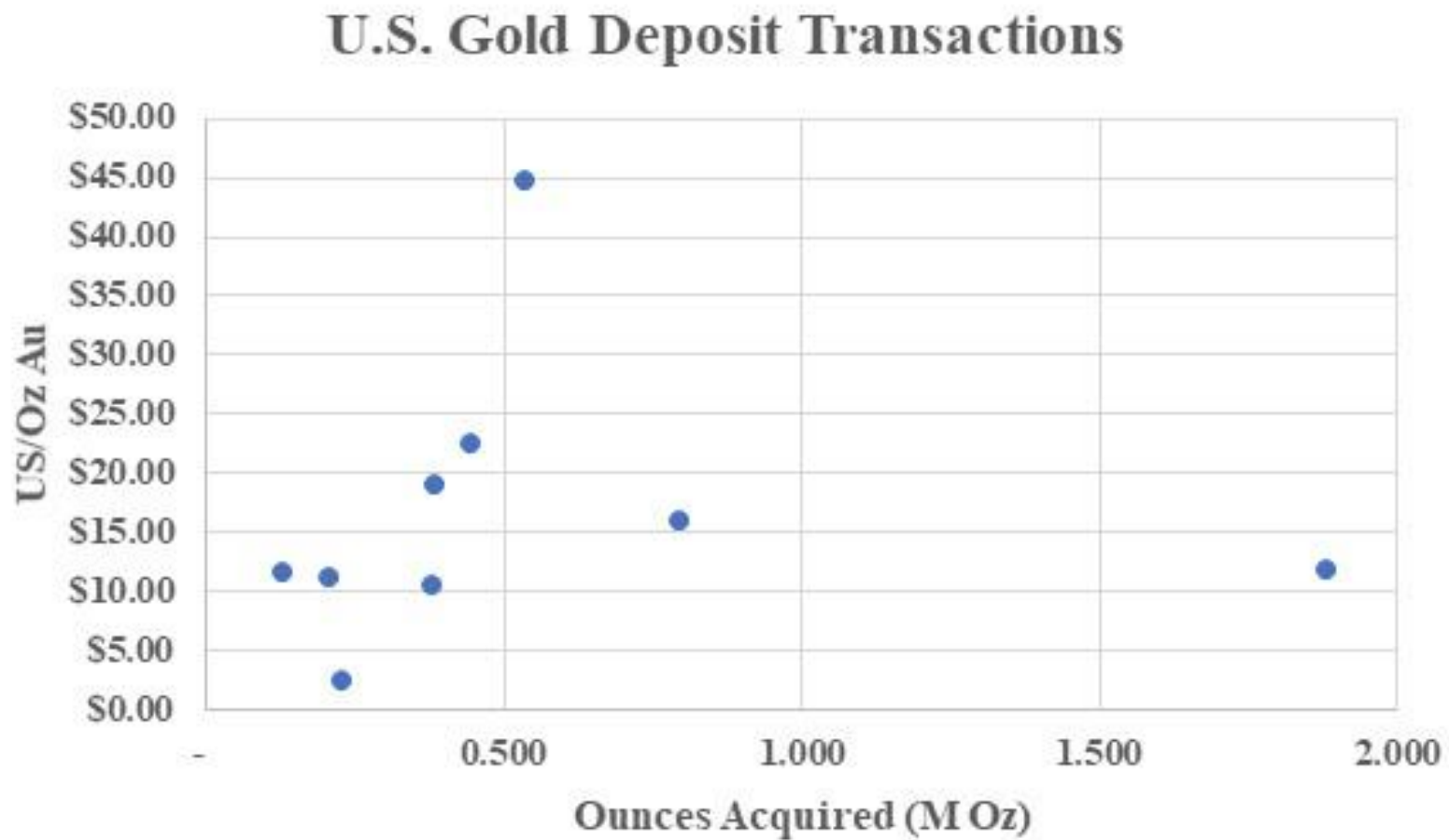
³ – First number weights all Resource categories the same. Second number is the risk-adjusted figure (100% Measured, 50% Indicated and 10% Inferred Resources).

Unadjusted - 3% Correlation



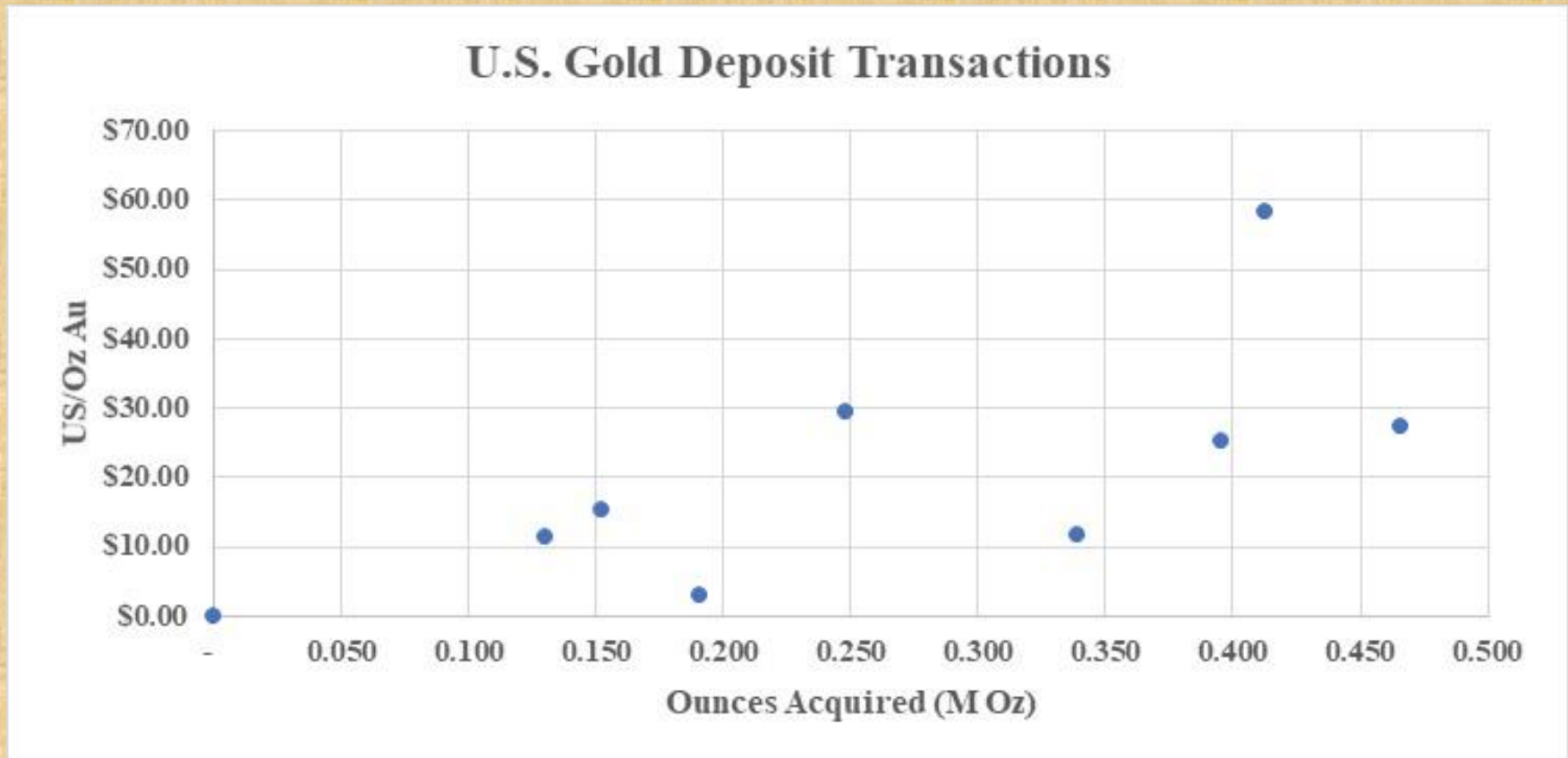
This dataset is statistically too small but does show some interesting trends...

Adjusted - 49% Correlation



If one weights Measured Resources at 100% of their ounces, Indicated Resources at 50% and Inferred Resources at 10%, then there is a 49% correlation between price and ounces purchased.

No Inferred - 70% Correlation



If you remove the Inferred Resources from the calculation and set Measured and Indicated Resources to 100%, then the correlation goes to 70%.

Gold Prices - Bullish

- Global debt levels at record highs and will rise further
 - Rising debt levels keep interest rates low.
- U.S. dollar is overvalued and will decline
- Inflation is coming.
 - Made at home is more expensive than made in China
 - Higher commodity prices due to supply/demand imbalance
 - Today's asset price inflation will lead to increasing general inflation
- Central banks focus on maximum employment: remain accommodative
- Mine supply contracting from COVID.
- Consumer demand will rebound (China + India = 50%)
- Central banks will buy gold as they sell U.S. dollars.

Gold Prices - Bearish

- U.S. dollar is still the most powerful currency.
 - Best safe haven for investors, especially is bond yields rise.
 - Global investors pouring money into U.S. dollar investments (mutual funds)
- Fed will begin tapering leading to higher interest rates. Taper Tantrum!
- Central banks will reduce their balance sheets as a reaction to higher inflation rates which will push nominal yields higher.

Rare Earth Metals

- China holds a monopoly on rare-earth refining.
- Most U.S. rare-earth deposits are geochemical anomalies and not economic.
- Without government support, these deposits will never be viable.
- Need government to fund a national refinery.
- Senator Rubio's bill is a good start
 - Prevents monopolistic lawsuits against investors.
- Biden's lack of support to mining is Environmental Imperialism.

Copper on Its Way Back to US\$ 5/Lb?

Demand

- Copper has a phenomenal number of applications, especially in electronics.
- Rebound in U.S. and China economies is increasing demand.
- Speculators kicking in.
- 7X more copper is used in EV than FF vehicles.

Supply

- Water shortages in Chile are impacting production.
- Strikes in Chile are hindering supply.
- Indonesia and Philippines always have production issues.

Reference: "Is Copper on its way to back to US\$5/lb?" Mining Journal August 5, 2021.

KKR Viewpoint

“We expect cyclical sectors (Industrial, Financial, Energy, Materials and Consumer Discretionary) to drive almost two-thirds of the EPS growth this year and next.”

The Way Forward

- The supply-chain problems are transitory and
- Proves the global economy is finely-tuned.

Meanwhile, global population continues to grow.

- Electronics have become the centerpieces of our lives.
 - Cell phones, computers, TVs, microchip applications
- The transition to EV is no longer a pipe dream.
 - Tesla's market capitalization is greater than all of the other car companies on a combined basis.
- Electricity and Transportation are the two largest human-contributors to greenhouse gases.
 - New technologies to combat these

So the World needs all sort of metals.

Conclusions

- Supercycles are caused by structural changes.
 - China opening its borders to trade in 2000
 - World Wars
- The Pandemic is (hopefully) a temporary change.
- There is a massive imbalance between supply and demand right now. Could take several years to catch up.
- The longer it takes for re-equilibration, the longer metal prices will remain robust.
- Extending permitting times adversely impacts the supply side.
- Enjoy the ride while it lasts!
 - Great time to be young in this industry.
 - Great time to retire! (Cash out on high prices)

Thank You!

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