2021
4TH QUARTER
QUARTERLY COMMENTARY

Angeles

2001 · 20 YEARS · 2021

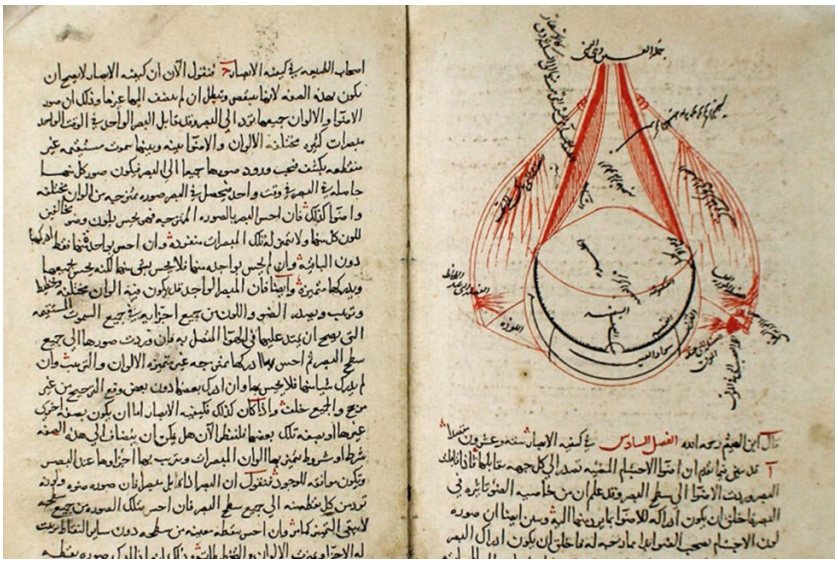
ANGELES INVESTMENT ADVISORS

429 SANTA MONICA BLVD, SUITE 650
SANTA MONICA, CA 90401
PHONE: 310.393.6300

375 PARK AVENUE, SUITE 2209
NEW YORK, NY 10152

400 N. MICHIGAN AVENUE, SUITE S1700
CHICAGO, IL 60611

WWW.ANGELESINVESTMENTS.COM



Optics

Euclid wrote *Elements* 2,300 years ago. It consists of thirteen volumes of mathematical proofs, essentially inventing the field of geometry. It is the foremost work of deductive reasoning, the use of logic to establish hypotheses or proofs. *Elements* is so comprehensive and instructive that it was the only mathematics textbook in use until well into the 19th century.

Around the same time as *Elements*, Euclid published *Optics*, the first text on perspective. *Optics* contains 36 propositions that examine how the size of objects varies with distance and how shapes appear to change when viewed from different angles. Brunelleschi, Alberti and other artists of the Renaissance consulted Euclid's *Optics* for their own works 1,800 years after it was published.

Four hundred years after Euclid, Ptolemy wrote his own *Optics*, covering reflection, refraction and color. Both books were mathematical texts, describing the geometry of light. The science of vision, however, was a mystery. Euclid and Ptolemy both believed that vision occurred when

rays emanating from the eye struck objects and reflected back into the eye. Aristotle saw it the other way; he surmised that every object emits rays which enter our eyes. All were wrong, of course, about how vision works (although Aristotle was a little closer to the truth). Their math, or Aristotle's logic, could not prove how vision occurs, and for more than a thousand years the matter was unsettled.

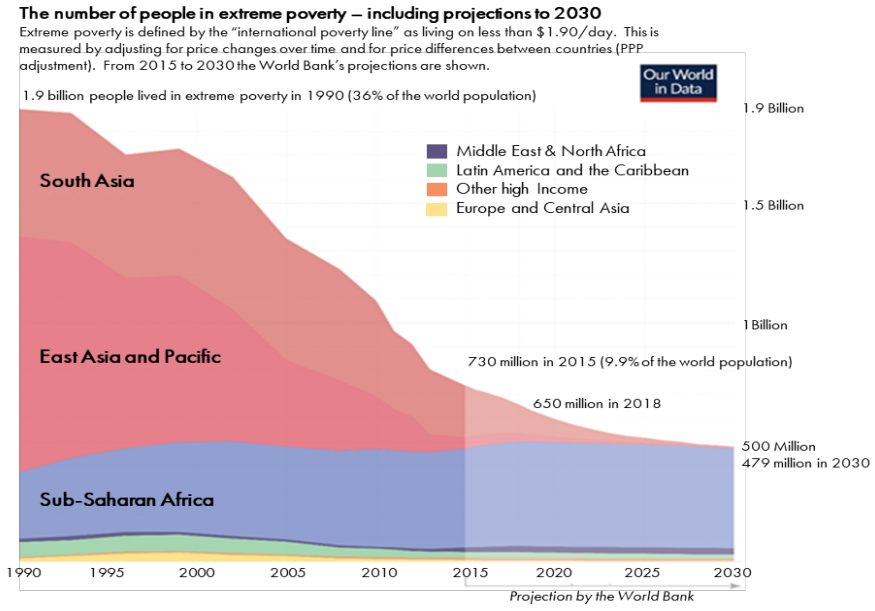
Euclid, Archimedes, Ptolemy, all the great minds of Ancient Greece and Rome, were deductive thinkers, applying logic to solve problems. The modern scientific method, which is the basis of all science today, is an *inductive* approach that involves testing logical hypotheses with empirical observations. Inductive reasoning informs not only scientific discovery today, but every pursuit from economics to criminology. Logic, alone, cannot be accepted unless it is backed by observational evidence. Einstein's theory of relativity was not accepted until "proven" by observation.[1]

Likewise, criminals cannot be convicted in a court of law solely by logic (circumstantial evidence); hard proof is required.

There is some debate about who invented the modern scientific method of empirically provable hypotheses. Newton, around 1700 C.E. certainly has a claim, or perhaps Galileo a hundred years before. Both made observations and drew conclusions.

In fact, the first modern scientist lived 700 years before Newton, 600 years before Galileo. His work, on optics, laid the groundwork for all science that followed. He was the first to test hypotheses with empirical experimentation, either verifying a theory or invalidating it if it could not be shown to be true. This breakthrough in methodology is relevant to us today as we struggle through a global pandemic, but the circumstances under which he conducted his seminal work of science is what is most remarkable.

Chart 1



Source: World Bank data from 1990 to 2015. The projections from 2015 to 2030 are published in the World Bank report Poverty and Shared Prosperity 2018. This is a visualization of OurWorldinData.org, where you find data and research on how the world is changing.

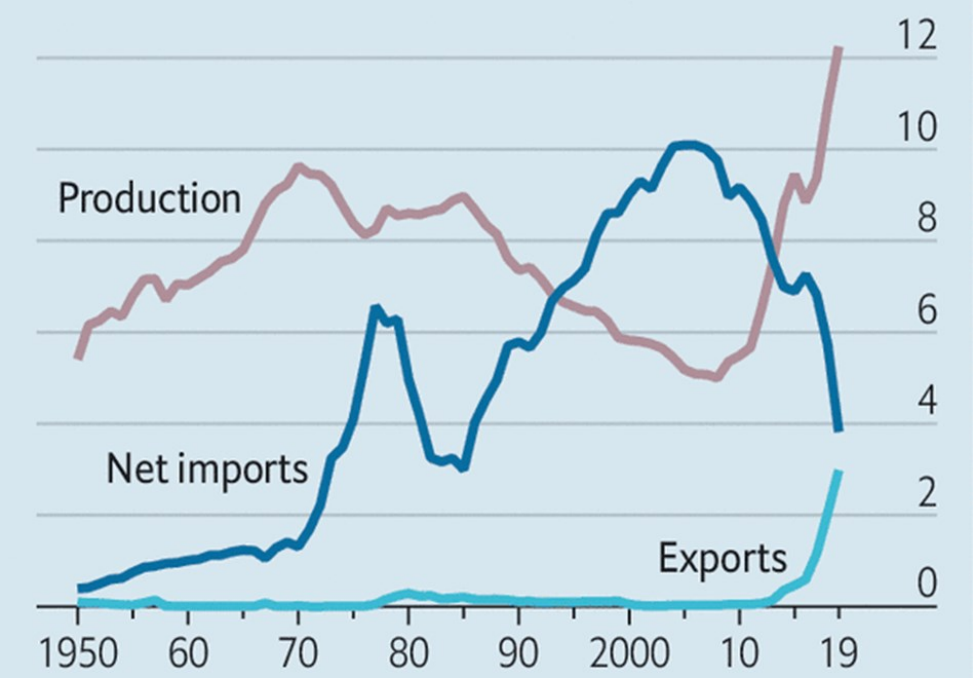
[1] Which it was on 29 May 1919, when a solar eclipse permitted the predicted observation that light from stars would be bent by the gravity of the sun. Sir Arthur Eddington traveled to the island of Principe off the west coast of Africa to record the event and confirm Einstein's theory.

Globalization and technological change were the dominant forces of the previous decades. Outsourced manufacturing and just-in-time supply chains accelerated global economic growth and reduced international inequality by lifting billions out of poverty (Chart 1, page 2).

Technological advances in automation made manufacturing processes more efficient. Horizontal drilling led to the shale revolution which turned the US into a net oil exporter for the first time since the 1940s (Chart 2) and the largest oil producer in the world.

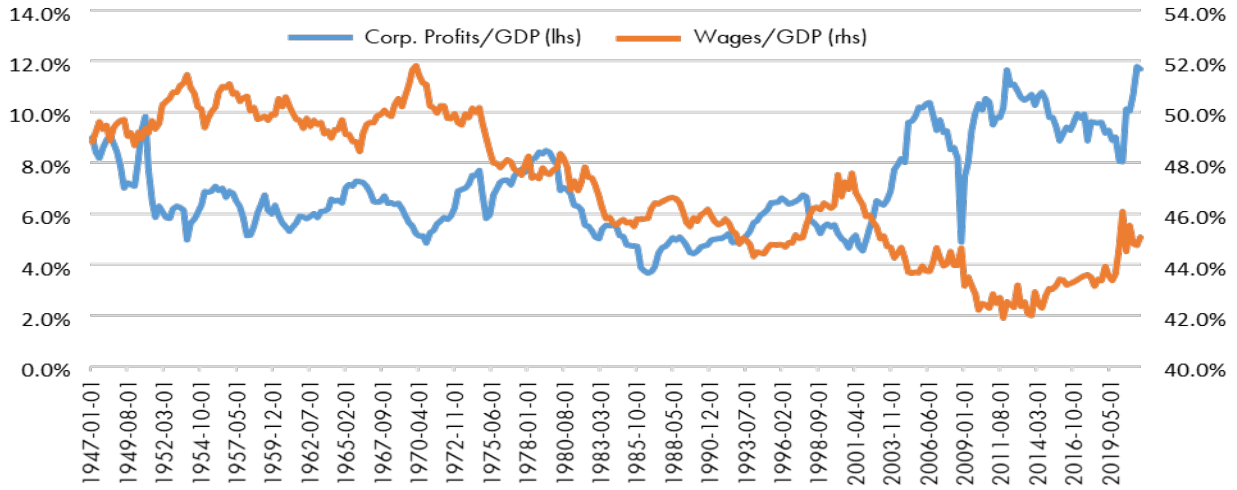
Globalization and technological advances were disinflationary forces, by expanding end markets and the labor supply, and by bringing greater efficiencies throughout the global economy. The principal beneficiaries were the owners of capital, who saw profits soar.

Chart 2 **US Crude Oil, MM Barrels/Day, 1949-2020**



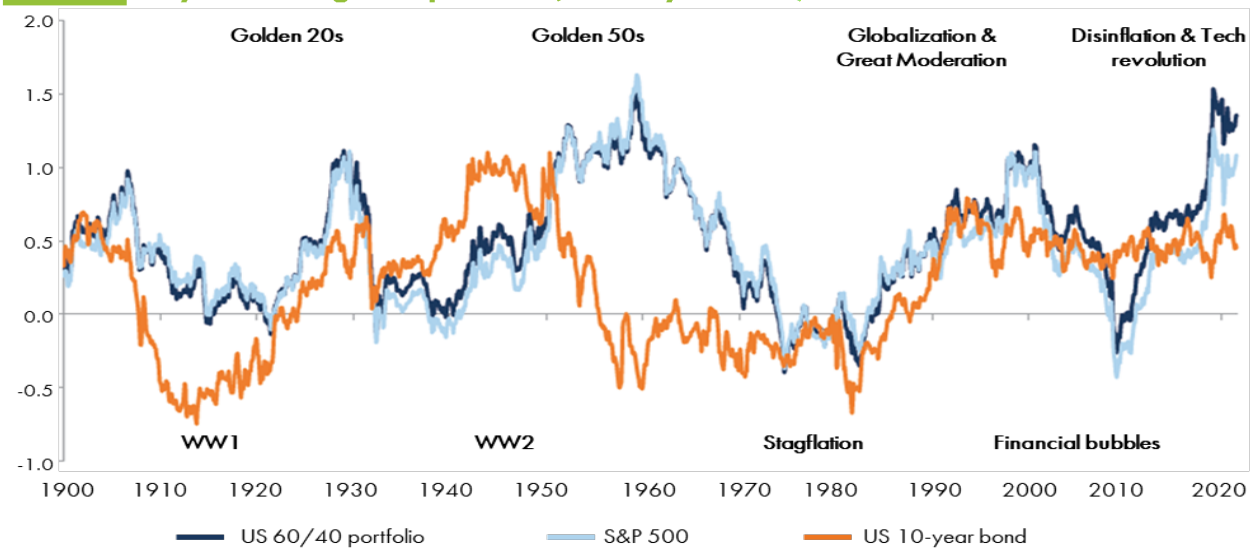
Source: U.S. Energy Information Administration, courtesy The Economist

Chart 3 **US Corporate Profits and Wages Paid as % of GDP, 1947-2021**



Source: Bureau of Economic Analysis

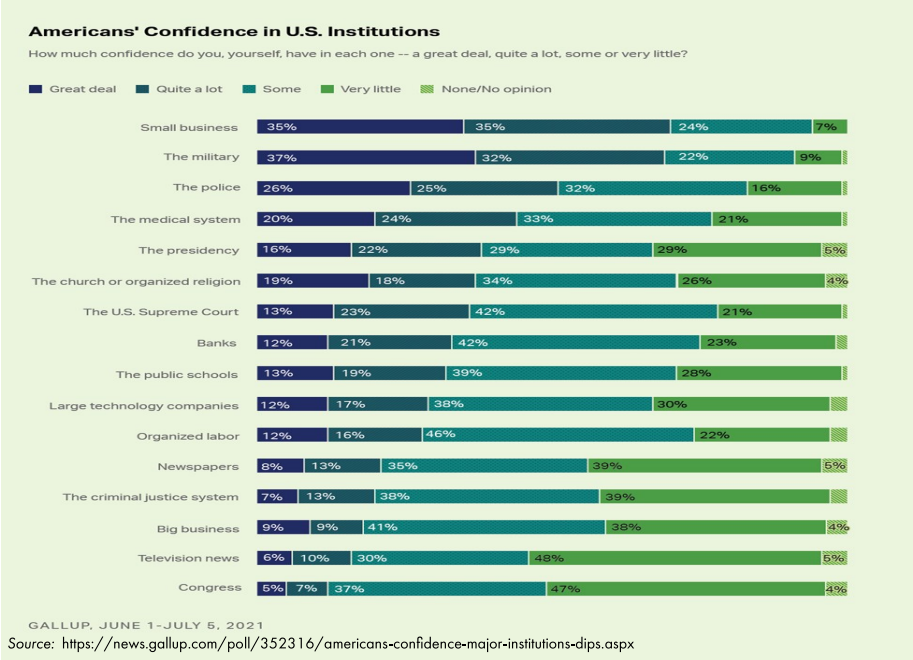
Chart 4 **10-year rolling Sharpe ratio (monthly returns)**



Source: Haver Analytics, Goldman Sachs Global Investment Research

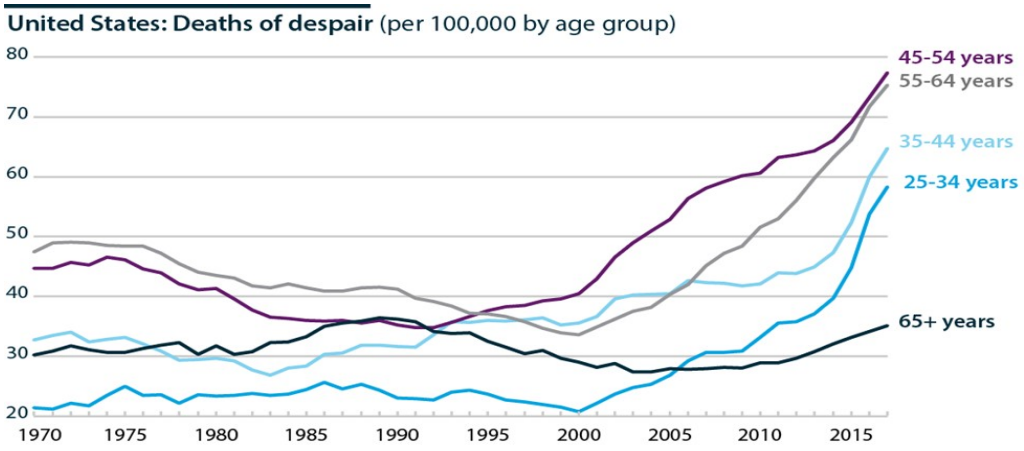
For investors, it was the best of times. The Great Moderation of steady economic growth, low inflation and record profits (Chart 3) over the past decade generated not only some of the highest returns in history, but among the best risk-adjusted returns as well (Chart 4).

Chart 5



Source: https://news.gallup.com/poll/352316/americans-confidence-major-institutions-dips.aspx

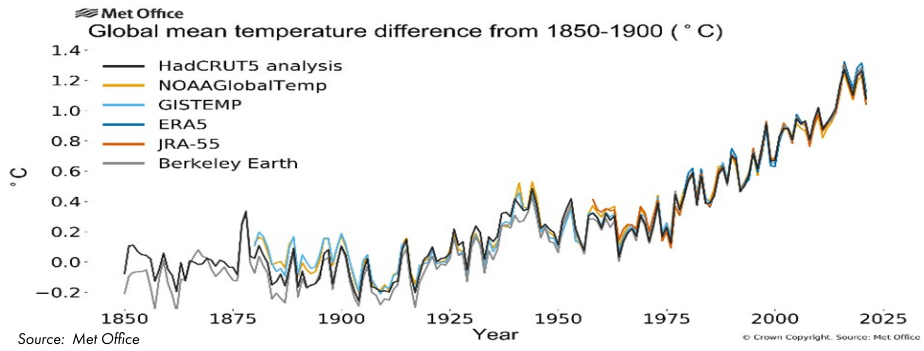
Chart 6



Sources: The Social Capital Project of the US Congress Joint Economic Committee/The Centers for Disease Control and Prevention.

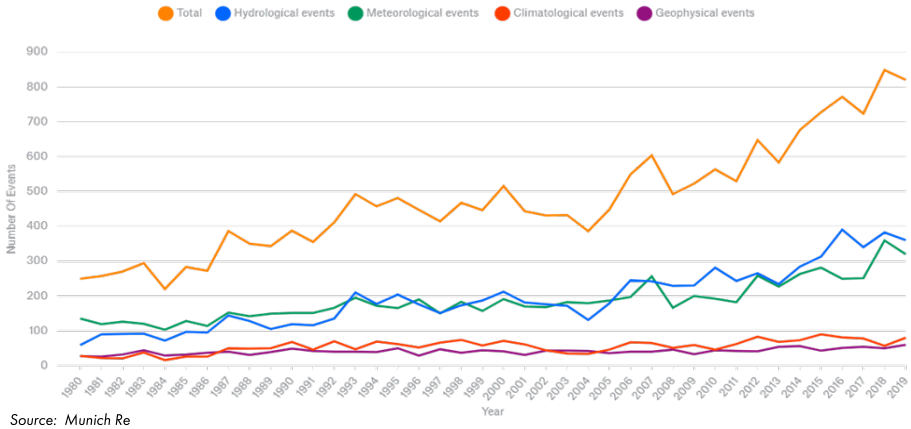
The economic boon came principally at the expense of labor and the environment. Wages, as a percentage of GDP have been falling for 50 years, although have improved modestly over the past decade (Chart 3, page 4). Most socioeconomic measures have seen a deterioration in satisfaction, from trust in institutions (Chart 5) to deaths of despair (Chart 6).

Chart 7



Source: Met Office

Chart 8 **Number of Loss Events, By Peril, 1980-**



Source: Munich Re

Chart 9 **Labor Force Participation Rate, 1981-2021**

Our environment is cracking under the weight of our economic "progress." Whether it's the rise in temperatures (more than 1^0C over the past century—Chart 7) or the number of climate-related disasters (Chart 8), the threats to our environment are having serious economic consequences that we continue to ignore.

Occasionally, there are events that alter the course of history. The COVID-19 pandemic is such an event. It has accelerated some preexisting, nascent trends, and spawned new ones that will shape our world for generations.

The percentage of the population in the labor force has been declining for twenty years (Chart 9). The last few years of the longest economic expansion in history[2] stabilized that decline, but the pandemic brought that to an end, and we have yet to recover to previous levels. Even as economic output is at an all-time high, we are more than 3 ½ million jobs short of the February 2020 peak.[3] These numbers do not just reflect an aging population, for even among 25–54-year-olds there are 1.8 million fewer working today than two years ago.[4]

[2] June 2009— February 2020.

[3] 148.95 million working at the end of 2021 versus 152.5 million in February 2020.

[4] 99.74 million versus 101.54 million at the December 2019 peak.

The fewer number of people working does not capture the full degree of turmoil and tightness in the labor market. The number of people quitting jobs typically rises steadily in an economic expansion as the labor market tightens, but it has soared over the past year. Never had more than 2.4% of labor force quit their jobs, but today 3% are quitting each month. There are 6.4 million unemployed, 4.5 million quit their jobs last month and there are more than 10 ½ million job openings (Chart 10). There are a lot of people voluntarily choosing not to work in what is being called The Great Resignation.

The reasons for this strange labor dynamic are myriad. Generous fiscal support likely accounts for the majority of the shortfall in workers, along with lingering health fears about returning to work. Presumably, both factors will fade in the coming months and the job openings will be filled, but this may only be partly true. Attitudes toward work have changed, possibly permanently.

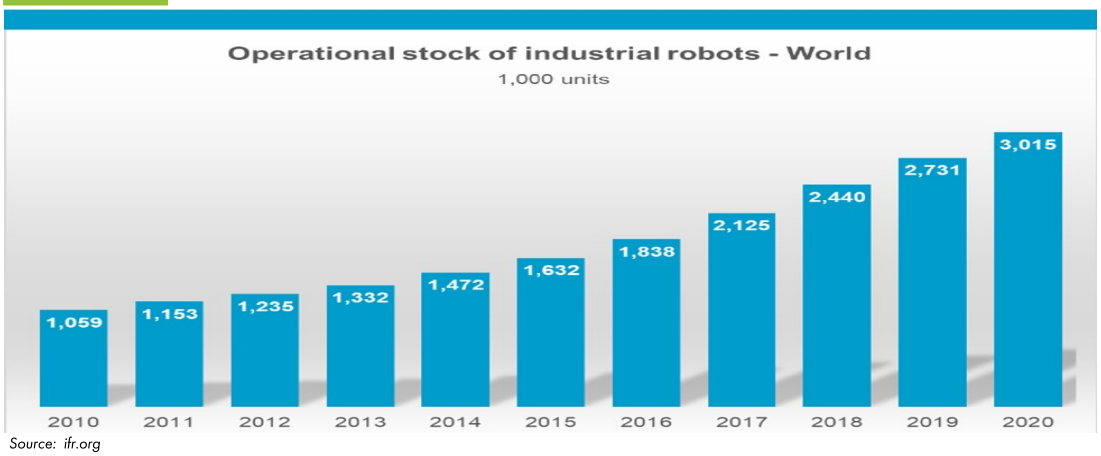
The conditions of employment have shifted substantially. Workers are never returning to offices five days a week. Globalization brought a massive expansion of the labor pool, but we are likely entering a period of labor scarcity. This has enormous implications for where and how people live and work.

Companies must now compete for labor, not only through rising wages but with more attractive working conditions. It will be a challenge to lure people into work. The r/antiwork thread on Reddit, with the tag

Chart 10 **Job Openings & Quit Levels, December 2001-November 2021, Thousands**

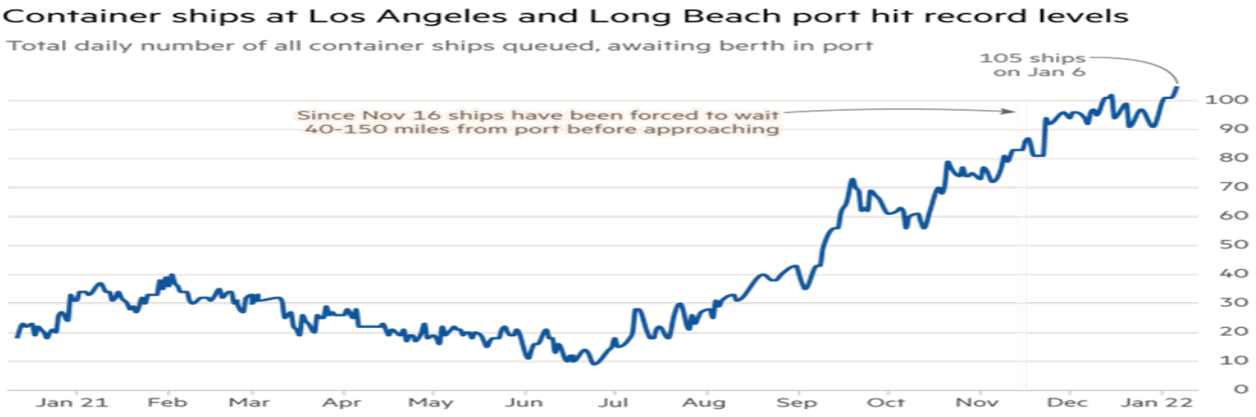
Source: Bureau of Economic Analysis

Chart 11



Source: ifr.org

Chart 12



Source: Marine Exchange of Southern California, FT Graphic: Caitlin Gilbert / @caitlinsgilbert © FT

line, "Unemployment for All, Not Just the Rich!", now has 1.6 million followers. "Lying flat[5]," working the bare minimum to "enjoy life," is China's millenials' response to "9-9-6," jobs that require working 9am-9pm, 6 days a week. Thousands seem to have adopted it and it was a Top Ten meme last year. Scarcity of labor, whatever the cause, will raise the cost of labor and will accelerate the previous trends of automation and technology substitution (Chart 11).

Inflation is a new trend spawned by the pandemic, or rather, by the policy responses to the pandemic.

There are a number of factors contributing to the recent spike in prices. Supply constraints are key contributors, only some of which get much attention. We discussed last quarter the backlog of 73 ships awaiting entry at the Port of Los Angeles/Long Beach.[6] The problem has gotten worse, with 105 ships backed-up now, some 150 miles offshore (Chart 12).

[5] Tang ping, 躺平. It began with a post on Baidu Tieba by Luo Huazhong, a 26-year-old factory worker who quit his job.

[6] https://www.angelesinvestments.com/insights/investment-insights/3rd-quarter-2021-eternity-in-an-hour.

Table 1 **Average Rail Construction Costs in Europe and the US**

Percent Tunneled	Sample Size	Non-U.S.	U.S.	Difference (U.S. Premium)
0-20%	56 U.S. / 51 Non-U.S. Projects	$81M	$118M	46%
20-80%	4 U.S. / 19 Non-U.S. Projects	$286M	$323M	13%
80-100%	8 U.S. / 42 Non-U.S. Projects	$346M	$1.2B ($511 excl. NYC)	247% (48% excl. NYC)

Source: Eno Capital Cost Database

There are bottlenecks in the number of dockworkers to unload containers and truckers to transport them away, but less discussed are the reams of regulations that hamper operations. There are limits on working hours, labor rules on what functions can be automated and restrictions on stacking only two containers high. Of the 351 major ports in the world, Los Angeles/Long Beach, the largest in the Western Hemisphere, rank 337th and 341st, respectively, in efficiency.[7]

We are short on truckers, and don't allow Mexican truckers to operate in the US, requiring them to transfer their cargoes to American truckers. We are also short on truck chassis. Most truck chassis are made in China, and in 2018 we imposed tariffs of 221% on them. A chassis from China that cost $10,000 a few years ago now costs $35,000. Overall, the tariffs imposed by the Trump Administration are estimated to have cost 245,000 American jobs and reduced annual household incomes by $675 to $2000.[8]

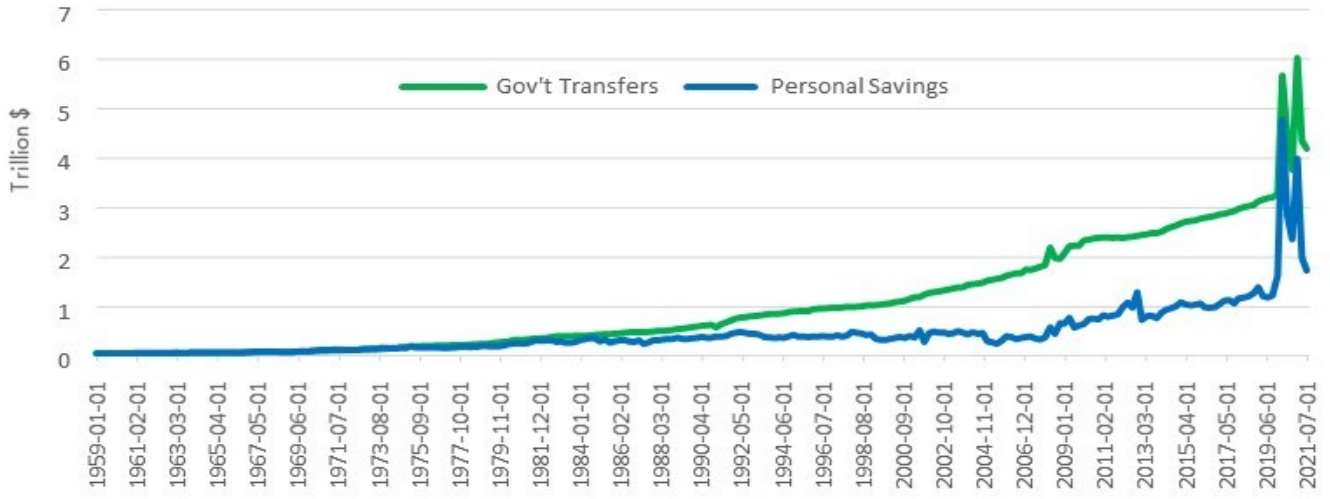
Our transportation infrastructure is crumbling partly because bureaucratic reviews add significantly to the cost. Rail projects cost, on average, 50% more than in Europe due to bureaucratic requirements. Projects that are primarily tunneled[9] cost, on average, $346 million per mile in Europe and $511 million in the US. These figures exclude New York City, where the cost of building the Second Avenue subway was $3.5 billion per mile (Table 1).

[7] *The Container Port Performance Index 2020, May 2021*

[8] *Oxford Economics, US-China Economic Relationship: A Crucial Partnership at a Critical Juncture, January 2021.*

[9] Subways, for example.

Chart 13 **Government Transfers and Personal Savings, 1959-2021, $1 Trillions**



Source: Bureau of Economic Analysis

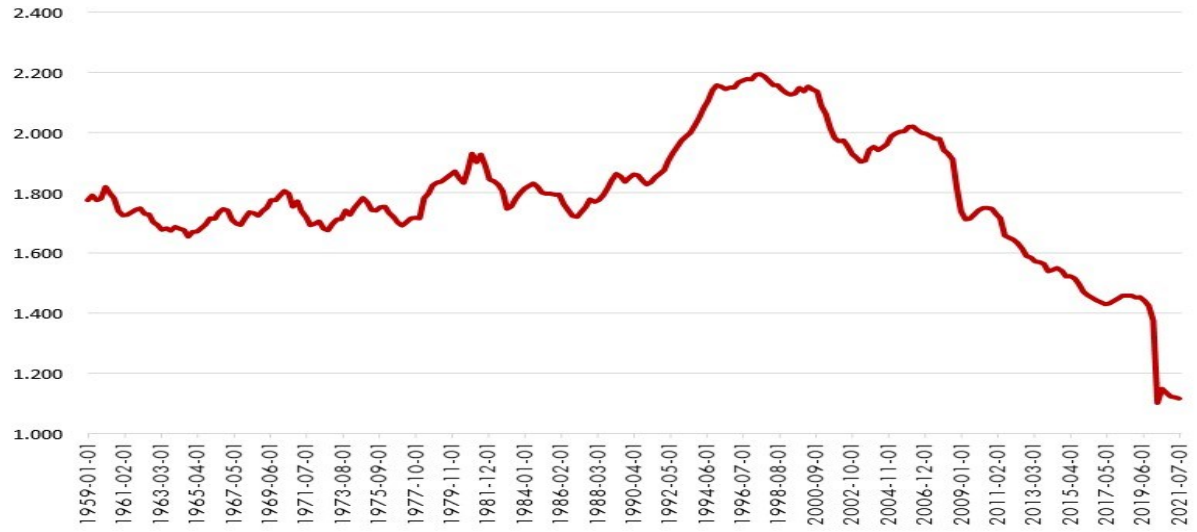
In addition to self-inflicted supply-side constraints, we sparked a massive demand-side boom with unprecedented fiscal support during the pandemic. Government transfers had been climbing steadily, reaching $3 trillion in 2019. Transfers soared to $5 trillion, and then $6 trillion as politicians sought to buoy incomes lost to the pandemic shutdown. At first, Americans chose to save this windfall. Savings had never exceeded $1 trillion, but in the pandemic personal savings shot up to nearly $5 trillion (Chart 13). As this excess savings is spent, this surge in demand has run head-on into the supply constraints discussed.

All these factors on the supply- and demand-side are contributors, but fundamentally, inflation is always and everywhere a monetary phenomenon.[10] That is, inflation is the result of an excess supply of money relative to the demand to hold it. Inflation is *not* (not!) a spike in the price of oil or meat or semiconductor chips. If we spend $100/week on groceries and the price of beef rises, either we will buy less beef or we will buy less of other groceries to offset the higher price of beef. The price of beef may rise, but the price of other foods will fall as we consume less of them. Likewise, if it costs more to fill a tank of gas, we will either drive less (and the price will fall) or we will reduce what we spend on other purchases (and the prices of those will fall). A rise in the price of one good does not (not!) cause a rise in the price of other goods. The inflation of the 1970s was *not* (not!) caused by a jump in the price of oil. It was caused by poor monetary policy in response to the oil price rise. This may be one of the most misunderstood concepts among the general public and the media that feed it nonsense.

Some basics: GDP is the quantity (Q) of all goods and services produced times the price (P) of those goods and services. GDP is equivalent to money (M) in the economy times its velocity (V), or how quickly a

[10] As Milton Friedman famously stated: "Inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output." *Counter-Revolution in Monetary Theory*. Wincott Memorial Lecture, Institute of Economic Affairs, Occasional paper 33.

Chart 14 **Velocity of M2, 1959-2021**



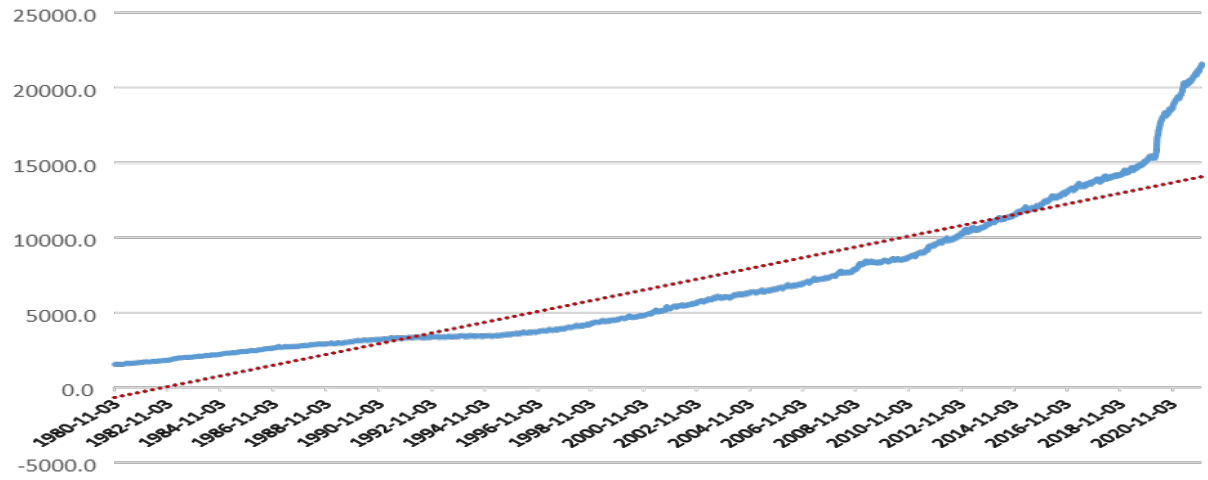
Source: Federal Reserve Bank of St. Louis

dollar circulates around the economy.[11] The velocity of money held pretty steady throughout the 1960s, 70s and 80s, before spiking higher in the 1990s, only to begin a 20+-year decline (Chart 14).

At the same time, the amount of money added to the economy had grown at a reasonably consistent 6% p.a. from 1980 to 2019 (Chart 15). Inflation fell during this time because the modest rise in money (M2) was more than offset by the drop in money velocity.

Since the pandemic began in February 2020, M2 grew $5.9 trillion, a rise of 38% over this period. However, this time, the rise in M2 was not offset by a

Chart 15 **M2, 1980-2021, $ Billions**



Source: Federal Reserve System

[11] This gives us the famous equation M*V = P*Q

Chart 16 **US CPI 1948-2021, Percentage Change From a Year Ago**

Source: Bureau of Labor Statistics

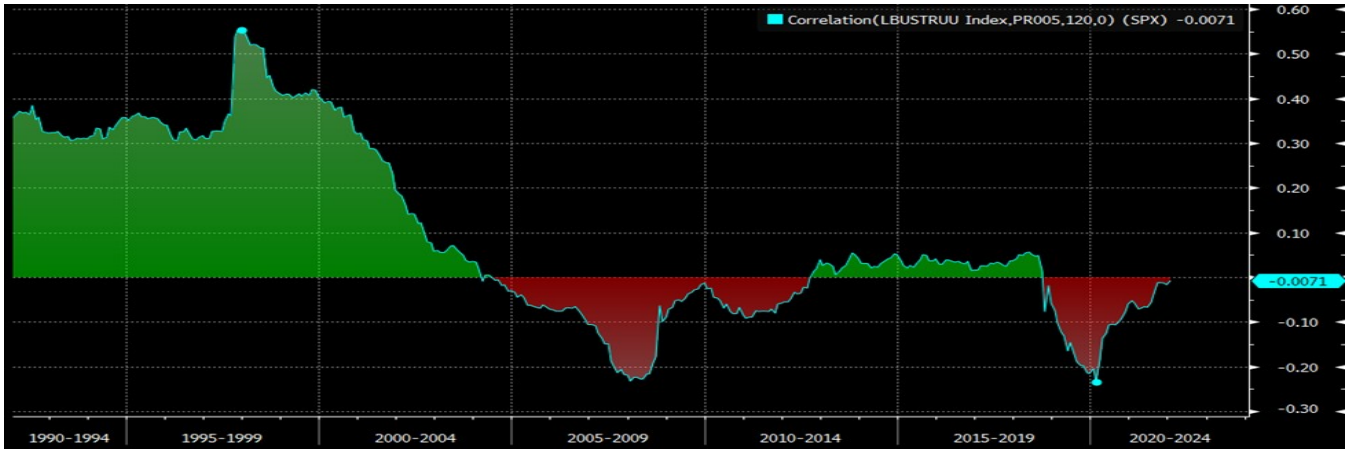
drop in its velocity. In fact, velocity bottomed at 1.10 in Q2 2020 and has risen slightly to 1.115 since. This huge jump in money supply (M) multiplied by a steady velocity of money (V) translates to higher inflation (P). And indeed, that is what we have seen: the highest inflation since the 1980s (Chart 16).

Americans are flush with cash and want to spend it. Thus the demand to hold cash is falling at a time when the supply of money is rising. This is what is driving inflation. The Fed must reduce the supply of money in-line to the demand to hold it. It is late in doing so, which they have acknowledged. The risk for investors is that the Fed continues to fall behind the supply/demand for money, by moving too slowly to tighten policy, thus ensuring that higher inflation is more persistent than desired. Investors do not believe this will be the case, as implied inflation for the next ten years is just 2.5%. But there are reasons to think the Fed will act slowly to tighten monetary policy, raising the risks of higher inflation, making a challenging period to come for investors even more difficult.

Valuation is one important headwind for investors. Both stocks and bonds are in the highest valuation percentiles in history. There are good reasons for high valuations: low inflation and high profits, primarily. High valuation does not necessarily mean bubble or imminent crash, but it will be very hard to generate high returns from this starting point. As noted, many of the very favorable trends of the past few decades—lower taxes, globalization, technology—could reverse. A global minimum tax has been agreed to, political pressures are building to redistribute income and to shorten supply chains by onshoring manufacturing and processes. Profit growth could slow as inflation picks up, a reversal of the favorable macroeconomic conditions that supported some of the best financial returns in history.

High valuation in bonds means not only lower future returns, but also heightened risk from two fronts. For much of the past twenty years, bond returns have

Chart 17 Correlation S&P 500 Index & Bloomberg Barclays US Aggregate Index, 1989-



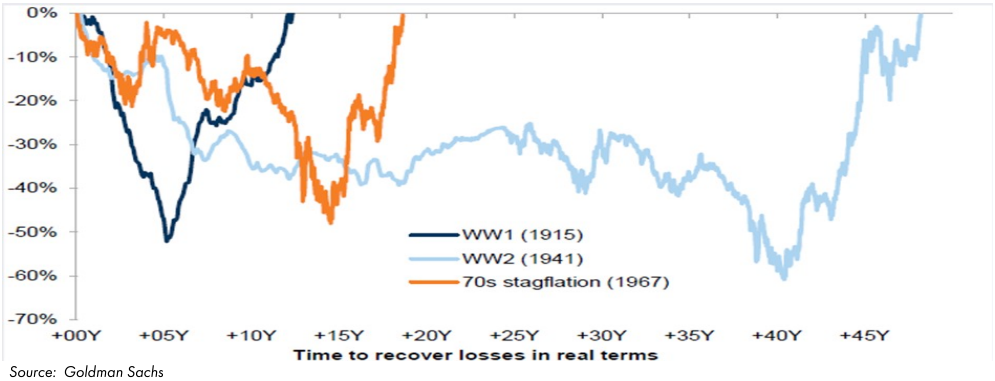
Source: Bloomberg, L.P.

been negatively correlated with equity returns (Chart 17). This negative correlation is hugely beneficial in portfolio construction as bonds have dampened equity volatility. Correlation has been turning less negative for the past two years, and bonds offer less diversification in portfolios accordingly.

The very low yields (high valuations) of bonds also translate into a less effective hedge during equity declines. As we noted a year ago,[12] rather than offsetting the February-March 2020 equity sell-off, investment-grade bonds actually *lost* value in this same period as equities fell, amplifying losses for investors.

Investors focus on equity declines because they can be sharp and steep and recoveries can be long. Following the tech bubble in 2000, equity investors did not recoup their investment until 2013.[13] For the past forty years, high-quality bonds have provided strong absolute returns as yields have fallen to record lows as inflation was squeezed out of the economy. But inflation is the scourge of bond investors, and in real terms,[14] there have been previous periods where bond investors waited years to recover, including more than 45 years following the Second World War (Chart 18).

Chart 18 Largest, 10-year Bond Drawdowns in Real Terms



Source: Goldman Sachs

[12] https://www.angelesinvestments.com/insights/angeles/a-new-framework-to-strategic-asset-allocation

[13] The Global Financial Crisis of 2008 rudely interrupted the recovery.

[14] Inflation-adjusted terms, the only terms that matter.

Investors must be able to see the environment through the appropriate lens of macroeconomic and socio-political forces, for these are the forces that determine what future returns will be and where the risks are greatest. Those forces are shifting today.

Hasan ibn Al-Haytham was born around 965 C.E. in Basra, now southern Iraq. He studied to become a religious scholar, but mathematics was his true love. He was frustrated that he could not resolve the Sunni-Shi'a theological differences[15] with logic or math,[16] and turned his attention to engineering.

Egyptians have sought to control the flooding of the Nile for millennia, and ibn Al-Haytham believed he could construct a hydraulic project at Aswan that would achieve this dream of the Pharaohs. The Fatimid caliph of Cairo[17] heard of ibn Al-Haytham and invited him to Egypt to lead the project.

We don't know why Hasan ibn Al-Haytham thought he could build a dam at Aswan. We don't know if he had ever been there or had just studied drawings. Either way, he arrived in Cairo to receive his orders and money, and traveled up the Nile to Aswan to begin work.

After a few months, it became clear to ibn Al-Haytham that whatever his ideas for a dam were they were not going to work. Egypt would have to wait a thousand years for a dam at Aswan.[18] Unfortunately, the caliph was not inclined to wait a thousand years, and promptly threw ibn Al-Haytham into prison to await his death. The caliph did not take disappointment well.

Ibn Al-Haytham knew that religious law prohibited killing the insane, and so he feigned madness. By doing so, he was allowed to live in protective custody, essentially, house arrest.

One day in his darkened room, he noticed a light shining through a pinhole that projected an image of the outside world onto his wall. He realized that the outside image was lit by the Sun, that light travels in straight lines, and that we see when those light rays pass through our eyes. Over ten years, he built lenses and mirrors to conduct experiments proving his theories of light and vision, filling seven volumes that he called the *Book of Optics*.[19]

Proving that light rays entered the eye was impressive, overturning the thousand-year notion of how we see by rays emitted by the eye (Euclid) or by objects themselves (Aristotle). Ibn Al-Haytham still needed to explain how light entering the eye causes us to see, and in the *Book of Optics* we have the oldest dia-

[15] Originally over the line of succession to the Prophet Muhammed, and then different interpretations of Sharia law. I am not a trusted source of religious advice, however.

[16] He wrote:" I am now convinced that...whatever differences exist between various sects are based not on the basic tenets of faith or the Ultimate Reality but on sociological content."

[17] Al-Hakim bi-Amr Allah.

[18] The Aswan Low Dam was completed in 1902, and the Aswan High Dam was completed in 1970.

[19] كتاب المناظر Kitāb al-Manāẓir.

gram ever made of the eye and its connections to the nervous system (see cover photo), thus proving how light is transported from the eye through the optic nerves to the brain to be interpreted as an image.

He also proved through experimentation that visual contrast was important in what we see, that the color of an object varies with the color of its surroundings and that the brightness of the Sun explains why we can't see the stars during the day. The *Book of Optics* was hugely influential for hundreds of years; Johannes Kepler and Leonardo da Vinci were among the great scientists who studied it. But the greatest contribution to science Hasan ibn Al-Haytham made was the invention of the scientific method, proof through experimentation and observation. In this respect, he may be called the First Scientist.

Hasan ibn Al-Haytham taught us to see the world as it is, to seek truth empirically. This is what we must do as investors, especially as the world around us is changing so fundamentally. We must follow the path Hasan ibn Al-Haytham lit for us.

Michael A. Rosen

Principal & Chief Investment Officer

January 2022

Please follow the Angeles Insights by Michael Rosen at https://www.angelesinvestments.com/insights/home

CONNECT WITH US

LinkedIn Twitter Facebook

Founded in 2001, Angeles Investment Advisors LLC is a global investment management firm serving select institutions and high net worth families and individuals.