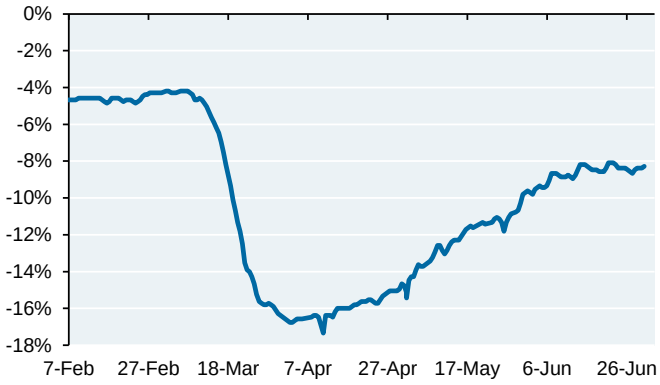
Topics: US recovery marches on; why deaths are diverging from sharply rising infections; the American scientific trust gap vs the rest of the world; energy paper client Q&A

The world is recovering rapidly from the COVID pandemic, erasing roughly half the 17% hit to global GDP that took place from January to April. Manufacturing and service sector surveys are rising around the globe, which we expect to continue in the months ahead. The US employment report beat expectations on new jobs (almost 5 million mostly private sector jobs) and on the unemployment rate, which fell to 11% from a peak level of 16%. The recovery in leisure and hospitality jobs is a positive sign given the impact on those sectors from the pandemic, and has roughly tracked our proprietary measure of hotel and restaurant credit/debit card spending.

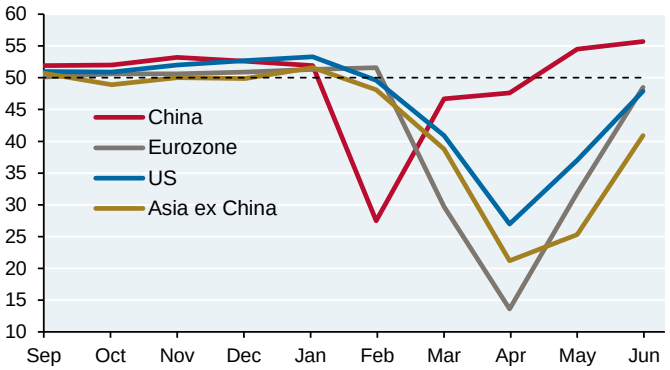
The good news for **profits**: in prior post-recession periods, S&P 500 companies managed expenses aggressively and generated profits growth even before substantial increases in top-line revenues. This is referred to as "**operating leverage**", and is shown in the fourth chart (yellow segments show the substantial contribution of operating leverage to profits post recessions and other market declines).

Estimated virus impact on global GDP



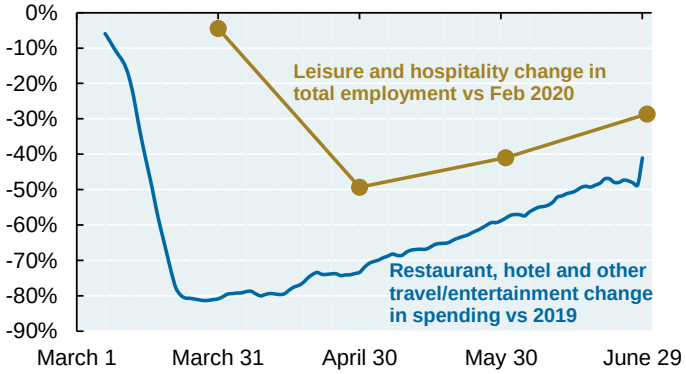
Source: GS Investment Research. J. Hatzius, A. Tilton, D. Struyven. Jul 1, '20.

Regional manufacturing & services business surveys
50+ = expansion



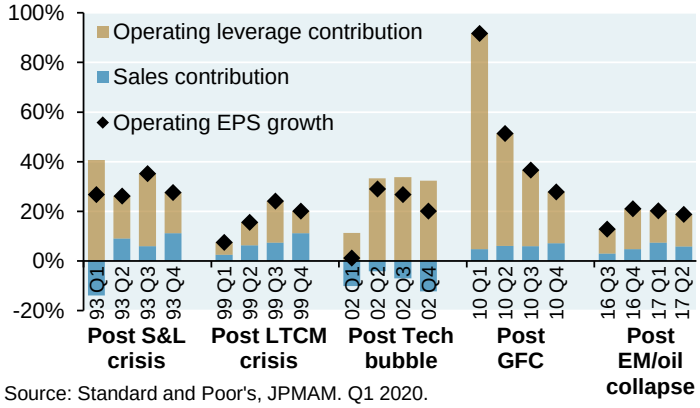
Source: Markit PMI. June 2020.

Leisure and hospitality: changes in spending and employment



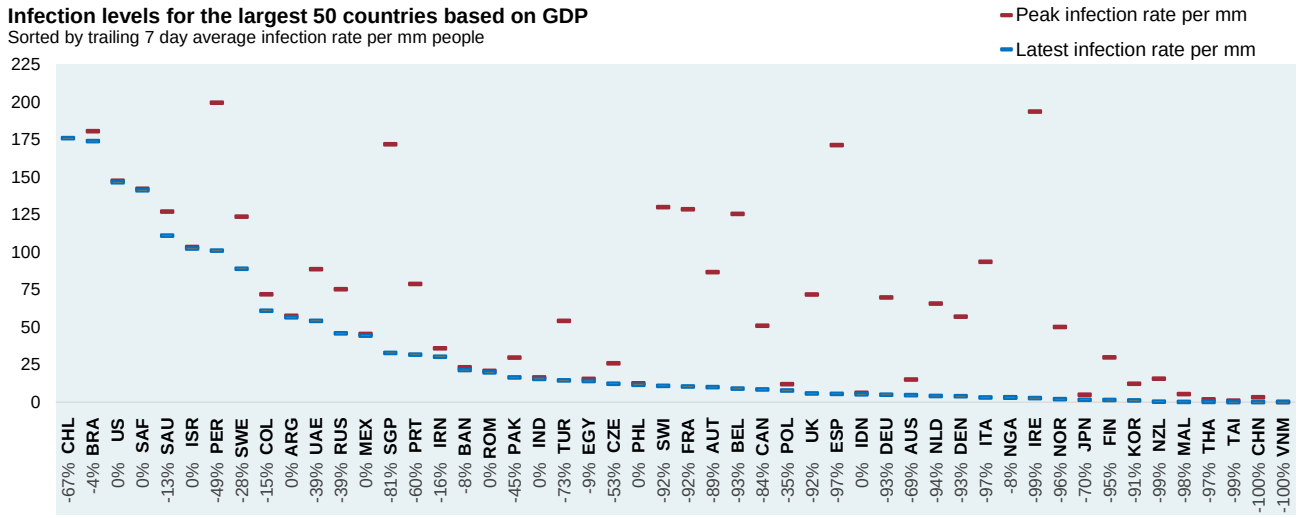
Source: Internal Chase data, BLS, JPMAM. June 29, 2020.

Contribution to S&P 500 profits from operating leverage after recessions and other market declines, y/y % change



Source: Standard and Poor's, JPMAM. Q1 2020.

The US recovery is taking place despite the US now having the third highest infection rate in the world, looking at the 50 largest countries by GDP[1]. The obvious question is whether this infection surge will derail the recovery. So far, most state countermeasures (shutting down gyms, bars, museums, water parks and some indoor dining) have been mild relative to restrictions imposed earlier.

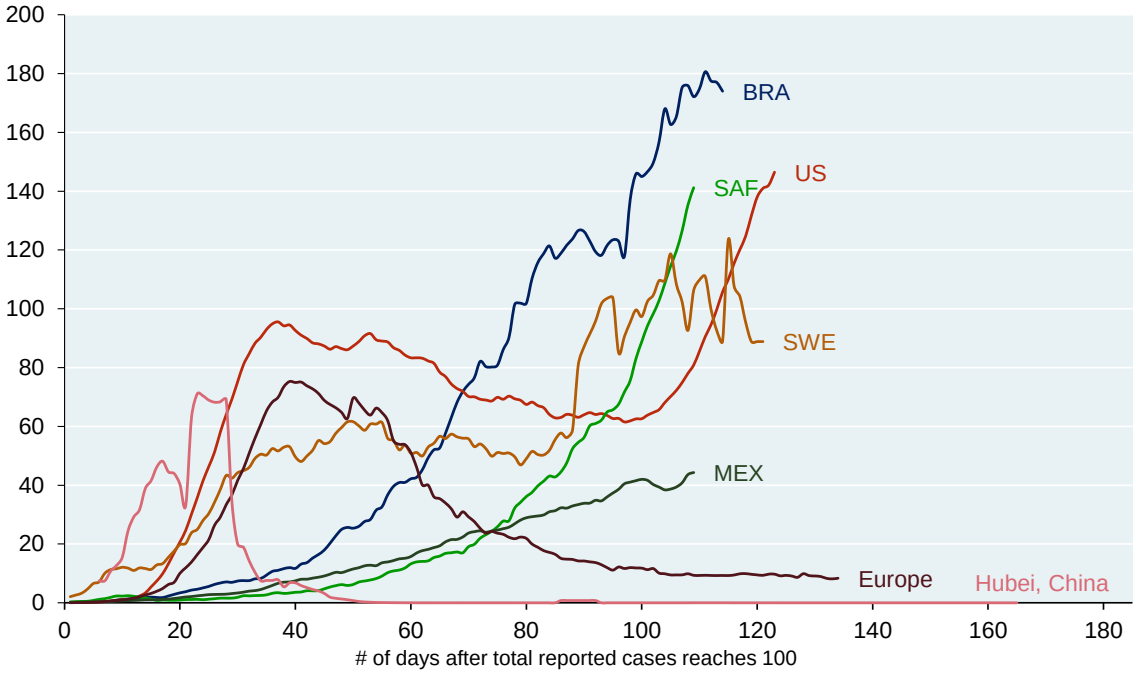


Source: Johns Hopkins University, IMF, JPMAM. Countries shown represent 94% of World GDP. Asterisk denotes countries with infection levels over 225 per mm people. July 05, 2020

Here's some data on new infections over time. Compare the US and other high infection rate countries to Europe, and to Hubei (China) where COVID originated.

New daily infections per mm people [Highly infected countries vs Europe and Hubei]

7 day trailing avg



Source: Johns Hopkins University, IMF, JPMAM. July 05, 2020

[1] On our web portal, we also look at the highest infection rates based on the 50 largest countries by population (which comprise 87% of the world population). In that chart, the US ranks second only behind Brazil.

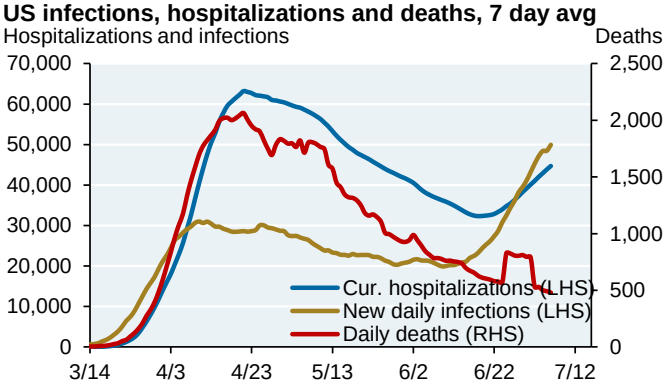
US hospitalizations now catching up to rising infections, but deaths are not

The charts below show virus trends in the US and in **Hotspot** states. A couple of weeks ago, infections in the US and in Hotspot states were rising (gold line) while hospitalizations (blue line) and deaths[2] (red line) were not. This has now changed, with hospitalizations rising as well. Deaths are still falling, possibly due to improved medical interventions such as anti-coagulants and corticosteroids discussed in Section 4 of our web portal, but we need to wait before drawing firm conclusions since time lags may play a role as well.

Two weeks ago, some observers proposed that rising infections were just the result of **more young people circulating and not getting sick**. This appears to be *part* of what's going on; a Vanderbilt study found that in Tennessee, COVID is now infecting a younger and less vulnerable population. This is depicted in the third chart; the primary reason for Tennessee's lower recent Case Mix Index is the lower age of recently infected people. However, most US states do not regularly disclose time series of infection age distributions[3]. So, the "younger infection age" theory could be true more broadly but it's hard to confirm, and now hospitalizations are rising as well as infections.

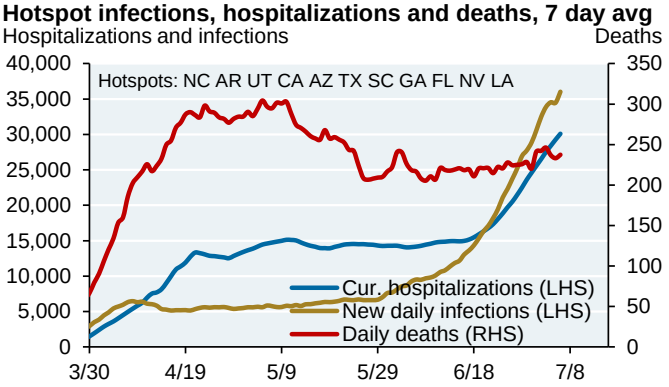
To be clear, lingering health consequences of COVID can be very debilitating for survivors of all ages: lung scarring, heart damage (cardiomyopathy and myocarditis), neurocognitive problems and abnormal blood clotting. Bottom line: you do not want to get this disease, no matter your age.

US infections, hospitalizations and deaths, 7 day avg



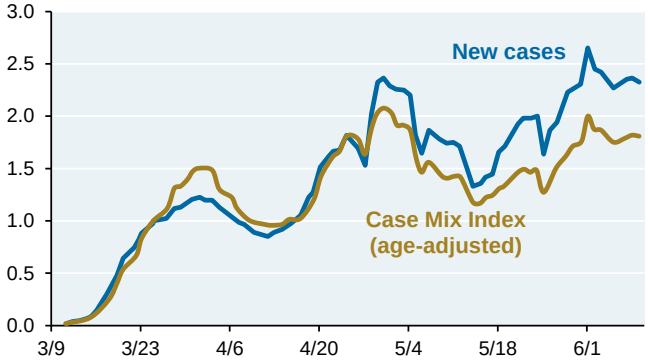
Source: CDC, COVID Tracking Project, JPMAM. July 06, 2020.

Hotspot infections, hospitalizations and deaths, 7 day avg



Source: CDC, COVID Tracking Project, JPMAM. July 06, 2020.

Recent Tennessee infections less risky, mostly due to lower age of newly infected persons, COVID Risk Index



Source: Vanderbilt School of Medicine. June 16, 2020.

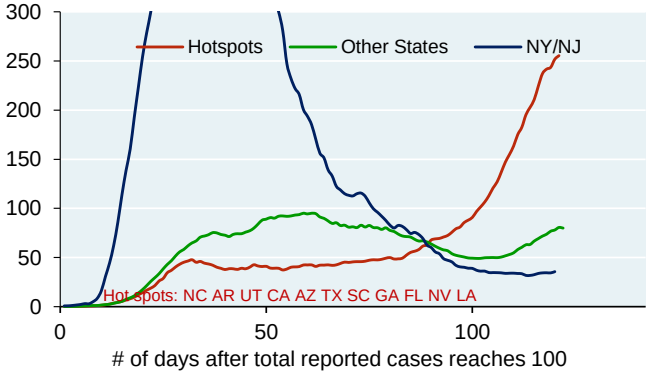
[2] The temporary death spike in late June resulted from a one-time addition of "probable COVID deaths" in NY/NJ.

[3] A few states report cumulative distributions of infections by age; see Section 2 page 7 on our web portal.

Others have suggested that the spike in infections is just the result of more testing, **but that's not entirely the case either**: as shown below, Hotspot infections have been soaring while Hotspot testing rates are not that different from "Other States".

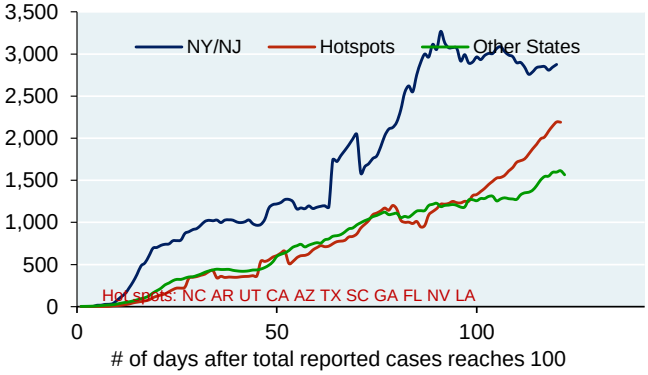
In any case, if falling deaths are now the barometer for state governments to remain open with only mild restrictions on bars and indoor dining, the US economy and equity markets may continue rising gradually through the summer, with the next litmus test being the possible market consequences of a Democratic Sweep in the fall (which we last wrote about on May 26). That's where we will focus our virus research in the weeks ahead: **deaths relative to rising infections and hospitalizations**.

US new daily infections per mm people
7 day trailing avg



Source: Johns Hopkins University, IMF, JPMAM. July 06, 2020

US daily tests per mm people
7 day trailing avg

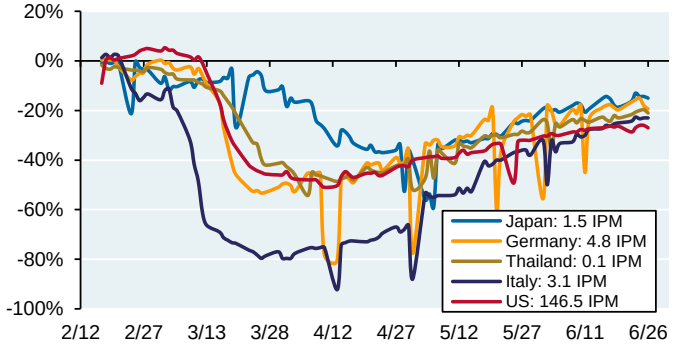


Source: Johns Hopkins University, IMF, JPMAM. July 06, 2020

Why is recent US virus performance so much worse than the rest of the world?

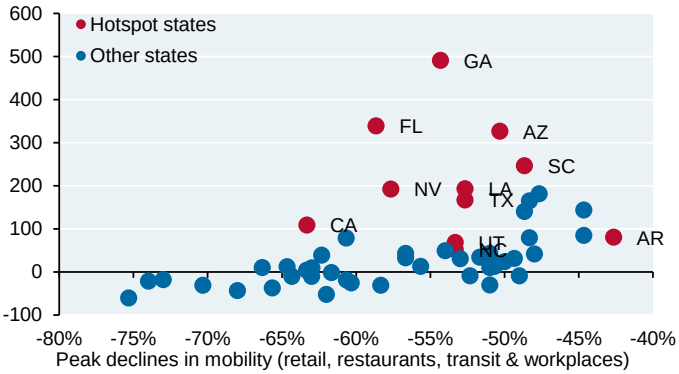
While peak US mobility declines are not as large as in other countries, there are many countries with similar mobility declines that haven't experienced the infection surge now occurring in the US (first chart). And while most Hotspot mobility declines were smaller than in other US states, mobility doesn't consistently predict state infections either. As shown on our web portal, reopening dates also don't predict infections and hospitalizations. **There are no easy answers for why US infections have soared recently**; reopening dates, mobility changes and other empirically measured behaviors do not lead to higher infections in any statistically consistent way.

Country mobility changes do not predict infections
Categories: retail, restaurants, transit & workplace
With most recent 7-day avg IPM (new daily infections per mm)



Source: Google, JPMAM. June 26, 2020.

US mobility changes only partially explain infection rise
Change in recent infections per mm people versus a month ago



Source: Google, JHU, JPMAM. June 26, 2020.

Blinded by Science: the American scientific trust gap

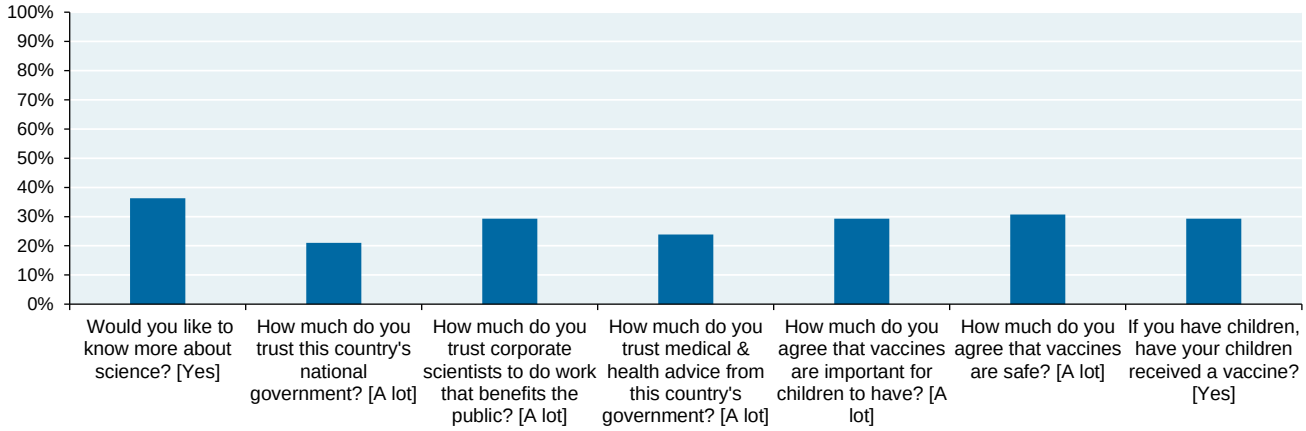
Are there other ways to explain the uniquely American virus surge?

- Despite the US leading the world in medical and biotech patents, and despite 22 of the top 40 universities for clinical research being located in the US (as per *US News & World Report*), **Americans rank below most of the world on interest and trust in science, on trust in science advice from government agencies and on belief in the importance, safety and utilization of vaccines.** See chart below for more details
- The **Trump administration** is not helping matters, according to 57 former US government scientists and public health officials of both parties. On Monday, the group called for a science-based approach to the pandemic and criticized the Trump administration for marginalizing science and expertise. See "*Statement From Former Gov. Scientists & Public Health Officials Calling for Science-based Response to the Serious and Growing COVID-19 Pandemic*", posted on Medium.com
- The lack of trust in science gets magnified since Americans rank highest in the world on measures of "**individualism**" (i.e., the Geert-Hofstede cultural dimension index), which refers to those acting according to their own beliefs irrespective of the impact it may have on broader groups of people
- Grant Sanderson at 3Blue1Brown has highlighted visually[4] how it doesn't take a lot of non-social-distancing scientifically skeptical individuals to accelerate the spread of infection, and how there really isn't that much of a difference between 80% compliance and 50% compliance in a pandemic

These beliefs and behaviors may also partially explain why so many Americans, their representatives and some Wall Street strategists misunderstood what the rest of the developed world figured out in May: **how to shut down a pandemic**.

How Americans rank globally on trust in science, medicine and vaccines

Percentile rank, 144 countries



Source: Wellcome Trust/Gallup Global Science and Health Monitor. 2018.

[4] Click here for Grant's YouTube visualization of a pandemic

"What about…": energy paper client Q&A

Last week, we sent out our tenth annual energy paper which you can read here. Each year, I receive follow-up questions from clients asking about topics that we did not address. Here are three of them.

What about low energy nuclear reactors (LENR) which convert hydrogen to helium and give off intense heat and no radiation?

Vaclav and I agreed upfront that we would only cover energy sources which have reached, at the minimum, early stages of commercialization. There are many ideas that work in the lab but which are never commercialized (and thus have no real world impact), either due to cost or operational reasons. In contrast, we wrote about deep geothermal in Iceland this year, since while the technology is in its infancy, at least there is one site in the world which had been engaged in power generation using this new technology in a commercial setting. Similarly, we wrote about utility scale energy storage using lithium ion batteries despite its miniscule presence in the electricity food chain, since a handful of utilities are using them.

Currently, LENR does not meet this commercialization test. I will write about it when/if the concept is substantiated in the marketplace, and agree that if such reactions can be made to give off substantial levels of heat without radiation, that would be a major development in power/heat generation. Based on what I read, the first commercial LENR applications in the next 5 to 10 years could be in space heating with temperatures up to 200˚C. To be clear, there's still plenty of skepticism on the idea: in May 2019, a team of researchers from the University of British Columbia, MIT, the University of Maryland, the Lawrence Berkeley National Laboratory and Google revisited LENR and failed to find evidence of fusion or heat.

What about renewable natural gas (RNG) made from landfills and other waste?

Renewable natural gas is available without retrofitting of existing infrastructure. US RNG volumes are 200-300 mm gallons per year. According to Platts, the estimated potential from all US landfills is 2.9 bn gasoline gallon equivalents (GGE) per year, while NREL estimates potential for 4.8 bn GGE per year from landfills, agricultural waste, wastewater and other organic waste. In 2019, 142 bn gallons of motor gasoline were consumed in the US. So, even if RNG from all potential landfill and other sites were channeled into central processing facilities (which is expensive), RNG could at most offset ~2.5% of annual US gasoline demand. That would definitely be worth doing, and its impact would be even greater if paired with greater penetration of EVs. For investors, an RNG industry of 3-4 bn gallons per year could support the profitability of multiple new entrants. But I don't see its potential scope as "transformative" given RNG volume estimates. Germany has been converting waste to energy as well, using biogas from crops, waste and landfills to generate electricity rather than to make liquid fuel. This is not cheap, nearly 20 cents/kWh compared to 9 cents/kWh for onshore wind. There may be plenty of waste but gathering it from large areas to central processing facilities is energy-intensive itself.

What about electrifying the world's container ships?

The first one is now in operation, carrying 120 twenty foot equivalent units (TEUs) at a speed of 6 knots for 30 nautical miles. Compare that to Maersk's Triple-E class ships which carry 150x as much cargo over distances 400x greater at speeds 3x-4x faster. What would it take to make an electric version of Maersk's ship, matching its speed and performance? Even when incorporating the higher efficiency of electric motors, using today's state of the art electric batteries with 300 Wh/kg of energy density, the electric version of the Maersk ship would have to dedicate 40% of its cargo capacity to the batteries themselves (obviously an economic non-starter). Or put it this way: an electric ship whose batteries and motors weighed no more than the fuel and diesel engine in today's container ships would need battery energy densities to improve by 10x vs current levels. Final bit of context: in the past 70 years, energy densities of the best commercial batteries haven't even quadrupled.

This report uses rigorous security protocols for selected data sourced from Chase credit and debit card transactions to ensure all information is kept confidential and secure. All selected data is highly aggregated and all unique identifiable information—including names, account numbers, addresses, dates of birth, and Social Security Numbers—is removed from the data before the report's author receives it.