Topics: Update on the Democratic Primary, and more on coronavirus: understanding the possible impact of temperature/humidity/sunlight on transmission rates; the importance of isolation and "contact tracing"; reproductive numbers; and how long viruses last on hard surfaces

Berning Man. Confounding almost every forecast I saw last week, Senator Biden appears to have emerged from Super Tuesday with a slight delegate lead[1]. Why might the night have turned out so differently from what was expected just a few days ago? Here are some charts and exhibits to think about.

[1] Sanders' political ideology vs the history of Democratic Presidential contenders

The chart shows the degree of ideological liberalism and partisanship for all politicians who have sought the Democratic nomination since the modern Primary era began 60 years ago[2]. Scores are based on Congressional voting records, and are computed by the UCLA VoteView project[3]. More voters may have been looking for moderation and actual Democratic Party membership than was forecast upfront.

Partisanship and ideology score for candidates seeking the Democratic Presidential nomination in the modern era
1 = most ideologically Liberal and highest degree of political partisanship (based on Congressional voting)
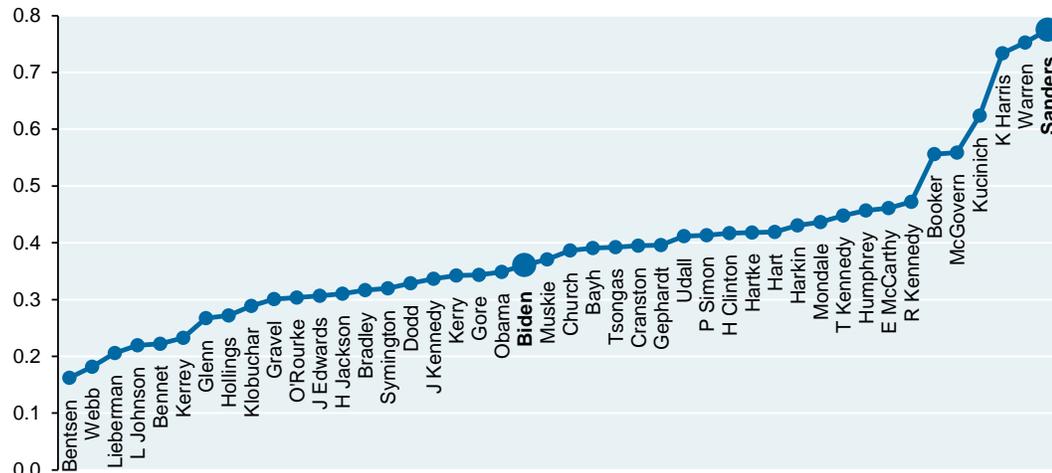
Source: Jeffrey Lewis, Keith Poole, Howard Rosenthal, Adam Boche, Aaron Rudkin and Luke Sonnet; Voteview: Congressional Roll-Call Votes Database. JPMAM. 2019. Modern primary era is assumed to begin in 1960.

[1] **Results**. Going into Super Tuesday, 538.com (one example of many) expected Sanders to emerge with a 535-303 lead over Biden. While most votes have been counted, delegate allocation takes more time. As of 4 am, NPR estimated that Biden had a 467-392 lead, while the New York Times estimated early this morning that by the time all delegates were allocated, Biden would have a delegate lead of 670-580. A total of 1,991 pledged delegates is needed to win on the first ballot at the convention (unpledged super-delegates don't vote on the first ballot this year).

[2] **Before 1960, party primaries played a much smaller role in Presidential elections**. A smaller number of (often higher-quality) Presidential candidates were generally chosen by party leaders and selected by consensus at the party convention. For example, in 1952, Democratic primaries were only held in 14 states. Estes Kefauver (TN) won 12 states compared to 1 each for Averell Harriman (diplomat) and Richard Russell (GA). Then at the convention, Democratic leaders drafted Governor Adlai Stevenson who eventually won on the third ballot (and eventually lost to Eisenhower in the fall). It was the last convention of either party to require more than one ballot to select a candidate.

[3] **Voteview** spatial parliamentary voting scores have been used in peer-reviewed studies of Congressional history since the 1980's, and include ideological scores for all House and Senate members since the first Congress in 1789. As each score is based on voting patterns, only candidates with legislative history are included in our chart. Governors, mayors, hedge fund guys, entrepreneurs, spiritual gurus, activists and conspiracy theorists are therefore excluded.

[2] Money to Bern: the estimated cost of Sanders' Medicare for All proposal

The chart below is a follow-up to our February 6th *Eye on the Market* which reviewed cost projections for Democratic healthcare plans[4]. The amazing thing about this chart: the projected increase in government debt[5] shown is **just due to Sanders' healthcare plan** (excluding the impact of his spending plans on infrastructure, student debt forgiveness, $2.5 trillion for housing etc), and is ***after*** the imposition of:

- $4 trillion in new employer healthcare contributions and taxes (even after netting out the elimination of existing ones)
- Another $4 trillion in new individual healthcare contributions and taxes (again, even after netting out the elimination of existing ones)
- $1.7 trillion in new taxes on individual income and wealth
- $500 billion in new taxes on businesses

Note to Millennials: when/if this bill ever came due, you would be paying for it. The rest of us would be long gone.

Sanders healthcare plan: estimated impact on Federal debt
Federal debt (% of GDP) with Presidential inauguration dates
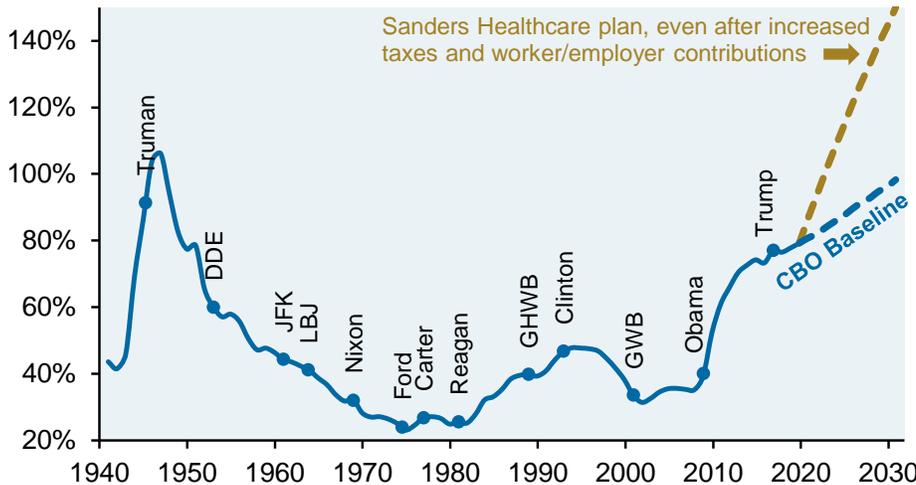
Source: CBO, CRFB, J.P. Morgan Asset Management. 2020.

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[4] Source: Committee for a Responsible Federal Budget. Cost figures cited are for the ten year period 2021-2030.

[5] Even in the lower CBO baseline case, US debt reaches such high levels that within a few years, 100% of Federal tax receipts are used to pay entitlements and service the Federal debt itself, with nothing left for discretionary government spending programs.

[3] What happened the last time Sanders ran for President?

In 2016, four well-known economists who all at some point ran the Council of Economic Advisors for Democratic Presidents were so concerned about the nonsense assumptions of the Sanders campaign that they wrote an open letter to Sanders and his economic advisor Gerald Friedman. The entire contents of the letter appear below; bolding is mine.

"Dear Senator Sanders and Professor Gerald Friedman,   February 17, 2016

We are former Chairs of the Council of Economic Advisers for Presidents Barack Obama and Bill Clinton. For many years, we have worked to make the Democratic Party the party of evidence-based economic policy. When Republicans have proposed large tax cuts for the wealthy and asserted that those tax cuts would pay for themselves, for example, we have shown that the economic facts do not support these fantastical claims. We have applied the same rigor to proposals by Democrats, and worked to ensure that forecasts of the effects of proposed economic policies, from investment in infrastructure, to education and training, to health care reforms, are grounded in economic evidence. Largely as a result of efforts like these, the Democratic Party has rightfully earned a reputation for responsibly estimating the effects of economic policies.

We are concerned to see the Sanders campaign citing extreme claims by Gerald Friedman about the effect of Senator Sanders's economic plan—claims that cannot be supported by the economic evidence. Friedman asserts that your plan will have huge beneficial impacts on growth rates, income and employment that exceed even the most grandiose predictions by Republicans about the impact of their tax cut proposals.

As much as we wish it were so**, no credible economic research supports economic impacts of these magnitudes. Making such promises runs against our party's best traditions of evidence-based policy making and undermines our reputation as the party of responsible arithmetic. These claims undermine the credibility of the progressive economic agenda and make it that much more difficult to challenge the unrealistic claims made by Republican candidates**.

Sincerely,

Alan Krueger, Princeton University (Chair, Council of Economic Advisers, 2011-2013)

Austan Goolsbee, University of Chicago Booth School (Chair, Council of Economic Advisers, 2010-2011)

Christina Romer, University of California at Berkeley (Chair, Council of Economic Advisers, 2009-2010)

Laura D'Andrea Tyson, University of California at Berkeley Haas School of Business (Chair, Council of Economic Advisers, 1993-1995)"

[4] On "electability", Sanders has been polling well against Trump in many swing states, but so does Biden

There may be factors that polls do not account for, such as the reluctance of people to tell pollsters they are voting for Trump[6]; studies are inconclusive as to how large this effect may be.

Trump vs Sanders polling in swing states, 2020 polls only
Trump spread over Sanders
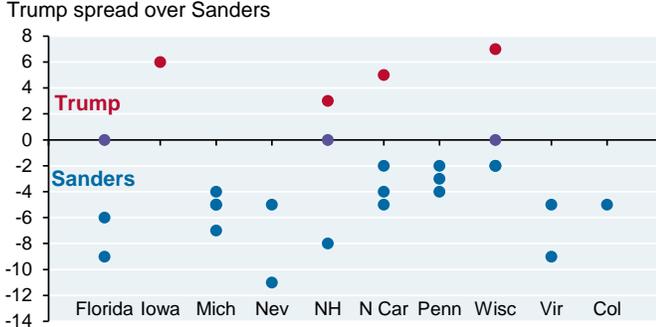
Source: RealClearPolitics, FiveThirtyEight. Includes polls from UNF, FAU, NY Times/Siena, Quinnipiac, EPIC-MRA, Fox, NBC, SurveyUSA, Glengariff Group, Tarrance Group, AtlasIntel, UW-Madison, Roanoke College. Feb 2020.

Trump vs Biden polling in swing states, 2020 polls only
Trump spread over Biden
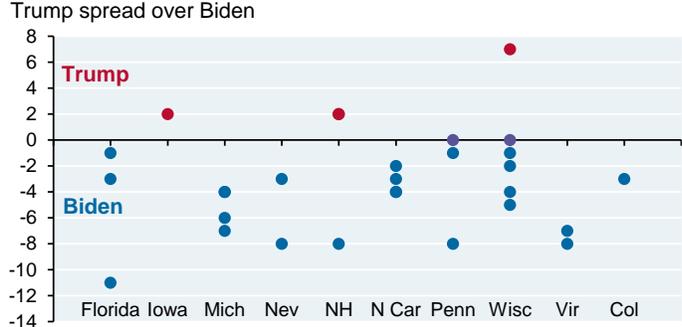
Source: FiveThirtyEight. Includes polls from UNF, FAU, NY Times/Siena, Quinnipiac, EPIC-MRA, Fox, SurveyUSA, Glengariff Group, Tarrance Group, AtlasIntel, UW-Madison, UNH, Roanoke College. Feb 2020

[5] What are the viable combinations under which Sanders could win the Presidency?

Here are some of them, according to polling estimates (which proved to be wrong last night).

Possible electoral paths to a Sanders victory
270 electoral votes needed to win
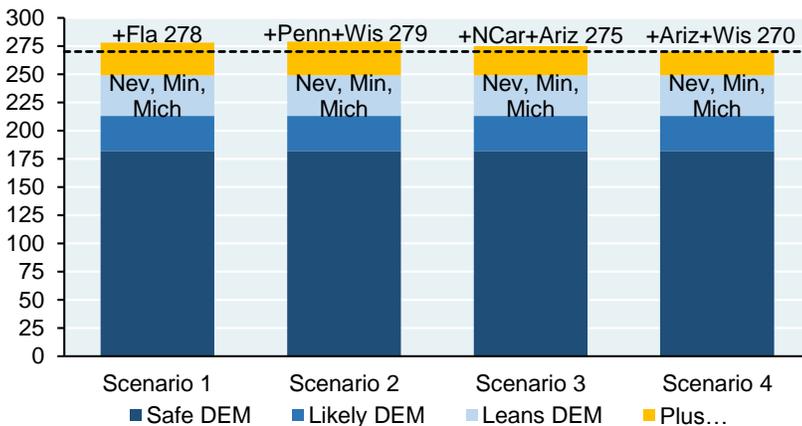
Source: 270 to Win. JPMAM. 2020. Ohio assumed to lean GOP.

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[6] I was walking on the street in Brooklyn the other day, and said on my phone that I was at a client meeting at which most attendees said they would be voting for the President. A woman walking by heard me say this, turned and glared at me, and I thought she was going to hit me with her umbrella. If she were my neighbor and if I were voting for the President, I would never admit it either.

[6] What parts of the US economy/markets could be most affected by a Sanders Presidency?

Since last fall, I've been writing that a Progressive, unified government could negatively impact financial asset prices. I've received grief for writing this, but **Sanders supporters cannot have it both ways**: you cannot argue for a fundamental restructuring of the US economy across sectors that have been leading the US equity market over the last decade without other people discussing the potential for a repricing of assets *affected* by this restructuring. Here's a partial list of Progressive policy proposals synthesized from Sanders and Warren campaigns:

Tax unrealized capital gains every year	Ban fossil fuel exports, no new nuclear power plants
Unify capital gains tax rates with ordinary income	Wipe out student debt for 75% of students
Repeal individual and corporate tax cuts	9 point eligibility test for trade counterparties
New payroll tax of 14.8% > $250k in income	Reverse anti-competitive mergers
Surtax on corporate profits over $100mm	National rent control standard at 1.5x CPI
Medicare for All with no deductibles or copays	Just cause requirement for evictions
Ban on private health insurance	Revitalize public housing
Curb or prohibition on stock buybacks	Housing for all at a cost of $2.5 trillion
Break up big banks, new financial transaction taxes	Wealth tax of 2% over $50 million
Public companies must produce "material public benefit"	Break up big Tech, reinstate Net Neutrality
Ban on state 'right to work' laws	Penalties for Federal contractors with gender pay disparity
Worker election of 40%+ of board members	Lobbying costs subject to 75% approval by shareholders
Industry-level sectoral bargaining	Allow HSS to manufacture or subcontract generic drugs
Ban hydraulic fracturing on public/private land	$3 trillion for clean energy transition subsidy
Eliminate secret ballots in worker union elections	Universal free public college education

Implementation of these policies under a Democratic President would depend on:

- Whether Democrats retake the Senate, and if so, **by what margin**

    o Democrats need to pick up 3 seats to regain control of the Senate since the Vice President would be the tie-breaking vote

    o If Democrats retake the Senate, it is projected to be by a very slim margin. For contrast, Democrats held 58 seats in 2010 when the Affordable Care Act was passed, and received 2 votes from Sanders (Independent) and Lieberman (Independent Democrat) to reach the 60-vote threshold required. Democrats held around 65% of Senate seats during the JFK/LBJ era when Great Society programs were passed, and held 60%-80% Senate majorities during most of FDR's Presidency when New Deal programs were enacted.

- If Democrats retake the Senate, what would presumed new Democratic Senate Majority Leader Schumer do regarding the **filibuster**

    o Schumer's predecessor Harry Reid now recommends that it be scrapped[7], which would allow major legislation to be passed with a simple majority instead of 60-40

    o A January 18th story in *The Atlantic* ("**Does Chuck Schumer Have an AOC Problem?**") discussed the "no" vote by Schumer on the new US-Mexico trade deal which 80% of Congressional Democrats supported, and how this may reflect an effort by the Senator to ward off a primary challenge from the left in 2022. Such concerns might affect his decision on the filibuster as well

- Whether a Democratic President would follow precedent set by Trump on immigration, energy, trade, etc to implement many policy changes via Executive Order and avoid the legislature

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[7] "*The Filibuster Is Suffocating the Will of the American People*", Harry Reid, NY Times, August 12, 2019.

Here are some charts we have shown before that reflect why the policy changes above, if enacted, could be challenging for equity markets. They illustrate the reliance of equity markets on stock buybacks, both overall and specifically within the banking sector; the degree to which new-found US energy independence is reliant on hydraulic fracturing; the degree to which profitability of the tech sector has been driving US equity market outperformance; the degree to which the 2017 tax bill evened the international playing field for US companies competing globally; and the shifting tides regarding small business concerns about regulation and red tape as their largest problem.

Sources of 2018 net US equity demand, US$ billions
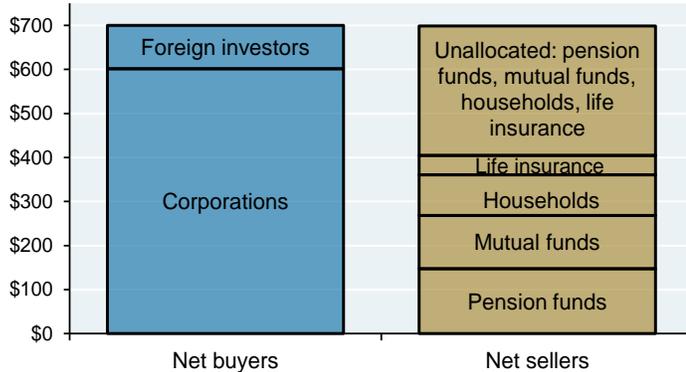
Source: Federal Reserve Board. 2019.

Total banks' shareholder yield based on approved capital plans

Source: J.P. Morgan Financial Institutions Group. December 16, 2019.

Percentage of US oil and gas production derived from hydraulic fracturing
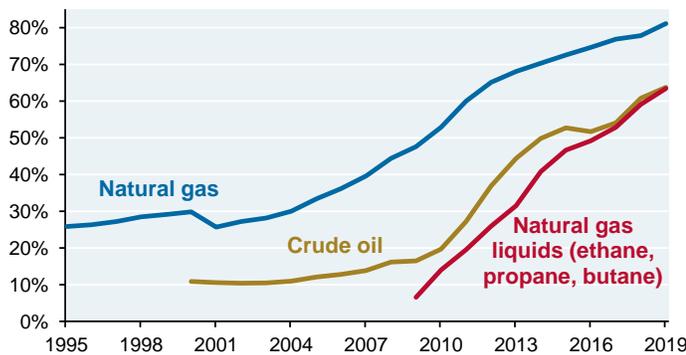
Source: EIA, US Department of Energy, JPMAM. 2019.

Tech: the primary driver for US margin expansion
Trailing 12 month average operating margin for S&P 500 companies
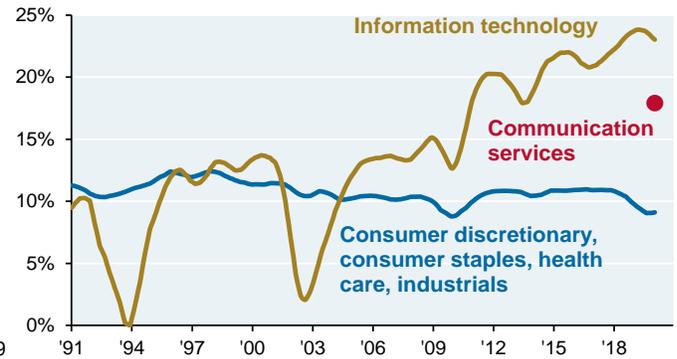
Source: Bloomberg. February 2020.

Marginal effective tax rate
%, effective tax rate on new investment in manufacturing & services
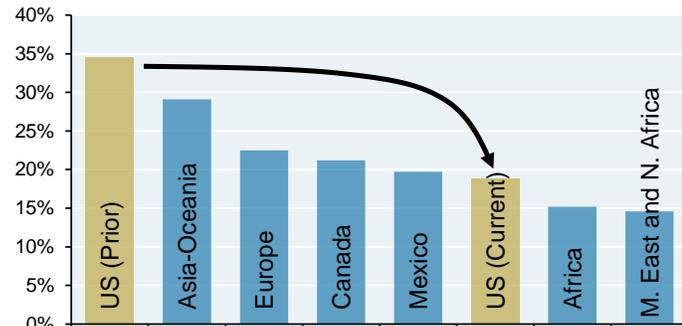
Source: University of Calgary School of Public Policy, Mintz & Bazel. Corporate tax rates are GDP weighted. December 17, 2017.

Small business concerns about regulation
% of respondents citing regulation as their largest problem

Source: NFIB, Haver Analytics, JPMAM. January 2020.

Coronavirus update (click here to access this week's client webcast on COVID-19 virus dynamics and market/economic consequences)

Topic: Could the onset of spring and summer slow virus transmission rates?

There have been press articles and government statements on the possibility that COVID-19 infection rates could fall as the winter comes to an end. There are three main theories as to why the **flu** season in temperate regions peaks in winter months:

- More clustering of infected and uninfected people indoors due to colder temperatures
- Colder, drier air is more conducive to airborne travel of viruses; colder air allows viruses to survive for longer periods and to travel longer physical distances
- Lower levels of winter sunlight may play a role given the ability of UV light to sterilize surfaces and kill both viruses and bacteria

Some details:

- Scientists have found that influenza peaks in periods of low humidity, low temperatures, low solar radiation and low precipitation. In other words: in cold, dry winter months

- In lab studies using animals, scientists also found that high temperatures and high humidity slowed the spread of influenza sharply, and at very high humidity levels, the virus stopped spreading completely

- During the SARS epidemic in 2003[8], infection rates declined from March to May as temperatures rose. However, there were other factors changing at the same time (changes in hospitalization rates, greater provision of gear to medical personnel, higher quarantine rates and the natural erosion of epidemic severity over time) so results were not conclusive with respect to weather in isolation. Even when combining all these factors, researchers were only able to explain two thirds of the change in SARS infection rates

- **Why might infection rates be impacted by temperature?**
    - Low winter humidity might impair the function of mucus, which traps and expels foreign bodies like viruses or bacteria. Cold, dry air can render mucus drier and less efficient at trapping a virus
    - In addition, influenza "virions" (an infective virus outside a host cell) appear to be much less stable in conditions of higher humidity, when respiratory droplets fall to the ground more quickly

- **It's not just the heat, it could be the sun as well**. Direct and scattered radiation from the sun can break down viruses that have been transmitted to surfaces ("fomites"), but is much less abundant in winter. UV light is so effective at killing bacteria and viruses that it's used in hospitals to sterilize rooms and equipment
    - One study found that in Brazil, there's a correlation between increased influenza hospital admissions and solar UV-blocking by smoke during the burning season
    - The US military reported that UV radiation sterilization virtually prevented the spread of influenza among patients in a veterans hospital, during the same time that an epidemic of influenza ravaged similar patients in nearby non-irradiated rooms

- **However, COVID-19 is not the same as influenza and SARS, and its reaction to changes in temperatures, humidity and sunlight is still unclear**. SARS did not completely subside until late May 2003, which suggests that temperature factors, if they did mitigate the disease, took time to work

- **If weather DOES play a role in COVID-19, then infection rates could FALL in the Northern Hemisphere as temperatures rise, but RISE in parts the Southern Hemisphere in June/July/August when temperatures fall there (i.e., what happens with the flu each year)**
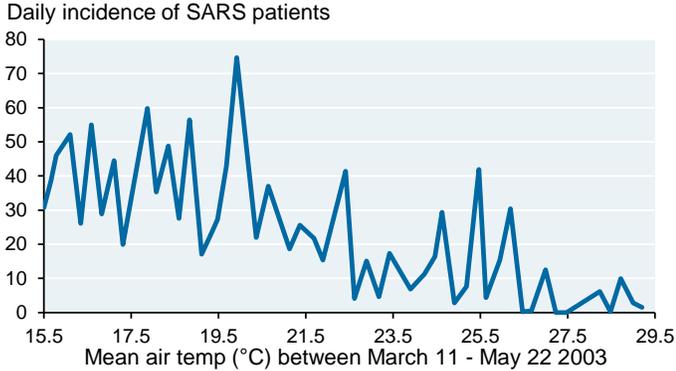
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[8] There wasn't too much weather based seasonality of the **MERS** virus, but since MERS is mostly an animal-to-human virus that is not very contagious, scientists don't believe there's a basis for weather based MERS seasonality

Exhibits: SARS and influenza infection rates as a function of temperature, humidity and precipitation

The 1st chart shows the SARS infection rate in 2003 as a function of mean air temperatures (in °C) each day from March to May. As temperatures rose, infections declined. The 2nd chart shows how influenza outbreaks (black dots) peak in periods of very low "specific humidity", measured as grams of water vapor per kilogram of air, and in periods of low precipitation. Both conditions correspond to winter months. There's also a cluster of influenza peaks during periods of *high* humidity and *high* precipitation: these mostly occur in tropic zones during summer.

SARS daily incidence and air temperature
Daily incidence of SARS patients

Global influenza peaks
Precipitation, millimeters

- Primary peak
- Secondary peak
- No peak

Source: "*Environmental factors on the SARS epidemic*", Epidemiological Infections, Lin et al. 2006.
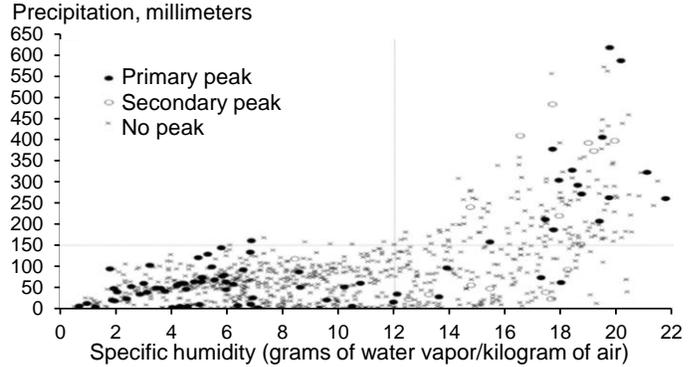
Source: "*Environmental Predictors of Seasonal Influenza Epidemics across Temperate and Tropical Climates*", PLOS Pathogens, Tamerius et al, 2013.

Topic: What does it take to control an outbreak? Aggressive isolation and "contact tracing"

The chart below gets into the question of what it might takes to control a COVID-19 outbreak[9]. Not only does the government have to arrange for isolation of infected persons, but they might also have to engage in aggressive "contact tracing", which involves finding out whom infected persons have come into contact with, and **isolating them as well** within 3-4 days. I am not sure open, Western societies will be able to execute this as aggressively as China has. Let's take an example from the chart: **in order to have a 90% chance of controlling an outbreak, if the reproductive number of COVID-19 were 2.5, 80% of the contacts of all infected individuals would have to be isolated as well (see circled dot).**

Aggressive isolation of infected individuals' traced contacts is required to control COVID-19 outbreaks
% of simulated outbreaks controlled

Reproductive number = 1.5

Reproductive number = 2.5

Reproductive number = 3.5

% of contacts traced and isolated

Assumptions:

Short delay to isolation once infection is identified (3-4 days); 100% of infected persons isolated once identified; 100% of contacts isolated once identified; 15% of individuals transmit infection before onset of any symptoms

Reproductive numbers reflect observed rates of COVID-19 transmission, which have been estimated from 1.5 to 3.5. See next page for more on reproductive numbers.

Source: "*Feasibility of controlling COVID-19 outbreaks by isolation of cases and contacts*", R. Eggo et al., Centre for the Mathematical Modelling of Infectious Diseases, Department of Infectious Disease Epidemiology, London School of Hygiene & Tropical Medicine, February 28, 2020.

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[9] A simulated outbreak is defined as controlled if there are no cases between weeks 12 and 16 after initial cases.

Topic: what are "reproductive numbers" used to describe communicable diseases?

- The basic reproductive number (R0) discussed in articles on COVID-19 is not just a reflection of the inherent transmission risk of the disease, but also of the behaviors and healthcare systems in which it spreads. It is *empirically* measured at a specific place and time, and not just predetermined by the disease itself

- For example, basic reproductive numbers measured for COVID-19 in early January differed markedly across Chinese provinces, and reflect factors such as the density of living conditions, frequency of mass gatherings, commuting patterns and isolation of infected individuals in each location

- By mid-February, a combination of quarantine, contact tracing and other restrictions reduced the observed reproductive number sharply in most provinces. However, for an outbreak to be controlled, the reproductive number needs to be less than 1 (most Chinese provinces were still above these levels in mid-February)

- Given the impact of behavior on reproductive numbers, many researchers believe that quarantine restrictions cannot be meaningfully lifted in China anytime soon due to the risk of reaccelerating infections

COVID-19 reproductive numbers in Chinese provinces
Reproductive number (the expected number of cases directly generated by one case in a population where all individuals are equally susceptible to infection)
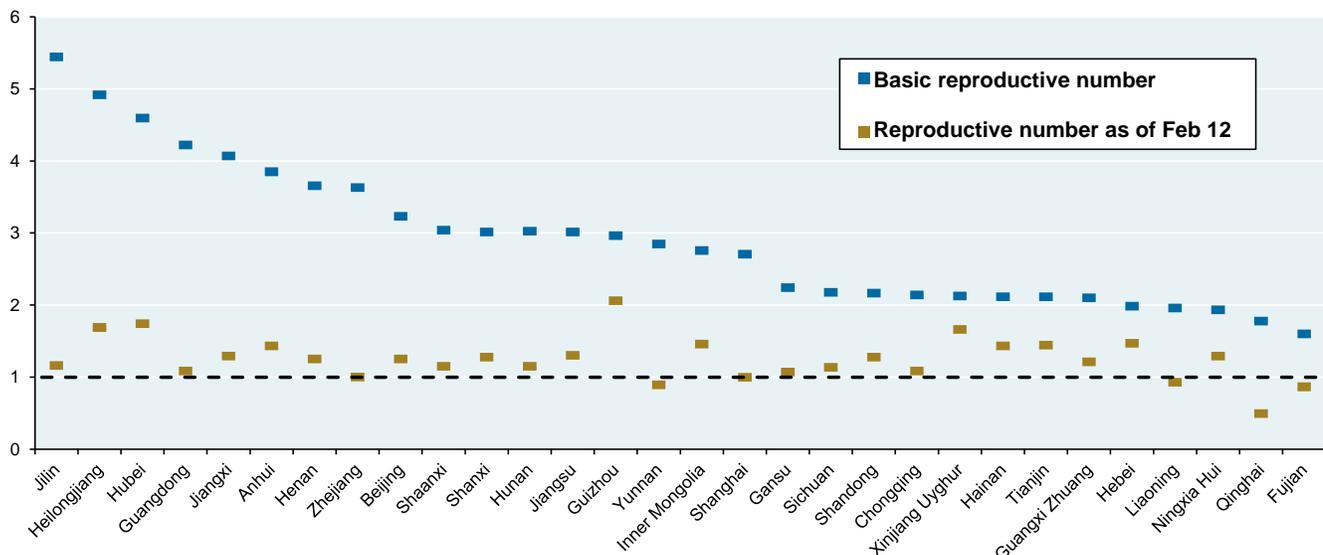
Source: Chu-Chang Ku et al, "*Epidemiological benchmarks of the COVID-19 outbreak*", University of Sheffield, School of Health and Related Research, Health Economics and Decision Science department, February 2020.

Topic: how long can viruses like COVID-19 last on hard surfaces?

Hard surfaces and objects which can carry disease are called "fomites". For example, just 5 seconds of exposure has been shown to transfer 31% of influenza's viral load to hands from hard surfaces. Every disease and surface type has its own unique survival duration, but there are some generalizations that can be made:

- A March 2020 report in the Journal of Hospital Infection cited 4-5 day survival persistence for both SARS and the Common Cold (sometimes referred to as HCov, or "human coronavirus") at room temperature on most surfaces, such as glass, plastic, PVC, rubber, steel, ceramic and Teflon. The only exception was aluminum, on which HCoV only survived for 2-8 hours. The other exception: at temperatures above 86°F (30°C), virus persistence was much shorter

- While virus persistence can last several days, a 2007 paper from The American Society of Microbiology, reported that diseases like influenza, HCov and pneumonia lost 90% of virus infectivity within hours

- Surfaces contaminated with viruses like SARS and HCov can be disinfected in just one minute using cleaning fluids with standard concentrations of sodium hypochlorite (bleach) or ethyl alcohol (ethanol)