CLIFF TAN

East Asian Head of Global Markets Research
Global Markets Division for Asia
T: +852 2862 7005
E: cliff_tan@hk.mufg.jp

MUFG Bank
A member of MUFG, a global financial group

China: Fear of WARS, Hopes of Peace

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Key Points:

- **WARS infections still appear on a declining but geometric expansion**
- **Our working assumptions:**
  - **An order of magnitude more severe than SARS; we explain**
  - **-1 to -2ppt off of 2020 China growth with the worst now**
  - **More CNY depreciation in 1H20; a rebound in 3Q20**
- **We assume 200,000 people could ultimately be infected; we explain**
- **With as much as a 6% mortality rate; we explain**
- **For those in Markets we say curb your enthusiasm about the negative 2nd derivative; we explain, statistically**
- **And we'll take the doctors' and scientists' words over our own any day**
- **Implications for: Global monetary policies; Hong Kong protests; phase 1; China's public health system; the lack of Chinese soft power**

Prologue

We expand comments from the February *FXO*

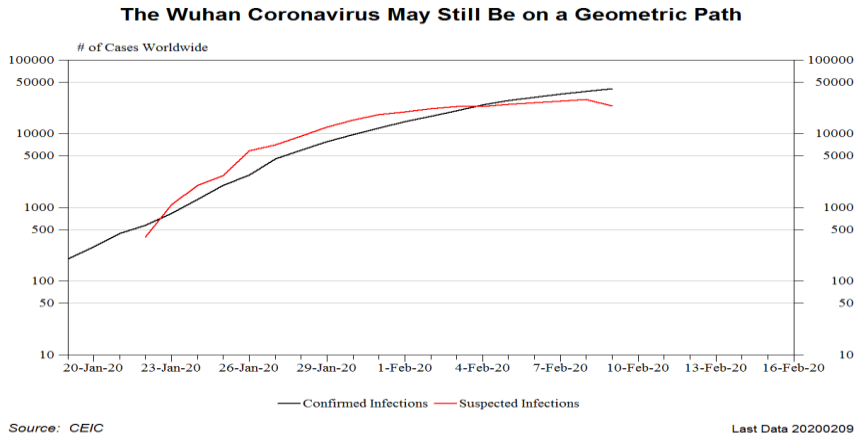
[This is an expanded version of preliminary 2019-nCoV thoughts first published in the February 2020 MUFG Foreign Exchange Outlook.

Our thoughts/sympathies remain with the suffering

Our thoughts and sympathies remain with the suffering, who have almost all been in China and overwhelmingly in Wuhan, where the first case broke.

WARS is a made-up acronym, standing for Wuhan Acute Respiratory Syndrome, as the new coronavirus has partly killed through, among other complications, Acute Respiratory Disease Syndrome (ARDS). It's meant to echo China's struggle in the previous decade with SARS, which the current coronavirus has already exceeded in deaths and far exceeded in terms of infections. This article from a New York-based professor of population health sciences may be a good place to start. WARS may be fitting given Chinese President Xi's call for a "people's war" (famous Maoist terminology) against the new disease. In the following, we use WARS, the Wuhan coronavirus and 2019-nCoV interchangeably to denote the same outbreak.]

CHART 1: FEAR OF WARS



Source: CEIC, Sina.com, MUFG Bank

Infections appear on a declining geometric path

The latest data plotted above continue to suggest at this juncture, confirmed plus suspected infections may still be on a declining geometric path. We characterize the initial data more formally below.

Summary of Working Assumptions

Our working assumptions about the coronavirus

In this Bank we are not the economists *per se,* but since foreign exchange views should partly be based on macro views and with WARS the driving theme in FX Markets, we need to spell out working assumptions about the new coronavirus. Though we have tried to make working assumptions judicious, based on study and not alarm, given the rate at which information is rolling in, it is almost certain we will have to revise.

We think this coronavirus is an order of magnitude more severe than SARS

Based on what medical scientists and epidemiologists have told us so far, we suspect WARS **will be worse than SARS – perhaps an order of magnitude worse.** Past studies of the SARS epidemic – which dated from 16 November 2002 (first case) to 5 July 2003 (when the World Health Organization, or WHO, declared SARS contained) – suggested it took -1ppt off of Chinese growth. **We are assuming this time round WARS will be twice as sapping on growth, shaving -1 to -2ppt off China's 2020 growth rate**.

An aggregate demand shock that may shave -1 to -2ppt off China's growth

It's worth pointing out that epidemics like WARS are not aggregate supply shocks (such as an earthquake). There is no rebuilding effect. Instead, they are best understand as aggregate *demand* shocks, because the primary effect is to prevent people from congregating together, which messes up global production and consumption processes as people are quarantined and self-quarantine against gathering together.

WARS will probably peak in late April – early May; some lost services cannot be made up

We assume WARS will peak in late April or early May (when warmer weather returns). Later on in 2020, China's economy will rebound and one of the quarterly growth rates may even surpass anything we've seen in the past few years. But while some production can play catch up in China – this assumes there will be end demand for goods that were expected in January but maybe not delivered till July – in general that is not true for services. While going out with the family to eat may feel great after skipping 20 weekends, most people probably don't want to get together 20 times over a weekend. The same reasoning applies to movies, online games, etc. When you lose service consumption earlier in the year, some of that is going to be gone permanently in 2020.

Currency Market Implications

More frontloaded 1H20 CNY depreciation

We already made initial forecast changes in the February 2020 *MUFG Foreign Exchange Outlook*. For CNY the overall depreciation story continues this year but the profile shifts, with more weakness frontloaded in 1H but a rebound in 3Q.

Infectability

We assume Imperial College projections that 30,000 to 200,000 will be infected

The evidence over the first two months suggest the new coronavirus is far more infectious than SARS. Early epidemiological modeling from London's Imperial College suggested WARS could eventually sicken at least 30,000 and up to 200,000 people worldwide (for SARS, total infections were 8,098). More recently, a team from the University of Hong Kong in *Lancet*, a respected UK medical journal, projected 75,815 people were already infected in the Greater Wuhan area as of 25 January 2020. Other public health pundits in interviews have mentioned up to a million. We will use Imperial College #s for now (adding up latest totals for confirmed+suspected cases already exceed the lower bound of the Imperial College projections). Because the Chinese government has been quicker and more forthright about the onset and spread of this new disease than it had been with SARS (China did not report SARS

to the WHO till 10 February 2003, almost three months after the first case), that will work to reduce ultimate numbers of transmissions. Yet complicating this is the fact China's local government in Wuhan admitted to having allowed **5 million** people to leave the city ahead of Lunar New Year (during the largest annual migration event of the year on earth).

China has been more forthright, but only to a degree

To be clear, China's greater forthrightness this time round appears to have been a matter of degree, as there are increasing reports in *The New York Times*, the *Washington Post* and in the *Financial Times*, all Western press, about cover-ups in the first month that the disease was discovered (December 2019 into the local Party congress in Wuhan during January 2020), culminating in the death of Dr. Li Wenliang, an ophthalmologist who raised alerts about the disease but whose warnings were quashed.

Less infectious than measles, much more infectious than SARS

Besides obviously the travel by potential carriers cited above, epidemiological modeling depends crucially on a parameter called R_0, which is the number of other people a carrier of the novel coronavirus can be expected to infect. Early studies suggested numbers between 2-4 (for comparison, R_0 for SARS was 0.5 and for measles it's between 12-18); the HKU *Lancet* study cited above assumed 2.68.

A shorter duration than SARS

Epidemiological modeling and infectious disease experts have suggested **WARS may peak in late April to early May 2020,** which is a typical pattern after warm weather returns. The most acute phase of SARS took place over about nine months. We assume WARS will have a shorter duration, a direct consequence of the comparatively greater transparency practiced by the Mainland government this time.

Statistical Modeling

Markets thought the second derivative is negative; maybe it's not

As we gather more data of confirmed and suspected infections, we can begin to characterize the data using a simple statistical model that is spelled out in the Appendix. Because recent Markets commentary suggested that risk-on sentiment might have been based on an observation that daily % rates of change of the infected seemed to have been declining (the second derivative is negative), we try to use the data to see if that's indeed the case. From Chart 1 above, it's clear the rates of growth of both confirmed and suspected infections have been declining. The model we run is a simple quadratic in time (measured in days) that allows us to characterize the shape of the arc in the data and whether implied declines will continue.

ESTIMATING WHEN INFECTIONS MAY PEAK

Data Implied Peak Date Based on Estimated Equation (3)		
Date of Final Observation	**Confirmed Infections**	**Suspected Infections**
5-Feb-20	29-Feb-20	14-Feb-20
6-Feb-20	1-Mar-20	16-Feb-20
7-Feb-20	1-Mar-20	17-Feb-20
8-Feb-20	2-Mar-20	18-Feb-20
9-Feb-20	2-Mar-20	19-Feb-20

Source: MUFG Bank, CEIC

Recursive estimation keeps pushing out the day of the peak

What we do with the data as they roll in is to recursively re-estimate equation (3) and see how parameter estimates shift and check if the implied peak date remains stable. **They don't so far, as more data seem to push out the implied peak date.** In particular, despite 9 February 2020 data showing a sharp drop in number of suspected infections, the date of peak suspicions is still pushed out farther. We plan

to continue to update these estimates.

And we'd rather trust the doctors and scientists anyway

Our simple model suggests a peak far earlier than late April or early May, so should we trust our model?

Infections may be slowing down but not peak for a while

Not on your life! We are using this simple model to suggest Markets might want to curb their enthusiasm based on the simple observation that daily % changes are slowing down. Our initial results suggest, even in a crude model, they may be slowing down but not peak for a while. Much more important, given a choice between expert analysis by doctors and infectious disease experts (and *their* models), we'll take their view over ours any day.

Undercounting

Undercounting may be the real problem

There is, in fact, a very logical counterargument against the data so far. As murky as the statistical results above may be, they are really nothing compared with a much more serious potential problem: That of rampant undercounting in Wuhan, Hubei and in other parts of China.

With the shortage of tests kits the culprit

Though in Chart 1 we see a promising slowdown in confirmed and suspected infections, we have reason to suspend judgment. Published reports and some of our communications with onshore China reporters both suggest the supply of 2019-nCoV test kits around the country remains less than needed. Although early isolation might have been done on temperature alone, a practice criticized by public health experts at the time, we assume more recently most of the official suspected cases are now being determined by actual coronavirus test kits. But with kits undersupplied, potentially not all infected cases get counted:

There may not be enough kits to get all the infected into hospital

1/ To be counted among suspect cases, you have to be tested and admitted to hospital or a clinic;
2/ But if you only have a high temperature but are not tested, you won't be able to get into hospital;[1]
3/ So if you only have a high temperature but are not tested, you are most likely self-quarantined at home but not yet in the official suspect pool, <u>even if you do have the coronavirus</u>.

Which means more infections will be discovered later on

That means that while the promising down-arc in Chart 1 could be real, meaning good progress is being made against the outbreak, it could also be a function of the shortage of test kits and isolation procedures in China.

Mortality

Unless they die at home

And if you die at home, you may not be counted among the coronavirus dead, either. (There is anecdotal reports of this happening in Wuhan.)

Sample mortality thus far is far lower than SARS

The most important silver lining in all of WARS has been evidence the novel coronavirus is less deadly than SARS. For SARS, the ultimate mortality rate was 9.6% and in data reported so far, the sample mortality rate for WARS appears to be between 2-3%.

But could be undercounted, too

But we've seen serious discussions by doctors in social media that would put the true mortality rate as (# dead) / (# dead + # recovered), which at pixel time is (909) / (909 + 3300) = 21.6%!

[1] Wuhan still appears to have a shortage of hospital beds despite rapid construction of two new hospitals, both of which went up in days.

A correction for truncation might leave us with a 6% ultimate mortality rate instead of a 3% sample rate

The problem with initial sample data in an outbreak is there is likely a truncation problem – we are not seeing the true distribution of the underlying population in the sample. A business colleague of ours who used to do ABS ratings for Moody's in Asia points out the formal similarity between epidemiological models that try to predict final mortality to the problem of calculating *average life* of a pool of structured securities. In the latter case, the modeler has to apply a scale-up factor to initial sample rates to get a more accurate idea of the final default (mortality) rate (the 9.6% in the case of SARS). She suggested scaling up to maybe 7.5%; we are going to be more optimistic and assume 6% in our working assumptions.[2]

What we mean by an order of magnitude more severe

So if, ultimately, 100,000 people are infected and there is a final mortality rate of 6%, we're looking at 6,000 deaths compared with SAR's 774. This is what we meant by an order of magnitude more severe.

The Economic Implications

We expect a much larger global impact from WARS than from SARS

Past studies of SARS suggested China lost about 1ppt of growth due to SARS. Because this novel coronavirus is a bigger outbreak in terms of infections and deaths and, just as important, because China is much, much more integrated into the world economy than in 2002-03, **we expect WARS to have a much larger global impact.** In 2002, China saw a little more than 20mn domestic resident departures; in 2018, it saw 162mn and the # was likely even higher last year. And in 2002, China was 4% of the world economy; now it's about 17%.

-1 to -2ppt off of China's 2020 growth, with the worst happening now; a 2H20 rebound

For China itself, we posit a range of -1 to -2ppt off of 2020 growth. If we are lucky (partly due to transparency and partly to the draconian measures undertaken all around the world to check this disease), we may finish off at the stronger end of this range. And we should note the overall effect will be a tale of two halves (if we are right about the late April – early May peak), with the worst effects occurring now. Eg, Macau visitor arrivals were down -79%YoY over 24-28 January; unfortunately, we expect many more #s like these. While headline growth in 1H20 may print as much as -2ppt off of 2019 paces (eg, one quarter printing 4.5%), we should see a pretty smart rebound in 2H20 as we did during SARS. One quarter could even show a 7% growth handle.

Closest to China: -0.25 to -0.5ppt; rest of Asia: -0.25ppt; US/EU/UK: -0.1 to -0.2ppt

For the rest of Asia, the East Asian nations immediately in China's orbit should see the biggest impacts, maybe between a -0.25ppt to -0.5ppt drop in growth, with the rest of the region looking at drops of around -0.25ppt. Even in big industrial countries China's slowdown should slow growth. Past work by the Bank of England suggested a 1ppt drop in Chinese growth would knock 0.1ppt off of UK growth, so we assume a WARS episode that shaves between 1-2ppt off of Chinese growth may lead to -0.1 to -0.2ppt less growth in the US, EU and UK.

The Good News; or, All the Ways We Might Be Wrong

As infections mount, this coronavirus does appear very infectious

This novel coronavirus is not that contagious. Some Japanese scientists have suggested this but as the #s of infected grow, this hypothesis seems less plausible. Hong Kong just reported nine people in an extended family coming down with the coronavirus after a New Year hotpot dinner together.

Do lockdowns work!? Weird disparity in death rates

China's Wuhan lockdown works. There's evidence to this, given the incredibly lopsided deaths that are concentrated in Wuhan and Hubei. Frankly we don't know how to explain this, if this is the same disease. Right now Wuhan has 681 deaths out of 16,902 confirmed infections (4%) and Hubei (which includes Wuhan), 871 out of 29,631 (2.9%). The rest of China and the world has 38 deaths out of 10,604

[2] Our colleague also reminded us that for SARS, there were also *over-estimates* of final mortality, including a 15% estimate that was published in *Lancet.*

infections (0.4%). Without even a formal test, the two means (Hubei and the ROW) do not look like they come from the same population.

Possible treatments, but too early to tell

We find a treatment – maybe. There have been isolated reports drugs intended to combat HIV may be having an effect on the coronavirus. Eg, one Zhejiang hospital has claimed it has found a treatment. But WHO has warned against jumping to conclusions.

We are less optimistic about a vaccine; it's probably too late already

We find a vaccine – NOT. The best news among some scientists has been the jettisoning of egos in this crisis. The genetic sequence of the novel coronavirus was shared very quickly, and apparently there has been unprecedented speed in scientific cooperation (which may say more about scientists than speed). That has led to rising hopes of developing a vaccine or a treatment. This video, aired by China state television overseas, expresses these hopes well.

Despite the inroads computer science has made into microbiology

But we have some doubts re vaccines. Most experts seem to feel that even if a vaccine is developed, it's too late for this particular coronavirus. And we point out that 17 years after SARS, there is still no vaccine. Nor is there one for the common cold, another coronavirus-caused disease.

We now trace out some worldwide implications of the novel coronavirus. Some of these implications deserve notes of their own.

Implications for Monetary Policy

Bond markets have priced in easing

It was true the coronavirus news seem to hit financial Markets all at once on Tuesday 21 January 2020. By the end of that week, on a Friday to Friday basis, the Barclays [Lehman] Pan-European Aggregate Index had gained 0.94% for the week and another 0.80% the following week. We think the rally in bonds is a reflection of the likely hit from WARS on global growth, **which means this external shock must have ramifications for all sorts of monetary policy decisions.** Already in Asia we have penciled in two new rate cuts for the Bank of Korea and feel more certain later in the year Chinese authorities will be doing their best to push yields down even farther and faster.

Occupy 2.0 Takes a Long Break But No Help for Carrie Lam

The kids will stay home, but seem madder at Carrie Lam

If it's not obvious by now, the Hong Kong street protests will go into hiatus for a time (the idea of infecting your compatriots and possibly killing them is probably not attractive). But the surprising upshot is that the coronavirus may have hurt SAR Chief Executive Lam even *more* in terms of reducing her popularity (the complaint now is her handling of the public health crisis itself). It is a very striking parallel that SARS hurt Hong Kong's first CE Tung Chee-Hwa's popularity right after a half-million had marched in the streets against introduction of national security education in Hong Kong's schools (which was the last time Hong Kong saw mass protests before Occupy 2.0). Tung's popularity rating before resigning was 32.3%; Lam's popularity rating has sunk to 21.5%.

phase 1 Purchase Commitments *Kaput*

We're not sure whether China can even match 2019 US import levels

If we are right about the degree of Chinese slowing (remember, though, our assumptions may have to be revised), we're not sure China will be able to import as much from the US in 2020 as it did in 2019, much less add the incremental USD200bn it committed itself to do in phase 1. As we'd hoped, US Treasury Secretary Mnuchin has sounded reasonable about China's extraordinary circumstances instead of behaving like a lunkhead, but this bears watching.

The Chinese Public Health System Must Improve

China cannot be a negative externality to the world economy every 10 years

If it had been only SARS, we may regard that episode as a 100-year storm. But having WARS in the subsequent decade means it looks more like a decadal event, and that scale of external risk emanating from China is not bearable for the world. Expect serious efforts among global nations to force China to improve its public health system. That will require expenditures which may reduce Chinese growth (fewer highways and bridges and subways), but may be necessary for China's good standing in the international economy.

A Lack of Compassion for China

China has lost a lot of soft power since 2008

Finally we cannot help but notice how much less sympathy China is drawing from the rest of the world during this natural disaster, compared with the 2008 Sichuan earthquake. **It's a measure of how much less soft power China now enjoys.** Without downplaying another tragedy, there were days over this outbreak when we saw more sympathy for Kobe Bryant than for China. Even if only from a selfish vantage point, China needs to recognize its poor standing in world opinion.

Appendix

The simplest model we could think of to capture initial coronavirus data is

(1) $A_t = A_0 e^{g(t)t}$

where A_t is the # of confirmed infected or suspected infected at time t, with the rate of growth, $g(t)$, itself another function of time

(2) $g(t) = a + bt$

Taking logs on both sides of (1) yields

(3) $\text{Log } A_t = \text{Log } A_0 + at + bt^2$

which is a quadratic in time. Looking at the shape of the initial data in Chart 1, b is likely a negative # (since the curve appears to be concave). A concave function of time will have a unique maximum (peak # of infections) and the quadratic forces the data to decline thereafter, presumably after the coronavirus has been brought under control. The nontrivial root of the time quadratic, $t = -(a/b)$, should be the date of maximum infection. We use least squares to estimate (3) for both confirmed and suspected infections.

Please note this models makes absolutely no sense medically. It's just our shorthand way to describe the data and to see if they support the Market enthusiasm for an early and imminent end to this outbreak. **Unfortunately, we don't think they do.**

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