The Macroeconomics of Pandemics — This Time is Different*

*The views herein draw on the collective wisdom of many scholars. They do not reflect those of the Financial Markets Authority or the Board of the FMA.
Roadmap

❖ Some implications for economic growth
❖ Policy responses
❖ Implications for supply chain management (from an outsider’s perspective!!).
“The pandemic has prompted an anachronism, a revival of the walled city in an age when prosperity depends on global trade and movement of people.”

–Henry Kissinger
Implications for growth
The ferocity and speed of the Covid-19 crisis has been unparalleled.

The annualised rate of decline in global GDP in 2020 Q1 could approach minus 20 per cent, triple that recorded in the worst quarter of the GFC in 2009.

Comparisons with the Great Depression may not be fanciful. Magnitude of shock on track to exceed the Depression. [Paul Romer — unemployment of 30% is plausible].

The Germany economy is expected to shrink by almost 10 per cent in the three months to June, double the size of the biggest drop in the 2008 financial crisis.

World trade will contract by 33%, according to the WTO (compared with 12% during GFC).
But unlike the Great Depression, this economic downturn is unusual in that — following an initial supply shock in Wuhan — the subsequent shock to supply has not emanated from private choices.

- it is a consequence of governments choosing to lockdown the economy so health systems can cope.

Firms and households are not to blame for this crisis, and therefore the economic burden should be shared as widely as possible.

- compensation via the state places the financial burden with society as a whole.
Comparison with the GFC

❖ The GFC led to a permanent reduction in US GDP of 7.5%.

❖ US GDP in 2019 = $22 trillion. So if the Covid shock is of similar size, then reduction in US output per month is $137 billion per month. [John Key — $12 billion/month].

❖ But more likely to be around $400 billion per month. (Permanent reduction could be more akin to 10-20%.)

❖ NZ GDP = $300 billion. So this would be $2-5 billion per month. [John Key — $12 billion/month].
Americans filing for first-time unemployment benefits

Almost 10m jobless claims filed in two weeks, 6.6m in most recent week

Initial US unemployment claims, weekly (thousands)

Source: Refinitiv
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Costs of crisis not equally shared

Coronavirus shutdowns hit middle and low-skilled jobs hardest in US

Cumulative change in jobs since Jan 2007 (millions)

- Change since Jan 2020:
  - High-skilled: -0.26mn
  - Covid-19 pandemic: -1.26mn
  - Middle-skilled: -1.51mn

Employment of middle-skilled had not yet recovered from the financial crisis

Source: Deutsche Bank Research
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Business activity in Europe

Eurozone's services activity has crashed

Purchasing managers' index, below 50= a majority of businesses reporting a contraction

Source: IHS Markit
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Emerging market capital outflows

This is a horrifying financial run on emerging economies

Accumulated non-resident portfolio flows to EMs since indicated date ($bn)

- China scare (Jul 26 2015)
- Taper tantrum (May 17 2013)
- Financial Crisis (Sep 8 2008)
- Covid-19 (Jan 21 2020)

Source: IIF
© FT
Economic recovery in China appears modest
Subindices (Jan 1 2020 = 100)

- **Real estate floor space sales**
  - Jan 1: 100
  - 2019: 100
  - 2020: 41.9
  - 16 Mar: 87.4

- **Power plant coal consumption**
  - Jan 1: 100
  - 16 Mar: 68.6

- **Container freight**
  - Jan 1: 100
  - 16 Mar: 75.0

- **Traffic congestion**
  - Jan 1: 100
  - 16 Mar: 87.4

- **Air pollution**
  - Jan 1: 100
  - 16 Mar: 68.3

- **Box office admissions**
  - Jan 1: 100
  - 16 Mar: 0

* 2019 values at same number of days before/after the lunar new year
Sources: WIND; EntGroup; FT research
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Mainstream expectations (hope!) for economic growth
Even with full recovery, output may return to a lower trend line
Quick vs delayed recovery

real GDP

permanent loss

quick recovery

delayed recovery

time
Delay/lockdown can deepen the permanent loss
The Swedish “experiment”

Sweden’s more relaxed approach means fewer are unemployed

Cumulative unemployment benefit claims (% of working age population)

Source: FT analysis of official figures
© FT
Flattening the curves

- Measures that help solve the health crisis can make the economic crisis worse.
- The economic crisis could be of the order of 10-20% of GDP, and the scale of policy intervention needs to be of that magnitude.
- Isolation has positive externalities for the health system, but negative externalities for the economy!!
Policy responses
Intertwining of aggregate supply and demand

- The initial supply shock (from outbreak in Wuhan) has been magnified. How?
  - The lockdown of advanced country economies has served as an additional supply shock.
  - Agents rationally expect that future productivity growth (and hence future incomes will be lower), weakening aggregate demand.
  - Firms’ investment decisions, in turn, depend on aggregate demand. They cut back on investment which, in turn, generates a reduction in productivity growth.
  - There is a “doom loop” as the initial supply shock is amplified*.

Figure 2: The supply-demand doom loop.

Investment and labor productivity, therefore, tend to be positively related to aggregate demand. These effects can be captured through a microfounded model, as done by Benigno and Fornaro (2018). Here, instead, we simply assume that productivity growth evolves according to

\[ g = l + \bar{g}, \]

(1)

where \( l \) captures the endogenous component of productivity growth. The rationale behind this term is that higher aggregate demand, which is associated with higher employment, leads to higher investment and faster productivity growth. \( \bar{g} \), instead, captures all the factors that can affect productivity independently of demand - such as the spread of the Covid-19 coronavirus. The \( GG \) schedule summarizes the supply side of our simple model.

Figure 2 plots the \( AD \) and \( GG \) schedules. The \( GG \) schedule is, for reasons explained above, upward sloping. The equilibrium is thus determined by the intersection of two upward sloped curves. As usual, this signals the presence of amplification effects.

Let's now go through the macroeconomic impact of a negative supply shock triggered by the coronavirus spread, which we capture by a fall in \( \bar{g} \). As shown in Figure 2, the fall in \( \bar{g} \) makes the \( GG \) curve shift toward the right. If monetary policy holds \( \bar{i} \) constant, the new equilibrium features lower productivity growth and lower employment. What is interesting, is that now a supply-demand doom loop takes place. As before, the initial negative supply shock depresses aggregate demand. But now lower demand induces firms to cut back on their investment, which generates an endogenous drop in productivity growth. Lower productivity growth, in turn, induces a further cut in demand, which again lowers productivity growth. This vicious spiral, or supply-demand doom loop, amplifies the impact of the initial supply shock on employment and productivity growth.

Now monetary interventions aiming at sustaining demand have a multiplier effect - because they reverse the supply-demand doom loop. Suppose that the central bank eases monetary policy, by

\[ ... \]
Policy responses

- Monetary policy is at the zero lower bound everywhere.
- So fiscal policy has had to do the “heavy lifting”.
- Monetary policy is now about (unlimited) quantitative easing (and monetary financing of fiscal deficits).
- Since governments have to borrow heavily to finance in this crisis, central banks will be buying bonds directly.
  - bond purchases may not be inflationary because it substitutes for deficient spending by firms and households in this crisis.
  - problem with inflation will only arise if the government determines how much money gets printed (fiscal dominance). And provided strong institutions (e.g. the UK’s independent MPC) can safeguard central bank independence.
QE in the UK

The BoE has never sold the gilts it has bought under quantitative easing

BoE cumulative asset purchases (£bn)

Source: Bank of England
© FT
Suppose agents are pessimistic about future productivity growth. But, because of the ZLB, the central bank cannot drop interest rates lower to counteract the drop in demand.

So employment and activity drop. Firms react by cutting investment, which negatively affects productivity growth.

The initial pessimistic expectations of weak growth become self-fulfilling.

The loop only happens if the fundamentals of the economy are sufficiently weak in the first place.
Which policy interventions can prevent a stagnation trap from taking place? There is little that conventional monetary policy can do, since the policy rate is constrained by the zero lower bound. Luckily, fiscal policy - and in particular policies that sustain investment - can be of help. Imagine that the government can implement policies to sustain investment, so that now the GG equation becomes

\[ g = l + \bar{g} + s, \]

where \( s \) captures government policies aiming at increasing investment. A higher \( s \), for instance, can be interpreted as a rise in subsidies to firms' investment or to an increase in public investment. Both policies, in fact, lead to a rise in aggregate investment - and therefore in labor productivity growth - for given aggregate demand.

Now suppose that the government reacts to the coronavirus outbreak by increasing \( s \). As can be seen in the right panel of Figure 3, this policy induces an upward shift of the GG curve, from \( GG_0 \) to \( GG_00 \). If this shift is large enough, the stagnation trap equilibrium disappears. In economic terms, this means that only a sufficiently aggressive policy intervention can rule out stagnation traps. A timid intervention, in fact, will not do the job (think about a small upward shift of the GG curve). Taking stock, monetary policy might not be enough to maintain the economy at full employment following the coronavirus outbreak. Monetary policy, in fact, might need to be supplemented with aggressive fiscal policy interventions aiming at sustaining investment.

We conclude by reiterating that in this note we have focused on a pessimistic scenario. Hopefully, the coronavirus will cause just a short-lived negative supply shock. In this case, agents' expectations about future growth will not be greatly affected, and the impact on aggregate demand will be small. But unfortunately, at present we cannot rule out more pessimistic outcomes, in which the supply disruption caused by the virus is going to be severe and protracted. If this possibility materializes, this simple model suggests that drastic policy interventions - both mon-

\[ AD \]

\[ GG \]

\[ GG' \]

\[ GG'' \]

\( l'' \)

\( l' \)

\( l \)

\( g \)

\( g' \)

\( g'' \)

\( g''' \)

\( l'' \)

\( l' \)

\( l \)

Figure 3: Stagnation traps and fiscal policy.
Since monetary policy is now constrained by the ZLB, fiscal policy has to come to the rescue. It works by sustaining (subsidising) firms’ investment.

This allows the GG curve to shift up, eliminating the bad equilibrium.

But the intervention cannot be a timid one.

And, it has to be credible.
Dread risk

- Stagnation traps can be compounded by behavioural reactions by economic agents.
- The GFC appears to have induced agents to systematically over-estimate the probability of tail risks re-occuring.
  - scarring effect on risk-taking and a race to safety.
  - firms have cut back on investment and innovation. “Paradox of Thrift”
  - The demand for safe assets has over-whelmed supply.
- Asymmetric responses of agents to news flow — good news gets banked (repairing balance sheets); bad news induces cuts in spending and risk-taking
“The aim of policy should not be to boost demand – more people shopping would just aggravate the health crisis after all – but rather to ensure that the present hiatus in economic activity does not lead to lasting damage to the supply potential of the economy and a lower level of activity that persists after the resolution of the health crisis.

That means avoiding perfectly good businesses being needlessly driven into bankruptcy, and the associated destruction of jobs and livelihoods. In essence, the state needs to play the role of ‘insurer of last resort’…”

–Professor Sir Charlie Bean, Former Deputy Governor of the Bank of England
- State loans or credit guarantees for firms; direct grants to firms unable to access banks.
- Bailout funds for large firms
- Tax deferrals
- Debt repayment holidays
- Income subsidies for workers. Care — we should be targeting public funds at involuntarily idle workers through the crisis (not those with salaries).
Advanced economies have fiscal space.

- low safe interest rates imply that higher levels of debt are sustainable and that the welfare cost of higher debt for future generations may be smaller.

- interest rates are likely to remain low. Precautionary saving is likely to be higher, there will be dread risk stifling risk-taking, and uncertainty will hamper investment. So the long-run neutral rate will be low for long.
Corporate credit runs and central bank backstops

- The Fed has stepped into the repo market to purchase Treasuries.
  - Repo market is a short-term borrowing market in which investors borrow cash for short periods in exchange for collateral (US Tbills).
  - By exchanging Treasuries for cash, banks are able to meet the demand of companies trying to stockpile $US in the face of a liquidity crisis.
- But there is always a risk that a spike in downgrades and corporate defaults could transform a liquidity crisis into a solvency crisis and trigger banking problems.
Implications for EMEs

❖ Even a relative quick exit by China and advanced economies will not avert crises in many EMEs.

❖ Commodity prices have declined, FX reserves are low, and debt burdens considerable. They do not have fiscal space.

❖ Large scale sovereign debt reduction and restructuring, along with international versions of some of the measures being considered within advanced economies may be needed.
Lessons from epidemiology

- During an epidemic, the percentage of infectives (population who are sick and spreading the disease) follows a hump shaped pattern.

- The reproductive rate is $R_0 = \frac{\beta S}{\nu}$.

- Pathogens with high contagion (the numerator) and low recovery rates (denominator) pose the greatest threats.

- Limiting contact (lowering the numerator) via social distance, and better hygiene (increasing the denominator) limit the spread of disease and “flattens the curve”.

- If reproduction rate $<1$, the epidemic dies out. $R_0 = 1$ is the “tipping point”. 
We are facing a joint health and economic crisis of unprecedented proportions in recent history. I want to start by acknowledging that containment of the pandemic is the utmost priority.

Figure 1 summarizes how public health experts approach the problem.

Figure 1: Flattening the Pandemic Curve

In the short run, the capacity of any country's health system is finite (capacity of Intensive Care Units, number of hospital beds, number of skilled health professionals, ventilators…). This puts an upper bound on the number of patients that can be properly treated, at any given point in time and is represented by the flat line in the Figure. Unchecked, and given what we know of the transmission rate of the coronavirus, the pandemic would quickly overwhelm any health system, leaving many infected patients with deteriorating pulmonary conditions without any treatment. The fatality rate would surge. The threat is almost beyond comprehension. With a 2% case fatality rate baseline for overwhelmed health systems, and 50% of the world population infected, 1% of the world population—76 million people—would die. This scenario corresponds to the red curve in Figure 1.
Suppose $R_0 = 2.5$. So on average an infected person will infect 2.5 people tomorrow.

Let $\phi$ be the fraction of infected people in isolation. This will directly reduce $R_0$. So $R'_0 = (1 - \phi)R_0$.

If $\phi = 0.7$ then $R'_0 = 0.75$, which is reliably below 1. So the epidemic dies out.

How can we get $\phi = 0.7$?

*These back of the envelope calculations are due to Paul Romer.*
Testing, testing, testing

- Let $t =$ fraction of population tested each day (at random)
- Let $l =$ # days in isolation
- Let $n =$ false negative rate, i.e. catch $1-n$ of infected people via tests.

$$\phi = t(1 - n)l.$$ 

- If $t=0.07$, $n=0.3$, $l=14$, then $\phi = 0.69$.
- So we need to test 7% of population each day.
- Germany — testing 350,000 per week.
Implications for supply chain management
Nature of shock to supply chains

- In the past, shocks to supply chains have been one-off events (e.g. Japanese tsunami), viewed as a temporary disturbance to a well-established business model, built on the assumption that globalisation is here to stay.
- The current shock to supply chains is likely to be persistent. The Sino-US trade conflict and the post-Covid world could look very different.
- Shock also highlights excessive reliance on suppliers located in China.
  - 300 of the world’s top 500 companies have facilities in Wuhan.
  - This reliance was the source of the initial supply shock.
Reimagining supply chains

- Businesses may be forced to rethink their global value chains. These chains were shaped to maximise efficiency and profits.
  - Just-in-time may be the optimal way to produce a highly complex item (e.g. a car).
  - But the shock exposes the disadvantages of a system that relies on all the elements working like clockwork.
- Businesses will be forced to diversify their supplier base to hedge against disruptions to trade policy, particular regions, or particular producers.
- This means building in redundancy and moving away from holding near-zero inventories. Supply chain fragility will become a key concern, not just cost.
- Adaptation will be the name of the game.
Parallels with finance

❖ Supply chains in the current crisis are not so different from payment chains in the GFC.

❖ The real economy presumption that additional inventories can be sourced from third party wholesale suppliers at adjustable prices as and when demand dictates is akin to the banking sector’s presumption that liquidity can always be sourced from wholesale markets.

❖ But the real economy does not have a lender of last resort to conjure up toilet paper at the stroke of a keyboard when there are runs on resources!
Lessons from macro-prudential policy

❖ Just as policymakers have sought to improve the resilience of banks post-GFC by mandating changes, there may be implications for firms:

❖ In many countries, energy sector is mandated to keep emergency buffer supplies on hand — equivalent of a capital buffer for banks.

❖ Companies could be mandated to keep depots with additional supplies of real resources (e.g. hand sanitiser) on hand. Or mandated to keep some share of total supply chain production capability entirely domestically.

❖ Manufacturers could be mandated to run adaptable production lines that can switch from non-essential to essential goods in emergencies.
“Nations cohere and flourish on the belief that their institutions can foresee calamity, arrest its impact and restore stability....

...When the Covid-19 pandemic is over, many countries’ institutions will be perceived as having failed. Whether this judgment is objectively fair is irrelevant. The reality is the world will never be the same after the coronavirus....

....The historic challenge for leaders is to manage the crisis while building the future. Failure could set the world on fire.”

–Henry Kissinger
Thank you !