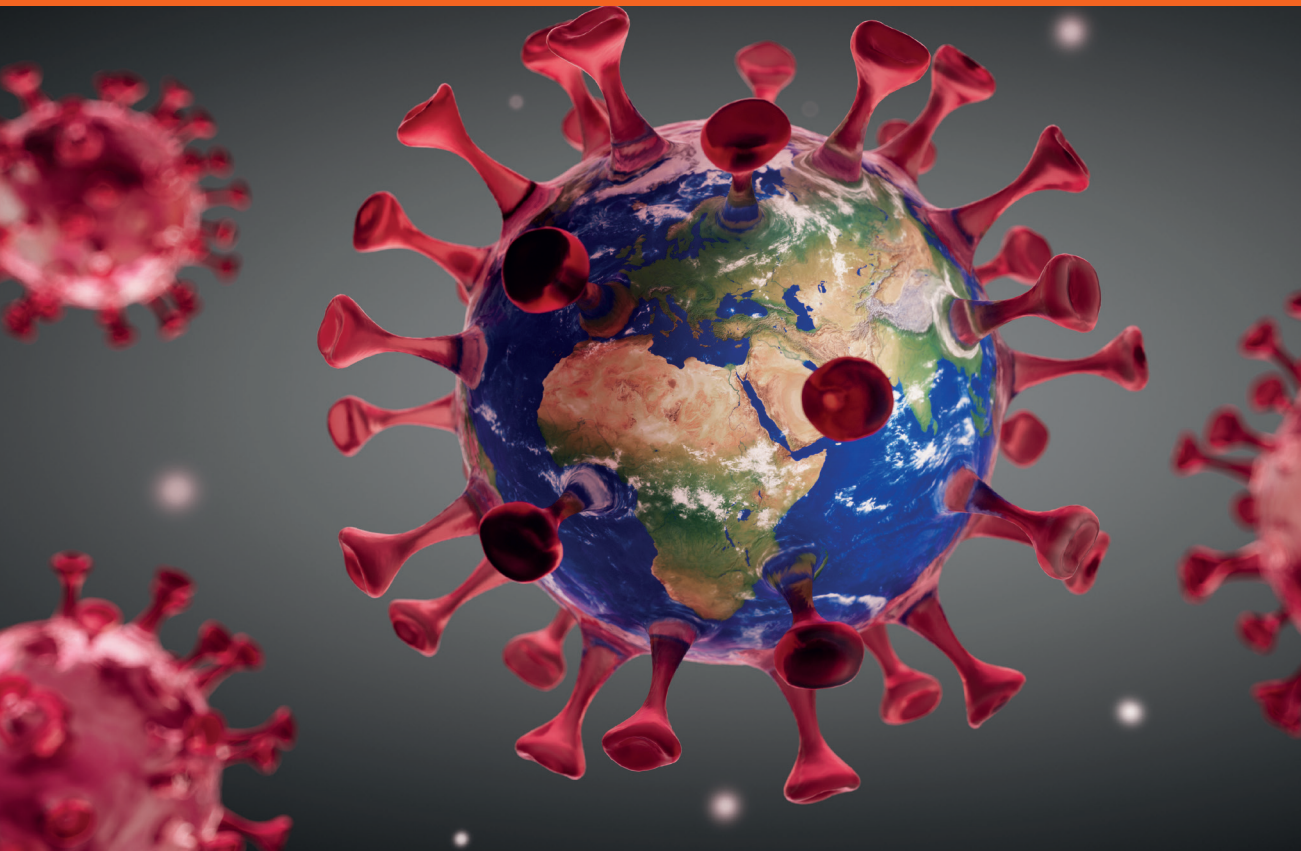


Economics in the Time of COVID-19

Edited by Richard Baldwin
and Beatrice Weder di Mauro



A VoxEU.org Book

CEPR Press

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Introduction

Richard Baldwin and **Beatrice Weder di Mauro**

Graduate Institute, Geneva and CEPR

COVID-19 is spreading human suffering worldwide; that is what we should all be focused on. But we are not doctors. We are economists – and COVID-19 is most definitely spreading economic suffering worldwide. The virus may in fact be as contagious economically as it is medically.

Joining the OECD's dire growth forecast of 2 March 2020, the European Commission said on 4 March 2020 that both Italy and France are at risk of slipping into recession, and the IMF said it sees "more dire" possibilities ahead for the global economy.

This book is an extraordinary effort for extraordinary times. On Thursday 27 February, we emailed a group of leading economists to see if they'd contribute to the effort. The authors responded and the eBook came together literally over the weekend (the deadline for contributions was Monday 2 March 2020). The eBook is a testimony to the power of collaboration in a network that has the size, speed, flexibility, and talent of CEPR.

The key *economic* questions addressed in the book are: How, and how far and fast, will the economic damage spread? How bad will it get? How long will the damage last? What are the mechanisms of economic contagion? And, above all, what can governments do about it?

Extraordinary times

Just six weeks ago, the world economy seemed well on the way to a nice recovery; trade and political tensions were seen as "not so bad", growth projections were rosy, and financial markets were cheery. Now all bets are off. As COVID-19 spreads around the globe, it has become clear that it has the potential to derail the world economy.

The size and persistence of the economic impact is unknowable. Like a healthy person who catches the seasonal flu, suffers a nasty but short-lived discomfort, and is quickly back to full power, the crisis could be short and sharp. Such a ‘V-shaped’ hit seemed likely when COVID-19 was essentially a Chinese problem and China was dealing with it forcefully. Times have changed.

While a short-and-sharp crisis is still possible, it’s looking less like the most likely outcome. The disease is spreading rapidly in dozens of countries. Three chapters in the eBook put numbers to this, and we’ll summarise those below, but the bottom line is that while there is too much uncertainty to be certain about outcomes, it is clear that this economic shock could cause lingering pain and perhaps leave deep scars – far larger than the other post-war pandemics (see Box 1 for a list).

The shock hits G7 plus China

This pandemic is different, economically speaking. Previous post-war pandemics (Box 1) hit nations that were – at the time – far less economically dominant. And those pandemics were far smaller; the number of COVID-19 case is already eight or nine times larger than the number of SARS cases. At least as important is one sobering fact: this time, the hardest-hit nations include the G7 plus China (see Table 1).

Medical data changes hourly, but as of 5 March 2020, the ten nations hit hardest by COVID-19 is almost identical to the list of the ten largest economies in the world (Iran and India are the exceptions). The US, China, Japan, Germany, Britain, France, and Italy are all in the top-ten most affected by the disease. While China is by far the hardest hit, the last few days have seen an exponential growth of cases in the G7 economies. Taking just the US, China, Japan, Germany, Britain, France, and Italy, they account for:

- 60% of world supply and demand (GDP)
- 65% of world manufacturing, and
- 41% of world manufacturing exports.

To paraphrase an especially apt quip: when these economies sneeze, the rest of the world will catch a cold.

- These economies – especially China, Korea, Japan, Germany and the US are also part of global value chains, so their woes will produce ‘supply-chain contagion’ in virtually all nations.

Table 1 Large economies and COVID-19 (updated 29 February 2020)

	GDP	Manufacturing	Exports	Manufactured exports	COVID-19 cases	COVID-19 deaths
US	24%	16%	8%	8%	159	11
China	16%	29%	13%	18%	80,410	2,991
Japan	6%	8%	4%	5%	331	6
Germany	5%	6%	8%	10%	262	-
UK	3%	2%	2%	3%	85	-
France	3%	2%	3%	4%	285	4
India	3%	3%	2%	2%	28	-
Italy	2%	2%	3%	3%	3,089	107
Brazil	2%	1%	1%	1%	4	4
Canada	2%	0%	2%	2%	34	-

Sources: World Bank World DataBank, FT COVID dashboard (<https://www.ft.com/content/a26fb7c-48f8-11ea-ach3-955839e06441>)

This pandemic is different in another way.

Manufacturing sector gets a triple hit

The manufacturing sector is likely to get a triple hit.

1. Direct supply disruptions will hinder production, since the disease is focused on the world's manufacturing heartland (East Asia) and spreading fast in the other industrial giants – the US and Germany.
2. Supply-chain contagion will amplify the direct supply shocks as manufacturing sectors in less-affected nations find it harder and/or more expensive to acquire the necessary imported industrial inputs from the hard-hit nations, and subsequently from each other.
3. There will be demand disruptions due to (1) macroeconomic drops in aggregate demand (i.e. recessions); and (2) wait-and-see purchase delays by consumers and investment delays by firms.

Manufactured goods, after all, are – on the whole – ‘postpone-able’ and thus more susceptible to ‘sudden stop’ demand shocks, as we saw in the Great Trade Collapse of 2009. Of course, the service sector in all affected countries are hit hard – as restaurants and movie theatres empty out – but it may well be manufacturing that takes the biggest hit.

Data are already reflecting these supply shocks. The February 2020 read out on China's key index of factory activity, the Caixin/Markit Manufacturing Purchasing Managers' Index (PMI), showed its lowest level on record. “China's manufacturing economy was impacted by the epidemic last month,” said Zhengsheng Zhong, chief economist at CEBM Group. “The supply and demand sides both weakened, supply chains became stagnant.” While China's workforce is gradually returning to work, the Purchasing Managers Indices from across East Asia are showed sharp declines in production, especially in South Korea, Japan, Vietnam, and Taiwan.¹

¹ See Japan Times coverage of the PMI's at <https://www.japantimes.co.jp/news/2020/03/02/business/asian-factories-china-pmi/#.Xl4HA6hKjMw>.

Box 1 Recent history of pandemics

The 20th century witnessed two pandemics since the historic ‘Spanish Influenza’ of 1918: the ‘Asian flu’ of 1957 and the ‘Hong Kong flu’ of 1968. The 21st century has seen four pandemic outbreaks: N1H1 in 2009 (‘bird flu’), Severe Acute Respiratory Syndrome (SARS) in 2002, Middle East Respiratory Syndrome (MERS) in 2012, and Ebola which peaked in 2013-14. This box reviews the timelines and mortality of these epidemics.

Asian flu (H2N2): The Asian influenza originated in the Chinese province of Yunan at the beginning of 1957. The disease reached Singapore in February 1957 and spread to Hong Kong in April 1957. It then spread in the Southern Hemisphere, reaching India, Australia and Indonesia in May, before arriving in Pakistan, Europe, North America and the Middle East in June. South Africa and South America, New Zealand and the Pacific Islands were affected from July, while Central, West and East Africa, Eastern Europe and the Caribbean were reached in August.² This first wave peaked towards the end of 1957 and affected mostly school children, young adults and pregnant women. A second wave arrived in 1958, hitting several regions including in Europe, North America and Japan, with this one tending towards affecting the elderly.

The estimated number of deaths is not precise, but the consensus figure is around 1.1 million deaths worldwide.³ Estimates for the mortality rate (deaths as a share of cases) are likewise imprecise but range between one in 4,000 and less than 0.2%. National death estimates are not widely available, but in the US it was between 80,000 and 110,000; in England and Wales, estimates put it around 6,000.⁴

Hong Kong flu (H3N2): The Hong Kong influenza was recorded for the first time in Hong Kong on 13 July 1968; 500,000 Hong Kong residents were infected in the first six months (15% of the population).⁵ By the end of July, the outbreak reached Vietnam, Singapore, and started spreading globally, reaching India, the Philippines, Australia, and Europe by September 1968. It entered California via troops returning from the Vietnam War. It ultimately led to about 33,800 American deaths.⁶ The disease reached Japan, Africa and South America by 1969 (Starling 2006).

2 See Potter (2001).

3 WHO (2009) reports that according to the source, it is possible to find estimates up to 4 million deaths worldwide.

4 See estimates at https://www.globalsecurity.org/security/ops/hsc-scen-3_pandemic-1957.htm

5 See Starling (2006).

6 See <https://web.archive.org/web/20090331065518/http://www.pandemicflu.gov/general/historicaloverview.html>

According to the CDC, H3N2 kill about a one million people worldwide, most of them over 65 years old. According to the US Department of Health and Human Services, the virus peaked worldwide in December 1968.

2009 Avian flu (N1H1): In 2009, a new pandemic flu emerged – the first in 40 years. The first case was detected in California in April 2009; it was declared over by the World Health Organization (WHO) in July 2010. A detailed timeline is provide by the European Centre for Disease Prevention and Control (ECDC).⁷ After the first case was detected in California, it was recognised in Mexico only a few days later. Two days after that, it reached Europe with the first reported cases in Spain and Britain. The WHO Director General announced a world pandemic state on the 11 June 2009, about two months after the first case.

The CDC estimates that between 151,700 and 575,400 people died worldwide (0.001-0.007% of the world population). The total number of cases in 2009 was highest in the US, Mexico, Canada, and the UK. The number of deaths was the highest in Mexico and the US.

Severe Acute Respiratory Syndrome (SARS): SARS is a viral disease originated by the SARS coronavirus at the end of 2002 in China; WHO was informed about the outbreak in February 2003. By the end of March 2003, 210 suspect and probable cases of SARS were reported around the world, starting from Toronto.⁸ Between November 2002 and July 2003, 8,096 cases were reported with 774 of these leading to death. SARS had a high mortality rate of 9.6%, but it was far less contagious than previous pandemics. Most cases were in China (5,327) and Hong Kong (1,755), where the fatality rates were 7% and 17%, respectively; Taiwan and Canada were the next hardest hit with 346 and 251 cases and mortality rates of 11% and 17%, respectively.

Middle East Respiratory Syndrome (MERS): MERS is a viral respiratory disease caused by a coronavirus (MERS-CoV) which has been found in dromedary camels in several countries.⁹ The first outbreak was identified in Saudi Arabia in 2012 and subsequently spread to 27 countries: Algeria, Austria, Bahrain, China, Egypt, France, Germany, Greece, Iran, Italy, Jordan, Kuwait, Lebanon, Malaysia, the Netherlands, Oman, Philippines, Qatar, Korea, Thailand, Tunisia, Turkey, United Arab Emirates, UK, the US, and Yemen. However, it was highly concentrated in

7 See <https://www.cdc.europa.eu/en/seasonal-influenza/2009-influenza-h1n1-timeline>

8 A detailed timeline of the evolution see https://www.who.int/csr/media/sars_waha.pdf?ua=1.

9 See [https://www.who.int/en/news-room/fact-sheets/detail/middle-east-respiratory-syndrome-coronavirus-\(mers-cov\)](https://www.who.int/en/news-room/fact-sheets/detail/middle-east-respiratory-syndrome-coronavirus-(mers-cov))

Saudi Arab (more than 80% of the cases). All cases identified outside the Middle East were people who were infected in the Middle East. The disease is highly lethal, with the WHO estimating that about 35% of reported patients died.

Ebola Virus Disease (EVD): EVD is a fatal illness in human, with an average fatality rate of around 50% (ranging from 25% to 90% according to the waves of outbreak; see WHO.int for details). The first outbreak was identified in 1976 in in the Democratic Republic of Congo and Sudan, where the mortality rate was 88% and 53%, respectively, with approximately 300 cases in both states. The second wave was in 2014-2016, starting in West Africa, and it was the largest one since its discovery in 1976 both in terms of cases and deaths. This outbreak spread across states starting in Guinea with 3,811 cases and a mortality rate of 67%, then moving to Sierra Leone, with 14,124 cases and a mortality rate of 28%, and Liberia, with 10,675 cases and a mortality rate of 45%. The most recent outbreak of 2018-2019 started in the eastern Democratic Republic of Congo, and as of now there are 54 cases with a mortality rate of 61%.

Likely nature of the medical shock

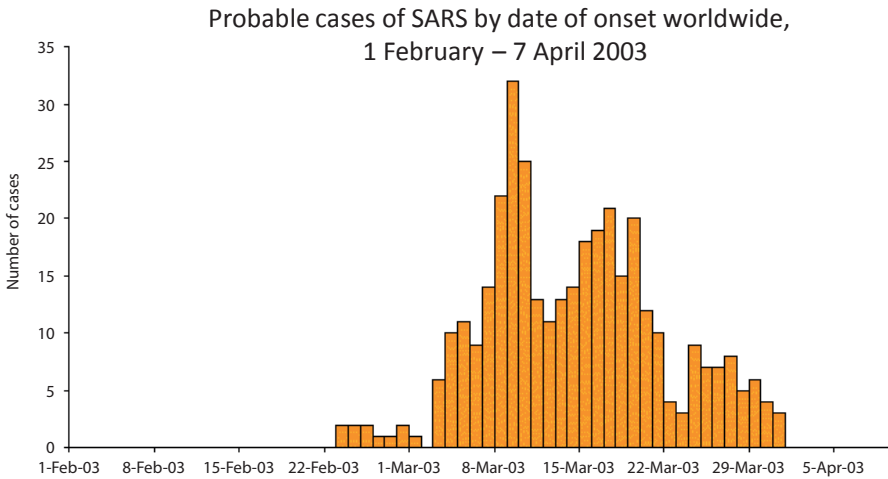
We do not have to be epidemiologists to understand the basics of epidemiology. Today, all well-informed economists should have some idea of the dynamics of spreading diseases. Times of fear are also times of rumours and misinformation; knowledge is the antidote.

Box 2 outlines the maths of the simple, well-known ‘SIR model’ of epidemics. The maths will be familiar to most economists, but the basic logic can also be rendered using an example.

Figures 1a to 1c are known as epidemiologic curves. The sharply rising part of this bell-shaped curve reflects the fact that each infected person infects more than one other person, so the percentage of the population that is infected accelerates at first, but the percentage of the population susceptible to infection remains high. The number of new cases eventually slows as there are fewer people to infect and a constant stream of people become non-infectious (they recover or die).

SARS, the disease depicted in the Figure 1a, was rather deadly but not very infectious – very unlike the seasonal flu, which is highly infectious but not very deadly. In the US, for example, the CDC reports that during the ongoing flu season (October 2019 – present), over 30 million people have fallen ill from the seasonal flu with over 300,000 hospitalisations. But given the low mortality rate (less than one in a thousand), few have died (the estimate is 18,000 to 46,000 deaths).¹⁰

Figure 1a SARS: Example of a typical evolution on new cases (epidemiologic curve)



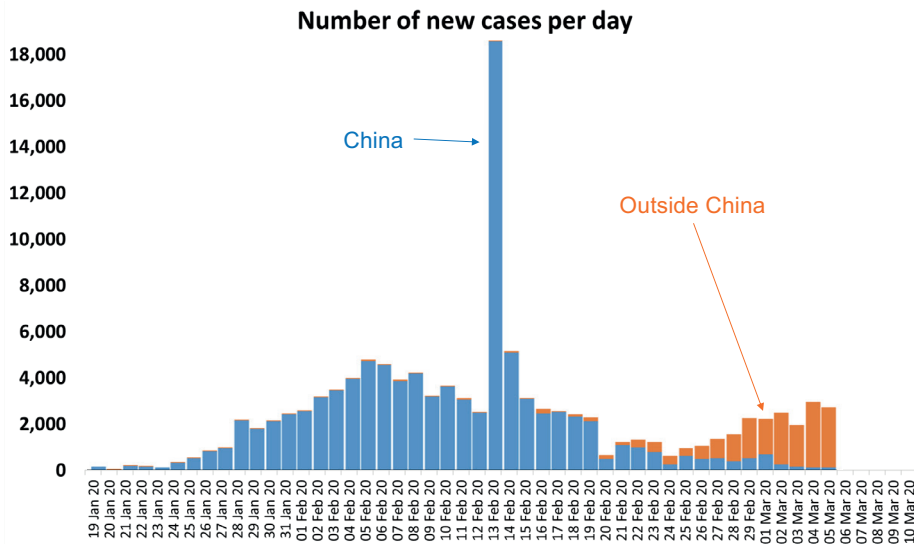
Source: WHO.int (https://www.who.int/csr/sarspicurve/2003_04_08/cn/index1.html)

COVID-19, it seems, is in between SARS and the flu on both dimensions; preliminary medical studies find that COVID-19 is “less deadly but more transmissible than SARS”.¹¹ The epidemiologic curve as of 5 March 2020 for the world is shown in Figure 1b. Here we see a clear twin peak pattern caused by the virus’ international spread. Figure 1c zooms in on the non-China cases, where it is clear that the rest of the world is in an accelerating phase.

¹⁰ See <https://www.cdc.gov/flu/about/burden/preliminary-in-season-estimates.htm> .

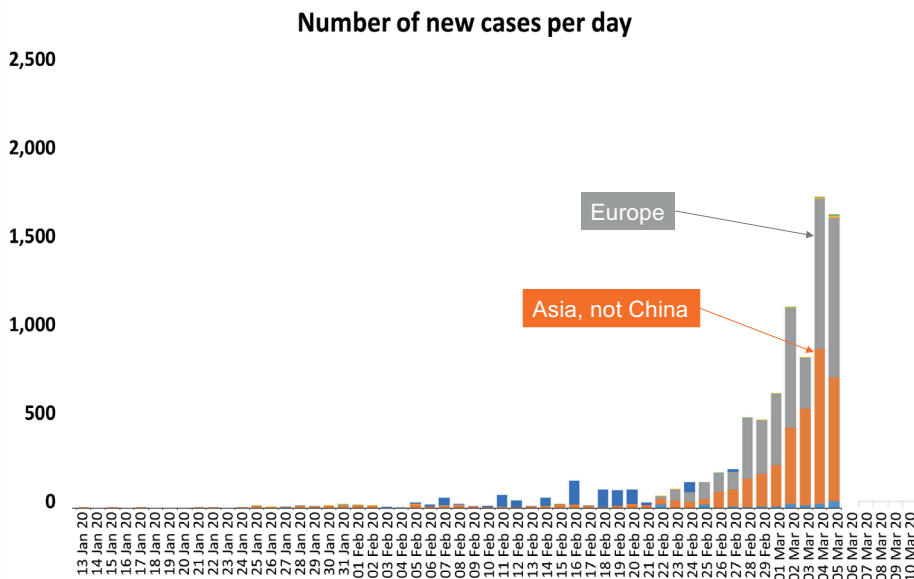
¹¹ See <http://www.cidrap.umn.edu/news-perspective/2020/02/study-72000-covid-19-patients-finds-23-death-rate>

Figure 1b COVID-19 epidemiologic curve, worldwide



Source: ECDC (<https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases>)

Figure 1c COVID-19 epidemiologic curve, outside China



Source: ECDC (<https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases>)

Box 2 Simple maths of epidemics

Epidemiologists have mathematical models for disease spread that use tools that will be familiar to economists. The most famous is a rough-and-ready model of unhindered transmission called the SIR model (developed in 1927). The first bold assumption is that the population can be classified into three categories: Susceptible to infection, Infectious, and Recovered (and thus immune). SIR is an acronym of these group labels.

Making the bold assumption that all infectious and susceptible people are equally likely to meet, the number of interactions is the stock of susceptible people, S , times the stock of infectious people, I , per period (the number of days during which an infected person remains infectious). If the transmission rate/probability is 'beta', the number of new cases is beta times S times I . Of course, each new infection makes the infectious group larger and the susceptible group smaller. Additionally, the size of the I group falls as people get better at the rate r (recovered people are neither infectious nor susceptible).

Plainly, this dynamic leads to a logistic-like rise in the stock of affected persons as shown in Figures 1a, b and c.

How many people get the disease in the long run? Simple maths show that the steady-state stock of never-infected people (i.e. susceptible) is S' , where $S' = \exp[-(1-R_0)S']$ and R_0 is the famous 'reproduction rate', i.e. the number of people who catch it from an average infected person.¹² For example, if R_0 is two, then eventually 80% of the population is infected in an uncontrolled epidemic. The current estimate for COVID-19 is between two and three;¹³ for the seasonal flu the number is about 1.3 (R_0 for the flu is low partly due to the existence of a vaccine).¹⁴

Dr Syra Madad, who runs preparedness efforts for NYC Health and Hospitals, said: "This particular virus seems like it is highly transmissible... I think that it is certainly plausible that 40–70% of the world's population could become infected with coronavirus disease, but a large number of cases are [expected to be] mild."

12 COVID-19's R-nought is estimated to be

13 See [https://www.ijidonline.com/article/S1201-9712\(20\)30091-6/fulltext](https://www.ijidonline.com/article/S1201-9712(20)30091-6/fulltext)

14 See <https://www.cdc.gov/flu/about/burden/preliminary-in-season-estimates.htm>

Public health responses

Controlling the epidemic means ‘flattening the epidemiologic curve’. This is done by slowing the rate of infection by, for example, reducing person-to-person contact overall via work and school closures and travel bans (‘social distancing’), and by removing infected people from the population either by curing them or quarantining them.

A flatter curve saves lives directly (fewer get ill and so fewer die) and indirectly since it avoids bottlenecks in the healthcare system that typically result in suboptimal treatment.

A desire to flatten the curve are exactly why governments around the world are taking what might seem like extreme steps. The harsh reality is that we have no 21st century tools to fight COVID-19. There is no vaccine or treatment. All we have is the methods that were used to control epidemics in the early 20th century. Those, as we shall see, tend to be very economically disruptive.

Likely nature of the economic shocks

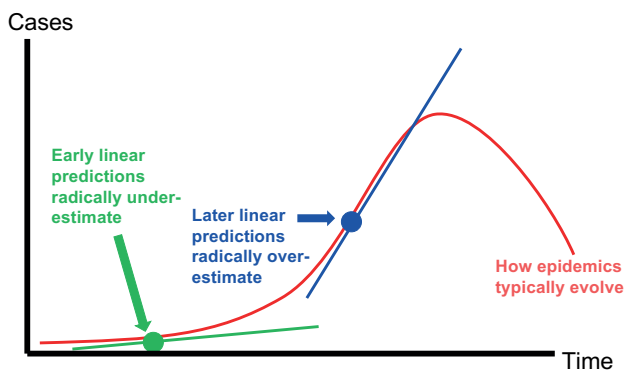
When it comes the economic shocks, it is important to distinguish three sources – two of which are tangible.

- First are the purely medical shocks – workers in their sickbeds aren’t producing GDP.
- Second is the economic impact of public and private containment measures – things like school and factory closures, travel restrictions, and quarantines.
- The third is literally ‘all in our heads’.

Belief-based economic shocks

Individual behaviour depends upon beliefs, and these are subject to the usual cognitive biases; consider Figure 2.

Human brains evolved in a walking-distance world, where future increments could reasonably be predicted by past increments. Using increments to predict increments is ‘straight-lining the future’ (i.e. linear approximation). It is natural, for example, to make guesses on the *number* of future COVID-19 cases based on the number of new cases that appeared in the recent past. This can lead to grave mistakes.

Figure 2 Mistakes from straight lining the future

Source: Authors' elaboration.

In Figures 1a to 1c, a linear prediction made during the early days of the epidemiologic curve would radically *under*-estimate the spread of the disease. A linear projection made later would radically *over*-estimate the severity of the outcome. It is easy to think that panic could arise when analysts in the media switched from under-estimating to over-estimating.

- As Michael Leavitt, ex-head of the US department of Health and Human Services, put it: “Everything we do before a pandemic will seem alarmist. Everything we do after will seem inadequate.”

The psychological, or beliefs-based elements of the shocks are also founded, in part, on the beliefs and actions of others. When beliefs are based on others' beliefs, multiple equilibriums are likely. There can be good and bad equilibrium – and very ‘nonlinear dynamics’ in transition. If everyone trusts the authorities to do the right thing, people may not rush out to hoard hand-sanitizer since they believe no one else will. But a mad scramble is likely if many think others will hoard. If beliefs switch from the good to the bad equilibrium, due say to loss of confidence in their government's ability to contain the spread, the result can be chaotic.

Or to put in more directly, beliefs that depend upon others' beliefs can produce herd behaviour and panic – just as it so often does in economic settings ranging from bank runs to panic buying of toilet paper.

The supply-side shocks are more tangible.

Supply-side shocks

The direct supply-side impact of human reactions to the virus are obvious and abundant. Authorities and firms in several nations have shuttered workplaces and schools. Japan presents clear and early examples.

After sporadic reports of COVID-19 infections, many large Japanese companies ordered their employees to work from home in late February. This practice is spreading rapidly. Ford Motor Company banned all travel on 3 March 2020 after two of its workers tested positive, and many firms are following suit.

- From an economic perspective, these closures and travel bans reduce productivity directly in a way that is akin to temporary drops in employment.

The size of the resulting output contraction may be attenuated today thanks to digital technology and cloud-based collaborative software and databases. These didn't exist when, for example, the SARS pandemic struck nearly two decades ago. But remote work is not a panacea. Not all tasks can be performed remotely even now. Human presence on site is required, especially to handle tangible goods. One Japanese manufacturer of health care products, Unicharm, decided to order remote working for all its employees, but workers at production factories were excluded from this order so they could meet growing demand for medical masks.

Other public health measures aimed at slowing the spread – like school closures – temporarily reduce employment, indirectly, as workers have to stay at home to look after children. Japan closed all schools for a month on 27 February 2020; Italy followed suit on 4 March 2020, and this trend is likely to accelerate since child-to-child infection is a major transmission vector in, say, the seasonal flu.

People staying away from work to tend to sick relatives is another indirect, temporary employment reduction. The same type of shock arises from the now common policy of imposing quarantines on the family of infected people, and those they have come in contact with. The severity of these shocks are amplified when they concern health workers. For example, a hospital in the Japanese prefecture with the largest number of COVID-19 patients was forced to stop accepting outpatients due to absent nurses (who stayed home to take care of their children).

Data are already reflecting these supply shocks. The February 2020 read out on China's key index of factory activity, the Caixin/Markit Manufacturing Purchasing Managers' Index (PMI), showed its lowest level on record. "China's manufacturing economy was impacted by the epidemic last month," said Zhengsheng Zhong, chief economist at CEBM Group, a Caixin subsidiary. "The supply and demand sides both weakened,

supply chains became stagnant.” While China’s workforce is gradually returning to work, the PMI’s across East Asia are showed sharp declines in production, especially in South Korea, Japan, Vietnam, and Taiwan.¹⁵

Health-shock propagation uncertainty

COVID-19 is not the first supply shock the world has seen. The 1970s ‘Oil Shocks’ are the most famous, but very clear and well-studied examples arose in 2011 with the flooding of factories in Thailand and the earthquake in Japan. All of these were quite different.

A unique feature of COVID-19’s supply shock concerns its propagation pattern. In the case of past supply shocks – like the Thailand floods of 2011 – the impact by factory was almost completely understood within days if not hours; it all depended upon the altitude of the factory. Likewise the supply shock that arose from the Great East Japan Earthquake in 2011 was simple to dimension. Distance to the epicentre was a quite reliable determinant of the damage to factories.

By contrast, the spread of the new virus is not necessarily dictated by the geographical distance from Wuhan in China – as the outbreak in northern Italy shows. The routes of airplanes and cruise ships appear to influence the dissemination of the virus in the early phase.

- Entangled webs, not concentric circles, are a more appropriate representation of the propagation of the supply shocks in the case of COVID-19.

Moreover, since it involves people, and human behaviour is hard to predict, uncertainty about the size and location of the shock is highly uncertain and is likely to remain so for many days, if not weeks.

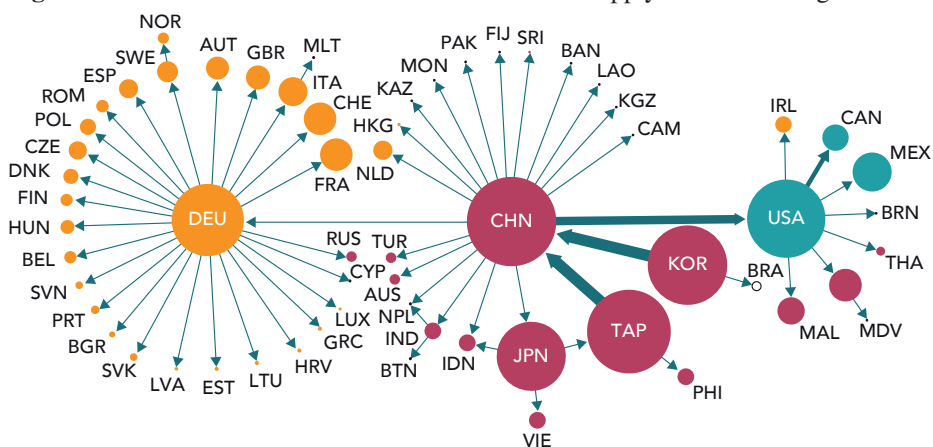
Lastly, the duration of the supply-shock depends upon the virus’s lethality and is thus highly uncertain for reasons having to with the nature of the virus and public-health policy reactions. In the more extreme scenarios considered by some economic forecasters (extreme in the sense that they involve death rates outside the ranges seen in the last half century), the shock could much more directly and much more permanently reduce employment by reducing the labour supply – due to deaths; the likelihoods of such scenarios involve medical judgements that we are not qualified to make.

¹⁵ See the *Japan Times* coverage of the PMI’s at <https://www.japantimes.co.jp/news/2020/03/02/business/asian-factories-china-pmi/#.Xl4HA6hKjMw>.

Supply-chain shocks

As of early March 2020, the COVID-19 epidemic was very much centred in China, with over 90% of reported cases located there. The two next hardest hit nations are Japan and Korea. These nations are central to the global supply chains in many manufactured goods. The chapter by Baldwin and Tomiura, which focuses on the trade implications, provides more details, but the basic point is straightforwardly illustrated in Figure 3.

Figure 3 Three interconnected hubs in the world’s supply chain for ICT goods



Source: Global Value Chain Development Report, 2019, www.WTO.org

In the figure, the size of the bubble reflects the size of the country (value of trade), and the thickness of the connecting lines show the relative importance of bilateral flows (small flows are zeroed for clarity).¹⁶ The figure looks at international supply-chain linkages in the information and communication technology (ICT) goods to be concrete.

Three features jump out.

- China really is the workshop of the world, being central to the entire global network. So manufacturing disruption there will create secondary supply shocks in manufacturing sectors in almost all nations.
- There is a strong regional dimension in supply chains, so the fact that China, Korea, and Japan are among the five hardest hit means the supply-chain shock will be especially strongly felt in Asia.

¹⁶ Reproduced from the WTO’s *Global Value Chain Development Report 2019*, Figures 1.16 and 1.17.

Germany is the network hub in Europe. It is also the seventh most-hit nation in the world (as of 5 March 2020). Add in the medical shock to Italy, France, and Britain (respectively the 6th and 13th most affected nations) and it is clear that supply-chain contagion is very likely to be a major source of economic contagion in Europe. Similar points apply to North America.

The US is the fifth most affected in terms of deaths (delayed and limited testing in the US means its death numbers are far ahead of its case numbers compared to the experience of other nations; on official statistics, the US death rate is about twice that of China and Italy). Also noteworthy is the fact that India, the world's seventh largest economy, is not very involved in supply chains and so may be shielded somewhat from this form of economic contagion.

As a point of caution, these network diagrams look very different for different sectors. It is important to not overgeneralise; sector by sector analysis is important.

Demand-side shocks

When it comes to COVID-19's immediate aggregate demand shock, two aspects are worth distinguishing: practical and psychological. There is a practical aspect since some consumers are or will be prevented from getting to stores, so their demand disappears from the market. Likewise, some home delivery services are suspended, so goods and consumers are coming together less frequently.

There is also a psychological aspect since – as happened in the wake of the Global Crisis – consumers and firms tend to embrace a 'wait-and-see' attitude when faced with massive Knightian uncertainty (the unknown-unknowns) of the type that COVID-19 is now presenting to the world.

In past crises – like the Great Trade Collapse of 2008-09 – people and firms postponed purchases and delayed investments. This effect can be particularly pernicious since international media and personal communications can unintentionally synchronise such beliefs.

Put differently, the wait-and-see shock is contagious via the internet. The demand-side shock need not travel along the traditional trade and financial bilateral connections. This was abundantly demonstrated during the Global Crisis of 2008-09. People and firms from around the world looked on with shock at the financial crisis unfolding in the US. While few nations were directly implicated in the subprime mess, the psychological shock led them to postpone purchases and investments. This turned what started as a North Atlantic financial shock into a massive and synchronised global demand shock.

Trade volumes collapsed at the same time in all nations and for almost all products at a pace never seen before. It is impossible to know if history will repeat this pattern in reaction to the COVID-19 shock, but it is a possibility.

Each of these first-round demand shocks are likely to be subject to Keynesian multiplier-like amplification. For many people and companies around the world, not working means not getting paid – and that puts an additional damper on their demand.

Duration of the shocks

On the duration of the crisis, we could seek some clues again from past shock experiences. The negative impacts of COVID-19 on domestic demand for non-tradable services will become substantial if it takes a long time to contain the infection. Previous epidemic shocks were short and sharp. Today, the duration is less clear. China exports an enormous amount of industrial goods, so the duration of interruption may depend as much on whether firms can find substitutes for Chinese goods as it does on the speed of the health recovery in China.

In the worst case of demand shrinkage aggravated side-by-side by supply disruption, one might even imagine a situation somewhat analogous to the oil shock in the 1970s, when almost all the industrialised countries fell into persistent stagflation.

- Governmental reactions create more and longer-lasting disruptions than the virus.

As a lesson from history, much of the economic problems from the 1970s oil shock came from the inflation sparked by inappropriate macroeconomics policy responses, not just the actual oil shortage. In a more recent episode, the tariff hike by the Trump administration resulted in reduced imports from China, but US imports from other sources, such as Mexico and Vietnam, largely offset the effects.

The channels of COVID-19's economic contagion

Globally, economies are connected by cross-border flows of:

- goods,
- services,
- knowhow,
- people,
- financial capital,
- foreign direct investment,

- international banking, and
- exchange rates.

Economies are also connected – but not physically – by beliefs. All these things are also mechanism for the propagation of economic shocks, or economic contagion.

Some of these flows within nations are also likely vectors connecting the medical and economic aspects of COVID-19. Consider them in turn, starting with banks – which provide a convenient rallying point for contagion involving financial capital, beliefs, and international banking.

Banks and other financial institutions

Some of the most spectacular (in a bad way) examples of contagion have involved international banking. Banks were at the heart of the euro area crisis (CEPR 2015). The 2008–09 Global Crisis also started with banks – as have countless others (see Reinhart and Rogoff 2010). This time, banks are unlikely to be a major vector of transmission, as Torsten Beck argues in his chapter in this eBook. After ten years of tightening regulation capital buffers are higher and the banking system are generally seen as safer. He argues that even under an adverse scenario with a 8.3% in GDP over three years, European banks would still be in good shape.

Other authors in this eBook, Steve Cecchetti and Kim Schoenholtz in particular, seem more concerned about banks' vulnerability to a crisis of confidence – the expectations shock discussed above. As they point out, bank runs are, by their very nature, contagious. “The news about a run on a specific bank alerts everyone to the fact that there may be other ‘lemons’ among the universe of banks, turning a run in to a panic.” If people are ill-informed, shocks can cause them act in ways that amplify disturbances. The solution is transparency and honest government communication.

Related linkages between medical and economic effects of the virus which are not necessarily international but are likely to be important are defaults or financial distress among firms that are not banks. Almost all businesses borrow as part of ‘business as usual’. They count on incoming revenue to service the debt. If a shock like COVID-19 leads to a sudden stop in revenue, ‘business as usual’ can turn to bankruptcy. This has already happened to the UK airline, Flybe, which had been struggling to meet its debt obligations and went into administration on 5 March 2020, citing the dramatic drop in air travel linked to COVID-19.

Nonbank financial sector

These firms may be more at risk if confidence and liquidity condition deteriorate. The IMF (2019) has been flagging the fact that due to an extended period of accommodative financial conditions, investors have been searching for yield, and in particular institutional investors with nominal return targets have invested in riskier and more illiquid assets. According to the IMF *Global Financial Stability Report* of October 2019, risks in nonfinancial companies and nonbank financial institutions in several systemically important countries are at historic heights. If the crisis leads to a sudden stop in lending, these firms could be in trouble.

John Cochrane's chapter in this eBook takes a bold swing at this financial sudden-stop mechanism, asking "What happens if the economy shuts down for a few weeks or months, either by choice or by public-health mandate?"

- "Shutting down the economy is not like shutting down a light bulb. It's more like shutting down a nuclear reactor. You need to do it slowly and carefully or it melts down."

He foresees huge financial problems. Firms have to pay debts and wages. People have to make mortgage payments or pay the rent. "Left alone," he writes, "there could be a huge wave of bankruptcies, insolvencies, or just plain inability to pay the bills. A modestly long economic shutdown, left alone, could be a financial catastrophe."

Cochrane does not provide estimates – his is a think-piece – but he worries about financial problems as factories may shut down due to lack of demand but will still have to pay their workers and their debt, with the consequence of mass bankruptcies among households and firms. And that's not to mention medical bankruptcies, which are already an important share of US personal bankruptcies.

Concerns over credit are also heightened by the profound change in how the market currently operates. Dealers have retreated from supporting the market over the past decade and there has been a notable rise in credit exchange traded funds, which provide the illusion of liquidity. As seen in 2001 and 2008, and then briefly towards the end of 2018, liquidity in the credit market simply evaporates when a crunch tightens.

Trade

As discussed above, and in Baldwin and Tomiura's chapter in this eBook, international trade is surely one of the leading mechanisms through which the virus damages domestic economics and spreads internationally. Trade happens when things are made in one nation and purchased in another. This, quite naturally, makes trade flows susceptible to demand shocks (purchases fall) and supply shocks (production falls).

The implications are clear. The supply shock aspects of COVID-19 – factory closures, travel bans, border closings and the like – will reduce exports of the afflicted sectors in afflicted nations. Exports from China, for example, have already been severely hit by the virus according to various media reports; official figures are available only after a several month delay.

Japan presents clear examples of this sort of supply shock. After sporadic reports of COVID-19 infections, many large Japanese companies ordered their employees to work from home. Given the serious congestions of rush-hour commuter trains in Japan, there may be a silver lining to these restrictions, but in the short run they surely diminish output. The size of the contraction may be different today from those projected from historical examples, since remote working on such a large scale was not possible when, for example, the SARS pandemic struck nearly two decades ago. That was before smartphones became ubiquitous. But remote work is not a panacea; not all tasks can be performed remotely even now. Human presence on site is required, especially to handle tangible goods. One Japanese famous manufacturer of health care products, Unicharm, decided to order remote working for all employees, but workers at production factories were excluded from this order so they could meet growing demand for medical masks.

Supply shocks in one nation, or in one industry within a nation, become a supply shock in other industries and nations when the thing being supplied is an input into the making of something else. This 'supply-chain contagion' will surely be an important element of COVID-19's economic legacy. The three hard-hit East Asian manufacturing giants – China, South Korea, and Japan – account for over 25% of US imports, and over 50% of US imports of computer and electronics products. Apparel and footwear companies are particularly vulnerable to East Asian supply disruptions. *The Economist* magazine pointed to the vulnerability of the electronics industry with its practice of keeping very lean inventory levels and the lack of alternative sources for many electronic components.

The optics sector is likewise highly exposed. The heart of the outbreak, Hubei province, is known as China's 'optics valley' since so many firms manufacturing fibre optic components are located there (these are essential inputs for telecoms networks). Something like a quarter of the world's optical-fibre cables and devices are in the

province. Hubei is also the location of highly advanced microchip-fabrication factories (these make the flash memory chips used, for example, in smartphones). *The Economist* cites analysts who conjecture that the epidemic in Hubei alone could knock 10% off worldwide shipments of smartphones.¹⁷

The automobile sector, especially in East Asia, is already significantly disrupted by ruptures in international supply chains. For example, a shortage of parts coming from China has forced Korean carmaker Hyundai to shut all its car plants in Korea. The Japanese firm Nissan closed a factory in Japan temporarily. The shock has even reached Europe. Fiat-Chrysler has recently warned that it could soon halt production at one of its European factories. Jaguar Land Rover, a UK-based auto company, announced it might to run out of parts from the end of February. To stave this off, it had flown in emergency supplies from China in suitcases.¹⁸

By contrast, in so far as COVID-19 is a demand shock, imports will fall, and they will fall most in the trade partners of the nations that are most severely hit. Given that the hardest-hit nations account for such a large share of world demand, this mechanism of contagion is likely to be important. And it is likely to be amplified by the wait-and-see mechanisms discussed above.

Commodity trade and prices

Since the beginning of the crisis, Brent oil prices have dropped from about \$69 to about \$50 per barrel. This is a large negative shock for oil-producing countries in particular in the Middle East, as Rabah Arezki and Ha Nguyen argue in their chapter in this eBook. On the other hand, declining oil prices may provide some relief, for instance for the transport industry. Extrapolating the SARS pattern of impact on air travel, IATA estimates that the aviation industry could face a loss of \$29 billion in passenger revenues, which would be partly mitigate by lower fuel costs.¹⁹

17 <https://www.economist.com/international/2020/02/15/the-new-coronavirus-could-have-a-lasting-impact-on-global-supply-chains>

18 <https://www.economist.com/finance-and-economics/2020/02/22/covid-19-presents-economic-policy-makers-with-a-new-sort-of-threat?cid1=cust/ednew/n/bl/n/2020/02/29n/owned/n/n/nwl/n/n/E/415278/n>

19 <https://www.iata.org/en/iata-repository/publications/economic-reports/coronavirus-initial-impact-assessment/>

Travel and migration restrictions

In an effort to slow contagion and be seen as proactive, governments may be tempted to go beyond travel restrictions and quarantine requirements and effectively close borders. Face-to-face contact is an essential part of many businesses, so these restrictions will have dilatory economic consequences domestically and for trading partners. In their chapter, Raffaella Meninno and Guntram Wolff warn that closing borders in Europe would severely impact the almost 1% of employed citizens in the Schengen countries – namely, those who commute across international borders. The economic impact of denying them transit may be sizeable.

A different view is taken in the historical chapter by Joachim Voth. After discussing the draconian travel restrictions imposed on Marseille during the 1720 plague (which involved troops and a two-metre wall), he asks how much mobility a globalised world can and should have in the future, if health shocks of the type we are experiencing become more frequent. Drawing this out, he points to one of the possible long-term negative consequences of the medical shock and thus persistence of the economic shock: controls on the movement of people – which have been gradually rising in many nations – may rise more and spread to more nations.

Deglobalisation policy reactions

There are mechanisms of immediate transmission, but policy reactions might put in place policies that could hinder the flow of goods, service and especially people. As Beatrice Weder di Mauro points in her chapter, this could well make the economic effects more persistent. Companies, individuals and governments are experiencing disruptions which may lead to sudden deglobalisation. Companies are learning the lesson that global supply chains can be abruptly broken by a health shock and will adjust accordingly. Financial intermediaries and regulators are likely to incorporate pandemic shocks into their future risk assessments and stress tests. Societies may learn that other countries react with xenophobia and closing borders. Overall, in times of rising nationalism and populism, people's fears and suspicions of 'others' might become a force for disintegration and deglobalisation.

Finally, the virus might become endemic – that is to say, a disease that reappears periodically – in which case COVID-19 could become one of humanity's constant companions, like the seasonal flu and common cold.²⁰

²⁰ <https://www.statnews.com/2020/02/04/two-scenarios-if-new-coronavirus-isnt-contained/>

Exchange rates

A classical vector of crisis contagion in financial crises is the exchange rate. For example, the Asian crisis of the late 1990s involved companies and countries that had borrowed in one currency while earning income in another. A sudden exchange rate devaluation of the Thai currency, for example, almost instantly made many Thai companies bankrupt. The dollar value of their income couldn't cover the dollar cost of the interest and loan repayment obligations.

So far, there is no hint of this mechanism in play. Moreover, the lessons of these crisis has lead to significantly less cross-currency borrowing.

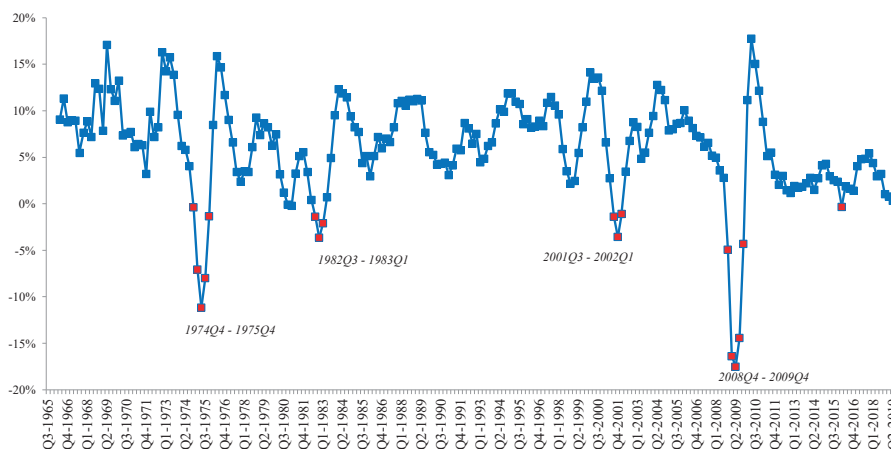
Capital flows

The last classic mechanism of shock transmission is the sudden stop of capital flows. During last decade's euro area crisis, for instance, the abrupt lending halt within the euro area is what put nations like Ireland and Portugal in a bind. As with the exchange rate mechanism, this one does not seem to be in play during this crisis – or at least not yet.

The size of the economic shocks

COVID-19 was first seen as a China shock, then as an Asian regional shock. It is now clear that the virus is travelling, and we are facing a global and common shock. The last time the world suffered a global shock was in the aftermath of Lehman's collapse in September 2008. By the end of 2008, the North Atlantic subprime crisis had blossomed into the Global Crisis – a financial crisis in many G7 nations with large banking sectors, and a trade crisis for the hundred-plus nations without much banking, but with a dependence on exports.

Richard Baldwin and Eiichi Tomiura argue in their chapter that the evidence from that the Global Crisis of 2008-09 provides an outer limit on the range of likely outcomes this time. That crisis produced what came to be known as the Great Trade Collapse. It was, and still is, the steepest fall of world trade in recorded history, and the deepest fall since the Great Depression. The drop was sudden, severe, and synchronised (Figure 4). Moreover, it was not particularly short as global trade growth stayed in negative territory for more than a year.

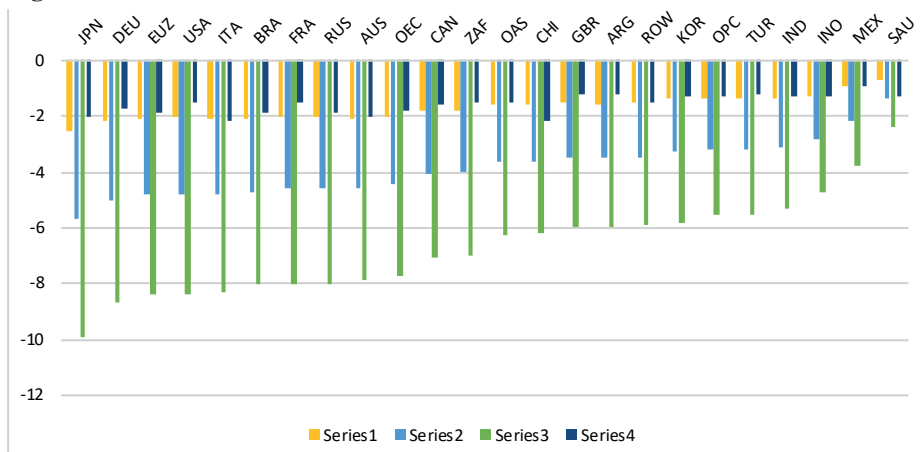
Figure 4 Quarter-on-quarter growth, world imports volume, 1965 to 2019 Q3

Source: Baldwin and Tomiura, elaboration on WTO online data (www.WTO.org).

In their chapter, Laurence Boone, David Haugh, Nigel Pain and Veronique Salins estimate a base scenario, in which the outbreak is contained to China and a few other countries, that implies a world growth slowdown of about 0.5% in 2020. In their downside scenario, where the spread is spread widely over the northern hemisphere the 2020 world GDP growth would be reduced by 1.5%. Most of the impact is attributed to lower demand, but in this scenario the negative contribution of uncertainty is also significant.

Catherine Mann discusses the possibility that this crisis is likely to be U-shaped rather than V-shaped, as has been the case for similar epidemics and other recent supply shocks. Her point is that the linkages discussed will affect different nations differently. It may be a V, i.e. short and sharp with full recovery to the old growth path for some sectors and nations, but much more lingering for others. This suggest that in aggregate it could, at least for manufacturing, look more like a U-shape in the global data.

For services, the shock will be hard to recover from so it may look more like an ‘L’. Growth drops for a while, and while it will resume eventually, there will be no catch up. People who skip a few restaurant meals, cinema outings, and holidays in the sun are unlikely to double-up on dining, movie-going and holidaymaking to catch up. The shock to tourism, transportation services, and domestic activities generally will not be recovered. Mann predicts that domestic services also will bear the brunt of the virus outbreak.

Figure 5 GDP loss in 2020, deviation from baseline

Source: Estimates by McKibbin and Fernando, S4-S7, Global Pandemic Scenarios

Warwick McKibbin and Roshen Fernando estimate the impact of different degrees of severity of a China only and a global shock. In their most severe scenario (with very high infection rate) their impact on 2020 growth four time higher than Boone et al.'s adverse case. In this scenarios Japan is the country with the highest hit of almost 10% GDP loss followed by Germany and the US with losses of about 8% each (Figure 5).

The policy reactions

The behaviour of the virus is one thing; governmental reaction is another. As Weder di Mauro puts it:

- “The size and persistence of the economic damage will depend on how governments handle this sudden close encounter with nature and with fear.”

On the dark side, it could become an economic crisis of global dimensions and a long-lasting reversal of globalisation. On the bright side, it could be the moment when policymakers manage a common crisis response. They might even manage to rebuild some trust and create a cooperative spirit that helps humanity tackle other common threats like climate change.

Charles Wyplosz – in a chapter based on decades of experience advising governments during crisis after crisis – suggests that government reactions to COVID-19 will be something like a Rorschach blot test. Except this time, governments' reactions will reveal the nature of their leaders and, more widely, that of societies. They can fail miserably by trying to hide the truth and being seen as acting opportunistically, or

they can rise to the challenge and actually rebuild some trust. Wyplosz points that that once the disease has disappeared from the headlines, people will see what is deeply wrong, or reassuringly good, about the systems in their country. Many things go unnoticed because they have been part of the landscape for so long – for example, the dysfunctional aspects of the US healthcare system. If many lives are lost, the failings will be exposed for all to see.

He also raises the deeper question of the extent to which policy reactions to COVID-19 are driven by political factors, and which are driven by lower-frequency things like history, culture, ethnic divisions, political regimes, and election laws on one hand, and the price that societies attribute to the value of life on the other.

What can government do to reduce the economic pain?

In the adverse scenarios, there will be a need for a strong policy response at the macro level to contain the damage. Box 3 catalogues an array of the many possible economic policy responses. Here we elaborate the main ones.

- Both monetary policy and fiscal policy action will be called for, and clearly the most effective action would be an internationally coordinated one.

Common approaches and announcements from the major central banks would be preferable to emergency actions from single ones. The emergency rate cut by the Federal Reserve has not made the situation easier for central banks that are already at the effective lower bound. All central banks should signal that they stand ready for coordinated interventions and to provide liquidity in case of serious disruption resulting in stress on financial intermediaries.

- Given the nature of this shock, small and medium-sized businesses may be among the most exposed to liquidity issues, thus special facilities to keep lending to small businesses may be appropriate.

China, Hong Kong and Singapore have decided on substantial fiscal measures to stimulate demand and boost confidence (almost 2% of GDP in the case of Singapore).

- Fiscal measures could quickly be deployed as targeted help for people affected by quarantines and income shortfalls – as has already been done in Italy.

In Cochrane’s catastrophic vision, more drastic action would be called for. He proposes a financial crisis plan to “flood the country with money in the right spots as insurance would” with judiciously targeted bailouts as the only way to keep businesses and people from going bankrupt.

Box 3 Examples of possible policy measures

Below is a selection of measures directed at stimulating incomes and confidence and alleviating liquidity crunches. Some of them have already been implemented, mostly in the ground zero of Asia and in Italy.

Targeted measures: Healthcare/confidence

Pay bonus for health care workers (Singapore)

One-month salary donated by political leadership in solidarity (Singapore)

Provide a small amount of face masks to all households (and discourage them from using them as long as they are healthy) (Singapore)

Targeted fiscal measures: Households

Cash payout to every citizen above 18 years of age of more than US\$1,000 (Hong Kong)

Suspension of payments for electricity in affected areas (Italy)

Support for uninsured households for medical expenses

Targeted measures: Firms

Subsidised short-term employment schemes for (Germany)

Accelerated depreciation for firms (Germany)

Sector-specific financial support for tourism, accommodation and aviation (Singapore)

Broad-based financial help for businesses, including enhanced absentee payroll support for workers (Singapore)

Reduction in profit tax and low interest loans for small and medium-sized firms (Hong Kong)

Targeted measures: Monetary/banking

Targeted liquidity provision bank funding conditioned on bank lending to small (ECB, TLTROs)

Liquidity support to banks

General fiscal stimulus package, large and coordinated at G20/EU level

Emergency tax reductions

Suspension of payments of social security

Increase spending

Relax fiscal criteria for affected countries in the EU

General monetary stimulus package, coordinated at G20

Cut rates (Fed, Bank of Canada, etc.)

Quantitative easing

Global/regional disaster insurance/ emergency funding

US\$50 billion emergency lending (IMF)

Scale IFC/EBRD facility to fund private sector in countries affected by the virus (World Bank)

Scale up the EU Solidarity Fund to include health related disasters (Proposal)

Concluding remarks

In 2008, world leaders came together to announce a common response to a common crisis. It was not perfect, but arguably it included coordinated fiscal stimulus and financial packages. And it is clear that the image of the G20 cooperating in the face of a clear and present danger to the world economy contributed greatly to dampening the fear-shock that had rocked the world economy. Today's leaders are facing a similar stress test and they will be measured by their ability to deal with this common threat in an effective fashion.

This is particularly true for Europe. Clearly, the right level of response has to be European and coordinated rather than national and idiosyncratic. The petty divisions that are currently plaguing the Union should be put aside to demonstrate the will and the ability to act together and to show solidarity with those that have been stuck. What is needed at this stage is concrete solidarity such as sharing masks, preparing for opening hospitals to patients from other European countries, seconding nurses and doctors. It will require being flexible with the Stability and Growth Pact and preparing for a concerted fiscal boost if needed. In addition, the EU should also consider what common disaster relief measures could be deployed.

Scaling up the EU Solidarity Fund could be one option. The fund was created in 2002 to support EU member states in cases of large disasters, like floods, earthquakes, volcanic eruptions, forest fires, drought and other natural disasters. The fund can be mobilised upon an application from the concerned country provided that the disaster event has a dimension justifying intervention at the European level.²¹ In 2018, the EU Solidarity Fund dispensed almost €300 million in relief for Austria, Italy and Romania following natural disasters. Certainly, the disruptions caused by COVID-19 do amount to the scale of a natural disaster event that would justify intervention at the European level.

²¹ https://ec.europa.eu/regional_policy/en/policy/evaluations/cc/cusf2002_2017

A scaled-up EU Solidarity Fund could step in to provide relief for affected regions and people and beyond immediate relief would send an important signal. Jean Monnet's famous words that Europe will be forged in crisis might ring true once more.

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He has been an adviser and consultant to many international organisations and governments. He did his PhD in economics at MIT with Paul Krugman and has published a half dozen articles with him. Before that he earned an MSc at LSE (1980-81), and a BA at UW-Madison (1976-1980). The author of numerous books and articles, his research interests include international trade, WTO, globalisation, regionalism, global value chains, and European integration.

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1 Macroeconomics of the flu

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Remember last time you had the flu? Likely, along with the fever, tiredness and the pain, there was a feeling that the world was really miserable and deeply unfair. Then one morning it was all gone. After a brief feeling of relief and gratefulness, the world went back to normal and you quickly forgot all about the episode.

This is roughly the way we might think about a temporary ‘health disruption’ to an economy. A ‘macroeconomic flu’ – i.e. a temporary negative supply and demand shock – causes output to fall for a little while, only to then lead to a quick recovery and possibly a full catch-up on the shortfall. The growth rate in one quarter may be lower, but in the next it will be higher and even fully compensate the shortfall in output. There is no reason for policy to get nervous or be active. Just do what the classic conservative monetary policymaker does best: wait for more data. But that is a normal flu, or rather a macroeconomic sneeze – not a pandemic, not a panic.

COVID-19 may still turn out like this, with a few weeks of disruption and then a lot of catching up of lost production and consumption. But that is becoming quite unlikely. Indeed, it is becoming more likely that the disruption will be large, global, and possibly persistent. At least that seems to be what markets have concluded (somewhat belatedly) as of last week.

The impacts on global and regional growth of such a scenario are still highly uncertain, but some early estimates suggest large downsides. Take the most extreme scenario of a severe, temporary global pandemic presented by Warwick McKibbin and Roshen Fernando in their contribution to this eBook: the average GDP loss is 6.7%, with an 8.4% loss for both the US and the euro area.

A global shock of scale, duration, and persistence?

The size of the shock will be determined mostly by the measures taken to avoid large-scale contagion and to limit the area of spread. As is well known by now, this virus is extremely contagious but not especially fatal. It appears that in the majority of cases, it is no worse than the seasonal flu. Thus, the containment measures – the disruption to work processes, the limitations on meetings and travel – will be a larger negative supply shock than the number of deaths, even if the latter could still turn out to be large.

Full or partial lockdown, like in China, is one of the most extreme measures and can bring production and consumption almost to a standstill. Such extreme measures are likely to remain restricted to certain areas and will be difficult to maintain for a long time.

Less extreme measures, such as cancelling large-scale events, are likely to remain in place for longer. This week, the French government banned all events of over 5,000 people and the Swiss government banned events of over 1,000 people (why the difference is unclear). Some of these events can be postponed, but many cannot. Also, as of this week an increasing number of companies have put in place global restrictions on international travel that is not absolutely business critical, have moved to postpone client events or hold them remotely, and are introducing shift work (with A and B teams alternating between working from home and in the office). Such measures could also be in place for longer because it will be difficult for decision makers to declare the coast clear as long as the number of infected is still increasing.

Supply chain disruptions may also turn out to be larger and more extended than is currently evident. Maersk, one of the world's largest shipping companies, has had to cancel dozens of container ships and estimates that Chinese factories have been operating at 50-60% of capacity.¹ Shipping goods to Europe from Asia via sea takes about five weeks, so at the moment goods are still arriving from pre-virus times. The International Chamber of Shipping estimates that the virus is costing the industry \$350m a week in lost revenues. More than 350 000 containers have been removed and there have been 49% fewer sailings by container ships from China between mid January and mid February.²

1 <https://www.nbc-2.com/story/41749179/maersk-operates-massive-container-ships-its-canceled-50-sailings-over-coronavirus>

2 https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/economy_en

How about the shock to demand? Clearly, the first casualties are the transport and hospitality industries. Ports and terminals are facing at the same time a sharp drop in income, higher costs from yard congestion due to the build up of empty containers, and requests from customers to waive storage charges due to ‘force majeure’. IATA estimates that the aviation industry could face a loss of 29 billion US dollars of passenger revenues if they extrapolate the SARS pattern of impact on air travel.³ Ultimately, the size of the demand shock will be only partially determined by objective dangers of infection or by official measures for social distancing. Fear and uncertainty will dictate caution – in case of doubt, meetings will be canceled rather than running the risk of being stuck in the isolation of home quarantine.

China has become a major source of demand in the world economy and many core European industries are highly dependent on the Chinese market. Sales in China account for up to 40% of the German car industry’s revenues, for example, and they have collapsed over the last weeks. This would seem to be an example where the demand shortfall is more likely to be temporary; a new car is usually not an essential item and the purchase can be delayed until the situation normalises.

Some effects may be more persistent, however. The disruptions that companies, individuals and governments are experiencing imply that globalisation and integration may be at risk from such health shocks. Firms will probably take into account the lesson they are learning that global supply chains can be abruptly broken by a health shock. Indeed, Covid-19 may end up doing more for reshoring than the mercantilists in the US government. Financial intermediaries and regulators are also likely to incorporate pandemic shocks into their risk assessments and stress tests. How governments deal with the crisis may have lasting consequences for stability and trust. Responses to an outbreak in a neighbouring state – for example, by closing the border and suspending trains, as Austria did with Italy – may promote stigmatisation and disintegration. Racial and national discrimination have already reared their ugly heads. And in times of rising nationalism and populism, people’s fears and suspicions of ‘others’ might become a force for disintegration – worse than Brexiteers. Finally, the virus might become endemic, meaning that it continues to circulate in people; it would be the fifth endemic human coronavirus.⁴

3 <https://www.iata.org/en/iata-repository/publications/economic-reports/coronavirus-initial-impact-assessment/>

4 <https://www.statnews.com/2020/02/04/two-scenarios-if-new-coronavirus-isnt-contained/>

How could policymakers respond to a recession?

Although the virus is only starting to spread in the US, the Federal Reserve has already reacted with an emergency rate cut to reassure investors. Other major central banks have less room for cutting rates, but they should stand ready to provide liquidity in case of market disruption or stress on financial intermediaries and keep lending to small businesses. They should signal readiness to dip into their toolbox one more time in case there is indeed a long-term shortfall in demand and do so in coordination with other central banks.

But fiscal policy would clearly be the better tool should the severe scenario materialise. Fiscal measures could quickly be deployed as targeted help for those affected by quarantine and income shortfalls. For example, Italy has already announced a series of relief for its most affected communities and firms, using similar instruments to those that would be deployed in the wake of natural disaster. The German government is talking about 'Kurzarbeit' – a state-subsidised scheme to protect employment which was used during the global financial crisis. It has also signalled its readiness to consider a fiscal stimulus package. China, Hong Kong and Singapore have decided on substantial fiscal measures to stimulate demand and boost confidence (almost 2% of GDP in the case of Singapore).

The measures to stem the spread of COVID-19 are still focused on a few ground-zero countries, but may soon amount to a global and common shock comparable to the Lehman shock. Then, the world's leaders came together to announce a common response to a common crisis. The coordinated fiscal stimulus and financial packages were the high mark for the G20 and clearly contributed to dampening the shock to the world economy. Today's leaders are facing a similar stress test and they will be measured by their ability to deal with this common threat in an effective fashion. This is particularly true for Europe. The petty divisions that are currently plaguing the Union should be put aside to demonstrate the will and the ability to act together and to show solidarity with those that have been stuck. Beyond using the flexibility of the European fiscal rules to increase room for spending, the EU should also consider a common disaster relief fund to help affected regions and people. Jean Monnet's famous words that Europe will be forged in crisis might ring true once more.

In a similar vein, governments and policymakers should be very careful to send a message of cohesion, responsibility and leadership to prevent fear and panic. They can learn from Singapore in this respect. Singapore has been battling the disease since Chinese New Year; it is highly connected with China and had a surge of cases early on,

but seems to have been quite successful at containing the spread.⁵ From the outset, the government communicated extensively and called for citizens to behave responsibly and respectfully towards each other. At the same time, it was transparent and honest about the measures that would have to be taken in case of further escalation of the threat level. An example of how social cohesion matters can be found in the government providing a few masks for every household but discouraging the use of masks except by those who are feeling sick (or by health workers). The problem is relatively simple when you think about it: there is one state of the world where everybody rushes to hoard masks (as well as food, toilet paper, and so on) and uses them to protect themselves, finding that there are not enough masks for every healthy person in the world. There is another social equilibrium in which masks are used by those who may be transmitting germs (Covid-19 or others) to protect the rest. The latter is clearly the better social outcome but it requires trust, which governments should be helping to build through their own actions.⁶

Overall, much will depend on how governments handle this sudden close encounter with nature and with fear. It could become an economic crisis of global dimensions and a threat to globalisation, or it could be a moment when policymakers manage a common crisis response and even manage to rebuild some trust.

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⁵ See the numbers at <https://www.moh.gov.sg/covid-19>

⁶ In this spirit, the leadership of Singapore took a one-month pay cut in solidarity with those suffering income shortfalls and has awarded a one-month bonus to all health workers on the front line.

2 Tackling the fallout from COVID-19

Laurence Boone, David Haugh, Nigel Pain and Veronique Salins

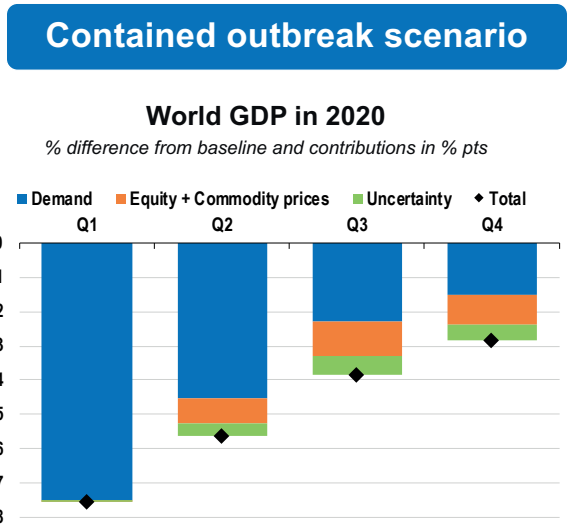
OECD

The novel coronavirus, COVID-19, hit China at the start of December and outbreaks have since spread more widely. The virus is bringing considerable human suffering. It is also resulting in significant economic disruption from quarantines, restrictions on travel, factory closures and a sharp decline in many service sector activities. These disruptions are the direct channels through which the virus is affecting economies.

There is ample reason to be cautious when assessing the economic consequences of the epidemic, given that the situation is evolving by the day. The main question for the economic outlook is for how long and how widely the virus will spread, and with it the containment measures. At this stage, there is little certainty on this, so we draw a best-case scenario and a downside scenario (OECD 2020).

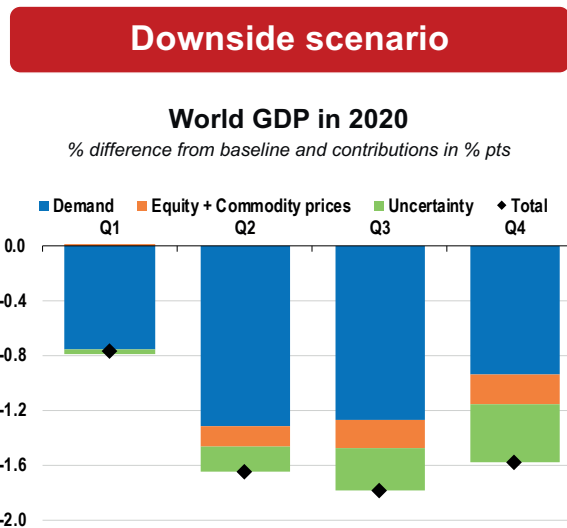
- The base-case scenario (the contained outbreak scenario in Figure 1) is based on the knowledge we have today of the spread of the epidemic, where the extent of the virus is broadly contained in China with some outbreaks in other countries. In this scenario, global economic growth would slow sharply in the first half of 2020, and then it would recover modestly.
- We also consider an alternative, downside scenario (Figure 1) where there is broader contagion of the virus across the Asia-Pacific region and other advanced economies in Europe and North America. That means more containment measures, a wider decline in confidence, and a much more marked and prolonged slowdown.

Figure 1 Contained outbreak scenario and downside scenario



Note: This simulation shows the impact of a 4% fall in domestic demand in China and Hong Kong-China in 2020Q1 and a 2% decline in 2020Q2, plus declines of 10% in global equity and non-food commodity prices in the first half of 2020, and a 10 bps rise in investment risk premia in all countries in the first half of 2020. All shocks are assumed to fade away gradually by early 2021.

Source: OECD calculations using the NiGEM global macroeconomic model.



Note: This simulation shows the impact of a 4% fall in domestic demand in China and Hong Kong-China in 2020Q1 and a 2% decline in 2020Q2, plus a 2% domestic demand fall in most other Asia-Pacific countries and advanced Northern hemisphere countries in 2020Q2 and 2020Q3, plus declines of 20% in global equity and non-food commodity prices in 2020, and a 50 bps rise in investment risk premia in all countries in 2020. These shocks are assumed to decline gradually through 2021.

Source: OECD calculations using the NiGEM global macroeconomic model.

There are supply, demand, and confidence channels through which the virus affects the economy.

The arrival of the virus triggered containment measures, which are having a large economic impact. These measures include wide-ranging restrictions on passenger transportation and labour mobility, which especially affect the tourism and travel industry and the entertainment and leisure sector, as well as plant closures or reduced activity, spilling into global supply chains.

We can identify three main channels through which these measures spill over globally:

- **Supply:** significant disruptions in the global supply chain, factory closures, cutbacks in many service sector activities;
- **Demand:** a decline in business travel and tourism, declines in education services, a decline in entertainment and leisure services;
- **Confidence:** uncertainty leading to reduced or delayed consumption of goods and services, delayed or foregone investment.

The epidemic, via containment measures and the transmission channels, has sharply slowed manufacturing and domestic consumption in China and in its economic partners. In other countries, outbreaks that are more recent are also prompting containment measures. All this is severely affecting consumer and financial market confidence.

Two scenarios provide a range of possible outcomes

As the epidemic situation is evolving by the day, it is even more difficult than usual to project the economic outlook. This is why we focus on best-case and downside-risk scenarios in order to offer an interval of possible outcomes and policy proposals to soften the economic implications of the virus.

Best-case scenario

In a first best-case scenario, the epidemic stays contained mostly in China with limited clusters elsewhere.

This would still affect global growth, which has been cooling for the past two years, bringing it to a subdued level. High-frequency indicators such as coal demand, air pollution, car sales and business surveys suggest the Chinese economy slowed sharply in the first quarter of 2020. As China accounts for 17% of global GDP, 11% of world

trade, 9% of global tourism and over 40% of global demand for some commodities, negative spillovers to the rest of the world are sizeable. This affects primarily China, but also other countries' supply and demand as well.

In our best-case scenario, most of the slowdown in activity comes from the contraction of demand in China. We have modelled the global impact of this contraction, including uncertainty effects and the impact on equity prices and commodity prices, and used it as a guide for the updated growth projections in the March OECD Interim Economic Outlook. The impact of the coronavirus outbreak, and the measures used to contain its spread, is akin to an adverse supply-side shock, with an enforced decline in the number of hours worked. However, the effects are mirrored in weaker demand. A decline in confidence, foregone income for laid-off workers, and lower demand for travel and tourism services all hit consumer spending; a reduction in cash-flow and higher uncertainty delay corporate investment; and existing inventory levels are run down due to the disruption of supply chains.

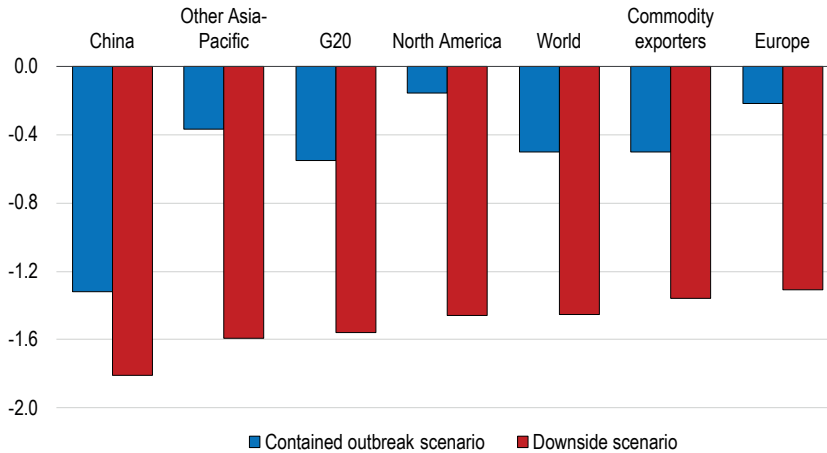
In this best-case scenario, overall, the level of world GDP is reduced by up to 0.75% at the peak of the shock, with the full year impact on global GDP growth in 2020 being around half a percentage point. Most of this decline stems from the effects of the initial reduction in demand in China. Global trade is significantly affected, declining by 1.4% in the first half of 2020 and by 0.9% in the year as a whole.

The impact on the rest of the world depends on the strength of cross-border linkages with China. In the near term, the adverse effects on GDP are relatively strong in Japan, Korea, other smaller economies in East and South-East Asia, and commodity exporters. All of these economies are significantly exposed to China via strong supply-chain linkages and tourism and other travel-related services.

The net effects of the combined shocks are deflationary, with consumer price inflation pushed down by around a quarter of a percentage point in 2020 in the OECD economies and by a little more in non-OECD economies.

We are obviously cautious in that this analysis cannot pick up the full extent of possible sharp discontinuities that might arise from the impact of the virus in China. These include possible supply-chain disruptions (particularly if alternative sources of supply are scarce) or the complete stop of cross-border travel into some locations. Such factors may change the impact of the virus outbreak over time and across regions.

Figure 2 Adverse impact on growth across regions
Change in GDP growth in 2020 relative to baseline (percentage points)



Note: Simulated impact of weaker domestic demand, lower commodity and equity prices and higher uncertainty. Contained outbreak scenario with the virus outbreak centred in China; downside scenario with the outbreak spreading significantly in other parts of the Asia-Pacific region, Europe and North America. Commodity exporters include Argentina, Brazil, Chile, Russia, South Africa and other non-OECD oil-producing economies.

Source: OECD calculations using the NiGEM global macroeconomic model.

How far the epidemic spreads will determine economic prospects, hence the downside scenario of broader contagion.

Downside scenario

In the downside scenario, the outbreak of the virus in China is assumed to spread much more intensively than at present through the wider Asia-Pacific region and the major advanced economies in the northern hemisphere in 2020. The scenario considers the additional impact if there were to be a sharp fall in private-sector demand in these regions as well.

Together, the countries affected in this scenario represent over 70% of global GDP (in purchasing power parity terms). While the extent of the restrictions on movement currently seen in China may not be fully replicated everywhere, many of the economic impacts are likely to be similar, with a significant hit to confidence, heightened uncertainty and (voluntary) restraints on travel and commercial and sporting events all likely to depress spending.

Overall, the level of world GDP is reduced by up to 1.75% (relative to baseline) at the peak of the shock in the latter half of 2020, with the full year impact on global GDP growth in 2020 being close to 1.5%. Initially, the adverse impact is concentrated in China, but the effects in the rest of Asia, Europe and North America gradually build up through 2020. The major part of the decline in GDP again stems from the direct effects of the reduction in demand, but the impact of heightened uncertainty accumulates gradually. World trade is substantially weaker, declining by around 3.75% in 2020, hitting exports in all economies.

The deflationary effects of the combined shocks are considerably larger than in the best-case scenario, with consumer price inflation pushed down by around 0.6 percentage points in 2020 in the OECD economies.

Policy recommendations

Economic policy choices have an important bearing on cushioning the implications of containment measures and the speed at which the economy can adjust towards more normal conditions after the virus outbreak.

Increased government spending should be first directed at the health sector, supporting all necessary spending on prevention, containment and mitigation of the virus, including higher overtime pay and better working environment conditions, as well as research.

Supporting vulnerable households and firms is essential.

Containment measures and the fear of infection can cause sudden stops in economic activity. **Beyond health, the priority should be on people.** Options include using short-time working schemes and providing vulnerable households with temporary direct transfers to tide them over the loss of income from work shutdowns and layoffs. Increasing liquidity buffers to firms in affected sectors is also necessary to avoid debt default by otherwise sound enterprises. Reducing fixed charges and taxes and credit forbearance would also help to ease the pressure on firms facing an abrupt falloff in demand.

If the epidemic spreads outside China, **the G20 should lead a coordinated policy response.**

Countries should cooperate on support to healthcare in countries where it is needed, as well as on containment measures. In addition, if countries announced coordinated fiscal and monetary support, confidence effects would compound the effect of policies (OECD 2019, Boone and Buti 2019). This would help reverse the sharp decline in confidence that a more widespread outbreak would provoke. It would also be more effective than working alone. Our work presented in the November 2019 OECD Economic Outlook (OECD 2019) shows that if G20 economies implement stimulus measures collectively, rather than alone, the growth effects in the median G20 economy would be one-third higher after just two years.

Some would say it is trite to call for international cooperation. However, in this globally connected economy and society, the coronavirus and its economic and social fallout is everyone's problem, even if firms decide in the wake of this virus shock to repatriate production and make it less inter-dependent.

Authors' note: For more information visit the latest [Interim Economic Outlook](#), released 2 March 2020.

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3 The economic impact of COVID-19

Warwick McKibbin and Roshen Fernando¹

Australian National University, Brookings Institution and the Centre of Excellence in Population Ageing Research (CEPAR); Australian National University and CEPAR

The COVID-19 outbreak was triggered in December 2019 in the city of Wuhan, which is in the Hubei province of China. The virus continues to spread across the world. Although the epicentre of the outbreak was initially China, with reported cases either in China or in travellers from the country, cases now are being reported in many other countries. While some countries have been able to effectively treat reported cases, it is uncertain where and when new cases will emerge. Amidst the significant public health risk COVID-19 poses to the world, the World Health Organization (WHO) has declared a public health emergency of international concern to coordinate international responses to the disease. It is, however, currently debated whether COVID-19 could potentially escalate to a global pandemic.

In a strongly connected and integrated world, the impacts of the disease beyond mortality (those who die) and morbidity (those who are unable to work for a period of time) has become apparent since the outbreak. Amidst the slowing down of the Chinese economy with interruptions to production, the functioning of global supply chains has been disrupted. Companies across the world, irrespective of size, that are dependent upon inputs from China have started experiencing contractions in production. Transport being limited and even restricted among countries has further slowed global economic activities. Most importantly, some panic among consumers and firms has distorted usual consumption patterns and created market anomalies. Global financial markets have also been responsive to the changes and global stock indices have plunged.

¹ We gratefully acknowledge financial support from the Australia Research Council Centre of Excellence in Population Ageing Research (CE170100005).

In McKibbin and Fernando (2020), we simulate a global economic model to explore seven scenarios regarding the spread of COVID-19. The G-cubed model is a hybrid of dynamic stochastic general equilibrium (DSGE) models and computable general equilibrium (CGE) models which was developed by McKibbin and Wilcoxon (1999, 2013) and extended to the G20 countries by McKibbin and Triggs (2018). Using this model, we follow the approach to evaluating the economics of SARS (Lee and McKibbin 2003) and pandemic influenza (McKibbin and Sidorenko 2006) to explore a range of different scenarios for the spread of COVID-19. Given a range of epidemiological assumptions, we create a set of filters that convert the epidemiological assumptions into economic shocks to reduced labour supply in each country (mortality and morbidity), rising costs of doing business in each sector (including disruption of production networks in each country), a reduction in consumption due to shifts in consumer preferences over each good from each country (in addition to those changes generated by the model based on changes in income and prices), a rise in equity risk premia on companies in each sector in each country (based on exposure to the disease), and increases in country risk premia based on exposure to the disease as well as vulnerabilities to changing macroeconomic conditions.

Scenarios 1 to 3 (called S01, S02 and S03) assume the epidemiological events are limited to China. The economic impact on China and the spillovers to other countries – through trade, capital flows and changes in risk premia in global financial markets – are determined by the model. Scenarios 4 to 6 (S04, S05 and S06) are the pandemic scenarios where the epidemiological shocks occur in all countries to differing degrees. Scenarios 1 to 6 assume the shocks are temporary. Scenario 7 (called S07) is a case where a mild pandemic is expected to recur each year for the indefinite future.

Table 1 outlines the assumptions in the seven scenarios.

Table 2 shows the impact on populations in different regions under each scenario. The table shows that for even the lowest of the pandemic scenarios (S04), there are estimated to be around 15 million deaths globally. In the US, the estimate is 236,000 deaths (for comparison, in a regular influenza season in the US around 55,000 people die each year).

Tables 3 provides a summary of the overall GDP loss for each country/region under the seven scenarios. It shows the change in GDP in 2020 expressed as the percentage change from the baseline. Further detailed results can be found in McKibbin and Fernando (2020). The table illustrates the scale of the various pandemic scenarios on reducing GDP in the global economy. In the case where COVID-19 develops into a global pandemic, our results suggest that the cost in lost economic output begins to escalate into the trillions of dollars.

Table 1 Scenario assumptions

Scenario	Countries affected	Severity	Attack rate for China	Mortality rate China	Nature of shocks	Shocks activated	
						China	Other countries
1	China	Low	1.0%	2.0%	Temporary	All	Risk
2	China	Mid	10.0%	2.5%	Temporary	All	Risk
3	China	High	30.0%	3.0%	Temporary	All	Risk
4	Global	Low	10.0%	2.0%	Temporary	All	All
5	Global	Mid	20.0%	2.5%	Temporary	All	All
6	Global	High	30.0%	3.0%	Temporary	All	All
7	Global	Low	10.0%	2.0%	Permanent	All	All

Source: Table 3 in McKibbin and Fernando (2020).

Table 2 Impact on populations under each scenario

Country/region	Population (thousands)	Mortality in first year (thousands)						
		S01	S02	S03	S04	S05	S06	S07
Argentina	43,418	-	-	-	50	126	226	50
Australia	23,800	-	-	-	21	53	96	21
Brazil	205,962	-	-	-	257	641	1,154	257
Canada	35,950	-	-	-	30	74	133	30
China	1,397,029	279	3,493	12,573	2,794	6,985	12,573	2,794
France	64,457	-	-	-	60	149	268	60
Germany	81,708	-	-	-	79	198	357	79
India	1,309,054	-	-	-	3,693	9,232	16,617	3,693
Indonesia	258,162	-	-	-	647	1,616	2,909	647
Italy	59,504	-	-	-	59	147	265	59
Japan	127,975	-	-	-	127	317	570	127
Mexico	125,891	-	-	-	184	460	828	184
Republic of Korea	50,594	-	-	-	61	151	272	61
Russia	143,888	-	-	-	186	465	837	186
Saudi Arabia	31,557	-	-	-	29	71	128	29
South Africa	55,291	-	-	-	75	187	337	75
Turkey	78,271	-	-	-	116	290	522	116
United Kingdom	65,397	-	-	-	64	161	290	64
United States	319,929	-	-	-	236	589	1,060	236
Other Asia	330,935	-	-	-	530	1,324	2,384	530
Other oil-producing countries	517,452	-	-	-	774	1,936	3,485	774
Rest of euro area	117,427	-	-	-	106	265	478	106
Rest of OECD	33,954	-	-	-	27	67	121	27
Rest of world	2,505,604	-	-	-	4,986	12,464	22,435	4,986
Total	7,983,209	279	3,493	12,573	15,188	37,971	68,347	15,188

Source: Table 2 in McKibbin and Fernando (2020).

Table 3 GDP loss in 2020 (percentage deviation from baseline)

Country/Region	S01	S02	S03	S04	S05	S06	S07
Australia	-0.3	-0.4	-0.7	-2.1	-4.6	-7.9	-2.0
Brazil	-0.3	-0.3	-0.5	-2.1	-4.7	-8.0	-1.9
China	-0.4	-1.9	-6.0	-1.6	-3.6	-6.2	-2.2
India	-0.2	-0.2	-0.4	-1.4	-3.1	-5.3	-1.3
Rest of euro area	-0.2	-0.2	-0.4	-2.1	-4.8	-8.4	-1.9
France	-0.2	-0.3	-0.3	-2.0	-4.6	-8.0	-1.5
Germany	-0.2	-0.3	-0.5	-2.2	-5.0	-8.7	-1.7
South Africa	-0.2	-0.2	-0.4	-1.8	-4.0	-7.0	-1.5
Italy	-0.2	-0.3	-0.4	-2.1	-4.8	-8.3	-2.2
Japan	-0.3	-0.4	-0.5	-2.5	-5.7	-9.9	-2.0
United Kingdom	-0.2	-0.2	-0.3	-1.5	-3.5	-6.0	-1.2
Rest of World	-0.2	-0.2	-0.3	-1.5	-3.5	-5.9	-1.5
Mexico	-0.1	-0.1	-0.1	-0.9	-2.2	-3.8	-0.9
Canada	-0.2	-0.2	-0.4	-1.8	-4.1	-7.1	-1.6
Rest of OECD	-0.3	-0.3	-0.5	-2.0	-4.4	-7.7	-1.8
Rest of oil-producing countries	-0.2	-0.2	-0.4	-1.4	-3.2	-5.5	-1.3
Argentina	-0.2	-0.3	-0.5	-1.6	-3.5	-6.0	-1.2
Russia	-0.2	-0.3	-0.5	-2.0	-4.6	-8.0	-1.9
Saudi Arabia	-0.2	-0.2	-0.3	-0.7	-1.4	-2.4	-1.3
Turkey	-0.1	-0.2	-0.2	-1.4	-3.2	-5.5	-1.2
United States	-0.1	-0.1	-0.2	-2.0	-4.8	-8.4	-1.5
Other Asia	-0.1	-0.2	-0.4	-1.6	-3.6	-6.3	-1.5
Indonesia	-0.2	-0.2	-0.3	-1.3	-2.8	-4.7	-1.3
Republic of Korea	-0.1	-0.2	-0.3	-1.4	-3.3	-5.8	-1.3

Source: Table 10 in McKibbin and Fernando (2020).

A range of policy responses is important both in the short term as well as in the coming years. In the short term, central banks and treasuries need to make sure that disrupted economies continue to function while the virus outbreak continues. In the face of real and financial stress, there is a critical role for governments. While cutting interest rates is a possible response for central banks, the shock is not simply a demand management problem but a multi-faceted crisis that will require monetary, fiscal and health policy responses. Quarantining affected people and reducing large-scale social interaction is an effective response. Wide dissemination of good hygiene practices, as outlined in Levine and McKibbin (2020), can be a low-cost and highly effective response that can reduce the extent of contagion and therefore reduce the social and economic cost.

The longer-term responses are even more important. Despite the potential loss of life and the large-scale disruption to a large number of people, many governments have been reluctant to invest sufficiently in their health care systems, let alone public health systems in less-developed countries where many infectious diseases are likely to originate. Experts have warned, and continue to warn, that zoonotic diseases will continue to pose a threat to the lives of millions of people, with potentially major disruption to an integrated world economy. The idea that any country can be an island in an integrated global economy has been proven wrong by the latest outbreak of COVID-19. Global cooperation, especially in the sphere of public health and economic development, is essential. All major countries need to participate actively. It is too late to act once the disease has taken hold in many other countries and to attempt to close borders once a pandemic has started.

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4 Novel coronavirus hurts the Middle East and North Africa through many channels

Rabah Arezki and Ha Nguyen

World Bank

The novel coronavirus (COVID-19) was first alerted to the World Health Organization (WHO) by the Chinese authorities on 31 December 2019. This new virus can cause flu-like symptoms which often are more severe and more likely to result in death than other known coronaviruses. The virus has spread to more than 65 countries and territories, with about 87,600 cases and close to 3,000 deaths (as of 26 February 2020).¹ It has the potential to severely disrupt global economic activities. In this chapter, I examine the channels through which COVID-19 may affect the Middle East and North Africa (MENA) region.

COVID-19 infections

Travellers from China, Korea, Italy, and other affected countries could spread COVID-19 to the MENA region. The virus has already spread to Iran and other MENA countries. As of 29 February, Iran had reported 593 infections and at least 43 deaths.² The rapid rise in infections there is likely to disrupt the country's production and trade. As the virus spread in Iran, authorities closed schools and cancelled art and film events, and neighbouring countries closed their land borders with Iran.³ Other MENA countries have also reported infections. As of 29 February, the United Arab Emirates had reported 19 cases, Iraq had reported 8 cases, Bahrain had reported 38 cases and Kuwait had reported 45 cases. Egypt, Qatar and Lebanon have also reported their first cases.⁴

1 <https://www.worldometers.info/coronavirus/>

2 <https://www.worldometers.info/coronavirus/>

3 <https://www.aljazeera.com/news/2020/02/neighbours-close-borders-iran-virus-concerns-rise-200223160135283.html>

4 <https://www.worldometers.info/coronavirus/>

The ability to contain the virus depends on the strength of the public health systems of the MENA countries. WHO ranks most MENA countries relatively high among the world's 191 health systems – with a few exceptions, such as Yemen (ranked 120th) and Djibouti (ranked 157th) (Tandon et al. 2000). However, some MENA countries might face difficulties in fighting the spread of the virus. Wars in Syria and Yemen will almost certainly impede the proper functioning of the health systems in the two countries. According to Abdinasir Abubakar of WHO's Regional Office for the Eastern Mediterranean, the US embargo on Iran may hurt Iran's ability to buy the technology required to produce essential equipment and medicine.⁵

Oil prices

Because of their exposure to oil and gas exports, a decline in the prices of petroleum-related products is expected to be the most significant channel through which effects of the COVID-19 are felt in MENA countries. Since the discovery of the new virus and infections in China at the beginning of 2020, oil prices have declined sharply. The price of Brent oil dropped from \$68.90 a barrel on 1 January to \$50.5 a barrel as of 28 February (see Figure 1). Crude oil futures tumbled by about \$20 a barrel during January and February in anticipation of the negative impact on oil demand from COVID-19 (see Figure 2).

Although other factors might have contributed to this drop, COVID-19 was probably the most important factor, largely because of the significant drop in demand from China as authorities shuttered production facilities as part of their efforts to contain the spread of the virus. According to the Oil Market Report for February from the International Energy Agency (IEA), China's oil demand currently accounts for 14% of global demand, and China's growth in oil demand currently accounts for more than 75% of the global growth in demand (International Energy Agency 2020). In addition, with an increasingly important role in the global economy, any setbacks to the Chinese economy are expected to have significant negative spillovers to the global economy (Arezki and Yang 2018). In addition, the global fear and uncertainty regarding the spread of virus will likely hurt investment decisions in China and in other countries, which further lowers oil prices. The IEA expects global demand for oil to fall by 435,000 barrels per day year-on-year in the first quarter of 2020 – the first quarterly contraction in more than a decade. The global demand for all of 2020 is also expected to fall by 365,000 barrels per day – the worst performance of demand since 2011. The risk posed by the

5 <https://www.aljazeera.com/news/2020/02/neighbours-close-borders-iran-virus-concerns-rise-200223160135283.html>

COVID-19 crisis has prompted the OPEC+ countries to consider an additional cut in oil production of 600,000 barrels a day as an emergency measure on top of the 1.7 million barrels a day already pledged (International Energy Agency 2020).

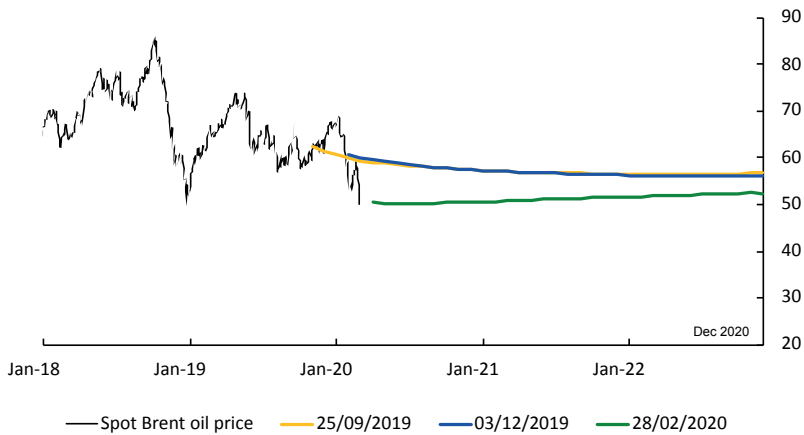
The recovery of oil prices will depend on how successfully China and other countries control the spread of the virus, the effects of which are becoming increasingly global. Although the vast majority of cases have been in China, Korea, Italy, and Iran have seen a surge in infections and many other countries have recorded some cases.

Figure 1 Brent oil price and future curves



Note: Data end on 28 February 2020

Figure 2 Oil price futures (US dollars per barrel)



Note: Expiration dates on horizontal axis. The colour lines show the future prices of Brent crude oil on 25 September 2019, 3 December 2019 and 28 February 2020.

Source: Bloomberg, L.P.

Value chains

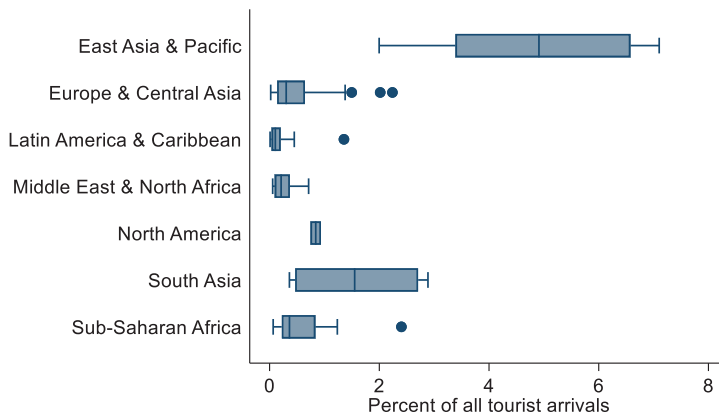
When China’s production is disrupted, countries with strong value chain connections with China will likely also be affected. This is a special concern for many Asian countries, which have important value chain connections with China, but less likely to be a concern for MENA countries, which have limited participation in global value chains. However, disruptions to global value chains might exacerbate the depression of oil prices caused by China’s weakening demand.

Tourism and travel

COVID-19 will likely reduce tourism from China to MENA in two ways. The first is the pull factor: many MENA countries are now imposing travel restrictions to Chinese. In addition, Saudi Arabia suspended entry of pilgrims to the holy sites, further reducing tourism to the Middle East.⁶ The second is the push factor: economic slowdown in China implies less tourists travelling to other countries, including MENA. East Asia and Pacific is likely see the sharpest drop in Chinese tourists. The effect of economic slowdown in China on tourist arrivals to MENA is expected to be more limited (see Figure 3). However, the reduction of global travel will further depress oil prices.

Figure 3 Estimated impact of a decline in China’s per capita GDP on Chinese arrivals to MENA and the rest of the world

Decline in Chinese tourist arrivals after a 0.3% fall in China's GDP pc
(As percent of all tourist arrivals from the World)



Note: Excludes Hong Kong.

Source: Lopez-Cordova (2020a, 2020b).

6 See <https://www.bbc.com/news/world-middle-east-51658061>

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5 Thinking ahead about the trade impact of COVID-19

Richard Baldwin and **Eiichi Tomiura**

Graduate Institute, Geneva and CEPR; Hitotsubashi University

COVID-19 is a supply shock and it is a demand shock. Both aspects will impact international trade in goods and services. This chapter is an attempt to think ahead about the trade effects using history and economic logic to guide the forward-looking effort. The key takeaway is that the virus is likely to be as ‘contagious’ economically as it is medically.

A few background facts are worth keeping in mind when thinking ahead about the trade effects.

- First, previous, post-war pandemics have generally affected much less economically important nations. This one is different.

As of 2 March 2020, the nations with the most reported cases include (in order) China, Korea, Italy, Japan, US, and Germany – with the cases growing rapidly especially in the US, Italy, and Germany. These six hard-hit nations account for:

- about 55% of world supply and demand (GDP)
- about 60% of world manufacturing, and
- 50% of world manufacturing exports.

Table 1 Large economies and COVID-19 (updated 29 February 2020)

	GDP	Manufacturing	Exports	Manufactured exports	COVID-19 cases
US	24%	16%	8%	8%	0.1%
China	16%	29%	13%	18%	85.2%
Japan	6%	8%	4%	5%	0.3%
Germany	5%	6%	8%	10%	0.2%
UK	3%	2%	2%	3%	0.1%
France	3%	2%	3%	4%	0.2%
India	3%	3%	2%	2%	0.0%
Italy	2%	2%	3%	3%	2.7%
Brazil	2%	1%	1%	1%	0.0%
Canada	2%	0%	2%	2%	

Sources: World Bank's World DataBank, WHO.int.

Plainly, supply disruptions and demand shocks in these nations will have global repercussions.

- Second, if the virus and accompanying preventative policies induce an important aggregate demand slowdown in these six nations, world trade will slow substantially.

The effect is likely to be amplified since, in past recessions, global trade has slowed faster than global growth. This outcome was especially marked during the 2008-09 Great Trade Collapse.

- Third, in addition to being global giants, the manufacturing sectors of the six hard-hit economies are at the heart of a myriad of international supply chains; each is an important supplier of industrial inputs to each other and to third nations.

For example, industrial parts and components made in China are important to manufacturing processes in most nations in the world. Thus a supply shock in these six nations is likely – via the trade in intermediate goods – to create what might be called ‘supply chain contagion’, i.e. the supply shock in the hard-hit six will create supply

shocks in in most nations – even those that are much less touched by the pandemic. This channel was shown to be important in Great Trade Collapse of ten years ago (Bems et al. 2010, Yi 2009, Alessandria et al. 2010, Altomonte et al. 2012).

Manufacturing sector gets a triple hit

An important point is that manufacturing is special. Manufactured goods are – on the whole – ‘postpone-able’ purchases. As we saw in the Great Trade Collapse of 2009, the wait-and-see demand shock impacts durable goods more than non-durable goods. In short, the manufacturing sector is likely to get a triple hit.

1. Direct supply disruptions hindering production since the disease is focused on the world’s manufacturing heartland (East Asia), and spreading fast in the other industrial giants – the US and Germany.
2. Supply-chain contagion will amplify the direct supply shocks as manufacturing sectors in less-affected nations find it harder and/or more expensive to acquire the necessary imported industrial inputs from the hard-hit nations, and subsequently from each other.
3. Demand disruptions due to (1) macroeconomic drops in aggregate demand, i.e. recessions, and (2) precautionary or wait-and-see purchase delays by consumers, and investment delays by firms.

Of course, the service sector in all affected countries are hit hard – as restaurants and movie theatres empty out – but it may well be the manufacturing that takes the biggest hit.

Supply and demand shock effects on aggregate trade flow

The gravity equation is one of economists’ most reliable empirical relationships. It models the value of exports from one nation (the origin nation) to another (the destination nation) as depending positively upon the destination’s aggregate demand (as measured by its GDP) and the origin’s aggregate supply (as measured by its GDP). The product of GDPs is divided by the bilateral distance to reflect frictions.

As distances don’t change, shocks to bilateral exports fall neatly into supply shocks (changes in the GDP of the origin nation, i.e. the seller) and demand shocks (changes in the GDP of the destination nation, i.e. the buyer). Thinking ahead, this decomposition suggests two aggregate trade implications:

1. To the extent that COVID-19 is a supply shock, exports will fall, and they will fall most in the nations that are most severely hit.
2. To the extent that COVID-19 is a demand shock, imports will fall, and they will fall most in the trade partners of the nations that are most severely hit.

Given their economic importance, sizeable demand and supply shocks in these the six hardest-hit nations are almost sure to trigger large drops in trade flows at the global level.

‘Supply-side contagion’ via international supply chains

As of early March 2020, the COVID-19 epidemic was very much centred in China, with over 90% of reported cases located there. The two next hardest hit nations are Japan and Korea. These observations are pertinent since China, Japan and Korea are central to the global supply chains in most manufactured goods. China itself has become, over the past few decades, something like the ‘OPEC for industrial inputs’, i.e. a critical supplier of inputs used in industries around the world. This is illustrated in Figure 1, which focuses on textiles to take concrete examples.¹

In the diagram, the size of the bubble reflects the size of the country in terms of the trade flows considered, and the thickness of the connecting arrows show the relative importance of particular bilateral flows. Small flows are zeroed out for clarity. The diagram looks only at trade in intermediate inputs used in the textile sector.

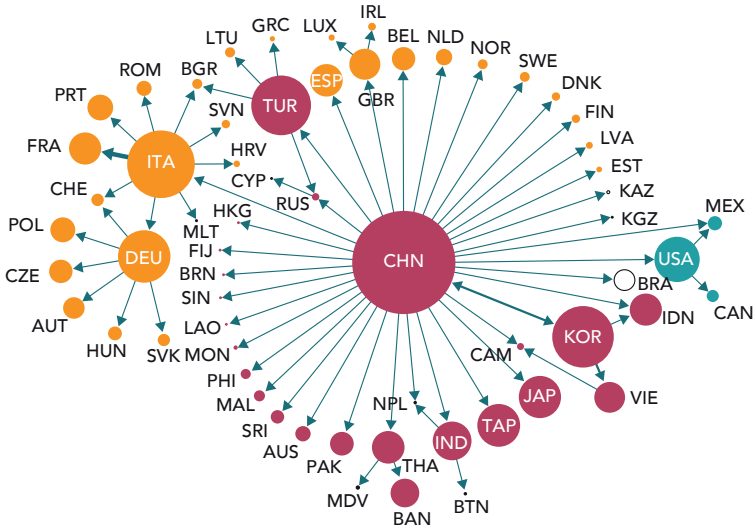
Two features are notable when it comes to thinking about COVID-19’s supply chain contagion.

- First, China really is the workshop of the world when it comes to textile sector inputs – it is central to the entire global network of trade and production.
- Second, there is a very strong regional dimension shown. When it comes to textiles, Italy is the heart of ‘Factory Europe’; China is the heart of ‘Factory Asia’, and the US is the heart of ‘Factory North America’. There are no hubs in Africa and South America.

The second figure shows the same information for intermediate goods used in information and communication technology (ICT) goods sectors. The stark differences between Figures 1 and 2 serve as a warning to analyst who would over generalise.

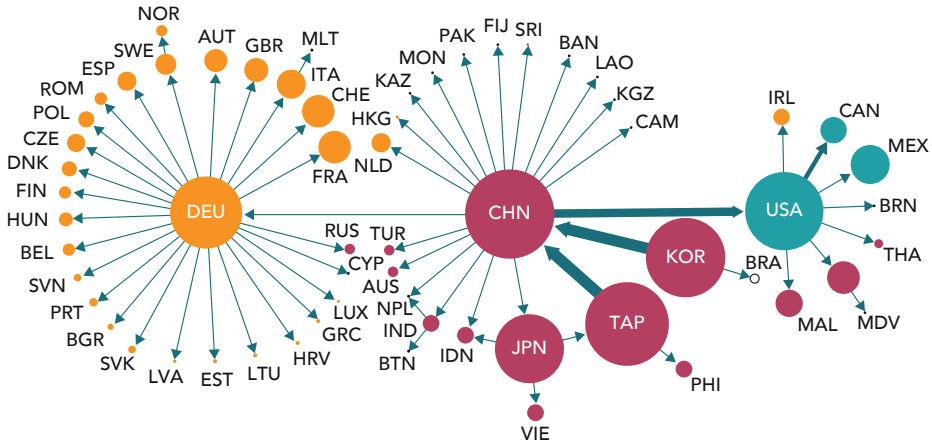
¹ Reproduced from the WTO’s Global Value Chain Development Report 2019, figure 1.16 and 1.17.

Figure 1 Three interconnected hubs in the world's supply chain for textiles



Source: WTO Global Value Chain Development Report 2019.

Figure 2 Three interconnected hubs in the world's supply chain for ICT goods



Source: WTO Global Value Chain Development Report 2019.

Supply linkages are very different in different sectors. In the ICT sector, for example, we see the centrality of China, but there are important nuances.

- Japan, Korea, Taiwan and China are basically co-hubs in ‘Factory Asia’ when it comes to ICT goods.
- The regionality of supply chains is stronger in ICT than in textiles. We note that for trade overall, the regionality is even more highly marked.

The upshot of these points is that supply-side contagion is very likely. Supply disruptions in East Asia’s manufacturing sectors are very likely to hurt manufacturing sectors of other nations all around the world.

Anecdotal evidence for such contagion already appearing is abundant. A recent article in *Barron’s*, for example, quotes the CEO of company that provides supply-chain software:

“In the last two decades, China became the factory of the world,” says Girish Rishi.
“Consumer packaged goods, automotive, apparel, high-tech. I can’t tell you which sector is not getting impacted.”

The three hard-hit East Asian manufacturing giants, China, South Korea, and Japan, account for over 25% of US imports, and over 50% of US imports of computer and electronics products. Quoted in the same article, an analyst at the consulting firm Cowen, John Kernan, noted that apparel and footwear companies are particularly vulnerable to East Asian supply disruptions.

The Economist magazine pointed to vulnerability of the electronics industry with its practice of keeping very lean inventory levels and the lack of alternative sources for many electronic components. The optics sector is likewise highly exposed. The heart of the outbreak, Hubei province, is known as China’s ‘optics valley’ since so many firms manufacturing fibre optic components are located there (these are essential inputs for telecoms networks). Something like a quarter of the world’s optical-fibre cables and devices are in the province. Hubei is also the location of highly advanced microchip-fabrication factories (these make the flash memory chips used, e.g. in smartphones). *The Economist* cites analysts who conjecture that the epidemic in Hubei alone could knock 10% off worldwide shipments of smartphones.²

2 See <https://www.economist.com/international/2020/02/15/the-new-coronavirus-could-have-a-lasting-impact-on-global-supply-chains>

The automobile sector, especially in East Asia, is already significantly disrupted by ruptures in international supply chains. For example, a shortage of parts coming from China has forced Korean carmaker Hyundai to shut all its car plants in Korea. The Japan firm Nissan closed a factory in Japan temporarily. The shock has even reached Europe. Fiat-Chrysler has recently warned that it could soon halt production at one of its European factories. Jaguar Land Rover, a UK-based auto company, announced it might run out of parts from the end of February. To stave this off, it has flown in emergency supplies from China in suitcases.³

Data on supply-chain linkages

International supply-chain linkages are easy to document at the aggregate level, thanks to the OECD's Trade in Value Added Data base. Table 2 shows the interdependence of nations when it comes to where things are made. The focus is on the source of the things that a nation buys both directly and indirectly. For instance, the US imports many things from the China – and this via three basic routes. The first is the direct import of final goods made in China. An adjustment, however, is made for the fact that some fractions of US imports from China are actually made in other nations. For instance, China may source sophisticated optical components from Japan to put into cameras it exports to the US.

The second is the import by US firms of Chinese parts and component that are then combined by US manufactures into things US firms and consumers buy. For example, China may sell electric motors US firms that incorporate them in remote-controlled gates installed on American driveways. The last route includes the Chinese parts that are incorporated into goods the US buys from third nations. For example, the Mexican car industry, which sells a lot to the US, buys lots of parts from China.

Table 2 shows the result of these calculations. What it demonstrates is that the goods and parts produced the US, Germany (DEU), China (CHN), and Japan (JPN) are massively important in the expenditure on all major nations. In all the nations listed, China's value added accounts for no less than 3% of final expenditure. Notice that there is strong regional reliance in the numbers. Especially in North America, the US is dominant for Canada and Mexico, as are China and Japan in East Asia. The big European manufacturers, the UK, Germany, France and Italy (especially Germany), are key suppliers to other European nations.

3 <https://www.economist.com/finance-and-economics/2020/02/22/covid-19-presents-economic-policymakers-with-a-new-sort-of-threat?cid1=cust/ednew/n/bl/n/2020/02/29n/owned/n/n/nwl/n/n/E/415278/n>

The obvious implication is that supply disruption in the US, Germany, China, or Japan could have large effects on consumers and firms in all the major economies. The same is true, but less so, for the UK, France, Italy, and Korea.

Table 2 Where do goods come from? Source of direct and indirect value added in the purchases

Importance of the row nation's value added in the column nation's final demand

	USA	CAN	MEX	DEU	GBR	FRA	ITA	ESP	TUR	NLD	CHE	CHN	JPN	IND	KOR	AUS	IDN	BRA
USA		39%	24%	5%	11%	10%	5%	5%	7%	11%	11%	6%	8%	4%	8%	10%	3%	8%
CAN	4%		1%															
MEX	5%	5%																1%
DEU	5%	4%	3%		19%	20%	14%	15%	15%	20%	25%	4%	2%	2%	6%	8%	2%	2%
GBR	1%	2%		3%		4%	3%	4%	4%	4%	8%	1%		1%	1%	3%		
FRA	1%	1%		6%	5%		5%	10%	6%	5%	5%	1%			2%	1%	1%	1%
ITA	1%	1%		2%	3%	4%		4%	3%	2%	6%					1%		1%
ESP				2%	5%	7%	4%		4%	3%	3%					1%		
TUR				1%	2%	2%	2%	2%			1%							
NLD					1%	1%												1%
CHE											1%							
CHN	7%	7%	7%	3%	4%	4%	4%	4%	5%	5%	6%		6%	9%	12%	9%	7%	7%
JPN	6%	4%	4%	2%	3%	3%	2%	2%	2%	3%	3%	3%		2%	8%	16%	8%	2%
IND			1%					1%		1%	1%							
KOR	3%	3%	2%		3%	1%	3%	1%	3%	1%	1%	2%	1%	3%		7%	2%	2%
AUS														1%				
IDN														1%				
BRA			1%															

Note: USA = US, CAN = Canada, MEX = Mexico, DEU = Germany, GBR = UK, FRA = France, ITA = Italy, ESP = Spain, TUR = Turkey, NLD = Netherlands, CHE = Switzerland, CHN = China, JPN = Japan, IND = India, KOR = Korea, AUS = Australia, IDN = Indonesia, BRA = Brazil.

Trade in services

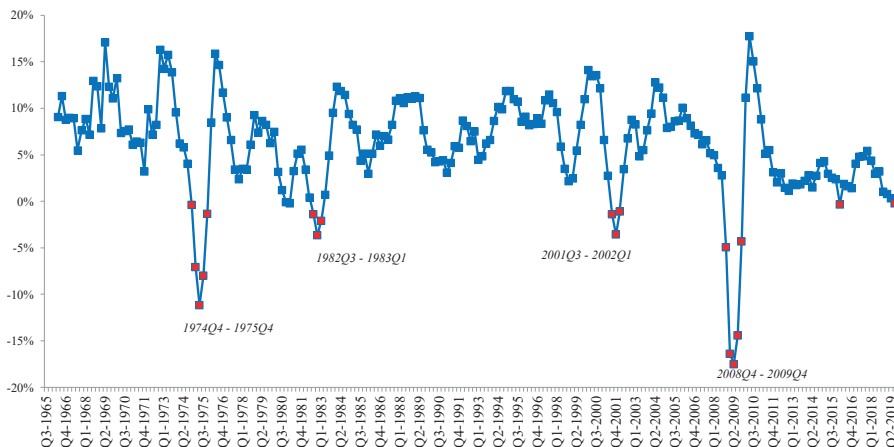
Some trade in services – like airplane travel, hotel rentals, and tourism – have already been hit hard by both the supply-side and demand-side aspects of COVID-19. Other services – say financial services and medical services – are much less like to be disrupted. Overall, it seems that the shock will encourage remote, tele-intermediated interpersonal interactions. Since these interactions are the heart and soul of many services, COVID-19 may well end up increasing trade in services.

How bad could it get? Lessons from past global trade shocks

The Global Crisis of 2008-09 produced what came to be known as the Great Trade Collapse. It occurred between the third quarter of 2008 and the second quarter of 2009. It was, and still is, the steepest fall of world trade in recorded history, and the deepest fall since the Great Depression. The drop was sudden, severe, and synchronised.

Global trade has dropped a few times since WWII, but the 2008-09 hit was by far the largest. As Figure 1 shows, global trade fell for at least three quarters during three of the worldwide recessions that have occurred since 1965 – the oil-shock recession of 1974-75, the inflation-defeating recession of 1982-83, and the Tech-Wreck recession of 2001-02.

Figure 3 Quarter-on-quarter growth, world imports volume, 1965 to 2019 Q3



Source: Authors' elaboration on WTO online data; www.WTO.org.

It seems at this point unlikely that COVID-19 would hit the world economy as hard and as broadly as the Global Crisis did in 2008-09, but the evidence from that experience provides an outer limit on the range of likely outcomes this time. It is also worth noting that the trade contract was sharp, but not particularly short. The global numbers stayed in negative territory for more than a year.

Another important difference was that the 2008-09 trade collapse was largely a demand-side event. There was some direct supply-side damage from the financial crisis, but mostly in the banking and finance side. The industrial damage (e.g. Chrysler went bankrupt) was due to the recession rather than the crisis shock per se.

Published studies of the causes of the Great Trade Collapse provide important hints about what may unfold going forwards. There were three leading hypotheses for what may have caused the collapse as follows: (1) a decline in aggregate demand for all goods, including imports; (2) difficulties in obtaining trade finance; and (3) rising trade barriers (Crowley and Luo 2011).

The received wisdom is that the collapse was due mostly to the demand shock – especially for ‘postpone-able’ goods (Eaton et al. 2009, Bénassy-Quéré et al. 2009, Levchenko et al. 2009). That is, since a large fraction of trade is in durable goods, exports tend to be two to three more times volatile than GDP (Engel and Wang 2011).

On top of this, a so-called ‘bullwhip’ effect operates for intermediate good producers (Zavacka 2012). A drop in demand for final goods leads each producer in the value chain to empty their inventories before re-ordering. The result is that the demand shock gets amplified for firms further up the supply chain. The role of GVCs has also been shown to be important (Bems et al. 2010, Yi 2009). Firm-level evidence for this was presented by Alessandria et al. (2010) and Altomonte et al. (2012).

As to the supply-chain contagion, Bems et al. (2010) use a global input-output framework to quantify US and EU demand spillovers and the elasticity of world trade to GDP during the global recession of 2008-2009. They find that 20–30% of the decline in the US and EU demand was borne by foreign countries, with NAFTA, emerging Europe, and Asia hit hardest

As to the two other mechanisms, Crowley and Luo (2011) conclude that there is almost no evidence that trade policy barriers rose during the period of trade collapse and recovery. Bricongne et al. (2012), and Chor and Manova (2010) find that the overall impact of credit constraints on trade was limited.

Concluding remarks

There is a danger of permanent damage to the trade system driven by policy and firms’ reactions. The combination of the US’ ongoing trade war against all of its trading partners (but especially China) and the supply-chain disruptions that are likely to be caused by COVID-19 could lead to a push to repatriate supply chains. Since they supply chains were internationalised to improve productivity, their undoing would do the opposite. We think this would be a misthinking of the lessons.

Exclusively depending on suppliers from any one nation does not reduce risk – it increases it. In Japan, for example, it would not only escalate costs but also expose production to the risk that the next earthquake could be bigger than that of 2011; such a quake is predicted to occur with high probability sometime within the next several decades.

We should not misinterpret pandemic as a justification for anti-globalism. Redundant dual sourcing from multiple countries alleviates the problem of excess dependence on China, though with additional costs. Japanese multinationals have already begun diversifying the destinations of foreign direct investment away from China in recent years, not foreseeing COVID-19 but prompted by Chinese wage hikes. We hope more intensive use of ICT enables firms to more effectively coordinate global sourcing.

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6 Finance in the times of coronavirus

Thorsten Beck

Cass Business School and CEPR

Economists have a bad track record in predictions, so I will not try my hand at predicting the effect of the novel coronavirus (COVID-19) on the global financial system or the global economy. Rather, I would like to offer some ideas on how to interpret what might happen during the next months. Obviously, the effect of the virus on the financial system will depend on (1) how much further the virus will spread across the globe and its effect on economic activity, (2) fiscal and monetary policy reactions to the shock, and (3) regulatory reactions to possible bank fragility. Current economic scenarios range from a small growth dip over a recession in several affected countries to a global recession as in 2008/9. While there is less monetary policy space today than during the Great Recession, bank regulatory and resolution frameworks certainly offer more policy options than 12 years ago, though the question is whether they are really fit to deal with a systemic crisis. I am writing all this, recognising that there are much more urgent and immediate public policy questions related to containing the spread of the virus and the associated socioeconomic damage.

One big factor will be whether virus-related disruptions will be temporary or persistent. As important as this is for the economic damage done by the virus shock (a V-shaped dip and recovery or a deeper U-shaped recession), this will have repercussions for the financial system. In the case of a temporary disruption to supply chains or a mild demand-side shock resulting in a delay in consumption, banks can serve as support for struggling firms, especially in the case of many European banking systems with close and long-running relationships between firms and banks. Recent research has shown that relationship lenders can help firms during times of recession and economic crisis (Bolton et al. 2016, Beck et al. 2018), based on their extensive knowledge of firms and long-run relationships. A longer slowdown or even a recession, on the other hand, will put pressure on banks' loan portfolios and solvency positions. Rather than the recent correction of stock markets across the globe, it will be non-performing loans (as well

as a freezing of funding markets) that could be a direct source of bank fragility. Non-performing loans, however, will not show up immediately, but rather (in a negative to adverse scenario) in the second half of 2020.

One starting point to assess the impact of such a negative or adverse scenario are stress tests undertaken by regulators across the globe, including by the Single Supervisory Mechanism (SSM) and European Banking Authority (EBA) for the largest banks in the euro area and EU. The 2018 stress test modelled a cumulative fall of 8.3% over three years relative to the baseline projection in its adverse scenario and concluded that even after such a shock, the average CET1 ratio would still be 10.1%, though with a large variation across banks.¹ Obviously, there might be quite some variation in such an adverse scenario across countries and banks, and there certainly could be bank failures, especially among banks whose loan portfolios are concentrated in the areas most affected.

Regulatory forbearance with respect to loan classification and thus loan loss provisions would be the wrong response. Letting markets guess what the true financial situation of banks is rather than providing such information can make things only worse. While there is an ongoing academic debate on whether more transparency is always better, experience from the early EBA stress tests in the EU – which turned out to be too lenient, with banks that passed the test failing shortly afterwards – suggests that pretending that things are just fine is not conducive to creating confidence. Rather than allowing forbearance on loan classification and thus loan provisions, regulators should instead allow banks to eat into their capital conservation and counter-cyclical buffers. Such loan losses would not show up that quickly anyway and consequent losses would not be expected before late 2020. At the same time, bank resolution frameworks might be put to the test, as will the political willingness to let supervisors and resolution authorities do their job.

Loan losses are only one source of fragility, though. Last October, the Hong Kong Monetary Authority ran a crisis simulation exercise with its major banks, which included the breakout of a disease like the Coronavirus, with the resulting operational challenges.² Operational risks can loom large in scenarios with widespread socioeconomic disruption, and the better prepared central banks, regulators and financial market participants are, the more limited the damage to the financial system and the real economy will be.

1 See <https://eba.europa.eu/risk-analysis-and-data/eu-wide-stress-testing/2018>

2 See <https://www.reuters.com/article/us-china-health-hongkong-finance/hong-kong-banks-compare-pandemic-stress-test-with-epidemic-reality-idUSKBN2070N2>

A third challenge (though related to the previous two) would be the loss of confidence in banks, be it by depositors (resulting in bank runs) or by markets. Loss of access to funding markets can easily turn into systemic distress, and much earlier than non-performing assets will show up on banks' balance sheets. Swift intervention by central banks as lenders and market-makers of last resort will be critical in such circumstances.

What will be the policy reaction of monetary and fiscal policy authorities? In the euro area, the ECB has all but run out of munition, unlike the Federal Reserve and the Bank of England – with the former having already taken action this week. While there might be still be options to influence the yield curve, large aggregate demand effects cannot be expected from such actions. Lowering already negative interest rates further might trade off aggregate demand effects with putting further pressure on banks' balance sheets.

Fiscal policy, on the other hand, has quite some space, especially in some of the 'frugal countries' such as Germany. Italy has just announced temporary tax cuts and higher health spending, with an obvious negative effect on its fiscal position. This seems the most reasonable approach right now, though it certainly might lead to problems further down the road in terms of Italian debt sustainability. The Italian government has requested that the European Commission relax the fiscal policy targets for Italy in light of both expected growth and a higher deficit resulting from COVID-19. However, it seems to matter little if the Commission loosens fiscal criteria for the Italian government, as it will ultimately be the market that will take a view on whether or not Italian sovereign debt is sustainable. In a perfect storm, an increase in Italian government bond yields together with rising loan losses could put Italian banks under pressure. While this might seem like a tail risk at this stage, it certainly should not be excluded. Policy responses to such an event would certainly fall outside regular frameworks. They might require a new 'whatever it takes', a restart of the Outright Monetary Transactions (OMT) programme (announced by Draghi in summer 2011, but never used) and a coordinated effort at the euro area level.

Which brings me to a final point. COVID-19 is a typical example of a shock that is hard for each country to handle separately. It is a challenge for which 'Europe' seems an appropriate level to coordinate action (notwithstanding urgently needed global coordination). Beyond handling the challenges for the health system, economic and financial policy coordination is critical for the EU and the euro area in the case of an adverse scenario. It might very well turn into another historic test for the EU and the euro area, in terms of economic policy response but also in terms of political significance and sending a signal of relevance and strength to its citizens.

In summary, in the most adverse scenario, COVID-19 could have quite important repercussions for the financial system. Immediate attention should obviously be focused on the public health aspects of the virus and on avoiding a global pandemic, if still possible. Adverse solvency effects in the financial system will most likely not be immediate, so appropriate responses can be prepared. Panic and spillover effects in markets, on the other hand, might come much more rapidly, so complacency over short-term effects might be mistaken as well. The experiences and regulatory upgrades of the past decade will come in useful for regulatory and monetary policy authorities; however, there seems to have been as little preparation as before for a tail-risk event. If I had to make one humble recommendation to regulatory authorities, it would be to (1) focus on possible operational disruptions in the financial system, (2) strengthen confidence in financial markets by clearly signalling that they stand ready to intervene, and (3) prepare for possible interventions in and resolution of failing banks, without ignoring tail-risk events.

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7 Contagion: Bank runs and COVID-19

Stephen G. Cecchetti and Kermit L. Schoenholtz

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“[I]f there is a single dominant lesson from 1918, it’s that governments need to tell the truth in a crisis...Those in authority must retain the public’s trust. The way to do that is to distort nothing, to put the best face on nothing, to try to manipulate no one.”

John M. Barry, *The Great Influenza: The Epic Story of the Deadliest Plague in History* (cited by @michikokakutani on Twitter, 28 February 2020)

There are currently more than 85,000 confirmed cases of COVID-19 in at least 60 countries.¹ The contagion rate could be double that of the common flu, with a fatality rate as much as 20 times higher. But, these estimates – the rate of transmission, the frequency with which people exhibit symptoms, and the consequence of becoming ill – are all extremely uncertain. In addition, since it is a new virus, we have neither tested therapies nor vaccines.

So we know very little about this pathogen, except that everyone is worried. And, with the number of cases rising each day, intensifying concerns will probably lead many people to behave in ways that undermine economic activity. They will shy away from places where the virus can be transmitted. That means avoiding mass transit, schools, and workplaces.

Moreover, many people will stay away until they are confident that the disease is manageable. That confidence probably requires an effective treatment or a very low likelihood of infection, or both. Not surprisingly, many observers are reducing their projections for economic growth this year, while financial market participants anticipate easier monetary policy to cushion the shock.

The challenge of re-establishing public confidence that it is safe to venture out bears striking similarity to the one that authorities face in stemming a bank run. Our ability to identify and quarantine people infected with COVID-19 is analogous to our ability to recognise and isolate a bank bordering on insolvency.

Banks are like black boxes: outside observers know little about the value of their assets, especially in the aftermath of a shock such as a broad-based plunge in asset prices. As a result, bad news can lead depositors to question the solvency of their bank.

Furthermore, banks are vulnerable. The sequential process of redeeming deposits at face value creates a *first-mover advantage*: those who get to the bank first get paid in full, while those who are patient (or just slow) may receive nothing. This leads to a run.

What is more, like viral illnesses, bank runs are *contagious*. The news about a run on a specific bank alerts everyone to the fact that there may be other ‘lemons’ among the universe of banks, turning a run in to a panic. Put differently, when people have insufficient information, shocks can cause them to behave in ways that *amplify* rather than *dampen* disturbances. Even if everyone believes that most banks are solvent, uncertainty about this bank or that bank can be enough to motivate a run.²

These similarities suggest that the means we use to control bank runs also may be useful in managing the economic consequences of an emerging pandemic like COVID-19.

By lending against good collateral to solvent banks, a central bank can easily manage a liquidity-driven run. But if banks’ solvency is in question, then the problem shifts to one where authorities need to credibly demonstrate the health of the banks. Amid frozen markets and fire sales, how can they do that?

In our experience, the most effective mechanism to arrest financial contagion driven by solvency concerns is an *extraordinary disclosure mechanism*. Stress tests that aim to reveal banks’ true condition are the most powerful such tool. In late 2008, doubts about the capital adequacy of the largest US intermediaries made potential investors, creditors, and customers wary of doing business with them, leading to a virtual collapse of unsecured finance. The May 2009 publication of stress test results for the 19 largest US banks constituted a key part of the remedy (Board of Governors of the Federal Reserve System 2009).

Why did the US stress tests restore confidence? One reason is that they were serious: a bank that passed the test could still lend to healthy borrowers despite a deep recession. But people also had to believe that the disclosure was truthful. Wouldn’t policymakers have an incentive to declare all banks healthy, even if some were not?

2 For slightly more detail, see our primer on bank runs (Cecchetti and Schoenholtz 2020).

The key to US authorities' credibility in the midst of the financial crisis was that, even after making large capital injections in late 2008, they still had the means to bail out a failing institution. As a result, investors accepted the news that the stress-tested banks 'only' needed to add \$75 billion in equity funding, allowing newly confident private markets to recapitalise them for the first time since Lehman's failure.

To limit the economic fallout from a pandemic, the requirement of thorough and credible disclosure is the same. Even if people believe that almost everyone is healthy, there is an incentive to stay away from places where you may encounter someone carrying the illness. Daily news of transmission in dozens of countries leads to the obvious conclusion that infection can happen anywhere. And, just as it is costly to observe the health of a bank in a crisis, in a pandemic it is difficult or impossible to observe whether someone sitting next to you is carrying (and spreading) the disease. Every cough and snuffle trigger fear.

The lesson from the 2009 stress tests is that sound science and public health policy are critical to limiting economically destabilising behaviour. For people to regain the confidence needed to go about their normal daily business, governments will need to demonstrate some combination of (1) credible testing to demonstrate the population is nearly virus free, (2) the effective quarantine of those stricken, and (3) advances in treatment that limit the pathogen's impact.

Success requires that people view authorities as extraordinarily trustworthy. This means providing detailed, up-to-date information on the spread of the illness, its severity and the methods available for treatment and control. As John Barry argues (see the opening quote), they have to stick to the facts, and shun politics entirely. Any attempt to colour the facts weakens the credibility of the announcements and delays the point at which confidence returns.

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8 Real and financial lenses to assess the economic consequences of COVID-19

Catherine L. Mann
Citi

A dramatic pivot in prospects and markets marks the impact of the novel coronavirus on countries and the global economy, from January's prospects for an upturn in global growth and record highs in US equity markets to February's downgrades of global growth and market corrections. The aggregate assessments mask substantial heterogeneity in impact on countries and sectors depending on their relative intensity of cross-border manufacturing supply-chain linkages, domestic and tradeable non-storable services, and energy and commodity prices. Crucial to the evolution of these economic data will be the behavioural responses of authorities, businesses, consumers, and policymakers, for which uncertainty and confidence play an important role.

- **The appearance of the novel coronavirus (COVID-19) dashed prospects for an upturn in global growth.**

Incoming data at the end of 2019 were favourable: Citi's Economic Data Change indicators were rising toward outright expansion; leading indicators of sentiment were turning up; and Citi's Financial Conditions Index was easing further, as central banks generally were taking advantage of the Federal Reserve's policy rate cuts in 2019 to ease as well. In emerging markets, fiscal policy was also generally supportive. Even though hard data were somewhat mixed, it did look like the downgrades of 2018/2019 were over and that the global economy was poised for an upturn. Concerns in the data included trade prospects, which were continuing to weaken as measured by the container throughput index and export orders. There were also concerns that the accommodative financial conditions were showing up in market valuations but were not being passed through to faster GDP growth.

Then the virus hit. The human toll is already dramatic, with disruption to personal and business routines via quarantine, work closures, and mobility limitations – first in China, and then spreading worldwide. There is uncertainty about the epidemiological progress of the virus, over how long and the extent to which routines will be affected and the spillover to the global economy, and over how financial markets are digesting news, rumours, and data. The interrelationships between the responses of authorities, businesses, consumers, and markets are complex and hard to model, but will determine the quarterly evolution of data as well as prospects for the year as a whole and into 2021.

- **The real economic impact of the virus requires evaluation through multiple data lenses: (1) manufacturing supply chains; (2) tourism, transportation, and services relationships; and (3) energy and commodity demand and prices.**

These linkages and factors have different weights for different countries, so the evolution of growth during 2020 and 2021 will be affected by the intensity of an economy's production, consumption, and trade across these three data lenses, because each will have a different 'shape' to its shock and recovery.

Manufacturing will show a 'V' or 'U' shape. Manufacturing spillovers from factory closures loom large in the near term, but production will rebound to restock inventories once quarantines end and factories reopen. However, the duration of closures, as well as spillovers through supply chains and through virus cases and closures worldwide, will generate a set of Vs that should take on a U-shape in the global data. Importantly, the loss to global growth momentum will drag on both in individual country data and global rebound economic data, particularly trade and industrial production.

Services, on the other hand, will experience an 'L' shape. The shock to tourism, transportation services, and domestic activities generally will not be recovered, and the projected slowing of global growth will further weigh on the L-shape evolution of demand for these non-storable tradeable services. Domestic services also will bear the brunt of the outbreak, depending in part on the responses of authorities, business, and consumers.

Energy and commodity prices are showing the pivot already, and there will be winners and losers. The third real-side data lens is the evolution of energy prices and commodity prices, which can either exacerbate or offset the other shocks, depending on an economy's structure of production, consumption, and trade. As an example of the change in expectations elicited by the coronavirus shock, Citi's energy price base case changed from a near-term 10% increase in energy prices in the January projection to a

15% decline in the February exercise. Falling energy and commodity prices undermine investment and GDP growth in exporting countries, but are potentially positive for importers, business users, and consumers.

- **Financial markets initially ‘looked through’ the corona virus shock.**

After an initial selloff at the end of January, markets – even in China – rebounded, with US markets reaching a new high. There could be several reasons for this. First, there was limited data to evaluate the impact of the various shocks and little evidence of virus transmission to other economies. Relatedly, the market may have believed that a quick rebound in China would lift other economies and that, on balance, the near-term lower energy prices would be positive for the global economy. The third reason is that markets apparently assumed that monetary policy will react to cushion the global economy, as has been the case in recent years.

But then the markets sold off dramatically. An apparent reassessment of the data spillovers, the transmission of the virus, the shock to uncertainty and the hit to sentiment precipitated a generalised market sell-off. Various research, including Citi’s own Financial Conditions Index and the financial conditions indexes created for the US Monetary Policy Forum 2020 research paper (Cecchetti et al. 2020), shows that the most important factors underpinning changes in financial conditions are equity valuations and volatility. An important question is how long the level of financial conditions will remain as accommodative as it is now.

- **The rise in uncertainty and its effect on sentiment and financial conditions are key.**

The COVID-19 outbreak has increased uncertainty and negatively affected sentiment through (1) how authorities are responding (via mandate or recommendation); (2) how consumers are responding to the fear of infection (and the authorities’ suasion) by staying home, telecommuting, and so on; (3) how business sentiment is responding to the virus, as well as to both weaker trade and domestic data. Historically, a rise in uncertainty and a hit to sentiment have been associated with weaker real activity data with a lag of two to four months. The financial markets have taken note.

For both uncertainty and financial conditions, the current levels matter for how changes affect the global economy. Investigation using threshold VARs shows that a rise in uncertainty (due in this case to the outbreak and transmission of the virus) has a greater impact on economic activity in a environment of high uncertainty than when uncertainty is low; the current environment was one of high uncertainty even before the coronavirus

hit, because of trade policy uncertainty. A tightening of financial conditions has much less of an effect on economic activity so long as the level of financial conditions is in accommodative territory.

The financial conditions threshold VAR has implications for monetary policy. If financial conditions remain accommodative through the market turbulence, in part because conditions were quite accommodative before the virus hit, then monetary policy easing has relatively little traction to support economic performance through the standard channels of consumer wealth or business cost of capital, because these are not the constraints on consumer or business behaviour. Rather, uncertainty and sentiment are the constraints. But if the hit to confidence is large enough and markets correct sufficiently, financial conditions could enter into tight territory, which opens the door for central bank policy.

- **The interlinkage between economic conditions, financial conditions and uncertainty/sentiment increases the challenges facing policy authorities.**

For central banks, so long as the level of financial conditions remains accommodative, central bank easing will not be an effective response to support the real economy. If the rise in uncertainty, the hit to sentiment, as well as the data are sufficiently great so as to yield an overall tight level of financial conditions, a monetary policy response would be warranted to avoid a market overshoot beyond that consistent with the expected path of the real economy. But, this is a challenging confidence game. Fiscal authorities also face challenges. Although many do have room to manoeuvre, particularly those that have enjoyed very low sovereign rates for the last decade, the types of fiscal response to the outbreak (crisis healthcare, crisis support for business and consumers) are not structural supply-side choices, which heretofore had been our recommended use of fiscal space.

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9 As coronavirus spreads, can the EU afford to close its borders?

Raffaella Meninno and **Guntram Wolff**¹

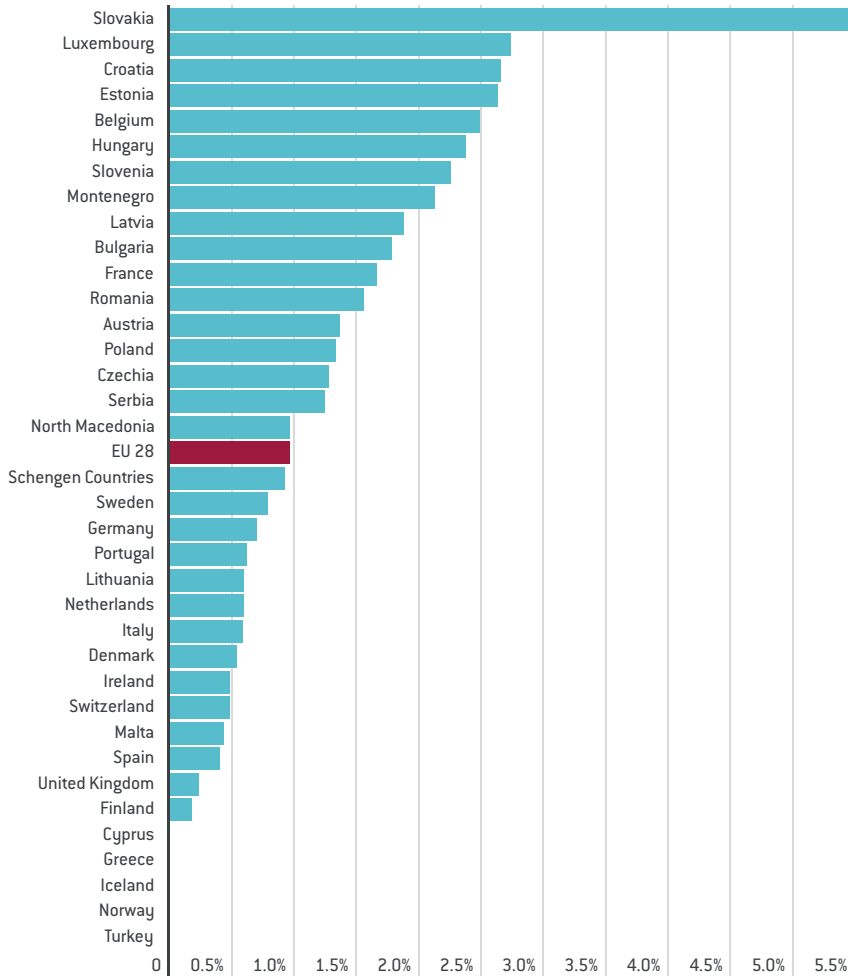
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Coronavirus crisis has triggered intense debate about border closings in the Schengen area as a way to contain the spread of the epidemic. Austria stopped some trains from Italy and as the virus spreads the open border policy will be further tested. Whether or not such a measure makes sense from an epidemiological point of view is beyond the expertise of the authors. The Schengen regulation in any case does allow travel restrictions in case of a threat to public health (Article 2(21) and 6(1e) of Regulation (EU) 2016/399). This chapter looks at some of the possible economic consequences of border closings. Many workers rely on the Schengen agreement, which allows them to cross the border without any ID controls. More than 1.9 million residents from Schengen countries crossed the border to go to work in 2018. As can be seen in the chart below, 0.9% of the employed citizens living in Schengen countries work across the border. The share of cross-border commuters is particularly high in Slovakia (5.5%), Luxembourg (2.7%), Croatia, Estonia and Belgium.

The Schengen agreement's relevance stretches beyond cross-border commuting to work. In 2018, EU27 citizens made almost 320 million trips of one night and over to other EU27 countries, more than 39 million (12%) of those were for business purposes.

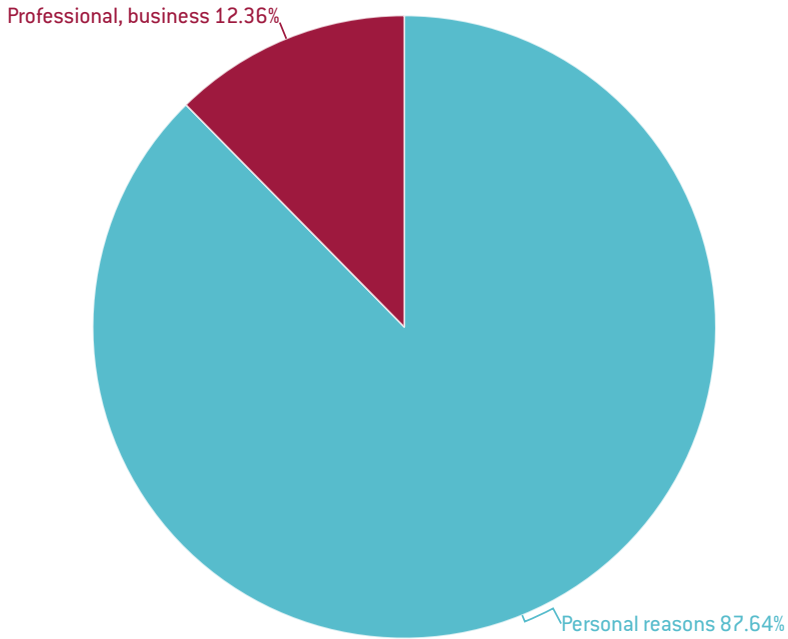
¹ This chapter first appeared as a blog on the [Bruegel website](#).

Figure 1 Cross-border commuters as a share of employed population (2018)



Source: Eurostat [lfst_r_lfe2emp] and [lfst_r_lfe2ecomm] Note: these figures represent the share of a country's employed residents who commute out of the country to go to work. Data for Cyprus, Greece, Iceland, Norway, Turkey was not available.

Figure 2 Number of outbound trips of one night and over from EU27 citizens to EU27 countries (2018)



Note: 100% = 319,960,265 trips Source: Eurostat [tour_dem_ttpur]

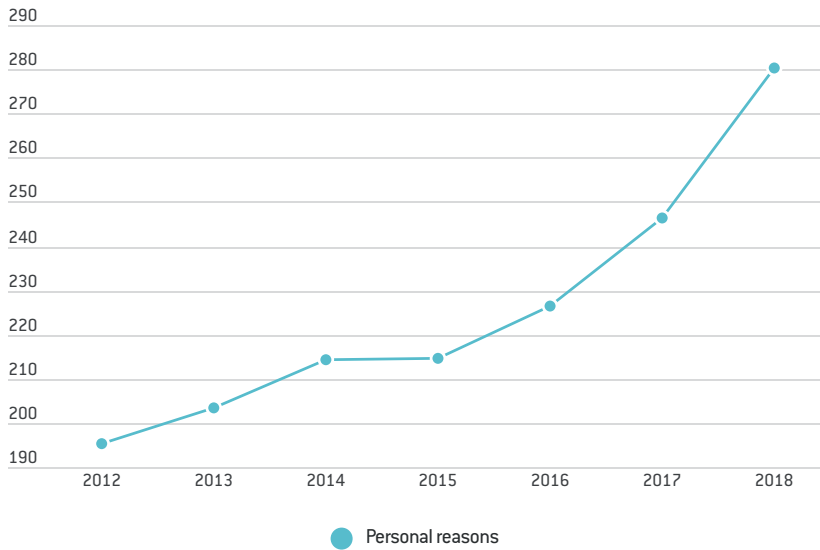
When, back in 2015,² we looked at the effects of border controls in the context of the migration crisis, we argued that the direct economic effects of additional border controls were likely to be relatively limited. The assessment now would be different: stopping cross-border travel would lead to a major disruption of economic activity. It is therefore no surprise that the EU for the time being has decided not to close borders.³

2 See <https://www.bruegel.org/2015/12/cross-border-commuters-and-trips-the-relevance-of-schengen/>

3 See <https://www.schengenvisainfo.com/news/eu-says-no-to-border-closure-allocates-e232-million-to-fight-coronavirus/>

Figure 3 Number of outbound trips of one night or over from EU 27 countries in millions (2012-2018)

a) Personal reasons



b) Professional reasons, business



Source: Eurostat [tour_dem_ttpur] Note: Data for Poland (2018), Romania (2018) and Sweden (2012-2013) are not available. Data for the United Kingdom have been excluded.

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10 Trade and travel in the time of epidemics¹

Joachim Voth

Zurich University and CEPR

The ship, *Grand Saint Antoine*, had already come to the attention of the port authority of Livorno. A cargo ship from Lebanon loaded with expensive textiles, it reached the port of Marseille in 1720. The Health Commission had its doubts – the plague was widespread in the eastern Mediterranean. Like all ships from affected regions, the *Grand Saint Antoine* was placed in quarantine. Normally, the crew and the property would have had to stay on board for 40 days to rule out the possibility of an infectious disease. But a textile fair near Marseille, where the importing merchants hoped for rich business, would soon begin. Under pressure from the rich traders, the health agency changed its mind. The ship could be unloaded, the crew went to town.

After only a few days it was clear that changing the initial decision had been a mistake. The ship had carried the plague. Now the disease spread like a forest fire in the dry bush. The city authorities in Marseille could not cope with the number of deaths, with corpses piling up in the streets.

The great plague of the late Middle Ages, in the years 1346-51, had also come to Europe via ports in the Mediterranean. As then, people tried to feel the danger of disease in Marseille. In contrast to the situation in the Middle Ages, they did not get very far. At the behest of the French king and the pope, a plague wall (*Mur de Peste*) was built in Provence. Tourists can still see parts of it today. The wall was over two meters high and the watchtowers were manned by soldiers. Those who wanted to climb over it were prevented from doing so by force. Although some individuals managed to escape, the last major outbreak of black death in Europe was largely confined to Marseille. While probably 100,000 people – about a third of the population – died in Marseille, the rest of Europe was spared the repeated catastrophe of 1350 when millions of people lost their lives. No medical miracle cure had saved Europe, but the effective intervention of a functioning state.

¹ This chapter first appeared in German in the Swiss newspaper *Finanz und Wirtschaft* (reproduced with permission).

The outbreak of the novel coronavirus (COVID-19) in Wuhan shows some interesting parallels to the situation in Marseille in 1720. There, too, the local authorities initially reacted incorrectly, which made the spread of the disease possible. In Wuhan and Marseille, there was a drastic restriction of mobility for people in the affected region to prevent the spread of the disease. In both cases, the mass quarantine was only partially crowned with success. It is still unclear whether the world will get away with a black eye like in 1720, despite the spread of COVID-19 outside of China, or whether there will be a worldwide pandemic with millions of deaths.

The fundamental question that arises, however, is: how much mobility can and should a globalised world have? In other words, are we, the globalised world, to blame for the outbreak, like the greedy textile traders in Marseille in 1720? When SARS broke out, China was responsible for about 4% of global economic output; today, China's share of the world economy is 16%, and growing. With the increase in economic strength, the interdependence with the rest of the world has exploded. Millions of people travel to and from China every year. Over 70 international flight connections from the Middle Kingdom enable fast travel to the far corners of the earth. The same applies – if not to the same extent – to the movement of goods and people with other regions of the world, which are constantly producing new pathogens such as Ebola and HIV.

Interestingly enough, modern medicine is almost as helpless in containing the outbreak and treating the sick as it was in 1720. Vaccination is not available, and no effective cure exists. In China itself, numerous doctors have already died as a result of COVID-19. Only the same primitive measure as in Marseille and Wuhan – quarantine – offers some protection. Just as Louis XV's France protected itself with soldiers, orders to fire and the *Mur de Peste*, today entire cities in China, Italy and Korea are cordoned off and cruise ships are isolated in port. The basic question, however, is: should normal traffic be massively restricted to known starting points for new infectious diseases, just as early modern societies in Europe protected themselves from the plague? Are we taking the first step towards the downfall of an exaggerated, unsustainable form of globalisation?

This question can be divided into two elements. First, is a massive restriction of mobility desirable? And second, is it feasible at all? An economically rational answer to the first question should begin with the value of a human life. With all the reservations that one can have against such calculations from a philosophical point of view, cost-benefit considerations without numbers for the value of a human life are not feasible. However, estimates regularly show an enormous range; the average is around US\$10 million per person (Viscusi and Masterman 2017). This means that even before the epidemic has peaked, COVID-19 caused an immediate cost of \$26 billion in deaths. If the epidemic ends with a maximum of 10,000 deaths (four times the current value), the value of life

destroyed would be approximately \$100 billion. For comparison, Switzerland spends CHF24 billion annually on social welfare.² In addition, there are disruptions in the supply chains that were never designed for such faults; massive declines in financial markets; empty beds in hotels built for mass tourism.

The costs must be compared with the enormous gains in economic performance that the free exchange of goods and people has made possible. In China alone, hundreds of millions of people have escaped deepest poverty during the past 20 years. In 1980, more than half of the Chinese population lived on less than \$2 a day; in 1998, it was less than a quarter (Sala-i-Martin 2006). Around the world, people have escaped the poverty trap wherever the free movement of goods and people has become possible. And richer regions also benefit massively, often in surprising ways. For example, Campante and Yanagizawa-Drott (2018) shown that better flight connections ensure new business contacts and better capital supply – cities that are well connected to the international flight network benefit enormously. So, the epidemic dangers of globalisation are offset by massive economic gains.

Smart policies have to weigh the costs and benefits of uninhibited exchanges of people and goods. Even if you decide that an outbreak every few years is a price that we should willingly pay in order to reap the benefits of globalisation, there is a very real question whether future epidemics might be worse. The next outbreak could be as infectious as coronavirus and as deadly as SARS (10% death rate), MERS (30%), or Ebola (60-90% death rate). Instead of deaths in the thousands, hundreds of millions of people could die before new treatment options or massive quarantine stop the next new virus. Even if such an outbreak is not very likely, slim probabilities of a ‘tail event’ must be taken into account in every cost-benefit calculation – and even a small reduction in the risk of such an outbreak may well be worth almost any price.

Fortunately, many – but not all – of the benefits of globalisation can be achieved without enormous health risks. The free exchange of goods and capital does not have to be restricted; only very few diseases are transmitted by contaminated goods. The free movement of people itself also contributes to the advantages of globalisation, but it is far less important for production. It is not obvious that running the risk of coronavirus outbreaks every few years – or worse – is a price worth paying for multiple annual vacation trips to Paris and Bangkok, say. Severe restrictions may well be desirable and justifiable, bringing to an end a half-century of ever-increasing individual mobility. In addition, specific restrictions could be brought in. For countries where, for example, wild animals are regularly sold and eaten (such as China, until recently), the certification for

2 See https://www.efv.admin.ch/efv/en/home/finanzberichterstattung/bundeshaushalt_ueb/ausgaben.html.

travel could be withheld without restrictions; anyone who comes or returns from there must undergo a medical examination and possibly spend a few weeks in quarantine. This would not only build a virtual plague wall against the next major outbreak, it would also put pressure on health authorities around the world to restrict dangerous practices that allow pathogens to jump from one species to the next. Even if airlines, hoteliers and tour operators would suffer from such rules in the short term and would complain, the lesson from Wuhan should be that we need a broad discussion within and outside of academia about how much mobility is actually desirable.

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11 On plague in a time of Ebola

Cormac Ó Gráda

University College Dublin

Before COVID-19, the last epidemic to command global attention was the 2014-15 Ebola epidemic. Ebola made the headlines for its highly infectious character, its high fatality rate, the lack of any known cure for it, and the grave risks that it posed for health workers and third parties. The fears that it generated and the strict public health measures that it prompted echoed responses to the medieval Black Death and the third plague pandemic that originated in China in 1855.

Ebola and plague (*Yersinia pestis*) have rather similar incubation periods and both cause painful and distressing deaths. Indeed, for a time in the 2000s, some experts believed that Ebola was a form of plague. Ebola is transmitted from person to person; whereas that is *literally* true of only one rare and highly lethal form of plague, pneumonic plague, the relatively recent finding that plague can be transmitted by body lice – and does not require the presence of rats and rat fleas – implies a route approximating transmission from person to person. Both diseases led to discoveries of a medical remedy – rapid in the case of the third plague once the bacillus responsible had been discovered, and similarly rapid in the wake of the 2014-15 crisis, with the preparation for use of the (previously discovered) VSV-EBOV vaccine. These common characteristics, coupled with the current spread of COVID-19, prompt the following reflections about plague and Ebola, even though the second and third plague epidemics dwarfed the 2014-15 Ebola outbreak in terms of mortality. I review the mortality due to the two diseases and their lethality, the role of public action in containing them; and their economic impact.

Deaths from plague and Ebola

At the outset, alarming projections were made about the mortality implications of the likely spread of Ebola in western Africa and beyond, with econometric simulations forecasting that if the disease spread, one million or more would die ‘in the next six months’. The World Health Organization’s mid-October 2014 forecast of 10,000 new cases weekly was more modest, though it still dwarfed the actual cumulative out-turn of

about 30,000 cases and over 11,000 deaths (roughly 0.05% of the combined population of the three affected countries, Guinea, Liberia, and Sierra Leone). Summary data are presented in Table 1 and Figures 1a and 1b.

Whereas demographic data on Ebola are plentiful, historians of the Black Death have very little solid data to work on. However, a compromise guesstimate suggests that the successive outbreaks of the Black Death c. 1348-1700 reduced Europe’s pre-plague population of about 80 million by around half. By and large, lower populations entailed higher wages and lower rents. Hard data on the *lethality* of the Black Death are also lacking, though it probably fell over time. Today, WHO reckons that half of those struck by plague recover without the aid of any medical treatment. During the 2014 outbreak of bubonic plague in Madagascar, 119 confirmed cases resulted in 40 deaths; an outbreak in August-September 2015, this time of the pneumonic form, killed 10 out of 14 victims. The fatality rate from Ebola in 2014-15 was much lower than from untreated plague.

Table 1 The Ebola epidemic: Cases and deaths

	All			Health workers		
	Cases	Deaths	%	Cases	Deaths	%
Guinea	3,800	2,534	66.7	196	100	51.0
Liberia	10,672	4,808	45.0	378	192	50.8
Sierra Leone	13,982	3,955	28.3	307	221	72.0
Total	28,454	11,297	39.7	881	513	58.2

Source: <http://apps.who.int/ebola/current-situation/ebola-situation-report-14-october-2015>

A second striking and disturbing implication of Table 1 is the very high proportion – nearly 5% – of native-born health workers among those who died during the Ebola outbreak. Perhaps the cumbersome procedures involved in ‘donning and doffing’ the highly uncomfortable Ebola protective suits worn by over-stretched health workers led some to take short cuts?

Malcolm Casadaban, who died of plague in Chicago in 2009, was a most unlikely victim. A biology professor, Casadaban succumbed to accidental exposure to a strain of the virus in his lab. But although the plague bacillus was blind, the most likely victims of plague have always been disproportionately the poor; well-off people such as the parents and siblings of Florentine merchant Francesco Datini and the two archbishops of Canterbury, who died in rapid succession during the first outbreak of the Black Death, were exceptional among their peers.

Figure 1a Cumulative cases in Guinea, Liberia and Sierra Leone

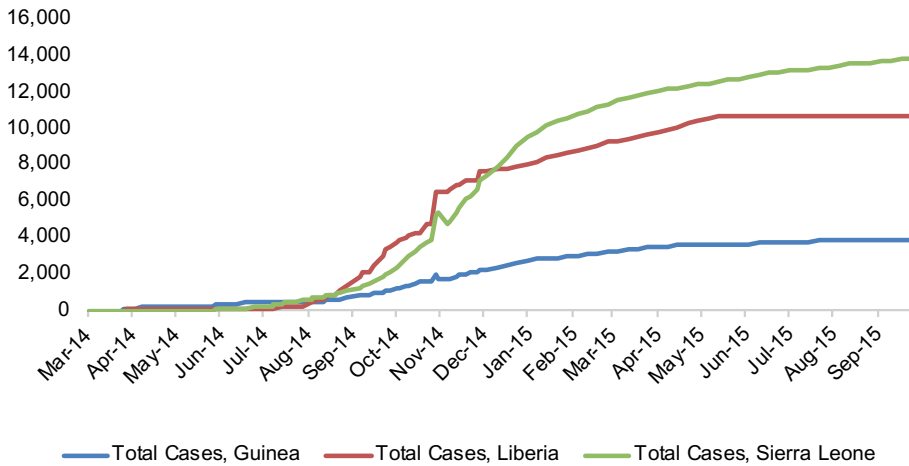
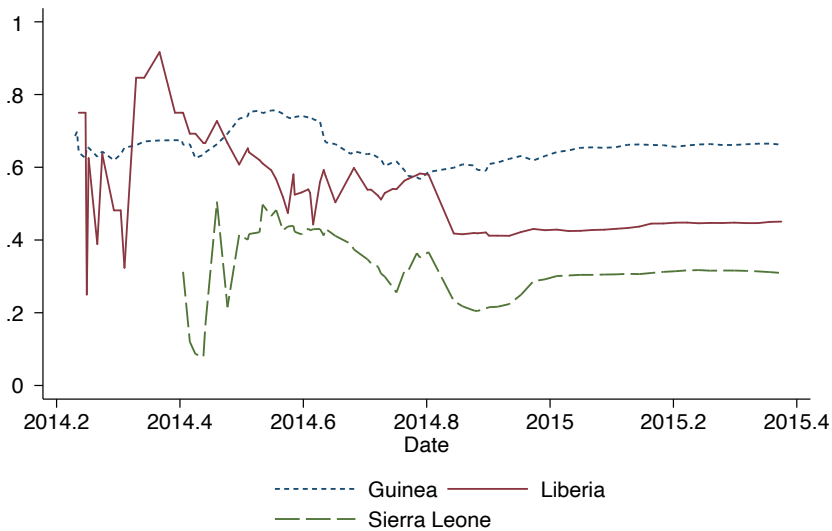


Figure 1b Cumulative death rates (dr) in in Guinea, Liberia and Sierra Leone



Public action

Why did plague recede in Western Europe during the 16th and 17th centuries? Why had it not done so earlier? The most likely reason is increasingly effective public action in the form of quarantining, removing foul-smelling refuse, and draconic measures against infringement. Such action, which is likely to have reduced the likelihood of transmission from fleas (and lice) to humans, required credible sanctions and a degree of

public support. The effectiveness of public health measures depended on preparedness, and eliminating corruption in the forms of breaching quarantines, concealing deaths, deliberate misdiagnoses of plague cases, and anti-social behaviour in general.

Its ruthlessly effective Visconti rulers saved Milan from plague in 1348-50. In Milan, the conviction – not prevalent at the time – that plague was contagious led to efforts to control the movements of contacts. But public action can claim few other victories in 1348-50. Quarantining and maritime cordons came later; the first *lazaretti* (pesthouses) were those in Ragusa (1377) and Venice (1423). The policy of isolating suspected plague victims in such places, while based on the (false) presumption that the disease was spread only from person to person, may well have worked to the extent that *lazaretti* were located in less flea- and rat-infested places; but the English policy of shutting healthy people in their homes when a death had occurred instead of allowing them to escape infection may well have been counterproductive. Municipal action such as the funding and enforcement of quarantines and the banning of processions reduced the threat of plague in parts of 17th century Italy. Other institutional responses to plague included the London Bills of Mortality (published continuously from 1603) and bans on processions and other large congregations of people.

On the eve of the Ebola crisis, Sierra Leone had 0.022 physicians per 1,000 inhabitants, Liberia 0.014, and Guinea 0.115. Although the medics behind these numbers did not know how to cure either plague or Ebola, the numbers also reflect broader medical infrastructures. All three affected countries were much poorer than, say, 17th century Italy or England, though they had also been growing much faster in recent years.

The goal of international relief in 2014-15 was to compensate for frail public health infrastructures and widespread destitution. However, given the huge transfers involved, corruption was inevitable. In November 2014 in Sierra Leone, when health workers protested violently at not being paid, all a spokesman for the National Ebola Response Centre could offer was that “somebody somewhere needs to be investigated (to find out) where these moneys have been going”.

The disease had already killed about 60 people in Guinea when it was identified as Ebola on 22 March 2014. At that time, WHO characterised it as “an outbreak of limited geographic area and only a few chains of transmission”, and this assessment tallied with evidence on earlier outbreaks of Ebola in central Africa. However, by late May the disease had reached Sierra Leone and on 8 August 2014, by which time the death toll had reached nearly one thousand, WHO declared the outbreak an “international health emergency”. In the following weeks, alarming forecasts of the likely death toll

from Ebola spurred the international community to action. By May 2015 such transfers exceeded \$3 billion, more than 30% of the combined GDP of the three recipient economies.

Still, there was plenty criticism of the response to the outbreak, at home and abroad. Médecins sans frontières, who provided most of the frontline defence against Ebola at the outset, accused the authorities in Guinea and Sierra Leone of seeking to conceal the outbreak and WHO of prevarication.

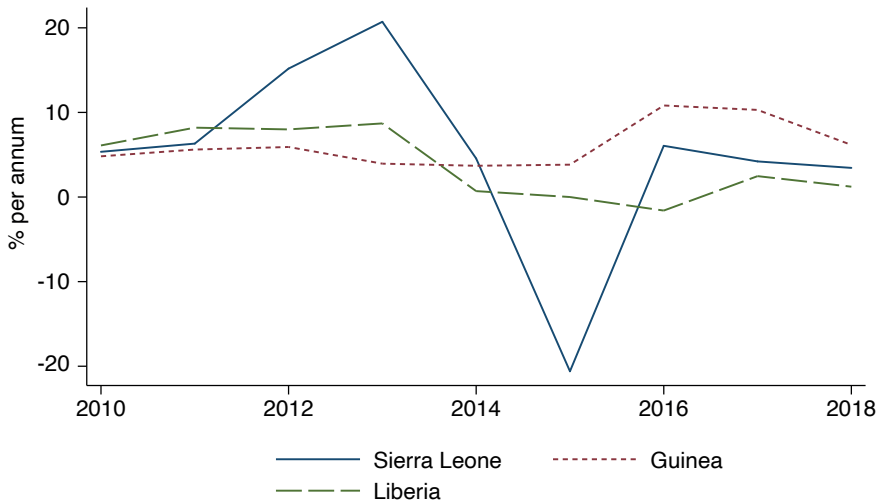
Containment and cure

The Ebola outbreak inspired fear and panic because of its lethality, its long incubation period, and the lack of a medical cure. The virtual elimination of plague as a threat across most of the globe relied on preventive rather than curative measures, and it took centuries for those preventive measures to become fully effective. One of the main defences against its spread, quarantine, involved isolating victims for a biblical 40 days – a big multiple of plague’s incubation period of two to six days (which, of course, was not known at the time). In the absence of a cure, quarantine was also a key weapon against Ebola: a precautionary 21-day quarantine for those who have been in close contact with an Ebola victim.

There was no therapeutic cure for Ebola during the epidemic of 2014-15. One of the dramatic by-products of that epidemic was the final release of a highly effective vaccine, VSV-EBOV, the *clinical* discovery of which dated back to 2003. Had Ebola struck in the 1890s, it is possible that a similar drug would have been discovered, in which case the authorities would have gambled on its immediate use. Although the crisis was almost over by the time the vaccine was ready for use in July 2014, the speed with which it was developed is nonetheless impressive.

Economic consequences

In October 2014, the World Bank predicted that Ebola would cost the affected countries US\$25 billion in economic losses in 2015, equivalent to almost twice their combined GDPs and enough to cripple them economically for years to come. By January 2015 that prediction had been reduced to a still significant US\$1.6 billion, equivalent to about 12% of combined GDPs. But in the event, the impact of Ebola on the level of economic activity was much smaller. The significant drop in GDP in Sierra Leone in 2014 was mainly due the global collapse in iron ore prices rather than to Ebola.

Figure 2 GDP growth per annum in the affected economies, 2009-2017

Source: World Bank

Analogous estimates of the economic impact of the Black Death are impossible, but elementary economics predicts that an exogenous shock such as the Black Death, which reduces population but leaves the capital stock and other resource endowments intact, should result in reduced output but an increase in wages relative to other factor payments. And undoubtedly, the first attack of the Black Death in western Europe resulted in significantly improved living standards for most survivors, while reducing urbanisation levels and making agriculture more pastoral. Some argue that high wages led to labour-saving technologies such as the Gutenberg printing press. The rather thin evidence available on income or wealth distribution implies a narrowing of the gap between rich and poor. There is also general agreement that it took populations a long time to recover their pre-plague levels, partly because plague kept returning but also because, in some countries at least, of incessant warfare in the following decades and centuries.

Final reflections

Despite the major differences between them, *Yersinia pestis* and Ebola share many resonances. The campaign to contain and eradicate Ebola – and the attendant red tape and corruption – recalls the varied attempts by the authorities at ridding western Europe of plague. Later efforts to control plague had an international dimension: the work of Odessa-born Waldemar Haffkine in Bombay was funded by the local authorities and by the Aga Khan, and plague's virtual eradication in pre-independence India owed

much to colonial policies. Today, the resources and knowledge available to campaigns against epidemics like plague, Ebola, and COVID-19 are global rather than local. In the case of Ebola, NGOs such as Médecins sans frontières, institutions such as WHO, and the governments of the countries affected combined in bringing the 2014-15 epidemic under control.

According to WHO data, the epidemic had caused 11,313 deaths up to mid-October 2015, by which time the crisis had been stayed, with only 23 deaths after the end of August 2015. The number was very modest compared to, say, estimates of famine deaths in Somalia in 2011-12 or of deaths from malaria in sub-Saharan Africa in 2014 (0.4 million), yet the global impact of Ebola was far greater.

At the height of the crisis, the Harvard global health specialist Paul Farmer insisted that “if patients are promptly diagnosed and receive aggressive supportive care ... the great majority, as many as 90 per cent, should survive”. Easier said than done, given the fears generated by Ebola and the primitive health infrastructures and rickety economies of the counties in question. Yet, how many lives might have been spared by a prompter response or by extra funding remains to be discovered.

About the author

Cormac Ó Gráda is Professor Emeritus of Economics at University College Dublin. Several of his recent publications, on topics ranging from the origins of the Industrial Revolution to London’s last plague epidemics, have been collaborations with Morgan Kelly. His best-known books are *Ireland: A New Economic History* (Oxford, 1994) *Jewish Ireland in the Age of Joyce: A New Economic History* (Princeton, 2006), and *Famine: A Short History* (Princeton, 2009). His latest is *Eating People is Wrong and Other Essays on the History and Future of Famine* (Princeton, 2015). He is past Editor of the *European Review of Economic History*.

12 Coronavirus monetary policy

John H. Cochrane¹

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A colleague and I were discussing the question, should the Fed lower interest rates in response to the novel coronavirus?

More generally, suppose a pandemic gets serious and, either by choice or by fiat, a large swath of the economy is shut down for a few weeks or months. What should the Fed, or other economic policy do about it?

My first instinct was that the Fed should not lower rates. This is a classic supply shock, and there is nothing more demand can do. What's the point of encouraging more spending if the stores are closed? Even giving people money doesn't do any good if the stores and factories are closed. The first job of a central bank should be to ask: "is this a supply shock or a demand shock?", and respond to demand shocks, not supply shocks. This is like stoking demand at night or over the weekend.

But supply and demand aren't so neatly distinguished. Maybe a supply shock creates its own lack of demand. And a pandemic has demand effects too. People hunker up at home and don't want to go buy a new boat. One job of the central bank is to spy what the natural real interest rate is and move the nominal rate accordingly, so there is no force unsteady inflation. Well, if the economy shuts down, people don't want to spend, since the stores are closed, so by definition they save (unless income is shut off). People don't want to borrow (except to roll over) for the same reason. The marginal product of capital is nothing. So that argues for a pretty sharp fall in interest rates.

But as I think about it, the right answer is that this is the wrong question, and aggregate supply and demand is the wrong framework for thinking about it. What happens if the economy shuts down for a few weeks or months, either by choice or by public health mandate? Shutting down the economy is not like shutting down a light bulb. It's more like shutting down a nuclear reactor. You need to do it slowly and carefully, or it melts down.

¹ This chapter first appeared on [The Grumpy Economist](#) blog.

I can see huge financial problems. The store and factory may shut down, but the clock still ticks. Businesses must still pay debts, with nothing coming in. They likely have to pay wages – otherwise, what will people do to buy food? People have to make mortgage payments and rent, likely with no income coming in. Left alone, there could be a huge wave of bankruptcies, insolvencies, or just plain inability to pay the bills. A modestly long economic shutdown, left alone, could be a financial catastrophe.

The problem would be mitigated if we could count on the lost GDP coming back. Then we just need loans against the future output. But the GDP won't come back. The level of GDP should return quickly – if these financial problems don't wipe out a segment of the economy. But the GDP not made is not made for good. If you make one pair of shoes a day, when you get sick you don't make shoes. When you get better you can make one pair of shoes a day again, but not two to make up for lost time. Some demands may accumulate, there is some ability to run above capacity for a while, but it's not a one for one gain. So the money needed in the interim cannot be borrowed against future incomes, even if banks would lend it.

In free market nirvana, I guess we would all have pandemic insurance to give us a flood of money in this event, and the pandemic insurers would not go bankrupt on this, by definition, non-diversifiable event. But that hasn't happened.

In second-best free market nirvana, we would each have recognised that at any moment the economy could shut down for a few months, and each of us – and every firm – has enough liquid savings to last, say, six months of expenses with no income. Precautionary savings should do the trick. Paradoxically, though many economists diagnose a 'savings glut', that glut is not widespread and there are many hand-to-mouth consumers and highly leveraged companies around. In the old days, when crop failure, famine, pestilence, war, and just plain winter were common, the general reaction was to try to keep enough grain around to get through it. That didn't always work and not for everyone.

So back to the Fed. Absent precautionary savings, one might imagine something like a switch turning off financial claims. But we can't just shut down the whole economy – people need food, heat, electricity, Netflix, hospitals, and so forth.

In sum, then, I think we need a detailed, pandemic-induced financial crisis plan, that forestalls bankruptcies and insolvencies where possible without causing downstream crises among people who were counting on being paid back, and floods the country with money in the right spots – as insurance would do – but not too many of the wrong

spots. Yes, you heard it here – judiciously targeted bailouts are really the only way I can think of to keep businesses and people from going bankrupt given the absence of pandemic insurance.

We need a detailed pandemic response financial plan, sort of like an earthquake, flood, fire, or hurricane plan that (I hope!) local governments and FEMA routinely make and practice.

Is there any such thing? Not that I know of, but I would be interested to hear from knowledgeable people if I am simply ignorant of the plan and it's really sitting there under "Break glass in emergency" down in a basement of the Treasury or Fed. Without a pre-plan, can our political system successfully make this one up on the fly, as they made up the bank bailouts of 2008?

Then we have to figure out how to prevent the atrocious moral hazard that such interventions produce. Pandemics are going to be a regular thing. Ex-post bailout reduces further the incentive for ex-ante precautionary saving. Too good a fire department, and people store gasoline in the basement.

This starts down the same bailout and regulate road that suffocates our debt-based banking system. I welcome better ideas.

One might say a rate cut can help provide such liquidity. But the level of the overnight rate is a very small issue to a business that needs a loan to keep up with mortgage or rent, payroll, electric bill, debt payments when there is absolutely no money coming in, it can't buy supplies if there were, and the bank is refusing (rightly) to make such a loan at any rate. So, yes, this dark view does argue for a sharp rate cut when serious economic disruption hits. But it's a very small salve to the fundamental problem.

About the author

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Cochrane is also a Senior Fellow of the Stanford Institute for Economic Policy Research (SIEPR), Professor of Finance and Economics (by Courtesy) at Stanford GSB, Distinguished Senior Fellow of the University of Chicago Booth School of Business, and of the Becker-Friedman Institute, a Research Associate of the National Bureau of Economic Research, and an Adjunct Scholar of the CATO Institute. He is a past President and Fellow of the American Finance Association, and a Fellow of the Econometric Society. He has been an Editor of the *Journal of Political Economy*,

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Before coming to Hoover, Cochrane was the AQR Capital Management Distinguished Service Professor of Finance at the University of Chicago Booth School of Business, where he taught the MBA class “Advanced Investments” and a variety of PhD classes in Asset Pricing and Monetary Economics. Cochrane earned a Bachelor’s degree in Physics at MIT, and earned his Ph.D. in Economics at the University of California at Berkeley. He was at the Economics Department of the University of Chicago before joining the Booth School in 1994, and visited UCLA Anderson School of Management in 2000-2001.

13 The economic effects of a pandemic

Simon Wren-Lewis

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A little over ten years ago, I was approached by some health experts who wanted to look at the economic effects of an influenza pandemic. They needed someone with a macroeconomic model to look at the general equilibrium impacts. In the 1990s, I had led a small team that constructed a model called COMPACT (Darby et al. 1998), and these health experts and I completed a paper that was subsequently published in *Health Economics* (Keogh-Brown 2009). We reference other studies that had been done earlier in that paper.

The current coronavirus outbreak will have different characteristics to the pandemic we studied, and hopefully it will not become a pandemic at all. (In terms of mortality, it seems to be somewhere in between the ‘base case’ and ‘severe case’ we looked at in our work.) But I think there were some general lessons from the exercise we did that will be relevant if this particular coronavirus does become a global pandemic. One proviso is that a key assumption we made about the pandemic is that it was mainly a three-month affair, and obviously what I have to say is dependent on it being short-lived.

It is worth saying at the start that the bottom line of all this for me is that the economics are secondary to the health consequences for any pandemic that has a significant fatality rate (as COVID-19 so far appears to have). The economics are important in their own right and as a warning to avoid drastic measures that do not influence the number of deaths, but beyond that there is no meaningful trade-off between preventing deaths and losing some percent of GDP for less than half the year.

Let me start with the least important impact from an economic point of view, and that is the fall in production due to workers taking more time off sick. It is least important in part because firms have ways of compensating for this, particularly if illness is spread over the quarter. For example, those who have been sick and come back to work can work overtime. This will raise costs and might lead to some temporary inflation, but the central bank should ignore this.

This 'direct' impact of the pandemic will reduce GDP in that quarter by a few percentage points. The precise number will depend on what proportion of the population that get sick, on what the fatality rate in the UK turns out to be, and how many people miss work in an attempt not to get the disease. The impact on GDP for the whole year following the pandemic is much less, at around 1% or 2%, partly because output after the pandemic quarter is higher as firms replenish diminished stocks and meet postponed demand.

All this assumes schools do not close once the pandemic takes hold. School closures can amplify the reduction in labour supply if some workers are forced to take time off to look after children. On the basis of the assumptions we made, if schools close for around four weeks, that can multiply the GDP impacts above by as much as a factor of three, and if they close for a whole quarter, by twice that. If that seems large, remember that nationwide school closures impact everyone with children and not just those with the disease.

But even with all schools closed for three months and many people avoiding work when they were not sick, the largest impact we got for GDP loss over a year was less than 5%. That is a one quarter very severe recession, but there is no reason why the economy cannot bounce back to full strength once the pandemic is over. Unlike a normal recession, information on the cause of the output loss, and therefore when it should end, is clear.

All this assumes that consumers who have not yet got the disease do not alter their behaviour. For a pandemic that spreads gradually, this seems unlikely. The most important lesson I learnt from doing this study is that the pandemic need not just be a supply shock; it can also be a demand shock that can hit specific sectors very hard, depending on how consumers behave. This is because a lot of our consumption nowadays can be called social, by which I mean doing things that bring you into contact with other people – things like going to the pub, to restaurants, to football matches or travel. Other sectors that provide consumption services that involve personal contact (e.g. haircuts) and can easily be postponed may also be hit.

If people start worrying about getting the disease sufficiently to cut back on this social consumption, the economic impact will be more severe than any numbers discussed so far. One reason it is severe is that it is partly a permanent loss. Maybe you will have a few more meals out once the pandemic is over to make up for what you missed when you stayed home, but there is likely to be a net fall in your consumption of meals out over the year. What I realised when I did the analysis was just how much of our consumption was social.

This is why the biggest impacts on GDP occur when we have people reducing their social consumption in an effort not to get the disease. However, falls in social consumption do not scale up all scenarios by the same amount, for the simple reason that supply and demand are complimentary. If school closures and people taking more time off work increase the size of the supply shock, the demand shock has less scope to do damage. The largest fall in annual GDP in all the variants we looked at was 6%.

Could conventional monetary or fiscal policy offset the fall in social consumption? Only partially, because the drop in consumption is focused on specific sectors. What is more important, and what we didn't explore in the exercise, is what would happen if the banks failed to provide bridging finance for the firms having to deal with a sudden fall in demand. The banks may judge that some businesses that are already indebted may not be able to cope with any additional short-term loans, leading to business closures during the pandemic.

It is in this light that we should view the collapse of stock markets around the world. In macroeconomic terms this is a one-off shock, so Martin Sandbu is right that the recent stock market reaction looks overblown.¹ But if many businesses are at financial risk from the temporary drop in social consumption, that implies a rise in the equity risk premia, which helps account for the size of the stock market collapse we have seen. (I say "helps" deliberately, as much of the impact will be on smaller businesses that do not find their way into the main stock market indices.)

If I were running the central bank or government, I would have already started having conversations with banks about not forcing firms into bankruptcy during any pandemic.

But economics can also influence health outcomes, and not just in terms of health service resources. For a minority of self-employed workers there will be no sick-pay, and those without a financial cushion will be put under stress. One of the concerns as far as the spread of the pandemic is concerned is that workers will not be able to afford to self-isolate if they have the disease. So if I were in government, I would be thinking of setting up something like a sick-leave fund that such workers could apply to if they get coronavirus symptoms.

The government also needs to think about keeping public services and utilities running when workers in those services start falling ill. In fact, there are a whole host of things the government should now be doing to prepare for a pandemic. It is at times like these that we really need governments to act fast and think ahead. Do we in the UK,² or US

1 <https://www.ft.com/content/e7fd61ee-57ef-11ea-a528-dd0f971febbc>

2 <https://www.theguardian.com/world/2020/feb/27/they-have-no-idea-government-failing-on-coronavirus-say-gps>

citizens,³ have confidence that the government will do what is required? One lesson of coronavirus may be never put into power politicians who have a habit of ignoring experts.

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About the author

Simon Wren-Lewis is a Professor at Oxford University and a Fellow of Merton College. He began his career as an Economist in H.M.Treasury. In 1981 he moved to the National Institute of Economic and Social Research, where as a Senior Research Fellow he constructed the first versions of the world model NIGEM. From 1988-1990, as Head of Macroeconomic Research, he supervised development of this and the Institute’s domestic model. During this period he published with colleagues a study suggesting that an entry rate of 1.95 DM/£ into the ERM was too high, which at the time was a minority view. In 1990 he became a Professor at Strathclyde University, and built the UK econometric model COMPACT. From 1995 to 2006 he was a Professor at Exeter University.

He has published papers on macroeconomics in a wide range of academic journals including the *Economic Journal*, *European Economic Review*, and *American Economic Review*. He also wrote one of the background papers for the Treasury’s 2003 assessment of its five economic tests for joining EMU and advised the Bank of England on the development of its new macromodel. His current research focuses on the analysis of monetary and fiscal policy in small calibrated macromodels, and on equilibrium exchange rates.

3 <https://www.cnbc.com/2020/02/28/trump-says-the-coronavirus-is-the-democrats-new-hoax.html>

14 The good thing about coronavirus

Charles Wyplosz

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It is far too early to know whether the coronavirus epidemic will have been just a huge scare or a major disaster. Some epidemiologists fear that half of the world's population may be infected. With a mortality rate of 2%, this means that 1% of the currently living could be wiped out. The toll would be 78 million people, a bit less than the population of Germany or Turkey. There are no words to describe such a threat.

How can one think of a 'good thing' about this immense threat, then? So far, at least, the epidemic looks like a giant Rorschach test, those coloured inkblots that reveal your personality, except that it reveals the nature of governments and, more widely, societies. It is fascinating to observe how governments are reacting to the threat. Even if the epidemic soon disappears, eventually its fallout could be spectacular – for the better or the worse.

Take China, a country whose government has been keen to promote worldwide its autocratic and secretive regime. The initial cover-up was unsustainable and forced the government into a U-turn that all citizens could see – a rare event. The famous hospital built in ten days looked like a massive achievement, until it backfired when the health system became visibly overwhelmed, in effect abandoning scores of sick people. The tight limitations imposed on the population may eventually be efficient, but they have violated elementary human rights. Even though most citizens are under no illusion about the nature of the regime, this is a traumatic experience.

Similar observations apply to other autocratic and secretive regimes. Iran's unbelievable numbers of reported cases and deaths will eventually blow up. Russia is likely to follow the same path, as it did with AIDS a while ago. As we know from the Chernobyl case, people are deeply hurt when they discover that their governments chose to protect the regime over their own lives. There is always a price to pay, sooner or later.

Trump's initial denial of the issue will be soon be revealed as yet another lie. Perhaps the US health system is better equipped to deal with the epidemic than most others, but the president will suffer badly if it emerges that his early denial has led to scores of avoidable deaths. The Italian and South Korean governments also reacted very slowly. Either they were not aware of what was going on or they were clueless about what to do, they were just incompetent. In France, politicised trade unions of health workers immediately blamed a lack of resources on the government, which is acting fast, forcefully and transparently. Divisions will rise in an already deeply divided country.

The cruise ship moored in Yokohama has been turned into a petri dish. Amazingly, the Japanese health authorities tested only a minority of the stranded passengers, officially due to lack of equipment. At the same time, another cruise ship was quarantined in Hong Kong and all passengers were promptly tested. Japan hardly qualifies as a poor country short of technical skills, but its narrow political elite and its bureaucracy are well-known for their bad habits, as the Fukushima disaster already revealed.

A telling contrast is Switzerland. As soon as the first two cases were identified, the government built up testing centres and required that large events (more than 1,000 people) be cancelled. Highly expensive exhibitions, such as the Geneva auto show or the prestigious watch show, were instantly cancelled. For a country frequently derided for being slow in everything (except maybe downhill skiing), its speed of reaction stands to reduce the extent of the epidemic even though its borders remain widely open. Then look at Israel, which is turning back foreigners coming from some infected countries when they land at the airport. They are not even allowed to disembark, while Israeli citizens coming in from the same countries are immediately taken care of. If that is not a fortress mentality, then what is?

Epidemiologists worry about the impact of the epidemic in poor, ill-equipped countries. Kazakhstan and Côte d'Ivoire have built brand new capital cities, but they lack elementary health systems, like many other countries whose armies sport advanced weaponry. Development economists have long identified health systems as a priority that public and private donors should focus on. They stand to be proven right, but the proof might be cruel.

These examples, and many more that will occur in the coming weeks, should not go unnoticed when the epidemic finally tempers down. They all will reveal what is deeply wrong, and sometimes reassuringly good, in each country. These things mostly went unnoticed because they have been part of the landscape for very long, just a normal fact of life. If many lives are lost, they will be exposed for all to see. Hopefully, it will

be much more difficult to ignore the facts or blame foreigners for national failings. This could be the silver lining of the disaster that awaits the world. It would be a tragic failure if the lessons that we are about to learn were to end up wasted.

Meanwhile, depending on its extent and duration, the epidemic will hurt economic growth. Will these differences in treating the epidemic also characterise the economic policy responses? The linkage is unlikely to be straightforward. The Chinese authorities all but shut down the economy with one click; they can order a restart as easily while pouring in cash to soften the economic and political blow. Italy has already started to ask for leniency from the European Commission regarding its budget deficit. The large central banks have signalled that they are monitoring the financial markets carefully and the Bank of Japan has started to buy shares. This may suggest that the less adequate the treatment of the epidemic itself has been, the more forceful will be the economic policy reaction – as if “money can buy me love”.

The deeper question is what drives the differences. This is a huge question. The simple answer is institutions, but institutions are the result of history, culture, ethnic divisions, political regimes and election laws where applicable. Deeper still is the question of the price that societies attribute to the value of life, which brings in religion and spiritual values. Maybe the only safe prediction that can be made is that, in the years to come, researchers in many fields will be busy disentangling these issues.

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Charles Wyplosz is Emeritus Professor of International Economics at the Graduate Institute, Geneva, where he was Director of the International Centre for Money and Banking Studies. Previously, he has served as Associate Dean for Research and Development at INSEAD and Director of the PhD programme in Economics at the Ecole des Hautes Etudes en Science Sociales in Paris. He is a CEPR Research Fellow and has served as Director of the International Macroeconomics Programme at CEPR. He is also CEPR’s Policy Director and Co-Chair of the Board of the journal *Economic Policy*.

