



A PRELIMINARY ASSESSMENT OF THE POSSIBLE ECONOMIC IMPACT OF THE CORONAVIRUS OUTBREAK: UPDATE

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A preliminary assessment of the possible economic impact of the coronavirus outbreak: Update

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Summary

- The coronavirus pandemic has triggered a global economic shock. We provide an exploratory analysis of its impact on the global economy
- The channels we focus on are a reduction in labour, a reduction in expenditure and investment, an increase in uncertainty, and a temporary shutdown in some sectors
- Not accounting for substantial policy responses, the underlying impact on global GDP growth may be similar in magnitude to the financial crisis of 2008/9.

Introduction

The coronavirus outbreak in China was first reported to the World Health Organisation (WHO) on 31 December 2019. At the time of our preliminary analysis on 4 February 2020 the WHO reported 26,630 cases of infection across 24 countries. Of those cases 77% (20,471) were in China and the city of Wuhan had experienced both a very severe outbreak and also what appeared to be drastic action by the authorities in terms of restricting movement in the city, region and country. Almost two months on from that initial date (27 March), the number of cases globally has risen more than ten-fold with some countries outside China (Italy, US) having notified cases comparable to those seen in China. At the time of writing the number of incidents outside China continues to grow rapidly and the news on the virus is changing daily.

Restrictions of movement are now widespread and the economic effects of the outbreak will be much worse than widely thought two months ago. There is still considerable uncertainty about issues such as the likelihood of getting the virus, what precise medical and other measures need to be taken to combat it (including self-isolation and hospital treatment), and how successful such measures might be, and therefore about how long the epidemic might last.

While the coronavirus outbreak represents a health shock that has potential adverse economic effects, it is not a 'traditional' direct economic shock. The aim of this note is to provide an update to the methodological approach used in our preliminary investigation of the potential economic impact

¹ The authors are grateful to Jagjit Chadha for his helpful comments

of the coronavirus on China and the world economy.² We have examined this issue by running stylised scenarios using the National Institute’s Global Econometric Model (NiGEM).³

Information on the performance of the Chinese economy in the first two months of this year is now emerging, but the implications of the outbreak are now much wider than initially assumed two months ago. Our approach, therefore, involves making a series of assumptions to construct a stylised shock to the global economy. It is, however, important to note that in such a fast-changing situation, the risk is that the simulations reported in this note will be overtaken by events in this unprecedented period. Partly for this reason, these scenarios should not be interpreted as NIESR’s central view of the effect of the coronavirus pandemic. They are provided as building blocks to help users and the broader community of policy analysts form their own views.

² The exercise was undertaken on 15 – 26 March 2020, a month and a half after our preliminary assessment which was published as ‘A preliminary assessment of the possible economic impact of the coronavirus outbreak’, NiGEM Observation No. 17.

³ NiGEM v1.20 was used in the analysis.

Modelling assumptions

Given the continuing spread of the virus and the size of the outbreak, any attempt to estimate the potential economic effect of the coronavirus will be subject to great uncertainty.

The focus of the first round of simulations of the NiGEM model (undertaken in early-February) concentrated on the effects on the Chinese economy from coronavirus, as the number of virus cases in China was by far the largest. But recent news of the growing number of incidents outside China, have led us to extend the analysis as a global economic shock. The economic effects are expected to emerge through four main channels.

First, lower production results from reduced employment and hours of work as people become ill, as well as the impact of the policies of isolation. This is a supply-driven shock. Indirect spillover economic effects of the virus internationally are expected to come through activities including trade, travel and global supply chains.

Second, lower consumer spending will result from voluntary reductions in e.g. reduced transport activity (including domestic and international air traffic and tourism), reduced consumer activity in terms of hotel stays, meals out and cinema visits, and reduced consumer retail shopping activity generally, with some evidence already of a sharp fall in sales of cars. In addition, companies are likely to reduce sharply their spending on investment at a time of considerable uncertainty. These are demand-driven shocks.

Third, further economic effects are likely to come from changes in confidence and risk appetite in financial markets as a reaction to the increased uncertainty. The effects of this have been seen in declines in asset prices and volatility in government bond markets.

Fourth, there will be deliberate reductions in economic activity as a consequence of lockdowns in many regions and countries to halt the spread of the coronavirus. These consist of joint supply and demand shocks.

Shock specifications

Over the course of the two months it has become clear that COVID19 is a global shock impacting on both the supply and demand sides of economies. Given the continuing spread of the virus and the size of the outbreak, any attempt to estimate the potential economic effect of the coronavirus will be subject to great uncertainty but it is still helpful to try and gauge its impact. Our analysis below instead focuses on the different channels by which a short-lived coronavirus outbreak impacts the global economy. We have allowed for some endogenous policy responses, but not the substantial discretionary measures that have been announced by many countries. As such our analysis quantifies the effect of the underlying shock without extraordinary measures. We will consider these in our forthcoming *Review*.

We model the impact of the coronavirus shock through a range of following channels and we set out the assumptions that are required to arrive at our results.:

Reduced hours of work due to illness

- The supply side effect is assumed to operate through reduced hours of work, with people either being physically unable to work (perhaps due to illness or due to factory closures) or having to 'self-isolate' in order to contain the spread of the virus. To set the scale of the shock we have assumed an infection rate of 16 per cent⁴, and that people are out of work for 12 (out of 48) weeks and associated with that there is a reduction in productivity of 3.9 per cent in the first quarter of infection. For the following quarter, productivity is assumed to improve by 50 per cent relative to the previous period and then return to base by about the end of the following year. Hence, there is no permanent negative impact on the trend capacity of output in this simulation.

Reduced spending on non-essential goods and services

- The main channel of lower domestic demand is through reduced consumer spending, as well as private investment and destocking. As a global macroeconomic model, NiGEM does not have sectoral or industry level disaggregation to consider the impact of spending on specific activities such as tourism, transport or retail sales. While information is still limited, it is very early to be at precise in making an informed judgement on the possible size of a demand side shock.
- However, to gauge the shock we assumed that the share of non-food and non-essential items in household expenditure is around 40 per cent, giving a negative shock of about 10 per cent to private consumption for one quarter. This shock is applied exogenously to all economies⁵ in the second quarter (apart from China, where it is applied in the first quarter). In the first and the second quarter, household consumption is reduced by a quarter of the full impact. Given the assumption about the temporary nature of the shock, it is expected in this simulation to dissipate by the end of the year (i.e. return to base).

Increase in uncertainty

- The third channel incorporates both demand and supply side impacts on the economy. It is represented by an increase in investment risk premia, which captures features of heightened risk and an adverse shock on businesses. Given the severity of the current impact, which in magnitude becomes comparable with the financial crises of 2008-09, we apply a 300 basis point increase in the investment premium in this simulation, which is assumed to last for 3 quarters and then gradually return to base by the middle of next year.

⁴ Assuming an infection rate of about 9% and a basic reproductive ratio (R_0) of 1.3 for seasonal flu, and assuming COVID-19 has proportionate infection rate given a R_0 of 2.25, results in COVID-19 infection rate of about 16%.

⁵ As reduced scale models do not have disaggregated domestic demand, we apply 70% of a shock to domestic demand directly, to proxy share of private consumption in domestic demand.

Shut down of economies

- A shut down of vast parts of the economies in countries affected by the coronavirus outbreak is unprecedented in peace-time. To mimic a temporary lockdown of the economy, where demand as well as supply fall by comparable magnitudes we apply additional negative shocks equivalent to about 5%⁶ per cent lasting for one quarter to trend capacity output directly and GDP (via reduced consumption)⁷.

Default model assumptions

- Monetary policy in all countries is assumed to follow dual targets i.e. to react to deviations from inflation and nominal GDP targets (subject to zero lower bound⁸). The exception is the UK, where the central bank intervention rate (Bank Rate) is reduced to 0.1 per cent for one year exogenously, in line with the recent announcement by the Bank of England.
- By default, exchange rates and financial markets are assumed to be forward-looking and respond to expected changes in interest rates. Thus, for example, if expectations of future interest rates are reduced as a result of a policy change, then bond and equity prices will increase and the exchange value of the domestic currency will decrease immediately.
- As a default, NiGEM incorporates a fiscal solvency rule which adjusts the effective income tax rate to ensure that in the long run the budget deficit, as a per cent of GDP, returns to a target level. Our assumption is that fiscal rule is not employed for the first two years of the shock and government spending is exogenous over this period of time.

Results

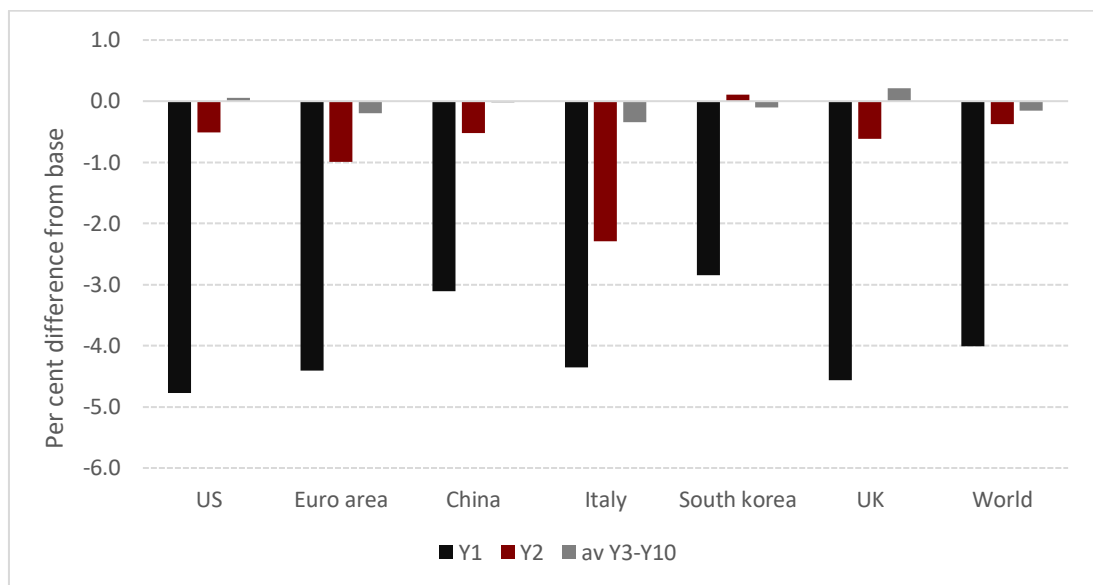
- Figure 1 shows the impact on GDP for the global economy and several major countries from the combined shocks, which we have outlined above. World GDP falls significantly by about 4 per cent relative to baseline in the first year (2020) but remains only slightly lower than in the baseline in the following year. This global recession would be of a similar magnitude to the financial crisis.
- All the major economies would see lower GDP than in the baseline in the first year of the shock. The overall impact will depend on a multitude of factors including but not limited to the scale and the timing of the shocks, structure of the economies (how flexible are the labour markets, stickiness of prices), current state of the economy, monetary and fiscal policy response, etc. With the vast majority of the economies experiencing falls in GDP of over 3 per cent than the baseline recessions would result.

⁶ Assuming partial (50%) shutdown for 6 out of 52 weeks gives us a reduction of about 5.8%

⁷ Lock down simulation is run with prices held exogenous for a year and monetary responses being exogenous for two years, and thereafter reacting to changes in the economic environment.

⁸ Apart for those economies where lower bound is already negative

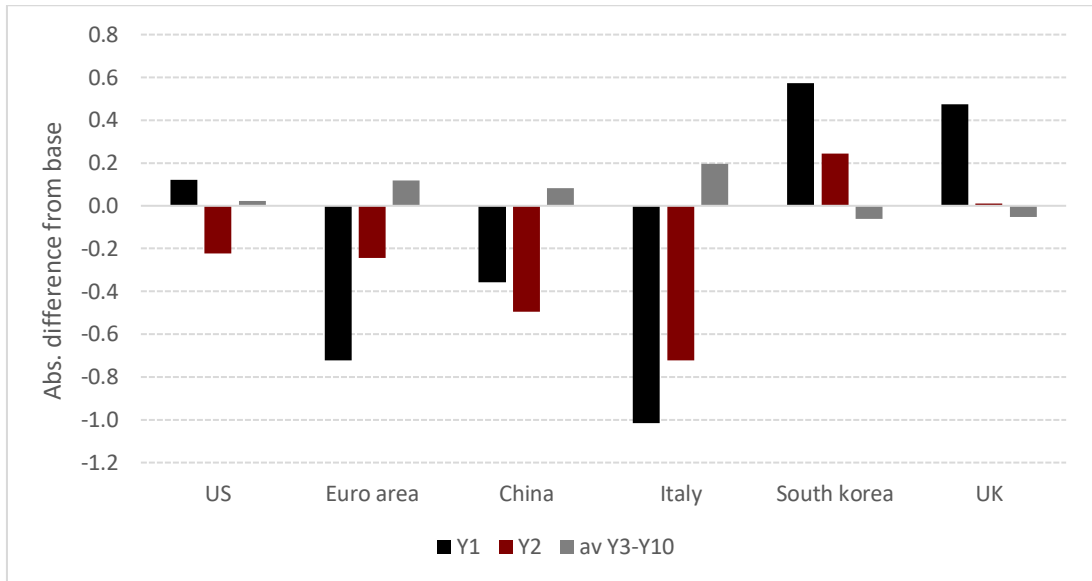
Figure 1: Impact on GDP (per cent difference from base)



Source: NiGEM simulation

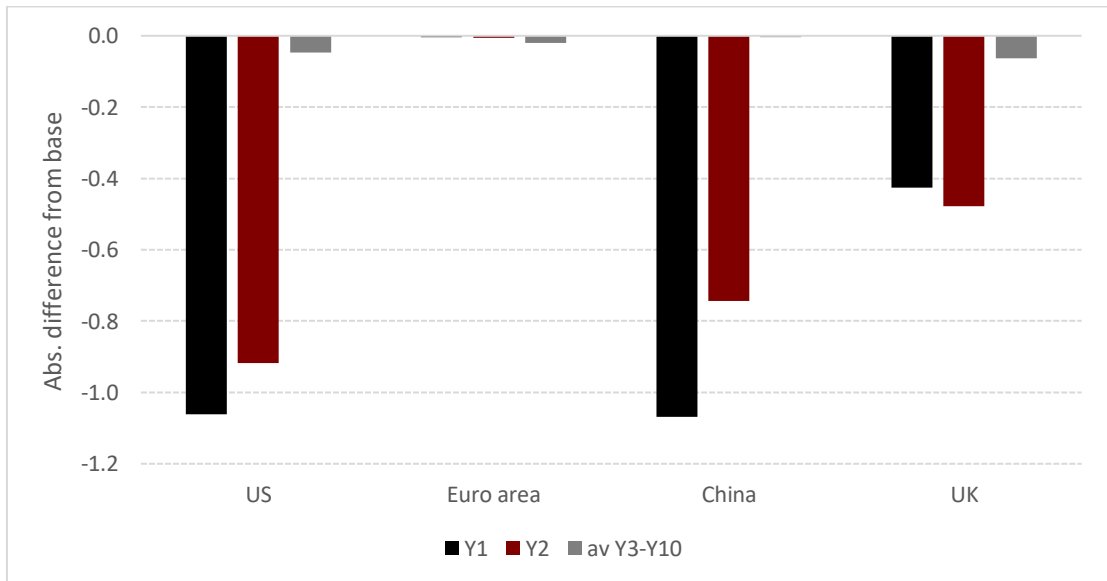
- The GDP fall (relative to baseline) is particularly large in the first and second quarters of the first year than in the baseline, partly due to the impact from the lockdown of the economies. The shock wears off and activity recovers towards pre-shock levels from the second half of the year and into 2021. The effect of the lower starting level of GDP in 2020 would therefore boost annual growth rates in 2021 relative to baseline. A temporary, but marked fall in domestic demand opens a negative output gap in the majority of the economies and puts downward pressure on prices, leading to an accommodative monetary policy response. The demand effect outweighs that of the negative supply shock, which would tend to raise prices.
- The effects of lower domestic demand, supply and economic activity in all economies spill over to other economies through trade relationships via reduced demand for imports and exports, which adds an endogenous response to the initial shock and exacerbates negative impact on economic activity. The spillover effect on individual economies will depend on the trade linkages with the economies affected by the coronavirus shock, as well as openness, with smaller and more open economies expected to be affected more.
- The basic net effect of the shocks tends to lower inflation, except for the periods when the reduction in demand falls short of reduction in supply side of the economy, temporarily creating an upward pressure on price (for example South Korea and UK in figure 3). Falls in GDP and the reduction in price levels prompts monetary policy reaction and the stance of monetary policy is loosened. The euro area having interest rates already at their lower bound has less scope than other economies to cut them further but may turn to other extraordinary measures

Figure 2: Impact on inflation (absolute difference from base)



Source: NiGEM simulation

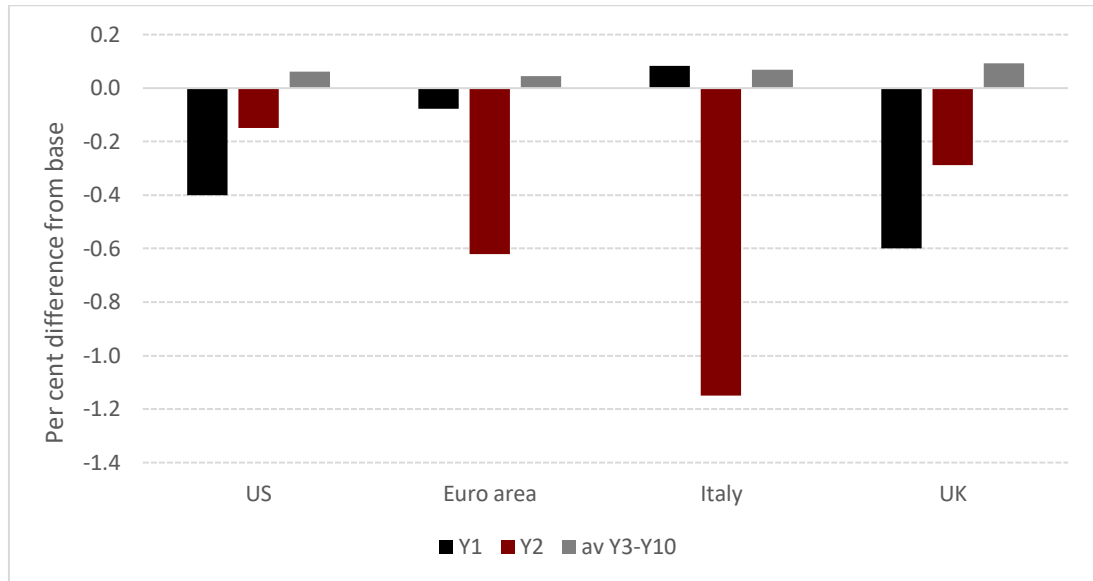
Figure 3: Impact on interest rates (absolute difference from base)



Source: NiGEM simulation

- The reduction in economic activity leads to job losses and employment falls relative to the baseline. However, given forward looking expectations and anticipation of a short-lived fall in output, the reduction in employment is not as severe as it can be given the magnitude of reduction in GDP. The impact on employment is not uniform among the economies. Apart from a direct effect from reduction in output, the labour market idiosyncracies are playing a large role too. For example, employment in the US is affected less than in the UK (where employment is reduced by just under 200000 in the first year), as working hours are falling more in the US thus keeping more people in employment, although the actual reactions may differ depending on how companies react in these unique circumstances.

Figure 4: Impact on employment (per cent difference from base)



Source: NiGEM simulation

- The stickiness of prices and monetary policy response are important factors too. In European economies real producer wages are falling by more and for longer than in other countries and at the same time monetary policy response (in terms of interest rate cuts) is severely impaired as well.

Concluding observations

Our updated analysis does not attempt to judge how effective the various measures taken to treat the epidemic will be, or what particular economic measures various governments and central banks may take (especially unconventional monetary policy measures) to mitigate the adverse economic impact from the outbreak. Two months on from our initial simulation, several central banks have now reduced policy interest rates and, in conjunction with governments, introduced substantial fiscal measures to help companies and households to cope with (what are hoped to be temporary) liquidity and cashflow problems. At the same time, governments have taken measures to limit the spread of the virus.

This simulation exercise represents our latest response to a fast-changing environment and attempts to try to capture some of the economic interdependencies across countries that the outbreak is affecting. The view of the economic effects of the coronavirus outbreak is likely to change as news on the spread and effects of the virus develops. It will not be until data on economic performance for the first half of this year becomes available that economists will be able to start to gain a clearer picture of how the economic effects of the outbreak have developed, and perhaps this will give extra

insight into how they might develop. As a consequence, this approach will be reviewed as new information becomes available.

27 March 2020

References

Liadze, I. and Naisbitt, B. (2020), ' A preliminary assessment of the possible economic impact of the coronavirus outbreak, NiGEM Observation, No, 17, February.