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COVID-19: Combined supply-side and demand-side shocks, so lift restrictions (carefully) lest GPD declines ultimately kill more than COVID-19

**Abstract**

COVID-19 remains pandemic. Social distancing and travel restrictions have avoided countless deaths and infections but disrupted livelihoods and economies. The global loss of gross (world) product is unprecedented as COVID-19 has inflicted both a supply-side and a demand-side shock. While public health measures have mitigated morbidity and mortality, the excessive loss of GDP will lead to years of life lost due to recession with diminished spend on healthcare, safety and the environment. This paper will review the estimated COVID-19 economic impact and show that it is timely and crucial to (carefully) ease restrictions as any additional economic slide will continue to intensify an already parlous situation and further negatively impact overall global average human life expectancy. The USA and UK will be used as specific examples, as will the general case of delayed cancer treatment due to COVID-19 service disruption. Financial stimuli that attempt to revive flagging economies by governments and blocs will be outlined and the current uniformly bleak global forecasts will be briefly contrasted with the Great Depression of the 1930s. The biased adverse impact on low-income households will be sketched, and a reminder of the unknown eventual costs of lasting illness (‘long COVID’) will also have to be factored in restriction removal policies. At this point in time (end of summer 2020), fierce debates rage within each country regarding the potential trade-offs of health vs economy. The need for unbiased and rigorous quantitative evaluations of all possible decisions is paramount.

**1. Introduction**

COVID-19 continues to run rampant in summer 2020 and in the absence of truly effective treatments or vaccines, the only way to reduce spread and death are by non-pharmaceutical interventions (NPIs), so-called community mitigation strategies [1]. These include hygiene, social distancing, self-isolation and travel restrictions. In unprepared localities where these measures were not in place, COVID-19 caused devastating morbidity and mortality and overwhelmed healthcare systems, as witnessed in Italy early in 2020 [2].

Social distancing, self-isolation and travel restrictions have flattened the curve and prevented millions of infections and saved millions of lives [3,4]. However, they have had detrimental effects on global healthcare systems and a disruptive ripple effect on literally every aspect human endeavour and economic activity. There have been unprecedented levels of disturbance to individual lives and even more importantly for the long term, to general economic activity, both at national and at global levels [5]. Workforces have been reduced across all economic sectors with countless jobs lost. Schools have closed, piling additional pressure on carers. The demand for commodities and manufactured products has significantly decreased while demand for medical supplies has risen. The food sector also faced increased demand due to panic-buying and stockpiling [5].

In economic terms, COVID-19 has inflicted both a supply-side and a demand-side shock. A shock is sudden and unexpected change which can be both negative and positive. A supply shock is an unexpected increase/decrease in the supply of goods/services due to non-price determinant factors. Demand shocks are sudden increased/decreased demands for goods or services. Since the supply of a commodity/good/service is usually not very flexible (inelastic in economic terms), all of these COVID-19 affected factors can and have wreaked economic havoc.

Almost all countries are reducing NPI restrictions but these actions will not undo the damage already done and the evolving domino collateral effects. Indeed, due to ongoing effects including decimated tourism, the World Travel and Tourism Council (WTTC) has averred that COVID-19 is threatening the livelihoods of 300 million people – one in 10 of the global workforce – employed in the tourism/hospitality industry, an industry which accounts for 300 million jobs and almost 10% of global gross domestic product (GDP) [6,7]. GDP is defined as the total amount of goods produced and services provided, typically quoted or cited per country, for a one year period [8]. Annual growth is invariably given as a percentage of the previous year’s GDP. The world’s GDP (the Gross World Product) was $85.9 trillion in 2018 [9]. As an example and for the sake of perspective, the largest economy in terms of GDP is that of the United States at almost $19.5 trillion/year [10], with an annual budget for 2019 of almost $4.45 trillion [11].

Health issues are inextricably intertwined with GDP and other economic indicators as it has been estimated that in the developed countries, if GDP drops to circa 6%, more years of life would be lost due to recession than would be gained through lives saved at this tipping point.
since there is a link between GDP and life expectancy. This is because affluent countries are able to spend more on healthcare, safety and the environment and this expenditure would be restricted due to decreased funds available if GDP falls [12].

This paper will review the estimated economic impact of COVID-19 and show that it is timely and crucial to (carefully) ease NIP restrictions – while cognizant of the need for vigilance and the imperative for swift action to curb viral hotspots – as any additional economic decline will continue to exacerbate an already parlous situation and further negatively impact overall global average human life expectancy. The United States (USA) and the United Kingdom (UK) will be used as specific examples, as will the general case of delayed cancer treatment due to COVID-19 service disruption.

2. General considerations

While NPIs have saved and will continue to save lives, the excessively lengthy enforcement of NPIs that severely restricts tourism and other revenue generating activity, to the detriment of the economy, will be counterproductive to general public health in the long term. This is because income is causally related to health not only via a direct effect on the material requirements necessary for simple survival, but also by influencing the ability to participate in society, including at work and hence the opportunity to control life circumstances. Indeed, the fewer the goods and services publicly made available by the community, the more important individual income becomes for health [13].

This can even be shown in relation to COVID-19 in that case fatality rates (CFRs) have varied widely in different countries, from 0 to 8.91%. An analysis of the effect of socio-economic and health indicators showed that GDP, especially GDP per capita among other indicators were significant contributors to CFR. Developing countries are therefore particularly vulnerable [14].

3. United Kingdom

A modelling study comparing the UK with European countries of similar income and healthcare resources showed that when applying a quality-adjusted life year (QALY) value of £30,000 (the maximum under national (NICE) guidelines), the cost of the imposition of further strict lockdown would only be justified with a QALY value of £220 k – £3.7 m (much higher than NICE values, x7 – x125). The authors concluded that clearly, the costs of continuing draconian restrictions are so great in relation to lives saved that a quick easing in restrictions is highly warranted [15].

4. United States

Another study showed that with a value of $125,000 per QALY, assuming COVID-19 vaccine availability by April 2021, QALY benefits from averted deaths by continued social distancing and limited reopening exceed full reopening with projected increased GDP gains. The authors concluded a limited reopening to achieve partial economic effects of the pandemic, and this has ranged from 2.5%–50% of GDP [20].

In order to assist economies and attempt to avoid a recession of the magnitude witnessed in the 1930s during the Great Depression [21], developed countries have pledged various stimulus packages, including a US $6 trillion internal aid boost [22], and a $1 trillion package for the European Union [23]. However, the economic outlook remains bleak. Despite the extraordinary efforts to counter the evolving recession/depression with fiscal and monetary policy support, forecasts vary but are bleak:

6. Economic stimulus and forecasts

Individual countries have varied in the degree of stimulation that they have internally provided in their attempts to ameliorate the negative economic effects of the pandemic, and this has ranged from 2.5%–50% of GDP [20].

Despite the extraordinary efforts to counter the evolving recession/depression with fiscal and monetary policy support, forecasts vary but are bleak:

6.1. World economic outlook

“A Crisis Like No Other, An Uncertain Recovery” [24]. Global growth is projected at –4.9% in 2020, 1.9 percentage points below the April 2020 forecast. In 2021 global growth is projected at 5.4%, leaving 2021 GDP circa ½% lower than the pre-COVID-19 projections of January 2020. The “adverse impact on low-income households is expected to be particularly acute, imperilling the significant progress made in reducing extreme poverty in the world since the 1990s.” [24]

6.2. World Bank

Forecasts envision a 5.2% contraction in global GDP in 2020, the deepest global recession in decades [25].

6.3. OECD and the Eurozone

The Organisation for Economic Co-operation and Development (OECD) anticipates the Eurozone’s economy to shrink by 9.1% in 2020, even 11.5% in the event of a COVID-19 resurgence. This contrasts badly with 5.5% contraction in 2009 as the Eurozone dealt with the financial crisis [26].

Per capita income will experience the largest contraction globally since 1870. Economies of developed countries are projected to shrink 7% and this will spill over into weaker developing countries with their fragile emerging markets which are expected to contract by 2.5%, the weakest result by this group of economies in the past 60 years [25].
6.4. Global GDP

A very recent study has estimated that global GDP could be set back $3.3–82 trillion over the next five years i.e. 0.65–5.3% of 5-year GDP. The equivalent values for the US are $550 billion - 19.9 trillion, i.e. 0.4–13.6%, and for the UK, $96 billion - $3.5 trillion i.e. 0.46–16.8% [27].

6.5. Comparison with the great depression

The Great Depression was a severe worldwide economic depression during the 1930s which began in the US and spread globally [21]. Between 1929 and 1932, worldwide GDP plummeted and for example, in the US, GDP fell by over 25% over 3 years with rocking unemployment (Table 1) [28].

7. “Long COVID”

In addition to acute morbidity and mortality, “long COVID” is a novel term that describes lasting illness in patients who have either recovered from COVID-19 but still experience lasting symptoms or who have had symptoms for longer than expected. Up to 90% of patients may go through this, with 90%, 32% and 55% were still experiencing at least one, two, or three or more symptoms respectively 60 days after onset. These included fatigue (53%), dyspnoea (43%), joint pains (27%), and chest pains (22%) [29]. It has been estimated that due to residual functional disability, the cumulative post-discharge healthcare costs/patient/year are comparable to those of elderly patients with severe chronic diseases [30]. The additional complication that relatively young and previously health individuals who lack important comorbidities do not return to their previous baseline functional status has enormous public health implications, particularly in the context of a pandemic [30]. These complications will weigh most heavily on those least equipped to shoulder them and their families and friends: lower-income earners, the uninsured/underinsured, and the homelessness [31]. All of these costs must also be factored in when weighing the pros and cons of removing restrictions.

8. Discussion

The oft-repeated ‘COVID-19 does not discriminate’ is patently incorrect – it certainly does and has in fact highlighted the stark wealth and health inequalities within society, and exacerbated them [32].

COVID-19 continues to pose a dynamic challenge for both governments and policymakers who have correctly prioritised reducing viral morbidity and mortality through social distancing interventions over economic growth. However, travel and mobility restrictions and shuttered businesses have triggered an economic collapse with an inbuilt uncertainty due to the possibility of a second wave in the northern hemisphere this coming winter [33]. Hence there remains great ambiguity as to how quickly recovery might/will be achieved.

At this point in time (end of summer 2020), fierce debates rage within each country regarding the potential trade-offs of health vs economy vis-à-vis the exact method and swiftness of reducing the extant enforced pandemic mitigation strategies. While uncertainty is certain, this very uncertainty highlights the need for unbiased and rigorous quantitative evaluations of all possible decisions. A “nuanced approach” to the easing of restrictions must take into account the balance of immediate mortality and both short- and long-term morbidity versus the even longer term risks of widening health and wealth inequalities and decreased life expectancy from poverty [20], particularly in the more socially and economically vulnerable strata since wide public health measures may disregard the most economically disadvantaged [32]. We must lift restrictions carefully while sheltering our vulnerable.

Table 1

| Year   | Real GDP\(^a\) | % change | Unemployment% |
|--------|----------------|----------|---------------|
| 1929   | 865.2          | 6.5      | 3.2           |
| 1930   | 790.7          | –6.6     | 8.9           |
| 1931   | 739.9          | –6.4     | 16.3          |
| 1932   | 643.7          | –13.0    | 24.1          |
| 1933   | 635.5          | –1.3     | 25.2          |
| 1934   | 704.2          | 10.8     | 22            |
| 1935   | 766.9          | 8.9      | 20.3          |
| 1936   | 866.6          | 13.0     | 17            |
| 1937   | 911.1          | 5.1      | 14.3          |
| 1938   | 879.7          | –3.4     | 19.1          |
| 1939   | 950.7          | 8.1      | 17.2          |

\(^a\) GDP is in billions of year $2000.

Declaration of competing interest

The authors have no conflict of interest to declare.

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References

[1] V. Grech, COVID-19 and potential global mortality - revisited, Early Hum. Dev. 144 (2020) 105054, https://doi.org/10.1016/j.earlhumdev.2020.105054.
[2] S. Fagiuoli, F.L. Lorini, G. Remuzzi, Covid-19 Bergamo Hospital Crisis Unit. Adaptations and lessons in the Province of Bergamo, N Engl J Med. 382 (21) (2020), https://doi.org/10.1056/NEJMc2111599-e71.
[3] S. Hsiang, D. Allen, S. Annan-Phan, et al., The effect of large-scale anti-contagion policies on the COVID-19 pandemic (published correction appears in nature. 2020 Aug 22;:), Nature. 584 (7820) (2020) 262–267, https://doi.org/10.1038/s41586-020-2404-8.
[4] S. Flaxman, S. Mishra, A. Gandy, et al., Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe, Nature. 584 (7820) (2020) 257–261, https://doi.org/10.1038/s41586-020-2405-7.
[5] M. Nicola, Z. Alshafi, C. Schrabi, et al., The socio-economic implications of the coronavirus pandemic (COVID-19): a review, Int. J. Surg. 78 (2020) 185–193, https://doi.org/10.1016/j.ijsu.2020.04.018.
[6] World Tourism Organization, UNWTO World Tourism Barometer 18(2), The World Tourism Organization (UNWTO), 2020, https://doi.org/10.18111/wtbabarometerg.
[7] D. Broom, Belgium eases lockdown with free train tickets for every citizen, World Economic Forum (June 10 2020). https://www.weforum.org/agenda/2020/06/free-train-tickets-belgium-tourism-lockdown-covid-19-coronavirus/.
[8] T. Callen, What is gross domestic product, Finance & Development. 45 (4) (2008 Dec) 48–49.
[9] World Bank, World GDP by year. https://data.worldbank.org/indicator/NY.GDP.MTP.CD, Accessed June 2020.
[10] Worldometer, GDP by country. https://www.worldometers.info/gdp/gdp-by-country/, Accessed June 2020.
[11] U.S.A. Spending. In 2019, the government spent $4.45 trillion. https://www.usaspending.gov/#/ . (Accessed June 2020).
[12] P. Thomas, S.W. Hub, J-value assessment of how best to combat Covid-19, Nanotechnology Perceptions 16 (2020) 14–40.
[13] M. Mann, The influence of income on health: views of an epidemiologist, Health Aff (Millwood). 21 (2) (2002) 31–46, https://doi.org/10.1377/hbh.21.2.31.2.
[14] S. Asafhan, A. Shahul, G. Chawla, N. Dutt, R. Niwas, N. Gupta, Early trends of socio-economic and health indicators influencing case fatality rate of COVID-19 pandemic, Monaldi Arch Chest Dis. 90 (3) (2020), https://doi.org/10.4081/monaldi.2020.1388, 10.4081/monaldi.2020.1388. Published 2020 Jul 22.
[15] D. Miles, M. Stedman, A.H. Head, ‘Stay at Home, Protect the National Health Service, Save Lives’: a cost benefit analysis of the lockdown in the United Kingdom [published online ahead of print, 2020 Aug 13], Int. J. Clin. Pract. (2020), e13674, https://doi.org/10.1111/ijcp.13674.
[16] R.B. Schonberger, Y.J. Listokin, I. Ayres, R. Yaesoubi, Z.R. Shelley, Cost Benefit Analysis of Limited Reopening Relative to a Herd Immunity Strategy or Shelter in Place for SARS-CoV-2 in the United States, Preprint, medRxiv, 2020, https://doi.org/10.1101/2020.06.26.20141044, 2020.06.26.20141044. Published 2020 Jun 28.
[17] R. Aseem, O. Warren, S. Mills, J. Smith, N. Pawa, Adjusting to the COVID-19 pandemic: challenges and opportunities of frontline colorectal cancer teams in the UK, Int. J. Color. Dis. 35 (9) (2020) 1783–1785, https://doi.org/10.1007/s00384-020-03647-2.
[18] A. Sud, B. Torr, M.E. Jones, et al., Effect of delays in the 2-week-wait cancer referral pathway during the COVID-19 pandemic on cancer survival in the UK: a
modelling study, Lancet Oncol. 21 (8) (2020) 1023–1034, https://doi.org/10.1016/S1470-2045(20)30388-0.

[20] S. Danielli, R. Patria, P. Donnelly, H. Ashrafian, A. Darzi, Economic interventions to ameliorate the impact of COVID-19 on the economy and health: an international comparison [published online ahead of print, 2020 Jul 13], J Public Health (Oxf) (2020), https://doi.org/10.1093/pubmed/fdaa104 fdaa104.

[21] C.D. Romer, The great crash and the onset of the great depression, Quarterly J Econ. 105 (3) (1990 Aug 1) 597–624.

[22] A. Van Dam, The U.S. has thrown more than $6 trillion at the coronavirus, Washington Post (April 15, 2020). https://www.washingtonpost.com/business/2020/04/15/coronavirus-economy-6-trillion/.

[23] European Parliament, Covid-19: the EU plan for the economic recovery, News European Parliament (May 28 2020). https://www.europarl.europa.eu/news/eu-news/headlines/economy/20200518STO79012/covid-19-the-eu-plan-for-the-economic-recovery.

[24] World Economic Outlook Reports, World economic outlook Update, June 2020, in: A Crisis Like No Other, An Uncertain Recovery, WEO, June 2020. https://www.imf.org/en/Publications/WEO/Issues/2020/06/24/WEOUpdateJune2020.

[25] World Bank, The Global Economic Outlook during the COVID-19 Pandemic: A Changed World. https://www.worldbank.org/en/news/feature/2020/06/08/the-global-economic-outlook-during-the-covid-19-pandemic-a-changed-world, June 2020.

[26] OECD, OECD Economic Outlook – the world economy on a tightrope. http://www.oecd.org/economic-outlook/june-2020/, June 2020.

[27] Centre for Risk Studies, COVID-19 and Business Risk, University of Cambridge Judge Business School, May 2020. https://www.jbs.cam.ac.uk/insight/2020/economic-impact/.

[28] R. Cooper, A. John, Theory and Applications of Macroeconomics, Unnamed Publisher, 2020.

[29] A. Carpenter, B. Bernabei, Landi F, Gemelli against COVID-19 post-acute care study group. Persistent symptoms in patients after acute COVID-19 [published online ahead of print, 2020 Jul 9], JAMA. 324 (6) (2020) 603–605, https://doi.org/10.1001/jama.2020.12602.

[30] P. Ambrosino, A. Papa, M. Maniscalco, M.N.D. Di Minno, COVID-19 and functional disability: current insights and rehabilitation strategies [published online ahead of print, 2020 Aug 4], Postgrad Med J. (2020), https://doi.org/10.1136/postgradmedj-2020-138227.

[31] D.H. Jiang, R.G. McCoy, Planning for the post-COVID syndrome: how payers can mitigate long-term complications of the pandemic [published online ahead of print, 2020 Jul 22], J. Gen. Intern. Med. (2020) 1–4, https://doi.org/10.1007/s11606-020-06042-3.

[32] J.A. Patel, F.B.H. Nielsen, A.A. Badiani, et al., Poverty, inequality and COVID-19: the forgotten vulnerable, Public Health 183 (2020) 110–111, https://doi.org/10.1016/j.puhe.2020.05.006.

[33] J. Middleton, H. Lopes, K. Michelson, J. Reid, Planning for a second wave pandemic of COVID-19 and planning for winter: a statement from the Association of Schools of Public Health in the European region [published online ahead of print, 2020 Aug 28], Int J Public Health. (2020) 1–3, https://doi.org/10.1007/s00038-020-01455-7.

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