

International cooperation during the COVID-19 pandemic

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Abstract: This paper explores the concept of ‘global public goods’ (GPGs) in the context of the ongoing COVID-19 pandemic. It argues that many of the tasks involved in public health, and in particular those involved in the control of an infectious disease like COVID-19, ought to be treated as GPGs that can only be effectively delivered through international cooperation. It sets out what a cooperative response to the COVID-19 pandemic should look like and introduces ideas for further discussion about how it might be financed.

Keywords: COVID-19, pandemic, global public goods, UN, WHO, cooperation

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I. The theory of global public goods

Economists turned their focus to ‘public goods’ in the middle of the twentieth century, exploring why particular goods with certain properties—those that are ‘non-rival’ and ‘non-excludable’—would tend to be systematically underprovided by the market (Samuelson, 1954, 1955).¹ The reasoning was that if self-interested individuals were able to ‘free-ride’ on the provision of those goods by others, enjoying the goods without contributing to their supply, then despite a strong collective interest to cooperate and produce the optimal amount of those goods, this unilateral incentive to deviate would undermine that collective interest and lead to under-provision. This literature on public goods explored how this result would be affected if those properties were present to lesser degrees (i.e. if they were ‘impure’, rather than ‘pure’, public goods). And it set out how we might resolve the ‘collective action’ problems that followed, where individuals find themselves collectively unable to achieve an outcome that they nevertheless all prefer to the *status quo*.

In most of the early canonical cases, the setting was a single country and the public goods were contained within its border: road networks, sewage systems, national defence, law and order, public works, and so on. But as this literature developed, it turned to consider public

¹ A good is ‘non-rival’ if the consumption of that good by one agent does not diminish the amount of good remaining for other agents to consume; a good is ‘non-excludable’ if agents cannot exclude one another from consuming that good. In practice, as noted, many public goods exhibit these properties to different degrees.

goods that are not geographically constrained in this way. These are *global* public goods (GPGs), which not only share the properties of traditional public goods, but also spill across the borders of different countries and have ‘global or near global’ consequences as a result: for instance, addressing climate change, avoiding financial crises, managing refugee flows, maintaining world peace, and many others (Buchholz and Sandler, 2020). In recent years, as globalization has accelerated, the theory of GPGs has become increasingly important: through international trade, cross-border travel, and global communication, people find themselves more connected and interdependent than ever before; and as a result physical ‘borders’ are not only less of a barrier to the free flow of people, goods, services, ideas, and technology—but to many public goods as well.

The fact that GPGs spill across national borders introduces an additional set of important features. To begin with, GPGs involve a far wider range of actors: not simply individual countries and their governments, but other countries and their governments, as well as non-governmental institutions, public–private partnerships, charitable organizations, sometimes acting alone, other times in coalitions and networks (Buchholz and Sandler, 2020). In turn, this variety creates very large inequalities in the ability of actors to respond; for instance, the same GPG will affect different countries, although some of those countries are far more capable of responding than others; consider, for instance, failed states or financially constrained governments.

But the most distinctive—and challenging—feature of GPG problems is that there is no obvious mechanism for resolving them. With a traditional public good, a national government has the power and authority to intervene to ensure the optimal level of provision is achieved within their particular country. But with a global public good, there is no analogous ‘global government’ that can be relied upon (Kindleberger, 1986). This is the so-called ‘Westphalian dilemma’; while national governments are able to change domestic law or build national institutions to ensure the optimal level of a traditional public good is secured within their borders, there are no provisions in international law to impose obligations on other sovereign countries to ensure the optimal overall level of a GPG is secured—without their consent (Nordhaus, 2005, 2015). The challenge is that, in practice, that consent is rarely achieved. Indeed, there are only two instances where a supranational authority can override national governments: the World Trade Organization (WTO) appellate system and the International Criminal Court (ICC), both of which are currently under attack from those who feel national sovereignty is being undermined. And so there are good reasons to think that many GPGs will tend to be under-provided.

II. Infectious disease control as a global public good

Over the last few decades, academics and practitioners have argued that ‘public health’ should also be considered as a GPG, with a particular emphasis on the control of infectious diseases (see, for instance, Kaul *et al.* (1999) and Woodward and Smith (2003)). This argument has a sudden, urgent relevance in light of the COVID-19 pandemic. And there are compelling reasons for thinking in this way. But first it is necessary to be clear about which specific task is being considered as a GPG: ‘controlling an infectious disease’ like COVID-19 is not one monolithic activity, but involves many different tasks, such as creating a vaccine or producing personal protective equipment (PPE). In turn, it is necessary to consider the properties of each task that might make it a GPG: not all tasks involved in controlling an

infectious disease are GPGs, even though they may be ‘good’ activities for the international community to carry out; and those tasks that are indeed GPGs may be so for very different reasons.

This second observation is important. In part, GPGs may differ because they exhibit the two properties of public goods from before—non-excludability and non-rivalry—to varying degrees. To see this, consider some of the GPGs involved with controlling an infectious disease. There may be variation in their levels of ‘excludability’: for instance, it may be easier for one country to exclude another from accessing the intellectual property for a particular vaccine than it is to exclude it from accessing knowledge about best treatment practice. And, at the same time, there may also be variations among tasks in their level of ‘rivalrousness’: for instance, if one country shares its knowledge of a cure with others it does not constrain their understanding of that cure, but choosing to allocate finite testing and tracing resources to one country may limit the resources that are available for others (Sandler and Arce, 2002).

But GPGs may also differ in how countries interact to produce them: more formally, they may have different ‘contribution aggregators’ (Arce, 2001) or ‘aggregator technologies’ (Buchholz and Sandler, 2020). In the early literature, public goods were exclusively treated as ‘summation’ public goods, where the amount of the public good supplied was simply the sum of the contributions made by all the agents (Hirshleifer, 1983). The classic case of a traditional summation GPG is limiting CO₂ emissions: the global reduction in emissions is equal to the reduction in emissions in each individual country. In the case of an infectious disease, the knowledge of how to produce medical equipment effectively might also be thought to have similar properties: the global stock of knowledge of how to produce medical equipment depends on the stock of knowledge that is developed in each individual country. But there are other forms that the contribution aggregator might take and, again, these distinctions are useful when thinking about why the GPGs involved with controlling an infectious disease might differ.

To begin with, there are ‘best-shot’ public goods, where the amount of the public good supplied is equal to the largest contribution made by an agent. Vaccine discovery, for instance, is a best-shot GPG: whether or not a vaccine is found strongly depends on the particular countries that contribute the most to its discovery. Then there are ‘weakest-link’ public goods, where the amount of the public good supplied depends on the smallest contribution made by an agent. Preventing the virus spreading, for example, is a weakest-link GPG: so long as there is a single country that fails to control the disease within its own borders, it is possible that the virus could spread beyond its borders and around the world. Then there are ‘threshold’ public goods, where some critical level of contribution must be made by each agent before the public good is produced (Hirshleifer, 1983; Buchholz and Sandler, 2020). Disease surveillance, for instance, is a threshold GPG: only once a critical number of countries or regions have tracking systems in place is it possible for the global community to understand the epidemiology of the virus.

Thinking of these goods as GPGs is revealing because it shows why *international cooperation* is critical if they are to be efficiently supplied. With summation GPGs, as with many traditional public goods, cooperation is required to stop certain countries free riding on others and to ensure that any financial burdens are efficiently shared. With best-shot GPGs, cooperation is required to ensure that *ex ante* efforts to provide the GPG are well coordinated and *ex post* attempts to exclude those who did not contribute are avoided. With weakest-link

GPGs, cooperation is required to support those countries which make no or a low level of contribution, but whose relative inaction has consequences for other countries. And finally, with threshold GPGs, there is a need for cooperation to ensure that the required aggregate contributions are made (Sandler, 1998; Buchholz and Sandler, 2020). Of course, international cooperation is important when supplying many private goods as well. But for GPGs, because they possess degrees of non-rivalrousness and non-excludability, this cooperation is particularly hard to achieve.

III. The response to COVID-19 and the role for cooperation

The response to the COVID-19 pandemic makes clear how difficult it is to efficiently supply GPGs. In the absence of sufficient cooperation, the international community has failed adequately to provide many of the GPGs associated with controlling this infectious disease.

For instance, rather than cooperate on a joint plan to share expertise and increase the global availability of medical equipment, there have been export bans, equipment poaching, and beggar-thy-neighbour bidding wars. Rather than cooperate to develop a vaccine together, ‘vaccine nationalism’ has taken place, with countries unilaterally pursuing independent research programmes, even attempting to capture research teams from other countries (Dyer, 2020). There has been insufficient cooperation in providing support to countries with poorer or weaker states that are unable effectively to control the spread of the disease on their own. The \$8 billion raised by the EU-led global health pledging conference on 4 May 2020 has—to credit a number of countries prepared to act in a cooperative manner—gone some way to rectifying this, as has the replenishment of GAVI (the Global Alliance for Vaccines and Immunisation), but while the principle of supporting each other was accepted, the financing raised is only a fraction of what is needed.² And rather than strengthen the World Health Organization (WHO), the international institution responsible for coordinating the global response to the virus, there have been systematic attempts to undermine and delegitimize it.

Given the current international context, this failure of cooperation was perhaps to be expected. Over the last decade, the process of trade integration that began after the Second World War has slowed and protectionism has increased (Gunnella and Quaglietti, 2019). In the last few years, there has been an accompanying surge in populist nationalism as well. The US shift is particularly striking: after the Cold War, the US preferred to act multilaterally in a unipolar world; but now, in a multipolar world, the US prefers to act unilaterally. This ‘My Country First’ attitude has become a global movement—‘American First’, ‘India First’, ‘China First’—and it has undermined the willingness of different countries to cooperate and thus their ability to respond effectively to the COVID-19 pandemic.

In many advanced countries, the first wave of the virus is coming to an end. There is therefore an opportunity, as countries reflect on their longer-term strategy for handling the pandemic, to take a different approach: to agree that many of the tasks required to promote public health are *global* public goods which can only be effectively provided through international cooperation. It should be emphasized that national governments are not the only actors involved in supplying GPGs: non-governmental institutions, public–private partnerships, and charitable organizations, for instance, have already played a critical role in responding to this particular crisis, coordinating with the state and each other in creative

² See ‘Coronavirus: World leaders pledge billions for vaccine fight’, BBC News, 4 May 2020.

networks and coalitions.³ This activity will also be vital in the future. In the case of a pandemic, though, national governments are the key actors, and so a focus on how to support cooperation among them is particularly important. And this cooperative response must achieve several objectives if it is to lead to the efficient allocation of GPGs.

The first is that countries must cooperate much more actively in their attempts to discover and manufacture a vaccine and effective treatments. In the language of GPGs, countries must work together to make their collective ‘best shot’ at a vaccine as effective as it can be. A ‘global Manhattan project’ is required, similar in spirit to CERN or the Human Genome Project (Berkeley, 2020). Here, countries would maximize their collective chance of success by providing mutual support to one another’s research, by simultaneously exploring multiple possible vaccines, by supporting global initiatives like the CEPI and the COVID-19 Therapeutics Accelerator,⁴ and by recognizing that while most of this activity will fail to discover a vaccine, only one success—if shared with all others—is needed to bring this pandemic to an end. In turn, multilateral institutions such as the WHO and World Bank should pool available funds to support capable countries in that research (Buchholz and Sandler, 2020).

But cooperation would also have to be strengthened because it is not enough just to produce a vaccine: it has to be mass manufactured and, if the disease is to be eradicated in every country, distributed equitably. This relates to a second reason that countries must cooperate—to address the substantial international inequalities in ability to respond to the pandemic. In the language of GPGs, countries must cooperate to help the ‘weakest links’ in the global community that are unable to control the virus on their own. To distribute any vaccine fairly, for instance, countries would have to radically expand and finance the global distribution chain currently organized by GAVI and its financial arm IFFIM (the International Finance Facility for Immunisation). Yet this particular case for cooperation is not only about vaccines; there are other significant international inequalities that must be addressed as well. According to the WHO, almost 30 per cent of countries have no COVID-19 national preparedness and response plans, and only half have a national infection prevention and control programme, and water, sanitation, and hygiene standards in all health-care facilities (Usher, 2020). Responding to these inequalities might involve: offering debt relief to poorer countries, so they are able to spend less on interest repayments and more on healthcare during this crisis; issuing special drawing rights, an increase in international money which can then, by a separate decision, be made available to emerging markets and poorer countries to respond to the pandemic; removing export restrictions on basic foods and medical supplies; and providing disaster relief and direct support to those countries struggling the most to cope through the World Bank, the International Monetary Fund (IMF) regional development banks, and UN agencies (Obstfeld and Posen, 2020). Helping the ‘weakest links’ in this way is also critical for countries offering this support, if they want to avoid further waves of the virus originating from poorer countries in the future.

Third, countries must cooperate not just in developing vaccines and treatments but also in coordinating the global production and distribution of medical equipment: testing kits, ventilators and related technologies, PPE, cleaning materials. In part, the challenge is that different countries have different production capabilities; indeed, no country has the domestic

³ See, for instance, Slaughter (2017).

⁴ The Coalition for Epidemic Preparedness Innovation (CEPI) is a global network of organizations that aims to accelerate the development of vaccines and broaden access to those vaccines; the COVID-19 Therapeutics Accelerator is an analogous organization that focuses on treatments for COVID-19.

capabilities to produce all the equipment it needs alone. In part, it is also that different countries will face acute demand for this equipment at different moments, according to the particular stage of the pandemic they find themselves in. Cooperation is therefore vital to make sure that global supply is maximized, by drawing on the comparative advantage in production of different countries, and also by allocating that equipment efficiently at any moment to those countries in most need. Again, this is not only important to help the ‘weakest links’ in the global community without these capabilities. But it is also important because the knowledge associated with producing and distributing this medical equipment effectively is a ‘summation’ GPG, where countries are able to re-use and build upon the expertise of others. The WHO, for instance, is trying to support this objective through the COVID-19 Technology Access Pool (C-TAP) and the Access to COVID-19 Tools Accelerator (ACT), both of which attempt to make available the data, knowledge, and intellectual property required to produce a variety of health technologies (from diagnostic equipment to vaccines). Yet far more must be done.

Fourth, countries must cooperate to ensure that early warning systems are in place to swiftly detect and contain new outbreaks in the future—not only outbreaks of COVID-19, but other infectious diseases as well. In the language of GPGs, countries must ensure that a sufficient ‘threshold’ in global surveillance is reached so that this monitoring can be done effectively. It is understandable that the current collective focus is on how to control the COVID-19 pandemic. But in responding to this pandemic, countries should also consider how to establish the capabilities that will contain the next pandemic, which may be even more deadly—and so the international regulations governing reporting and monitoring need to be strengthened.

Finally, countries must make more effective use of existing international institutions that are designed to support global cooperation. For instance, though the G7, G20, and UN Security Council have met and issued various statements with respect to COVID-19, they have not yet acted in a sufficiently decisive or well-coordinated way. It is only through the decisions of governments that extra resources can be mobilized. Indeed, while the World Bank and the IMF still have a variety of mechanisms at their disposal that could help with controlling the virus and its consequences (some of which have already been explored), they will need the approval of their shareholders to approve additional spending beyond their grant and loan ceilings. Of particular focus, though, ought to be the WHO, which was established in 1948 ‘to act as the directing and coordinating authority on international health work’.⁵ While it has attracted criticism for its response to COVID-19, as it has in previous international health crises,⁶ an international public health forum or organization to deal with infectious diseases had been in existence since the 1850s, and few would disagree that at the very time that international collaboration is needed most, the WHO is wholly under-resourced for the many tasks that its members have asked it to discharge: in 2018, it had a budget of about \$2.9 billion, similar in size to the budget of a large US hospital, and less than a third of the US Coast Guard budget that year.⁷

⁵ https://www.who.int/governance/eb/who_constitution_en.pdf

⁶ See, for instance, Gostin and Friedman (2014) on the WHO’s inability to take up its role as the ‘global health leader’, and Lakoff (2017) for a broader history of ‘health preparedness’.

⁷ The International Sanitary Conferences began in 1851. For the WHO budget in 2018 see <https://www.unsceb.org/content/FS-A00-02?agency=WHO>; for comparison with ‘a large US hospital’, see Pien Huang, ‘Trump and WHO: How Much Does the US Give? What’s the Impact of a Halt in Funding’, *NPR*, 15 April 2020; for the US Coast Guard budget in 2018 see https://www.uscg.mil/Portals/0/documents/budget/FY%202018%20Budget%20Overview_WEB%20FINAL.pdf?ver=2017-09-19-140304-977. See also ‘The organization is still the world’s best hope for fighting pandemics’, by the Editorial Board of *The New York*

In time, a detailed study of the international response to the current crisis is required, reviewing what has gone well and what has not (Obstfeld and Posen, 2020). A vital part of this must be a careful interrogation of the WHO's role and that of other multilateral organizations in the current pandemic, and the implications for how to reform them.⁸ If these efforts are to succeed, they must take comfort from one of the more successful aspects of the COVID-19 response that is, at least in part, inspired by the convening catalytic and coordinating role playing by the WHO. It is noteworthy that, while governments and politicians may have struggled to work across borders, scientists, statisticians, epidemiologists, doctors, and many other experts have not. Operating in networks that sit across national boundaries, they have cooperated and collaborated in pursuit of a common goal—understanding the virus and ending the pandemic. Any consideration of reforms of the WHO must take encouragement from these examples of a bottom-up, technologically empowered ‘network of these networks’ that may be a model for the future management of global public health. CERN, for instance, again provides one case for further study: although they have 2,500 staff members, 12,200 scientists from institutes in more than 70 countries engage with their work and research.⁹ It is a useful example of a global institution that, though it is financed by different governments, works effectively across boundaries with greater freedom of initiative.

IV. Financing the response to COVID-19—the UN and WHO

Supplying the GPGs associated with controlling an infectious disease comes at a great cost. With traditional public goods, a national government can raise the required revenue within its own borders through taxation and borrowing; but with GPGs, no comparable global mechanisms exist to require countries to pay. In turn, it is very hard, in both theory and practice, to construct voluntary cooperative agreements to finance GPGs that are either self-enforcing or particularly effective (Barrett, 1994, 2007). The UN and WHO, central institutions for coordinating the global response to the COVID-19, demonstrate this: though they require members to make mandatory payments, they are still heavily reliant on voluntary contributions to fund most of their activity.

The UN asks for two types of mandatory payments.¹⁰ The first are known as ‘assessed contributions’, which make up the UN’s so-called ‘regular budget’ (about \$3 billion for 2020).¹¹ In theory, this contribution is meant to reflect each country’s capability to pay: this is approximated by a country’s national income, and then adjustments are made according to its debt burden and population (i.e. relief is offered to those with high levels of debt or low

Times, 13 June 2020.

⁸ There is partial recognition of this in the G20 Leaders’ [Statement](#) on 27 March 2020, which included a commitment ‘to further strengthen the WHO’s mandate in coordinating the international fight against the pandemic’. See, for instance, Bollyky and Fidler (2020) for what such a review might look like.

⁹ <https://home.cern/about/who-we-are/our-people>

¹⁰ Article 19 of the UN Charter. See <https://www.un.org/en/ga/about/art19.shtml>. They are mandatory in the sense that any country in arrears equal to its calculated contribution for the 2 preceding years can, in theory, lose its vote in the General Assembly. In practice, as the US showed in the 1990s, this threat is not properly enforced.

¹¹ <https://news.un.org/en/story/2019/12/1054431#:~:text=The%20UN%20General%20Assembly%20on,by%20Secretary%2DGeneral%20Ant%C3%B3nio%20Guterres.>

levels of *per capita* income).¹² Limits are then set on contributions: a floor is imposed to make sure all countries contribute at least 0.001 per cent of the budget; a ceiling ensures no ‘least developed country’ contributes more than 0.01 per cent; and another ceiling ensures no country contributes more than 22 per cent (this only binds for the US).

The second type of mandatory payment are peacekeeping contributions, which raise additional finance for UN peacekeeping missions in particular (about \$6.5 billion for 2019–20).¹³ This contribution again is meant to reflect each country’s capability to pay, but it is calculated according to a different formula.¹⁴ And importantly, while the five permanent members of the Security Council are expected to pay more for peacekeeping than others (they pay about 58 per cent of the total),¹⁵ the majority of other countries with lower *per capita* incomes are offered very large discounts on their contributions (up to 90 per cent), and allowance is made for what are called ‘victims’ of internal conflict or wars.¹⁶

Yet these mandatory payments, though carefully calculated and administered, only cover a small proportion of the UN’s activity: around 24 per cent of the UN’s overall revenue in 2018, for instance.¹⁷ And so, inevitably, the UN must rely on voluntary funding to fill that gap. The US, often viewed as a reluctant financial contributor to the UN, still provides the majority of its support through voluntary contributions (almost two-thirds of its \$10 billion contribution in 2018).¹⁸ These voluntary contributions are not only from countries, either: in 2018, the Bill and Melinda Gates Foundation donated \$282m to the UN—more than, for example, Argentina, Ireland, or the UAE.¹⁹

This voluntary feature is also systematic to the funding of the WHO: in 2018, less than a fifth of its budget came from assessed contributions.²⁰ But this reliance on voluntary financing is not a new phenomenon: the global eradication of smallpox in 1979, led by the WHO, relied very heavily on voluntary funding. Indeed, though it is celebrated as an example of successful international cooperation, ‘perhaps the greatest achievement of international cooperation in human history’ (Barrett, 2016), the WHO regular budget, funded by mandatory payments, provided only 11 per cent of the total expenditure on the eradication programme; the gap was filled by governments in endemic countries and voluntary payments (Fenner *et al.*, 1988).

The case of smallpox eradication also reveals another important fact—that not only is voluntary financing an important source of funding for the UN and the WHO, but it is also extremely tenuous. Traditionally, the case for providing voluntary financial support to other countries is made by appealing to other-regarding motivations. But because of the global nature of the benefits associated with controlling an infectious disease, the country providing

¹²This is rule 160 of the General Assembly’s rules of procedure. For details of this formula, see ‘The Methodology used for the Preparation of the United Nations Scale of Assessments for the Period 2019–21’, 79th Session of the Committee on Contributions, 3–21 June 2019, Statistics Division, United Nations.

¹³<https://undocs.org/A/C.5/73/21>

¹⁴https://www.un.org/ga/search/view_doc.asp?symbol=a/res/70/246

¹⁵ US (27.89%), China (15.21%), Japan (8.56%), Germany (6.09%), UK (5.79%), France (5.61 per cent), Italy (3.30%), and Russian Federation (3.04%). See <https://undocs.org/A/73/350/Add.1>

¹⁶https://www.un.org/ga/search/view_doc.asp?symbol=a/res/70/246. Also see: <https://www.una.org.uk/news/un-briefings-uns-finances>

¹⁷ \$13.5 billion of \$56 billion. See <https://www.unsceb.org/content/FS-K00-01>

¹⁸ Shendruk *et al.* (2020).

¹⁹ For Bill and Melinda Gates Foundation, see <https://www.unsceb.org/content/FS-L00-02>; for Argentina, Ireland, and the UAE, see <https://www.unsceb.org/content/FS-D00-01>.

²⁰ ~\$500m of a total budget of ~\$2.9 billion. See <https://www.unsceb.org/content/FS-A00-02?agency=WHO>

financial support also benefits greatly from providing that support: the ‘provision of these goods represents a novel rationale for foreign assistance that transcends country-based motives, because the donor may also gain from the good’s benefits’ (Sandler, 2002). The hope would be that, when countries face large unilateral benefits from financing GPGs, they would reliably and voluntarily choose to do so.

And yet, this did not happen in the case of smallpox. To show that smallpox eradication was a strong investment in public health, some have noted that the US achieved cost savings equal to its total financial contributions every 26 days (Brilliant, 1985; Fenner *et al.*, 1988).²¹ But even more remarkable is the fact that the US achieved cost savings equal to the total cost of the *entire* global eradication programme within just 2 years.²² Yet in spite of incentives like this, voluntary payments from a range of countries who could afford to contribute still ‘remained miserly to the last’ (Barrett, 2007).

Reliance on voluntary financing leaves us, however, with an unstable system for financing the very international institutions that play a critical role in coordinating the cooperative response to COVID-19. As we have seen, while mandatory payments are transparent and predictable, the reality of who actually pays, once arrears are taken into account, and idiosyncratic voluntary contributions are also included, is very different.²³ In moments of crisis like the current one, the system is at risk of breakdown: the WHO, for instance, has come to rely for at least some of its urgently needed resources on an appeal for voluntary donations, a manner increasingly akin to how UNICEF has raised emergency funding in the past—yet experience suggests that such humanitarian appeals often tend to raise a fraction of what is required.²⁴ By relying on recurring voluntary contributions, opportunities for free-riding and collective inaction are increased. And finally, a system that is dependent on voluntary contributions is, in turn, far more vulnerable to the whims of populists and nationalists who are willing to support institutions like the WHO at one moment, but swiftly remove their support the next—as we have seen with President Trump.

V. Reflections on future financing arrangements

In considering any alternative financing arrangement for institutions like the UN and the WHO, we have to revisit the underlying principles of fairness that determine how the financial burden of supplying GPGs might be shared. At present, as noted, the principle that underlies the UN and WHO funding is usually stated as ‘capacity to pay’. Yet in practice, we might question whether this principle is actually upheld. To begin with, it only applies to mandatory payments, a small proportion of total financial contributions. In turn, the application of the UN formulae that are supposed to reflect this principle gives rise to some surprising results. For instance, among the ten largest contributors to the UN, the US and

²¹ This saving was largely due to the cost of the vaccination programmes that the US was able to end.

²² The cost of smallpox to the US alone was estimated to be about \$150m a year (in 1970s dollars), far greater than the total international expenditure on the entire eradication programme from 1967 to 1979, and similar to the total national expenditure by endemic countries on eradication (about \$98m and \$200m respectively (Fenner *et al.*, 1988)).

²³ For instance, only 35 countries paid their assessed contributions for the UN regular budget by the 1 February deadline in 2020. See <https://www.un.org/en/ga/contributions/honourroll.shtml>

²⁴ The ‘COVID-19 Solidarity Response Fund’. See, for instance, the UNHCR budget funding gap of 50 per cent, as of October 2019. http://reporting.unhcr.org/sites/default/files/ga2020/pdf/Global_Appeal_2020_full_lowres.pdf

China are the only countries that contribute less to the UN regular budget than their share of global gross national income (GNI); in turn, China is also the only country to contribute less to peacekeeping operations than its share of global GNI. And while the US might make the largest financial contribution to the UN in absolute terms, in *per capita* terms it ranks 21st: Norway, which ranks 1st, gives about nine times as much (McArthur and Rasmussen, 2019).

In light of these observations, one approach to reforming the financing of international institutions is simply to improve this existing mechanism. To begin with, the current burden-sharing principle, that a country ought to contribute according to its ability to pay, could be applied to all financial contributions: in order to improve the stability of the existing financing system, countries should make larger assessed mandatory payments. One possibility would be to extend the mandatory assessment system for UN peacekeeping to include UN humanitarian aid. In turn, the various adjustments that are made to the basic assessment formulae could be reviewed, to remove some of the surprising results from before and to take account of the changing balance of economic power in the world as Asia's share of the world economy grows and that of the West declines. For instance, one might consider whether the privilege of permanent membership of the Security Council or membership of other organizations like the G20, or the boards of the IMF, World Bank, or Financial Stability Board should incur a more general obligation to contribute more to the financing of GPGs, and whether floors and discounts that reduce the financial burden on lower-income countries should be revised.

A different approach to reform is to explore alternative principles of financial-burden sharing, drawing on those that are used in other international institutions. The IMF, for instance, uses a measure of a member country's 'relative position in the world economy' to determine its allocation of quotas: this depends not only on national income, but on an economy's levels of external trade, foreign reserves, and export variability.²⁵ (Even then, IMF quotas have not kept pace with the fast changing national incomes of member countries.) By contrast, the EU raises 70 per cent of its financing simply according to a member country's GNI.²⁶ Both mechanisms attempt to capture a country's ability to pay, as with the UN assessment, but in different ways. Calculations suggest that they would have different implications for how the financial burden is shared. If, in turn, these burdens were allocated according to a country's GNI *per capita*, another possible measure of 'ability to pay', then those financial burdens would change again.

To return to the observations made at the start of the paper, it is also important to remember that different GPGs have very different features, and as a result some will be far easier to finance than others (Sandler, 2002). In turn, while countries may offer support in principle for sharing the burden of financing GPGs, they may be less enthusiastic about a one-size-fits-all arrangement. In general, then, financing strategies should also be tailored to the particular features of the GPG in question: for instance, while a 'single best effort' GPG, such as avoiding an asteroid collision, might be financed by one developed country that is willing and able to do so to avoid extinction, a 'summation' GPG, like mitigating climate change, cannot be financed by one country alone, since no country could unilaterally reduce emissions sufficiently or afford the overall investment needed (Barrett, 2007). Any principles of financial-burden sharing should take into account the different types of GPGs involved, recognizing that different obligations may apply to different countries.

²⁵ See <https://www.imf.org/en/About/Factsheets/Sheets/2016/07/14/12/21/IMF-Quotas>.

²⁶ See https://ec.europa.eu/info/strategy/eu-budget/revenue/own-resources/national-contributions_en.

There are further principles of financial-burden sharing that could be explored. The measures of the IMF, EU, and UN, for instance, all try to reflect a country's 'ability to pay'. An alternative is a 'polluter pays principle', where countries that impose more cost on others—and so necessitate the supply of a GPG—should contribute more. A different approach is a 'benefit principle' which would, on the surface, seem less helpful to poorer countries. Under it, the countries that benefit the most from the provision of a particular GPG contribute more (see Sandler (2002)). A further source of guidance is the Barnett formula, which determines the block grants that Scotland, Wales, and Northern Ireland receive from the UK government (Keep, 2020). The formula does not change the total size of the grant, only the yearly change as the UK government allocates its departmental expenditures. This allows fluctuations in spending over time, without repeated and protracted negotiations about the size of the grant. In the context of the UN and the WHO, a similar mechanism would be useful, to provide a predictable way of raising mandatory payments from countries when faced by unexpected surges in demand for finance.

In this paper, we have argued, for two reasons, that it is important to view many of the important tasks involved in controlling infectious diseases like COVID-19 as GPGs. First, it helps us to understand why the international response to COVID-19 has fallen short: because of their public properties, these GPGs will tend to be underprovided in the absence of effective cooperation. In turn, even when countries face a very strong incentive to act unilaterally, as in the case of smallpox eradication, they may still choose not to do so. But at the same time, second, it is also revealing in that it shows us what a cooperative solution should look like and how it might be achieved. If countries are to find a way to supply GPGs in the future—not simply controlling the next infectious disease, but the many other global problems that we will undoubtedly face in the twenty-first century—then working out a stable and reliable financing arrangement for international institutions, one that supports cooperation, is a task that requires a more intensive dialogue between governments and other interested parties. We hope the discussion in this paper is one step towards enhanced cooperation.

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