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Political economy of vaccine diplomacy: explaining varying strategies of China, India, and Russia's COVID-19 vaccine diplomacy

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ABSTRACT

The COVID-19 pandemic and global responses to this crisis reveal the changing landscape of global health governance. As countries around the world struggle to secure COVID-19 vaccines for their citizens, some non-Western powers have actively distributed vaccines internationally – an act broadly recognized as vaccine diplomacy. While existing literature suggests that geopolitical concerns affect the selection of recipient countries, it has yet to explain other aspects of vaccine diplomacy. Why are some countries focused on vaccine sales while others are more open to donation? Why do some prefer bilateral to multilateral channels in distributing vaccines? Through comparative analysis of China, India, and Russia, this article shows that political economic factors, in addition to geopolitics, shape the ways non-Western powers conduct vaccine diplomacy. We argue that these countries adjust their strategies in line with their relative advantages in development, manufacturing, and delivery of vaccines. Each country has unique strengths and weakness, which gives rise to the varied patterns in vaccine diplomacy. Our findings suggest that their strategies of vaccine diplomacy are enabled as well as constrained by their economic realities, and the rise of these countries in this field does not necessarily mean an outright challenge to the existing international system.

KEYWORDS

Vaccine diplomacy; rising powers; global health governance; economic advantage

Introduction

The COVID-19 pandemic is the most impactful global crisis in decades. Since its outbreak in January 2020, the virus has spread to every country in the world, infected over 251 million and killed 5 million people globally (Johns Hopkins University, 2021). Strict measures against the pandemic have reduced world trade by 9.2% and GDP by 3.5% (IMF, 2021). The first one and half years of this pandemic revealed novel dynamics in global health governance: a near absence of Western countries and the rise of non-Western powers distributing medical aid to countries in need. When the pandemic broke out, many Western countries issued export restrictions of personal protective equipment, and some also banned vaccine exports once they developed COVID-19 vaccines (Euronews, 2021). This is in

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sharp contrast with some non-Western powers. Facing an unprecedented global demand for vaccines, China, India, and Russia have distributed large volumes of COVID-19 vaccines to the developing world and even to some high-income countries. Scholars and popular media call it 'vaccine diplomacy', relating the swift disbursement of vaccines with diplomatic intentions (Su et al., 2021). Although traditional Western donors, such as the US and the UK, also started donating COVID-19 vaccines in June 2021, non-Western powers had already distributed millions of shots by then (Duke Global Health Innovation Center, 2021).

The actions of emerging countries, coupled with inaction of Western powers, calls a long-held assumption into question: that wealthy Western countries are major donors and others are recipients of health aid, especially when it comes to the distribution of innovative medical products. The COVID-19 pandemic marked a debut of non-Western powers as vaccine inventors on the world stage. These countries had long been recipients, not donors, of health aid. To be sure, China has a long history of sending medical missions to less-developed parts of the world, and India has helped low-income countries by massively producing cheaper generic drugs (GHSi, 2012; Freeman & Boynton, 2010). However, these activities are rather labor-intensive, and these countries had yet to play the role of vaccine developers and suppliers during an outbreak of an infectious disease. China did not develop vaccines against SARS during the outbreak in 2003 (Yang et al., 2020). Russia and China each developed an Ebola vaccine, but neither vaccine has been approved by the World Health Organization (WHO) or Ebola-endemic countries. The WHO instead approved two Western vaccines that were invented after the Russian and Chinese vaccines (WHO, 2019). Over the past several years, emerging countries have rapidly developed capacities in pharmaceutical research and development (R&D) (Santos Akkari, 2016), but they have not acquired equal status with Western countries in global health governance.

Because we have never seen emerging countries conducting large-scale vaccine diplomacy, we know little about their strategies and the factors accounting for such strategies. Existing studies on geopolitics, disaster diplomacy, foreign aid, rising powers, and international order provide rich insights on certain aspects of vaccine diplomacy, notably the selection of recipient countries. However, they have yet to explain several key patterns, including the selection of distribution channels, production outsourcing, and technology transfer. This article adopts a political economic approach to fill this gap. We argue that non-Western powers vary in their relative advantages in vaccine R&D, manufacturing, and delivery, and they leverage their strengths to make up for weaknesses. Specifically, we expect that countries with an advantage in vaccine R&D would be more open to technology transfer; countries with greater manufacturing capability would be more likely to keep vaccine production within their borders than outsourcing it overseas; and countries with expansive distribution networks would prefer bilateral to multilateral distribution. This article examines three non-Western powers – China, India, and Russia – who were the only major countries practicing vaccine diplomacy between 2020 and June 2021. Using data published by news media, governments, and other sources, we identify their relative advantages in R&D, manufacturing and delivery, and analyze their strategies in vaccine diplomacy, with a focus on the types of transfer, manufacturing sites, and distribution channels.

We find that Russia is strong in vaccine R&D but weak in production and distribution. As a result, it seeks to outsource vaccine production with technology transfer. Russia also advertises the quality of the 'world's first COVID-19 vaccine' to attract buyers. India's greatest advantage lies in vaccine production. The country thus leverages its production capacity to secure large orders from multilateral as well as bilateral buyers. China has a more balanced profile, but its distribution network is stronger than the other two countries. By launching clinical trials in major markets abroad, China built up R&D credibility and capitalized on its flexible distributional capacity to get bilateral orders from emerging countries.

This article makes two major contributions. First, our analysis shows that the ability of non-Western powers to deploy vaccine diplomacy is constrained by their economic situations. None of them has advantages in all three segments of the vaccine supply chain, hence they leverage strengths to offset weaknesses, usually by seeking partnerships with other countries and organizations. This finding suggests that non-Western powers' vaccine diplomacy is driven not only by geopolitical but also by economic and reputational calculations. Second, we find that these countries actively utilize existing international organizations (multilateral channel) to advance their own interests, such as enhancing international credibility and boosting sales of their vaccines. In this sense, the aggressive vaccine diplomacy demonstrated by these non-Western powers does not necessarily mean an outright challenge to the Western-led international system governing public health. They have emerged as a new group of donors but they are still operating in the existing framework. When their interests align, non-Western countries collaborate with Western powers.

This article proceeds as follows. In the next section, we discuss what the existing literature can and cannot explain. We then propose a political-economic framework to explore the varying strategies exhibited by non-Western powers. In section three, we apply this framework to analyze China, India, and Russia's vaccine diplomacy. Section four takes a recipient perspective by illustrating how non-Western powers have attempted to enter one of the largest emerging markets, Brazil. Section five discusses factors that underly a country's relative advantages in the supply chain of COVID-19 vaccines. The article concludes with theoretical and policy implications.

Diplomatic motivations and economic constraints in vaccine diplomacy

Existing studies on disaster diplomacy and world orders provide a foundation to examine the motivations and patterns of vaccine diplomacy during the COVID-19 pandemic. Notably, these studies potentially explain why non-Western powers have been so eager to distribute vaccines internationally and how they choose recipient countries for vaccine aid.

The literature on 'vaccine diplomacy' has examined how some countries (especially the US) have used vaccines as a diplomatic tool (Hotez, 2001, 2014, 2019; Chattu & Knight, 2019). Yet, most of the studies feature vaccine diplomacy in non-emergency situations, making it difficult to compare with the COVID-19 pandemic. For instance, in his famous article on vaccine diplomacy, Hotez (2014) discusses how the two hegemons in the Cold War developed and delivered vaccines against smallpox and polio. In these cases, however, vaccine diplomacy operated in a relatively static situation: the development and distribution of vaccines were not the

only solution for worldwide well-being, and other forms of health diplomacy, such as sending medical missions to disease-endemic regions, could substitute for vaccine diplomacy. If other public health measures can effectively remedy the situation, the motivation to develop vaccines is limited. This might explain why there has not been much effort in vaccine diplomacy for the recent outbreaks of other infectious diseases. Viruses like Ebola do not spread among hosts fast enough, which makes it relatively easy to physically contain the infected areas. Most influenza viruses, on the other hand, have low fatality rates and, thus, do not require costly containment measures. Vaccines for these viruses may be developed but with less urgency and low diplomatic leverage. In contrast, the coronavirus strikes a balance between transmission and virulence – it is more infectious than fatal viruses like Ebola; yet it is significantly more deadly than many influenza viruses (Piroth et al., 2021). Governments around the world thus cannot ease extensive restrictions of human activities until vaccines are developed and widely distributed. This creates an urgent need for an unprecedented volume of vaccines worldwide, which in turn raises the potential gains of vaccine diplomacy. It is, thus, not surprising to see some countries quickly launching vaccine diplomacy to seize the heightened diplomatic opportunity in this pandemic.

A broader literature on hegemony, rising power politics, and contested multilateralism provides further insight on how vaccine diplomacy fits into a country's vision of international order. The COVID-19 pandemic and the vaccine diplomacy took place in a period of power shifting from the West to emerging states, whose power stems largely from their roles in the global economy. In an ever-integrated world, a country can weaponize its central position in the global market to coerce other countries (Drezner et al., 2021). Similarly, if a country can provide substitutes for goods monopolized by a small group of suppliers, it can change the international order associated with the goods. Rising powers are increasingly capable of providing scarce goods that were previously controlled by Western powers, and this enables them to reshape the market by transforming the types of goods and the ways the goods are distributed (Andersen et al., 2021). Indeed, between late-2020 and mid-2021, Western countries hoarded COVID-19 vaccines as club goods for the US and its allies ('vaccine nationalism'). In contrast, non-Western powers widely distributed vaccines and advertised their vaccines as public goods ('vaccine diplomacy'), thereby shifting the market dynamics associated with COVID-19 vaccines.

Furthermore, the literature on disaster diplomacy sheds light on how countries would choose recipients of their vaccines during this pandemic.[1] It suggests that a provider of generous disaster relief may be able to buy political gains in recipient countries (Kelman, 2012; Pfaff, 2020). A major implication from this literature is that, when conceptualized as disaster diplomacy, vaccine supply is part of a country's grand diplomatic strategy. Park (2020) argues that the pandemic provides an opportunity for the US to win the hearts of countries like North Korea and Iran. This suggests that vaccines are likely to be distributed to the countries where the donor wants to make diplomatic gains. As will be discussed later, China, India, and Russia all have distributed COVID-19 vaccines to strategically important countries, particularly to small countries that are hedging between rising power rivalry.

While existing studies may explain *whether* and *where* a country sends vaccines, other patterns of vaccine diplomacy are yet to be sufficiently explained. For

example, some countries produce most vaccines domestically, while others outsource production abroad. Some are more open to multilateral distribution, but others clearly prioritize bilateral contracts. These variations are puzzling if we focus solely on geopolitical dimension of vaccine diplomacy.

COVID-19 vaccines have certain characteristics of scarce strategic resources, considering the unprecedented demand for them and the enormous resources required for a rapid development process. If vaccine diplomacy is driven purely by strategic motivations, then countries that have developed a vaccine would be unwilling to transfer technology because they would not want others to learn how to develop the valuable resource. Even in a non-emergency situation, novel pharmaceutical products generate large profits, and countries with established R&D capacities have long been unwilling to transfer technologies. The US and the EU have tried to expand the protection of pharmaceutical patents internationally, signaling their opposition to technology transfer (Shadlen et al., 2020). One can imagine that the opposition would only heighten under emergency situations, when technologies become more valuable. In a similar vein, countries would not outsource vaccine manufacturing overseas, especially to non-allies, so that they can minimize technology spillover and risks to supply disruptions. In reality, however, China has been very open to technology transfer, and Russia, too, has tried to outsource vaccine production to various countries, including to the US's allies.

Another question of interest is the selection of bilateral vs. multilateral vaccine allocation. We agree with the existing research that countries may conduct vaccine diplomacy to pursue geopolitical interests. Yet, if countries use COVID-19 vaccines purely to project influence, then they should be giving vaccines bilaterally to strategically important countries. Existing literature on foreign aid argues that bilateral donors can enjoy full control over aid disbursement and, thus, they can effectively extract policy concessions from recipient countries (Carter & Stone, 2015). By this logic, countries should favor bilateral vaccine deals to precisely target their recipients and to maximize diplomatic gains. On the other hand, donors may well prefer multilateral channels if they can offset the loss of control by picking multilateral organizations that have closer policy preferences to their own or are susceptible to their influence (Copelovitch, 2010; Schneider & Tobin, 2013; Kuziemko & Werker, 2006). For the distribution of COVID-19 vaccines, COVAX is the dominant multilateral platform,[2] and non-Western powers do not have strong influence over any of the constituting organizations of this body (the WHO, the Coalition for Epidemic Preparedness Innovation, GAVI, and UNICEF). India, however, has distributed almost 30% of its vaccines through the COVAX, and China also pledged to supply 11 million doses to the platform.

Political economy of vaccine diplomacy

To understand why countries operate vaccine diplomacy in different ways, it is necessary to go beyond a country's grand strategy and take a closer look at other factors that enable or restrain vaccine diplomacy. We argue that the way a country conducts vaccine diplomacy is determined by not only geopolitical but also political economic factors. Non-Western powers adjust their strategies based on their relative strengths in development, manufacturing, and delivery of vaccines, and this

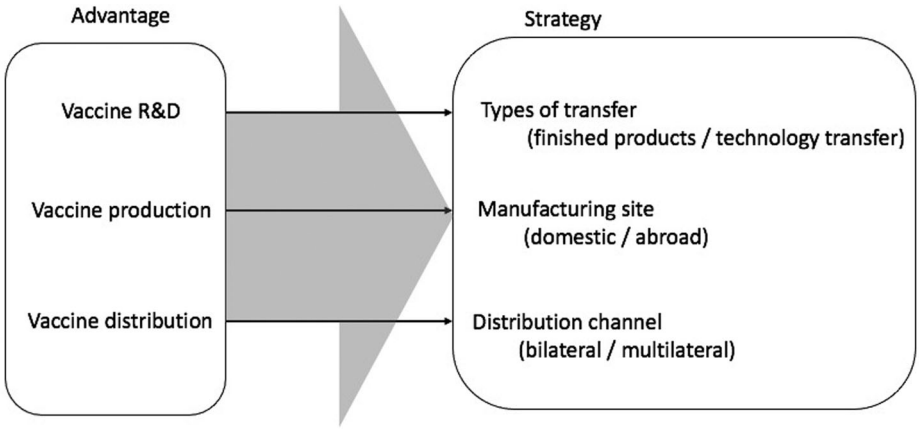


Figure 1. Relative advantage and vaccine strategy.

gives rise to varied patterns in vaccine diplomacy. Based on the three segments of the vaccine supply chain, we specifically expect the following (Figure 1).

First, an emerging country with an advantage in vaccine R&D would be more open to technology transfer. This is because a country with home-grown vaccines can use technology transfer to either promote sales when its vaccines have low international credibility or to encourage offshore production when the country has limited domestic production capacity. Because technology transfer is welcomed by many developing countries striving to secure vaccine supply and to develop their pharmaceutical industry, it can also be used to enhance soft power of the giving country. This is arguably a key difference between non-Western and Western countries. Major Western powers do not need to use technology transfer to attract foreign customers because their reputation in pharmaceutical R&D is already established. Also, major Western powers usually do not need to compromise their pharmaceutical patents because they are self-reliant in manufacturing, either through stable domestic production or through partnership with other Western countries. In comparison, non-Western powers are newcomers in the pharmaceutical sector, and they may lack R&D credibility or manufacturing capacity. In such scenarios, a non-Western power with emerging R&D capacity would be open to technology transfer.

Second, a country with a relative advantage in vaccine manufacturing is more likely to produce vaccines domestically. The greater the manufacturing capability it has, the more likely it will keep production in the country to benefit domestic manufacturers. On the flip side, a country with limited manufacturing capacity would outsource production overseas.

Third, a country with a relative advantage in international distribution would market its vaccines through bilateral deals. As discussed above, the foreign aid literature suggests that donors prefer bilateral to multilateral channels when they wish to maximize diplomatic gains from recipient countries. For non-Western powers, in particular, the bilateral channel is attractive because it also grants greater flexibility in negotiating various conditions related to vaccine distribution, including local clinical trials, emergency use authorization (EUA), and local production. Countries with stronger distribution networks thus have incentives to strike

bilateral deals. On the other hand, though donors may lose control over vaccine distribution, multilateral platforms can enhance donor credibility that is difficult to obtain elsewhere (Milner & Tingley, 2013). This gives non-Western powers motivations to use multilateral institutions, even if those institutions are dominated by Western countries. As the studies on rising power politics and contested multilateralism note, rising powers may maintain and even reinforce the prevailing international architecture to their benefit (Heldt & Mahrenbach, 2019; Newman & Zala, 2018). We therefore expect that a non-Western power allocates vaccines through a multilateral channel if the country considers it helpful to enhance credibility and the usage of its vaccines internationally.

To be clear, a country's relative advantages in vaccine supply chains is not derived from its pharmaceutical industry alone. The domestic industry-government relationship plays an important role. To accelerate vaccine R&D, ramp up manufacturing, and facilitate distribution, it is crucial to have governmental assistance in the form of financing, facility, expertise, and regulatory support.

Empirically, we examine three countries' strategies in vaccine diplomacy. China, India, and Russia have actively engaged in vaccine diplomacy. We analyze how each of them navigates the course of vaccine diplomacy in the rapidly evolving pandemic. We surveyed news articles, statistics, and other data published by international and governmental organizations, academia, media sources, and other primary and secondary sources. Although our theoretical scope covers a universe of non-Western powers, we limit our analysis to these three countries because other non-western powers, such as Brazil and South Africa, have not actively conducted vaccine diplomacy during the COVID-19 pandemic.

Varieties of vaccine diplomacy

China: the all-around dealer of COVID-19 vaccines

China has relatively balanced capacities in vaccine R&D, manufacturing, and distribution. It has developed multiple vaccines with reasonable efficacy, and its manufacturing capacity has grown exponentially. Yet, its biggest advantage lies in marketing and distribution. Being the world's largest exporter and trader, China has strong business ties with developing countries, and Chinese vaccine makers, with the help of the Chinese government, are skilled in catering to the diverse demands from developing countries.

As the country where the pandemic first broke out, China initiated vaccine development in January 2020, before the number of cases increased in many other countries. Chinese vaccine development used four platforms: inactivated virus, viral-vector, protein subunit, and nucleic acid (DNA or RNA). Most vaccine development teams featured partnerships between public research institutions and pharmaceutical companies. The Chinese government provided significant financial, institutional, and infrastructural assistance to accelerate vaccine development (Chinese Ministry of Finance, 2020). By April 2020, three vaccine candidates had launched domestic clinical trials, including BBIBP-CorV (by the SOE Sinopharm and Chinese Academy of Science), CoronaVac (by Sinovac Biotech), and Convidecia (by CanSino Biologics and Chinese Academy of Military Medical Science). These three vaccines, as well as a fourth vaccine developed by Zhifei-

Longcom and the Chinese Academy of Science, had been approved domestically and in at least one foreign country for emergency use by March 2021.

With help from the government, manufacturers started ramping up production capacity when vaccines were still being tested. As early as April 2020, Sinopharm built production lines in Beijing and Wuhan that would supply 100 million doses by the end of 2020, with an eventual annual capacity of 300 million doses (Sinopharm, 2020). Sinovac had increased their annual production capacity to 300 million doses by August 2020, too (The Paper, 2020a). This expanded capacity allowed China to fulfill both domestic demand and orders from abroad.

A major challenge for Chinese vaccines is their efficacy. China is a newcomer in vaccine development, and the number of its domestic cases are too low to conduct phase-3 clinical trials. To get credible efficacy results, vaccine developers conducted clinical trials in their potential markets – developing countries where the pandemic was yet to be contained. In emerging markets with relatively strict regulations, local phase-3 clinical trials are crucial to receive regulatory approval, especially when the vaccine had not gained EUA from Western countries or the WHO. Chinese vaccine developers arranged phase-3 clinical trials in developing countries across regions, with little overlap among different Chinese vaccines: Sinopharm conducted trials in Peru, Argentina, Morocco, Egypt, Bahrain, UAE, Jordan, and Malaysia; Sinovac in Brazil, Turkey, Indonesia, and Philippines; CanSino in Mexico, Chile, Saudi Arabia, Pakistan, and Russia; and CAS-Zhifei Longcom in Uzbekistan, Pakistan, Ecuador, and Indonesia. This differentiated layout minimizes competition between Chinese vaccines and maximizes data credibility for countries across the continents.

This strategy also broadens the buyer base because the clinical trial agreements usually include clauses for post-trial purchase. Chinese vaccine developers promised to provide a certain volume of vaccines if the trial was successful, meaning that the trial-hosting countries have prioritized access to the vaccine. This provision was attractive for developing countries that struggled to secure enough doses for their populations. Vaccine developers collaborated with local pharmaceutical companies and/or health departments who helped recruit volunteers, coordinated resources, and assisted with clinical trials. These pharmaceutical companies usually became partners for local production and distribution after clinical trials, as in the cases of Indonesia (Bio Farma), Malaysia (Pharmaniaga Bhd), UAE (G42), Brazil (Butantan Institute), and Pakistan (AJM Pharma Pvt). By August 2021, China had secured orders from every country that hosted phase-3 clinical trials, including Brazil (100 million doses), Turkey (100 million doses) and Indonesia (126 million doses) for Sinovac, Mexico (35 million doses) and Pakistan (33 million doses) for CanSino, and Argentina (30 million doses), Indonesia (75 million doses), and Morocco (41 million doses) for Sinopharm (UNICEF, 2021). These orders served as an endorsement for the efficacy of Chinese vaccines before they received approval from the WHO, paving the way for their global distribution.

Chinese vaccines excelled in accessibility and flexibility. Chinese President Xi Jinping called Chinese vaccines 'public goods', contrasting with the Western-made vaccines hoarded by industrialized countries (CIDCA, 2021). Chinese vaccines are usually delivered faster and shipping experiences fewer delays than other vaccines. Given the delivery uncertainties during the pandemic, countries like Mexico, Brazil, Serbia, and Hungary ordered Chinese vaccines to hedge risks and ensure scheduled

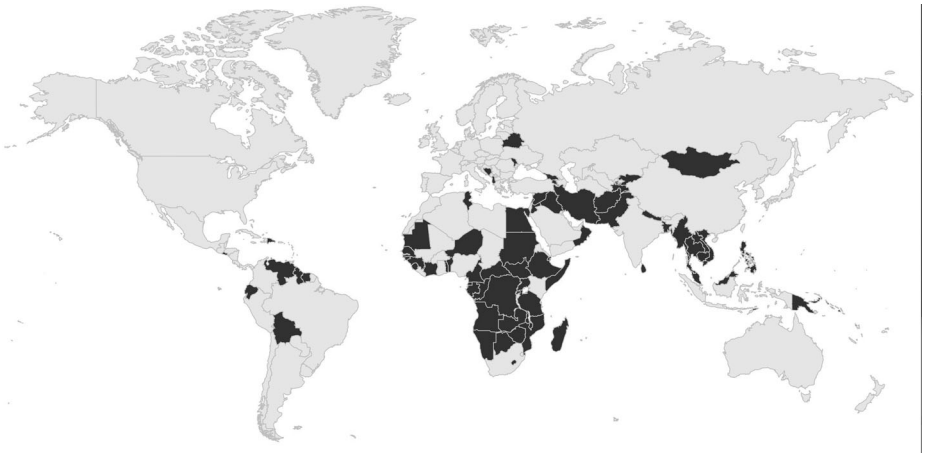


Figure 2. China's bilateral vaccine aid (January–October 2021).

domestic inoculation (Ma, 2021; Hu, 2021; Vladisavljev, 2021; Spike, 2021). Many countries started domestic inoculation with Chinese vaccines (often for frontline workers) before other vaccines arrived. Moreover, China provided flexibility in the means of delivery. Vaccine developers can deliver finished vaccines, ready-to-fill ingredients, or raw materials for production with technology transfer. They are also willing to provide personnel training and machinery for production or to create joint ventures for vaccine production.[3] This 'joint production' gained Chinese vaccine developers a foothold in emerging markets and attracted states that strove to become regional pharmaceutical centers.

As China secured large commercial orders, it began to donate vaccines. China's vaccine aid has been overwhelmingly bilateral and unevenly distributed (Figure 2).[4] The geopolitical rivalry between China and India in South Asia made Pakistan the first and largest beneficiary of China's vaccine aid, with 5 million doses arriving on February 1, 2021 and additional shipments later (XinhuaNet, 2021). China's vaccine aid covers the vast majority of Southeast Asian and African countries. Among the 13 countries that received China's first batch of vaccine aid, five are ASEAN members and four share borders with China.[5] China donated to 20 African countries between February and March 2021. Some of these deliveries were the first vaccines these countries received. Zimbabwe, Mozambique, Senegal, Sierra Leone, Comoros, Namibia, Niger, and Cameroon kicked off domestic vaccination programs with Chinese vaccines, sometimes with national leaders getting the first shots. Many countries that received donations also made commercial orders. Moldova bought 100,000 doses of CoronaVac and received a donation of 150,000 doses of BBIBP-CorV in the same shipment. The Philippines, the first country that received commercial vaccine shipments from China, also received 1 million doses as donation in addition to its 26.4 million-dose contract. Still, compared to commercial shipments, which started in November 2020, China's vaccine aid started later and on a much smaller scale. By July 2021, China had donated 26 million doses, comprising merely 5.2% of its total exported (China News, 2021).[6]

China has also donated small amounts of vaccines to military and regional organizations, and it has recently increased distribution via COVAX. Eighteen

countries in Asia, Africa, and Latin America received military vaccine aid from China by August 2021, with Pakistan and Cambodia being the first recipients. China also donated vaccines to the African Union Commission, the League of Arab States secretariat, and United Nations Peacekeeping. It also launched the 'Spring Vaccination Plan (春苗行动)' in March 2021 to vaccinate Chinese citizens abroad, particularly those in developing countries with limited access to vaccines.

In comparison to bilateral aid, China's contribution to COVAX has been small but growing. China initially did not join COVAX, but it changed its mind in October 2020 and pledged to buy vaccines for around 1% of its population through COVAX (ABC News, 2020). This pledge might have signaled China's support for multilateral institutions while practically incentivizing the WHO to facilitate the EUA process of Chinese vaccines. In truth, after the WHO gave EUA for Sinopharm and Sinovac vaccines in May and June 2021, both companies signed contracts with COVAX to provide 11 million doses, with options for additional orders. Within a month, the Chinese government donated $100 million to COVAX (GAVI, 2021). Considering the prices of Chinese vaccines, this donated money might be just enough to cover COVAX's payment for the 11 million doses from Sinopharm and Sinovac.[7] As more Chinese vaccines apply for the WHO's EUA, China may increase its contribution to COVAX to boost China's share in the global market, especially the markets yet to be reached through bilateral means.

India: a manufacturing center for the developing world

India's vaccine diplomacy can be characterized by mass-production of Western-invented vaccines, prompt bilateral donations, and large-scale sales to bilateral buyers and the multilateral COVAX initiative. Being known as the 'pharmacy of the world', India was producing about 60% of the world's vaccines by volume even before the outbreak of COVID-19. While the limited level of government-industry collaboration impeded its vaccine development, India has leveraged its advantage in vaccine manufacturing when conducting vaccine diplomacy.

During the first quarter of 2021, India used the Western-invented vaccine 'Covishield' as a major currency of its vaccine diplomacy. The Serum Institute of India (SII), the world's biggest vaccine producer and a family-owned company, signed an agreement to produce the AstraZeneca-Oxford vaccine back in April 2020, when it was still under clinical trials. Under the deal, SII can produce 1 billion doses of Covishield – the AstraZeneca-Oxford vaccine manufactured by SII – and sell them for prices that are no higher than production costs (Gettleman, 2020). Because of this early move, the SII already had hundreds of millions of doses ready to ship when governments around the world began granting EUA for the vaccine in December 2020 (Frayer, 2021). Not only did it stockpile the Covishield doses early on, SII has expanded its production capacity 'at world-record speed', as described by the company's CEO, Adar Poonawalla (Sharma, 2021). Its capacity scaled up from 50 million a month in January 2021 to 70 million in March and 90 million in June. The company achieved more than 100 million doses per month in July (Menon, 2021), then 150 million in August (Reuters, 2021c). The CEO mentioned that his company will supply 200 million doses per month from October (Financial Express, 2021).

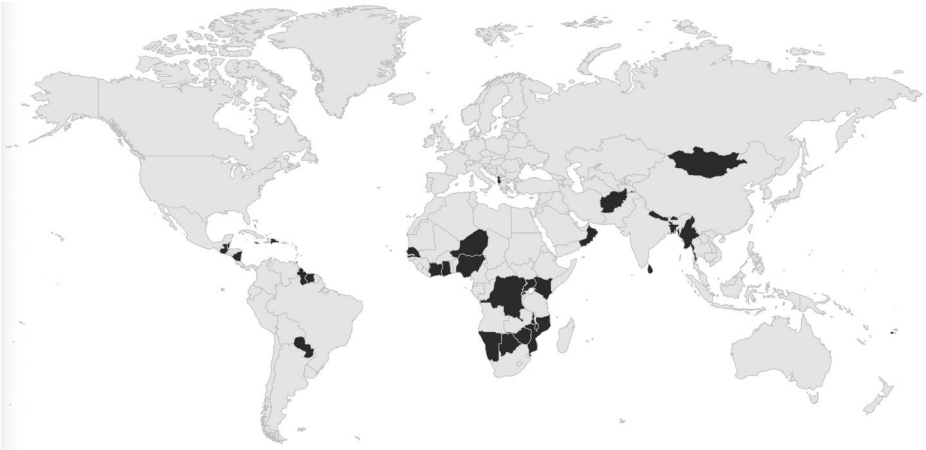


Figure 3. India's bilateral vaccine aid (January–October 2021).

This outstanding manufacturing power enabled India to quickly roll out large-scale bilateral programs called 'Vaccine Maitri' (Vaccine Friendship) (Ramachandran, 2021). SII promised that half of the doses it manufactures would go to India, with the Indian government deciding how to distribute the remaining doses to other countries (Gettleman, 2020). More than 90 countries swiftly approached India (Siddiqui, 2021), but it was neighboring countries that had priority access to India's donations. Bhutan and the Maldives were the first countries to receive India's vaccine aid on January 20, 2021, followed by Nepal, Bangladesh, and Myanmar. One of India's largest donations is to Nepal (1.1 million doses), where India and China are competing over influence (Mashal & Yee, 2021). Myanmar also shares borders with both China and India. China initially promised to send 300,000 doses, but India quickly delivered 1.7 million doses before Myanmar received the shipments from China (Marlow et al, 2021). In this sense, India's bilateral vaccine aid is in line with its 'neighborhood first' policy. Outside the region, India has also donated to a range of Caribbean and African states, albeit in smaller volumes. These states have either sizable populations of Indian diaspora or close trade ties with India. India's bilateral donations are shown in Figure 3.

Geopolitical interest, however, is not the only factor affecting India's strategy in vaccine diplomacy. The choice of sales vs. donation seems to be informed by the need to cover the costs for massive manufacturing. India concentrated its donations on countries with which it has strong geopolitical and economic ties, but it sold a much larger sum to relatively wealthy countries beyond its geopolitical reach. Indeed, India bilaterally exported more than 46 million doses to 65 countries between January and April 2021, but nearly 80% of these doses were dispatched on a commercial basis (Indian Ministry of External Affairs, 2021). Only Bangladesh (3.3 million), Myanmar (1.7 million), and Nepal (1.1 million) received a donation of more than 1 million doses, and all of them are important neighbors to India. On the other hand, India sold larger volumes of vaccines to countries like Morocco (7 million) and Saudi Arabia (4.5 million). It implies that India balances geopolitical interests and financial reality by carefully deciding how many vaccines it donates and/or sells and to which countries.

Participation in COVAX also helps cover the expenses of the massive vaccine production. As early as April 2020, the CEO of SII expressed his hope that the Indian government would assist the company to cover the expenditures of vaccine manufacturing. Although it could expect long-term profits from the vaccine, SII was challenged to finance the near-term production cost of $450 million (Gettleman, 2020). Two collaboration deals between SII, GAVI, and the Bill and Melinda Gates Foundation largely resolved the issue. In these deals, the Gates Foundation promised to pay $300 million for the manufacturing in exchange for the company's 200 million-dose supply to COVAX with a ceiling price of $3 per dose. To some extent, these deals are a windfall for the Indian government because they enhance India's reputation as a key contributor to multilateral cooperation while the actual financial cost is borne by Western donors. Moreover, India has been the largest beneficiary of COVAX as a recipient country. It is true that India allocated about 19.8 million doses to COVAX before halting the export at the onset of the deadly Delta wave. Yet, India also received 10 million doses from COVAX, more than any other country has received (UNICEF, 2021). This means that India, through participation in COVAX, earned the reputation as a generous vaccine contributor while receiving a large portion of the vaccines it supplied.

Like China and Russia, India has an ambition to develop its own vaccines (Marandi & Sharma, 2020). The R&D process in India, however, has been slower than the other two countries. Six Indian pharmaceutical companies (Zydus Cadila, SII, Biological E, Bharat Biotech, Indian Immunologicals, and Mynvax) have participated in the global race to develop COVID-19 vaccines (Bloomberg, 2020), but only two home-grown vaccines had been approved for emergency use in India by November 2021. The first home-grown vaccine, Covaxin, is an inactivated vaccine developed jointly by the National Institute of Virology, the Indian Council of Medical Research, and Bharat Biotech (Schmall & Singh, 2021). In this public-private collaboration, the National Institute of Virology isolated the SARS-CoV-2 strain and the Indian Council of Medical Research identified sites for clinical trials, but the actual process of vaccine development was covered by Bharat Biotech (BBC, 2021). Until October 2021, only nine countries have approved Covaxin, and only Mauritius and Iran have bought the vaccine (McGill University, 2021; Mordani, 2021). India's second home-grown vaccine, ZyCoV-D, is a three-dose vaccine developed by the pharmaceutical company Zydus Cadila. India approved ZyCoV-D in August 2021, but no other countries have granted EUA for this vaccine. Though it may change in the future, India so far has neither pushed for international recognition of these home-grown vaccines nor widely used them in its vaccine diplomacy.

India's vaccine diplomacy was interrupted by the second wave of COVID-19 infections, which hit India in early April 2021. This outbreak overwhelmed its medical system, infecting more than 300,000 people and killing 3,000 patients every day during the peak month of May. As the Indian government accelerated domestic vaccinations, the skyrocketing demand outpaced the supply of vaccines (Menon, 2021). This changing supply-demand balance led the Indian government to ban all vaccine exports starting mid-April, forcing COVAX and AstraZeneca to seek other suppliers of the vaccine. This provided an opportunity for other vaccine producers, including Chinese manufacturers, to fill the gap in vaccine supply. India's bitter

experience highlights how a surge of domestic demand can hamper a country's ability to conduct vaccine diplomacy.

Yet, India has not given up the endeavor of vaccine diplomacy. India announced on September 20 that it would resume vaccine exports in October (Yasir, 2021). India took the tough experience as an opportunity to further strengthen its pharmaceutical industry and manufacturing capacity. The Ministry of Science and Technology launched the 'Mission COVID Suraksha', under which numerous Indian public and private enterprises collaborate to boost the production of Covaxin (The Hindu, 2021). Notwithstanding its quest to waive patents for COVID pharmaceuticals at the WTO, India is also promoting collaboration between local and foreign pharmaceutical companies. SII and Novavax, Cipla and Moderna, Biological E. and Janssen, and SII and Gamaleya have launched partnerships to produce and/or distribute foreign vaccines in India (and potentially abroad). The health minister mentioned that India would produce more than 300 million doses a month from October onwards (Yasir, 2021), signaling the country's ambition to resume vaccine diplomacy once its production capacity surpasses the domestic demand again.

Russia: a reclaimed science superpower

Russia's greatest advantage lies in its R&D capacity. It is neither a major manufacturer like India nor trader like China, but Russia has developed a highly effective COVID-19 vaccine, Sputnik-V. With rich experience from the Soviet era, the state research institutes rapidly developed Sputnik-V. The efficacy of this vaccine was endorsed by the top global medical journal, *Lancet*. To compensate for manufacturing and distribution limitations, Russia seeks to outsource production with technology transfer. It has used marketing strategies to attract buyers as well as to manage the backlash of delayed vaccine delivery.

Russia has approved three home-grown vaccines, all of which were developed by public research institutions. Sputnik-V, the only vaccine Russia has exported, is a viral-vector vaccine developed by the Gamaleya National Center of Epidemiology and Microbiology with investment from the Russian Direct Investment Fund (RDIF). Completing the phase-1 trial in June, Russia announced Sputnik-V to be the world's first COVID-19 vaccine in July and approved it for domestic use in August 2020. The phase-3 clinical trial was conducted between September and November 2020 in 29 medical institutions in Moscow, one of the most-infected areas in Russia, with nearly 20,000 volunteers (Logunov, et al., 2021). The clinical trial reported an efficacy rate of 91.6%, and a published study at the *Lancet* reversed the international suspicions against the vaccine. A second vaccine, EpicVacCorona, is a protein-subunit vaccine developed by the Vector State Research Center of Virology and Biotechnology. It was registered in October 2020. A third vaccine, CoviVac, is an inactivated-virus vaccine developed by the Chumakov Centre of Russian Academy of Sciences. CoviVac was registered in February 2021. Both EpicVacCorona and CoviVac are currently in domestic circulation while still undergoing phase-3 clinical trials.

Given limited domestic manufacturing capacity, Russian vaccine developers have been striving to outsource vaccine production. Russia relies on domestic and several foreign manufacturers to supply its domestic market. RDIF partnered with

Russian manufacturers, R-Pharm and Binnopharm, to produce 6.5 million doses of Sputnik-V by late January 2021. Production of EpicVacCornona started in February 2021, with a total of 3.4 million doses produced in Russia by June (TASS, 2021b). For the international market, RDIF has contracted the bulk of Sputnik-V production to pharmaceutical manufacturers in Asia, Latin America, and Eastern Europe. Some of these countries, such as Brazil, South Korea, and China, had not approved the Sputnik-V when the contracts were signed, but they could still export to countries that have approved the vaccine. Unión Química, RDIF's partner in Brazil, started producing Sputnik-V for export to Argentina and Bolivia before Brazil granted conditional emergency use. Tibet Rhodiola and Hualan Biological Engineering Inc. from China signed contracts with RDIF to manufacture and export Sputnik-V to Russia, but the production lines at Tibet Rhodiola are yet to be approved by Russia for production. RDIF has also contracted seven Indian companies to manufacture Sputnik-V, including a 300 million-dose annual contract with SII (RDIF, 2021). In South Korea, GL Rapha and a consortium have signed contracts to produce 150 million and 100 million doses of Sputnik-V per month, respectively (Stangarone, 2021). To further ramp up production, Russia has been seeking international partnerships with technology transfer. By September 2021, RDIF had contracted to produce Sputnik-V in India, South Korea, China, Serbia, Argentina, Belarus, Kazakhstan, Iran, Brazil, Algeria, Turkey, Vietnam, and Mexico, with more partnerships under negotiation.

Despite the extensive outsourcing of vaccine production, the global delivery of Sputnik-V remains significantly behind schedule. By August 12, 2021, merely 20 out of the 95 million doses ordered by Latin American countries in early 2021 were delivered. This delay has led many countries, including Iran, Guatemala, Argentina, and Bolivia, to postpone their domestic inoculation, prolong the interval between the first and second doses, or cancel their Sputnik-V orders (Euractiv, 2021). Sputnik-V's delivery deficit partly stems from Russia's weak manufacturing capacity. Unlike China, which welcomes 'joint production' for marketing purposes, Russia outsources vaccine production out of necessity: its domestic production capacity struggles to even fulfill domestic orders. It means that Russia must outsource more segments of the vaccine supply chain, raising the bar for potential partners. Moreover, manufacturing of active pharmaceutical ingredients (API) is more technology- and capital-intensive than fill-and-finish operations, and the two doses of Sputnik-V are different and not interchangeable. These technical requirements make it difficult to find manufacturing partners abroad.

Russia's marketing strategy is different from that of China. It attracts buyers by emphasizing the high quality of Sputnik-V instead of catering to individual buyer countries. Although the WHO has yet to approve Sputnik-V, the *Lancet* article reported an over-90% efficacy rate of the vaccine, ranking it among the top of viral-vector COVID-19 vaccines, including the WHO-approved AstraZeneca-Oxford vaccine (Logunov, et al, 2021). This favorable efficacy rate, combined with its apparent accessibility compared to Western vaccines in early 2021, gave Russia a major boost in the global market. Indeed, advertising the safety and efficacy of its vaccine is at the core of Russia's marketing strategy. Russia has made a greater effort in having Sputnik-V registered in other countries than actually selling the vaccine (Chaudhury, 2021). Sputnik-V has its own Facebook, Twitter, and

YouTube accounts, which promote the reputation of the vaccine as well as cast doubt on mRNA vaccines.

Russia has adjusted its marketing strategies to counteract the backlash from the delivery deficit. Because the second dose of Sputnik-V experiences far greater delay than the first shot (Kay, 2021), RDIF has suggested longer intervals between the two doses of Sputnik-V and promoted a single-dose use of Sputnik-V, which it calls 'Sputnik Light'. Sputnik Light was registered in May 2021 in Russia and the phase-3 clinical trials are undergoing in multiple countries. RDIF announced that Sputnik Light has an efficacy rate of 79.4% and costs less than Sputnik-V (TASS, 2021a). As Sputnik Light is getting EUA in countries that have approved Sputnik-V, it is possible that the delayed Sputnik-V orders will be modified into Sputnik Light ones to avoid further order cancellations. In addition, developers of Sputnik-V are promoting mixing Sputnik-V with other vaccines using the same platform, including AstraZeneca-Oxford and CanSino vaccines. Being the only COVID-19 vaccine that uses different components for two doses, Sputnik-V is among the first to experiment with this heterogenous boosting approach ('vaccine cocktail') for greater immune response. In December 2020, RDIF announced collaboration with AstraZeneca on clinical trials to test if combining the two vaccines could boost the efficacy of the vaccine (Nikoskaya,2021). Participants of these trials will receive AstraZeneca as dose-1 and Sputnik-V as dose-2. Preliminary results from Azerbaijan have been positive, with more clinical trials to come in other countries. This is followed by the agreement between RDIF and CanSino to test a combined regimen (Sputnik dose-1, CanSino dose-2) against new virus strains (Reuters, 2021a). The push for the heterogenous boosting approach echoes Russia's overall marketing strategy based on its advantage in innovation, and it paves the way to sell Sputnik-V (and Sputnik Light) as boosters for people vaccinated with other vaccines.

The geographical coverage of Russia's vaccine diplomacy overlaps with its geopolitical sphere of influence. Russia has a dominance in the Commonwealth of Independent States (CIS) and Balkan countries, and most of these countries have registered and purchased Sputnik-V for mass inoculation. Some have started producing Sputnik-V, and Turkmenistan even registered Russia's second vaccine, EpiVacCorona. Many post-Soviet countries still see Russia as their biggest ally, and Russia has regularly provided public health assistance to these countries before and during the pandemic. Globally, Sputnik-V has been approved in 70 countries but received orders from only 37 countries, with the largest orders from Iran, Vietnam, Turkey, Mexico, and Argentina (UNICEF, 2021). Even though the largest domestic manufacturers are all engaging in Sputnik-V production, the total production by August 2021 was merely 127 million doses, 90% of which came from Russia. This is one tenth of China's CoronaVac output in the same period (Global Commission for Post-Pandemic Policy, 2021).

Russia's participation in multilateral organizations is minimal. The director of RDIF said that Russia prefers the bilateral approach: 'COVAX will be a small part of our portfolio. Most of the approach will be direct' (Ravelo, 2021). Given Russian struggles to deliver existing bilateral orders, it indeed has no incentive to join COVAX, which would further stretch its production capacity with limited reputational gains. Russia has donated small amounts of Sputnik-V to Vietnam, Seychelles, Palestine, Angola, Egypt, and Zimbabwe, but these donations were

neither in the name of the state nor advertised in Russia's vaccine diplomacy. In other words, Russia aims to increase its presence in the global scene of COVID-19 vaccination, but with no intention to give away vaccines for free.

Vaccine diplomacy from the recipient side: a case of Brazil

In this case study, we illustrate how the three non-Western powers operate vaccine diplomacy in a single recipient country – Brazil. Brazil was heavily hit by the pandemic, facing the world's third highest caseload and second highest deaths from COVID-19. This large upper-middle income country, therefore, has an urgent demand for COVID-19 vaccines and presents an attractive market for vaccine providers. By analyzing strategies employed by vaccine suppliers from China, India, and Russia in penetrating the Brazilian market, we find that vaccine suppliers approached different political actors in Brazil. Each vaccine provider may secure orders from Brazilian political actors who favor the vaccine, but the success of each vaccine, in terms of the number of shots administered, is a function of R&D credibility and reliable delivery. In a period of vaccine scarcity, there has been limited direct competition between suppliers, but a supplier could still benefit from others' misfortune.

Brazil launched domestic vaccination on January 18, 2021. By August, it had administered 254 million doses of COVID-19 vaccines (Figure 4). The federal government ordered 548 million doses, but the bulk of Pfizer and Janssen vaccines are yet to be delivered. A large part of the administered vaccines, therefore, has been Sinovac and AstraZeneca vaccines. Covaxin from India and Sputnik-V from Russia have both attempted to enter Brazil but have yet to receive full EUA.

A characteristic of Brazil's COVID-19 vaccine procurement is the multiplicity of domestic actors that are interested in and capable of buying vaccines. Vaccine suppliers approach these potential buyers, who may also negotiate with multiple

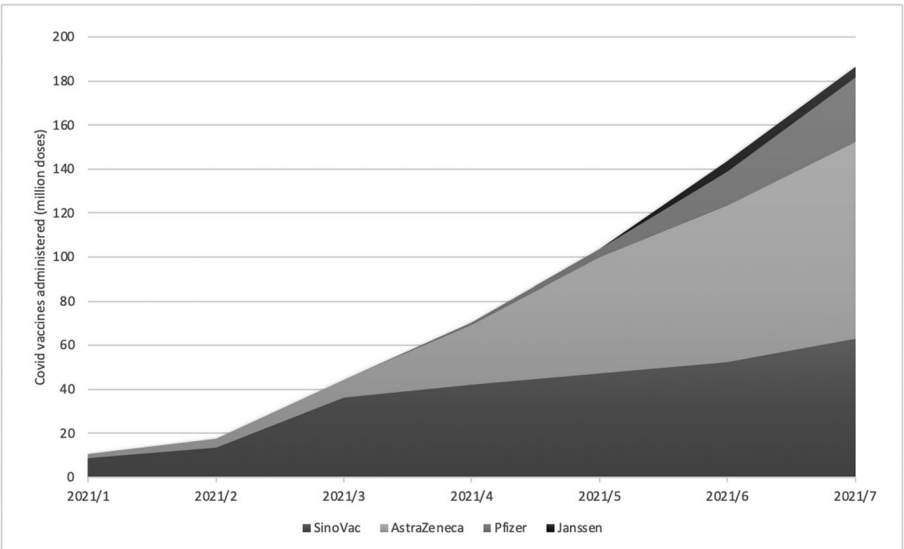


Figure 4. COVID-19 vaccines administered in Brazil.

suppliers to secure enough doses. China was the first to enter the Brazilian market. Seeing Bolsonaro administration's anti-China attitude, Sinovac chose the State of Sao Paulo as its point of entry. Sao Paulo is Brazil's largest state, consisting of 21% of the country's population and 33% of Brazil's GDP. The state governor, Joao Doria, is a critic of Bolsonaro's anti-scientific handling of the pandemic and is interested in vaccinating state residents with any vaccines. Sinovac launched the phase-3 clinical trial of CoronaVac in July 2020 in Sao Paulo, in collaboration with the Butantan Institute. Instructed by the state governor, the Butantan Institute ordered 6 million doses of CoronaVac and started constructing production facilities in November 2020, before the clinical trial was officially concluded (Reuters, 2020b). The first shipment arrived in Brazil on November 19 and local production began within a month. In January 2021, Brazil's Health Ministry ordered 100 million doses of CoronaVac from the Butantan Institute, who would fill-and-finish the vaccine doses with API imported from Sinovac. Domestic vaccination started in the same month with CoronaVac, and 45% of the 103 million doses administered in Brazil by May 2021 were CoronaVac (Figure 4).

Brazilian President Jair Bolsonaro is a vaccine skeptic and particularly so against Chinese vaccines. He announced that the federal government would not buy Chinese vaccines soon after the Health Ministry said that it would buy CoronaVac for the national immunization program (Paraguassu, 2020). Bolsonaro planned to launch the national immunization program with AstraZeneca-Oxford vaccine (Covishield in this case). Back in August 2020, Brazil ordered 100 million doses of AstraZeneca-Oxford vaccines. Of which, 20 million doses were supposed to use API from the SII to fill-and-finish in Brazil by Fiocruz. In January 2021, 2 million doses of Covishield finally arrived after Bolsonaro wrote to Modi for an urgent clearance. With the onset of the second wave in India, SII ceased export altogether with 16 million doses yet to be delivered.[8]

Brazil also showed interest in India's indigenous vaccine, Covaxin. The federal government met with Bharat Biotech and its Brazilian partner Precisa Medicamentos in November 2020, before Covaxin's clinical trial was concluded. This meeting resulted in a contract in February 2021 to supply 20 million doses (Precisa Medicamentos, 2021). However, Anvisa, the Brazilian Health Regulatory Agency, denied Covaxin's EUA in March 2021, citing manufacturing and data insufficiency. Anvisa later allowed an import of 4 million doses with strict conditions, but an unexpected government investigation over the 'irregularities' in the Covaxin deal led Brazil to suspend the $324 million contract (Fonseca & Stargardter, 2021). Bharat Biotech denied any wrongdoing in this deal but abruptly terminated the agreement with its Brazilian partner and exited the Brazilian market.

Other domestic buyers put their faith in the Russian vaccine, Sputnik-V. Nine northeastern states signed a contract in March 2021 to buy 37 million doses of Sputnik-V (Riente, 2021). Bolsonaro was reported to have called Vladimir Putin of Russia to have the vaccine produced in Brazil (Paraguassu, 2021). Yet, Sputnik-V failed to get EUA in Brazil, with Anvisa stating that one of the two Sputnik-V doses contained adenoviruses capable of replication. Anvisa later allowed an import of 2 million doses with strict conditions, but these doses were essentially for use in the local phase-3 trial of Sputnik-V (Reuters, 2021b). These restrictions led the northeastern states to cancel the contract at the last minute.

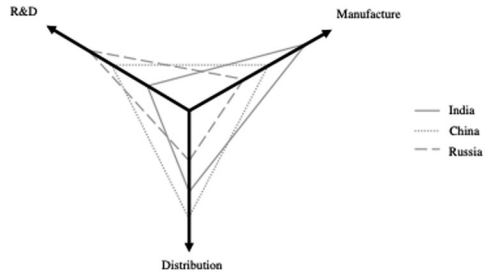
In the Brazilian market, vaccine suppliers from China, India, and Russia have gained vaccine orders from diverse political actors at federal and state levels. However, the number of vaccines administered is ultimately determined by vaccine availability and regulatory approval. Vaccine availability is a constraining factor, because Brazil's demand for vaccines outpaces the rate of public procurement. Bolsonaro repeatedly claimed that CoronaVac will not be used and favored Western vaccines such as AstraZeneca, Pfizer, and Janssen vaccines. Pfizer is the only vaccine that has received a full use approval in Brazil, and Pfizer and AstraZeneca-Oxford each account for 200 out of the 548 million doses Brazil ordered (UNICEF, 2021). However, the first shipment from Pfizer (1 million doses) did not arrive in Brazil until April 29, 2021, more than three months after the domestic immunization started. By then, 69 million doses of Sinovac and AstraZeneca-Oxford vaccines had been administered. The availability issue also affected AstraZeneca-Oxford vaccine. When SII stopped exporting after delivering merely four out of 20 million doses that Brazil ordered, a Chinese supplier Shenzhen Kangtai fulfilled the rest of the contract between AstraZeneca and Brazil. The successful market penetration of CoronaVac in Brazil is partly attributed to its reliable supply.

Brazil's health regulatory agency plays a critical role in granting market access to vaccine suppliers. Covaxin and Sputnik-V failed in the Brazilian market because Anvisa denied their EUA applications. By comparison, Sinovac approached the State of Sao Paolo and collaborated with Butantan Institute, one of the only two vaccine-producing plants in Brazil, for local phase-3 clinical trial and joint production.[9] This arrangement took advantage of Butantan's experience and knowledge, which proved instrumental in navigating CoronaVac through the EUA process and production within Brazil.

The case of Brazil sheds light on the dynamics between the three countries' vaccine diplomacy: they are neither in direct competition nor coordination with one another, and each has its own way of making deals. As long as vaccines are in short supply, political actors in Brazil would welcome any supplier that meets Anvisa's regulatory requirement. While the plight of Covaxin and Sputnik-V result more from their own inadequacy rather than competition, Chinese vaccine developers and API producers have indeed benefited from India's and Russia's struggles in exporting vaccines on time.

Synthesis

Our empirical analysis shows that China, India, and Russia have designed their strategies in vaccine diplomacy in line with their relative advantages. India leverages its massive production capability to become the major manufacturer of a Western vaccine and the largest supplier to the multilateral distribution initiative. Russia, with a high-efficacy vaccine but limited manufacturing and distribution capacities, advertises the quality of its vaccine to attract buyers while outsourcing vaccine production. China is reasonably endowed in R&D and production, but it still promotes sales with its advanced marketing and distribution network to compensate for relatively low R&D credibility. Figure 5 summarizes the three countries' relative advantages in the vaccine supply chain and the patterns in their vaccine diplomacy.



	Diversity in types of transfer	Outsourcing of vaccine production	Use of multilateral distribution channel
China	Medium	Medium	Medium
India	Low	Low	High
Russia	High	High	Low

Figure 5. Relative advantage and strategies of China, India, and Russia.

The industry-government relationship is crucial for forming a country's relative advantage in vaccine R&D. Because developing countries generally have limited R&D capability, governmental support is essential in expediting vaccine development. For instance, public research institutions are usually more equipped for high-containment biological research than private labs. Seven out of nine home-grown vaccines in the three countries were developed by public teams or public-private partnerships. India's R&D potential might not fall behind China and Russia, but the limited collaboration between private and public actors later impeded the international reception of its home-grown vaccine, Covaxin. So far, the Indian government has not advertised Covaxin as a major currency in its vaccine diplomacy, and only several countries have registered or purchased Covaxin. By contrast, the Chinese and Russian governments have shown greater determination in vaccine development by pouring financial and institutional resources to facilitate R&D. Both countries have developed multiple vaccines and used them to claim credit for solving this global health crisis. The level of governmental support may be affected by political systems: resource mobilization for vaccine R&D can be expedited where the government executive has greater power in times of crisis.

Governmental support can also influence a country's vaccine production. In China, where vaccine manufacturing capacity was initially moderate, the government poured in resources to help vaccine developers expand production and backed their marketing strategies abroad. For vaccine aid, the Chinese government primarily used vaccines produced by the state-owned Sinopharm. In India, SII and Baharat Biotech had to finance their production without support from the Indian government. Amid the Delta wave in April 2021, the Indian government finally agreed to provide $600 million to these two companies to expand production. However, the slow and limited governmental support made it unavoidable for India to delay its promised vaccine delivery to COVAX and bilateral buyers by half a year. This has affected India's reputation as a reliable vaccine supplier.

In line with the insights from existing research, our case studies reveal that geopolitical and strategic concerns also motivate the non-Western powers' vaccine diplomacy. Their vaccine donations show clear geopolitical patterns. Russia targets

Central Asia - its traditional sphere of influence - for vaccine sales and production outsourcing. India prioritizes South Asian countries in its donation programs, reflecting the 'neighborhood first' policy. China has arranged clinical trials, sales, and donations across the developing world, but it announced preferential access only to African and ASEAN countries (The Paper, 2020b; Xi, 2020). This reveals China's geopolitical emphasis on Southeastern Asia and Africa, two focus areas of the Belt and Road Initiative.

The case studies also illuminate the role of image-building in vaccine diplomacy. The distinctive patterns in vaccine diplomacy reflect the images the countries are trying to shape for themselves in the international arena. China's vaccine diplomacy is the costliest, with tremendous investments in vaccine development, production, and distribution. These efforts signify China's ambition to be recognized as an all-around vaccine supplier in the global market. By contrast, Russia neither gives away vaccines for free nor considers the developing world as its only market. This reflects Russia's ambition to be seen as a scientific superpower. India is less ambitious in R&D, and its strategy caters more toward sustaining the image as a humanitarian actor who supplies advanced Western pharmaceuticals at affordable prices. This self-portrait, in addition to economic benefit, may have contributed to India's active engagement with COVAX.

Conclusion

This paper assesses the vaccine diplomacy conducted by three non-Western powers during the COVID-19 pandemic. We found that these countries' strategies in vaccine diplomacy are driven by their relative advantages in vaccine R&D, manufacturing, and delivery. While confirming the role of geopolitics especially in vaccine aid, this study adds a political economic perspective to the existing strategic explanations for vaccine diplomacy.

The findings of this paper have important implications for global health governance and rising power politics. Rising powers may conduct vaccine diplomacy in the same region, but their dynamics cannot be characterized simply as competition or confrontation. Because these countries have yet to build strength in all segments of the vaccine supply chain, their operations of vaccine diplomacy are not completely independent from one another. In fact, the BRICS countries are intertwined in the complex structure of vaccine enterprise. Russia received a large order for Sputnik-V from Brazil and outsourced vaccine production to China and India. China has conducted clinical trials in Brazil and Russia, while it also supplies API to Brazil and India for production of the AstraZeneca-Oxford vaccine. India has exported Covishield to Brazil and South Africa. Russia and China have conducted a joint experiment of a Sputnik-V-CanSino combined regimen. These examples illustrate the interdependent nature of COVID-19 vaccine diplomacy, in addition to countries' competition for influence in certain regions. This interdependence can, at least in the short-term, mitigate outright conflicts between the rising powers.

Another important question is whether these non-Western powers are changing the existing architecture governing global health, most notably the multilateral system centered around the WHO.[10] Our tentative answer is no. China, Russia, and India have indeed emerged as new actors in vaccine R&D, but they have yet to

change the international system. Despite the prediction that China may create an alternative global health organization to rival the WHO (Allen-Ebrahimian, 2020), China has not made concrete steps in that direction. Even though non-Western powers have distributed a large volume of COVID-19 vaccines bilaterally, they are willing to use the existing multilateral system when it suits them. Non-Western powers' participation in multilateral platforms may increase as they learn how to take advantage of the existing system.

Although this paper highlights the agency of emerging countries, Western powers are not giving away the stage. When there is an opportunity, Western countries piggyback on the growing presence of rising powers. At the Quad Summit in March 2021, the US, Japan, Australia, and India pledged to supply up to 1 billion doses of COVID-19 vaccines across Asia to counter China's growing influence. The rise of China, India, and Russia in vaccine diplomacy, therefore, might indicate that it is just the constellation of the haves (those who have capacities in vaccine R&D, manufacturing, and/or delivery) and the have nots (those without such capacities) that is changing. These emerging powers are joining Western countries *without* transforming the existing institutional architecture for global health governance, and Western and non-Western powers work together when their interests align. The changing constellation of suppliers may still benefit the have-nots, since the newcomers have been – so far – more willing than traditional members to distribute vaccines. Regardless of their intentions, greater supplies of vaccines may improve public health in low- and middle-income countries. Future research is needed to quantify the global health impact of non-Western powers' vaccine diplomacy.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes

1. The COVID-19 pandemic can be also characterized as a "disaster" as well as "crisis," with three defining features of threat, time-pressure, and uncertainty. See Lipscy, 2020.
2. For detailed information of COVAX, see https://www.who.int/initiatives/act-accelerator/covax
3. Sinopharm and G42 have created a joint-venture in the UAE to produce BBIBP-CorV called "Hayat-Vax". Sinopharm also provided equipment for vaccine production in Serbia.
4. A governmental statement said China has offered vaccine aid to 106 countries without specifying country names. The author(s) have found deliveries for 81 countries by September 2021.
5. The first 13 countries (excluding Pakistan) are Brunei Darussalam, Nepal, the Philippines, Myanmar, Cambodia, Laos, Sri Lanka, Mongolia, Palestine, Belarus, Sierra Leone, Zimbabwe, and Equatorial Guinea.
6. Another governmental statement claims China has exported over 700 million doses. Here we adopt the more conservative figure.
7. Selling prices of Chinese vaccines abroad vary widely. Due to confidentiality provisions of these contracts, there is very limited information on price. Based on information from Brazil and Indonesia, the price of CoronaVac can be as low as $10 to $14 per dose. Based on information from Bangladesh, Sri Lanka, and Nepal, the price of BBIBP-CorV is as low as $10 to $15 per dose.

8. Since then, Fiocruz imported API from a Chinese provider for vaccine production.
9. Brazil has only two (human) vaccine-producing plants: Butantan Institute produces for Sinovac and Fiocruz for AstraZeneca. Both plants are publicly owned.
10. For a more detailed discussion regarding how the emerging powers are collectively challenging the existing international architecture, see Roberts et al., 2017.

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