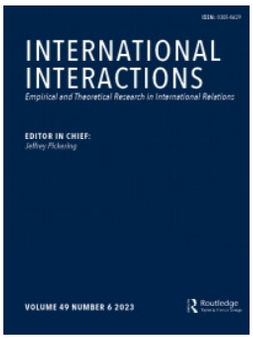

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Calling the Shots through Health Diplomacy: China's World-Wide Distribution of Anti-Covid Vaccines and the International Order

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NOTE

Calling the Shots through Health Diplomacy: China's World-Wide Distribution of Anti-Covid Vaccines and the International Order

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ABSTRACT

The donation and sale of vaccines are diplomatic tools that have impact well beyond health policies. May Chinese Covid-related vaccine diplomacy be understood beyond reactive terms vis-à-vis power disputes with the West, in particularly the United States? We then scrutinize the drivers of China's vaccine diplomacy, assessing whether Beijing privileged the expansion of its diplomatic leverage in the Global South. By employing logit and tobit models in the analysis of a cross-sectional dataset covering 213 countries, we examine the probability of countries receiving vaccines from China. We find that low-income states, in particular, and middle-income ones and those with more Covid deaths were more likely to receive vaccines through either donations or purchases. For donations, states that integrate the Belt and Road Initiative (BRI) and/or oppose the United States at the United Nations General Assembly (UNGA) were also privileged. China's vaccine diplomacy has therefore a twofold purpose. First, the expansion of the country's soft power in the Global South. Second, the consolidation of the BRI bilateral ties and an anti-US allied network. Hence, current global health initiatives cannot be detached from debates on the contestation of the liberal international order (LIO) and China's dual role as a responsible stakeholder and most successful emerging power that has the potential to challenge American hegemony. Moreover, the findings also suggest that bilateral donor-recipient flows may be less politicized than what prior works on development aid and health diplomacy have claimed.

La donación y la venta de vacunas funcionan como herramientas diplomáticas que tienen un impacto que va mucho más allá de las políticas sanitarias. ¿Puede entenderse la diplomacia china en lo relativo a las vacunas para el COVID más allá de los términos reactivos con respecto a las disputas bilaterales de poder con Occidente, en particular con Estados Unidos? A continuación, estudiamos los catalizadores de la diplomacia referente las vacunas por parte de China,

KEYWORDS

China; Covid-19; health diplomacy; power transitions; vaccines

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evaluando si Pekín favoreció la expansión de su influencia diplomática en el Sur Global. Estudiamos, mediante el empleo de los modelos logit y tobit sobre el análisis de un conjunto de datos transversal que cubre 213 países, la probabilidad de que los países reciban vacunas procedentes de China. Concluimos que los Estados que tenían bajos ingresos, en particular, así como los que tenían ingresos medios y aquellos que sufrieron más muertes por COVID tenían más probabilidades de recibir vacunas a través de donaciones o compras. En cuanto a las donaciones, también se favoreció a aquellos Estados que integran la Iniciativa de la Franja y la Ruta (IFR) y/o que se oponen a Estados Unidos en la Asamblea General de las Naciones Unidas (AGNU). Por lo tanto, la diplomacia de las vacunas de China tiene un doble propósito: en primer lugar, la expansión del poder blando por parte del país en el Sur Global. En segundo lugar, se busca la consolidación de los lazos bilaterales de la Iniciativa de la Franja y la Ruta y de una red aliada antiestadounidense. Por lo tanto, las iniciativas actuales en materia de salud global no pueden desvincularse de los debates sobre la impugnación del orden internacional liberal (LIO) y del doble papel que tiene China como parte interesada responsable y como potencia emergente más exitosa, la cual tiene el potencial de desafiar la hegemonía estadounidense. Además, los resultados también sugieren que los flujos bilaterales entre donantes y receptores pueden estar menos politizados de lo que han afirmado trabajos anteriores sobre ayuda al desarrollo y diplomacia sanitaria.

Le don et la vente de vaccins constituent des outils diplomatiques dont les répercussions dépassent largement les politiques sanitaires. La diplomatie liée aux vaccins chinois pour la Covid peut-elle s'appréhender en d'autres termes qu'une réaction liée à la lutte pour le pouvoir avec l'Occident, et notamment les États-Unis ? Nous analysons ensuite les facteurs de la diplomatie chinoise des vaccins, en évaluant si Pékin a privilégié l'expansion de son avantage diplomatique dans l'hémisphère sud. En employant des modèles logit et tobit dans l'analyse d'un ensemble de données transversales couvrant 213 pays, nous nous intéressons à la probabilité que des pays reçoivent des vaccins de la Chine. Nous remarquons que les États aux revenus faibles, notamment, ceux aux revenus intermédiaires et ceux comptant le plus grand nombre de décès liés à la Covid avaient plus de chances de recevoir des vaccins par le don ou l'achat. Pour les dons, les États faisant partie des nouvelles routes de la soie (Belt and Road Intitiative ou BRI) et/ou qui s'opposaient aux États-Unis à l'Assemblée générale des Nations unies (AGNU) passaient également en priorité. La diplomatie chinoise des vaccins comprend donc deux finalités. D'abord, l'expansion du « soft power » du pays dans l'hémisphère sud. Ensuite, la consolidation des liens bilatéraux du BRI et d'un réseau d'alliés anti-États-Unis. Aussi, les initiatives sanitaires mondiales actuelles ne peuvent pas s'appréhender séparément des débats sur la contestation de l'ordre libéral international (OLI) et sur le double rôle de la Chine en tant que partie prenante responsable et puissance émergente la plus florissante, capable de remettre en question l'hégémonie américaine. En outre, les conclusions suggèrent aussi que les flux bilatéraux entre donneur et bénéficiaire pourraient être moins politisés que ne l'avaient affirmé des

travaux précédents sur l'aide au développement et la diplomatie sanitaire.

Introduction

On November 30, 2021, the Health Minister of Djibouti Ahmed Robleh Abdilleh received 1.1 million doses of the anti-Covid Chinese vaccine Sinovac at the nation's international airport. According to the China International Development Cooperation Agency (CIDCA), "Abdilleh thanked the Chinese government and people for once again providing selfless assistance to his country" (CIDCA 2021). Yet, more than reflecting a benevolent action, bilateral flows of health aid—like the ones between China and a low-income country such as Djibouti—and medical-related trade address the political interests of donor/supplier states.

As the pandemic has been understood as a potential watershed after which China may expand worldwide influence (McNamara and Newman 2020), verifying the drivers of vaccine donation and sale shall contribute to unfold how Beijing aims to consolidate its status as an emerging power vis-à-vis the United States. This research note assesses through logit and tobit regression models whether China pursued through vaccine diplomacy the longstanding goal of consolidating through soft power—defined as the "…ability to obtain preferred outcomes by attraction rather than coercion or payment…" (Nye 2017, 1)—, the Belt and Road Initiative (BRI), and its historical ties with the Global South.

Our findings suggest that Chinese vaccine diplomacy reached countries that are strategically important in the BRI context or who oppose American positions at the United Nations General Assembly (UNGA), while also signaling to low-income countries that Beijing was a donor/supplier of last resort for overcoming a pandemic that evolved amidst a deficit of global governance. We, however, do not find any evidence to claim that China's vaccine donations are driven by either commercial ties (as implied by Suzuki and Yang 2023) or affinities that may stem from the domestic system of government. For the Chinese government, the pandemic was therefore an excurse for China to embrace the role of a responsible stakeholder through the provision of a global public good—that is, the provision of the means necessary for controlling Covid-19 and resuming life as before the pandemic. Hence, Beijing's vaccine diplomacy also echoes her ongoing efforts to dismiss the idea—particularly among African states—that it establishes relationships with the Global South based on a neo-colonial approach (e.g., Ding 2008).

Such findings had already been reached through qualitative analyses that nevertheless focused only on Chinese agency while neglecting characteristics of states who either bought or received vaccines at no cost (e.g.,

Kobierecka 2023; Suzuki and Yang 2023). By contrast, our research design based on multivariate regression models accounts for potential effects beyond China's foreign policy choices. Moreover, our findings contrast with the budding literature on the topic that assumes China's vaccine diplomacy was merely reactive, filling the space left by the US under Washington's domestic and international mishandling of the pandemic (e.g., Cohen 2020). Chinese pro-active vaccine diplomacy, however, makes sense considering the historical-institutional assumption that legacies matter in international affairs (e.g., Fioretos 2011). That is the case as well before being considered an emerging power with the potential to challenge U.S. hegemony, China already had a longstanding tradition in providing health aid to the developing world without the mediation of international organizations (McDade and Mao 2020). Such ties have only expanded as Beijing accelerated its rise at the global stage in the 21st Century (Kleidermacher et al. 2021) and culminated in the Covid-19 Chinese vaccine diplomacy.

This note is organized as follows. We first review the literature on health diplomacy and states' empowerment at the international level. In doing so, we pay particular attention to what has been written on China related to such a topic and broader theoretical implications of patterns of development aid, including debates on power disputes with the United States. Based on the gaps this literature has yet to address, we elaborate three testable hypotheses. In the subsequent section, we detail how we operationalize those hypotheses through regression analysis and report the results along with a summary of robustness checks that are detailed in the online appendix. We conclude the paper by reflecting on the limitations of our findings and outlining a research agenda to unfold other linkages between vaccine diplomacy and power transitions in the 21st Century.

Health Diplomacy and Power Disputes

Vaccine diplomacy, which "…is the branch of global health diplomacy that relies on the use or delivery of vaccines" (Hotez 2014), is anything but new. Likewise, China's ambitions in the international arena have been evident at least for a decade now. Since 2013, Beijing has adopted a foreign policy strategy that consists of "striving for achievement", which in 2017 became "striving for achievement in a new era" (Wei 2020), a reference to Washington's pullback from global governance during Donald Trump's government (2017–21). In the pandemic context, being a great power may mean displaying the domestic and international ability of winning over the virus.

However, as the literature on development aid has shown, audiences tend to view multilateral action as more legitimate than bilateral flows from donors to recipient states (Milner and Tingley 2012; Tallberg and Zurn 2019) although it is well known that international developmental organizations may act on behalf of leading stakeholders (Stone 2011; Clark and Dolan 2021) as a means of advancing their individual foreign policy goals (Rodrigues Vieira, Vadlamannati, and Li 2023).

In the broader context of the debates on power transitions, the role Beijing has played in health diplomacy amidst the Covid-19 pandemic reflects the behavior that the international community expect from a responsible stakeholder (Etizioni 2011; Zoellick 2005). As Kim and Kim (2023) argue, one must distinguish between "contestation" and "challenge" when analyzing China's behavior vis-à-vis the liberal international order (LIO). While challenge implies in proper revisionism by delegitimizing the existent order, contestation would not pose a threat to its structure but only to its centrality—that is, the hegemonic power itself. Considering China's record in the provision of global public goods, Beijing seemed—at least during the pandemic—to have restricted itself to contestation only.

Therefore, it is plausible to hypothesize that far from having the aim of turning upside-down the American-led LIO as the world battled against Covid, China engaged in health diplomacy—understood as the donation and priority sale of medical equipment for fighting the pandemic—as a means enhancing its soft power (Kyte 2020). In fact, Beijing's deployment of health diplomacy begun right after the onset of the pandemic and well before vaccines against Covid-19 were developed. An aura of benevolence helps improve a state's international standing, particularly within the developing world (Lee 2021; Kobierecka 2023). In this vein, it is worth noting that since the consolidation of her political-economic rise in the 2000s, Beijing's image among low- and middle-income states has often been associated with neo-colonialism (Ding 2008). As Zhang (2021) argues, China's soft power deficit has hindered the reach of its influence even in the Global South.

Therefore, within such a context, instead of just having humanitarian goals, health diplomacy also expresses strategic goals (Fazal 2020), thus being an instrument for a nation to enhance its soft power. In the case of China, such intentions reflect tensions that arise from her complex international identity (Suzuki 2014). On the one hand, the country perceives itself as part of the Global South due to the relatively recent past of poverty. On the other hand, Beijing also reclaims a great power status because of its growing economic clout and permanent member status at the United Nations Security Council.

It is also plausible to consider that the distribution of dosses reflects pre-pandemic foundations of Chinese foreign policy other than the mitigation of criticism against Beijing's neocolonialism in the Global South. In this vein, the BRI emerges as the key feature of Chinese bilateral relations. Such set of infrastructure projects addresses the developmental needs of recipient states as much as the Chinese goals of expanding Beijing's role in providing global public goods amidst the leadership vacuum the US had left in the years that preceded the pandemic (Yağci 2018). The BRI becomes more crucial for China's vaccine diplomacy in the light of its main spin-off, namely the Health Silk Road (HSR), which was announced in October 2015, just seven months after the parent initiative had been unveiled by Beijing (Jiahan 2020, 21–22). Despite being fundamentally developed within a framework that is essentially bilateral, the HSR also relies on partnerships with the World Health Organization (WHO) and United Nations health-related programs (Jiahan 2020, 23).

Alternative explanations of China's behavior in health diplomacy during the pandemic beyond enhancement of its soft power and the BRI comprise the accomplishment of short-term goals and the reinforcement of ideological affinities. Regarding short-term objectives, given that at the onset of the pandemic in the beginning of 2020 China controlled contamination rates faster than Western states did, Beijing could focus on the sale and donation of vaccines abroad (Chang 2021. 5), particularly for resuming trade connections that had been severed as Covid-19 was spread out throughout the world. This is not to say that bilateral vaccine diplomacy was the only game available for Beijing until May 2021, when the WHO finally approved the use of Chinese-developed vaccines for inclusion in the COVAX multilateral consortium (Chang 2021, 5). With the doors closed to multilateral/collective vaccine-related initiatives, China thus had an additional stimulus for both distributing and selling shots around the world as part of its strategies for consolidating international power vis-a-vis established powers. In terms of ideological affinities, it is necessary to remind that previous studies found that Chinese aid targets autocracies (e.g., Dreher and Fuchs 2015), which oppose liberal values at both domestic and international levels.

Therefore, under Beijing's eyes, the pandemic can be understood as window of opportunity for assuming a responsible stakeholder role—that is, a global-public-good-provider. Nevertheless, alternative explanations related to BRI consolidation, short-term goals in foreign policy, and ideological affinities are also persuasive. Having said that, the literature has yet to analyze those competing hypotheses in a systematic manner, trying to unpack as much as possible the different mechanisms that drove the Chinese health diplomacy in the context of the pandemic. Next section outlines testable hypotheses for unpacking China's anti-Covid vaccine donation and sale.

Beyond Acquiescence and Challenge to the Status Quo

As seen above, the literature assumes that China's vaccine diplomacy simply aimed at filling the space left by the US under Trump's domestic and international mishandling of the pandemic (Cohen 2020). Yet, there is enough evidence to consider that China's vaccine diplomacy also echoes Beijing's historical aid ties with the Global South and its soft power ambitions to consolidate is role as a provider of global public goods. China has a longstanding tradition in providing health aid to the developing world that can be traced back to early 1960s, having initially focused on knowledge transfer (McDade and Mao 2020). Moreover, Beijing's medical statecraft has significantly expanded since the 2000s as development finance related to health accounted for about 20% of the total budget disbursed from 2004 to 2014 (Kleidermacher et al. 2021). We then posit:

- **Hypothesis 1:** China's vaccine diplomacy is driven by the desire of expanding Beijing's leverage in the Global South through soft power.

Yet, concerns with soft power are not so easily detachable from diplomatic action that aim at preserving immediate economic linkages. As discussed in the previous section, instead of being only conceived as an act of empathy towards low- and middle-income countries, vaccine donation during the pandemic can be understood as an element of bargaining in international affairs (Su et al. 2021), thus satisfying immediate foreign policy goals. Let's illustrate the overlap between competing explanations with the case of Malaysia and Indonesia as China has been their main trade partner since 2008 and 2005 respectively. Moreover, both countries have joined the BRI. For Beijing, however, helping Kuala Lampur and Jakarta to overcome the pandemic hurdles was grounded not only on economic matters insofar as maritime border disputes in the South China Sea created incentives for the Chinese diplomacy to soften its image in Southeast Asia.

Malaysia had initially built an immunization portfolio with the Astrazeneca and Pfizer Western-developed shots (Chang 2021, 4). In the meantime, due to concerns about the efficacy of Chinese-developed Sinovac immunizer, Malay authorities removed it from the main options available to the population even though the same authorities remained unsure about Western—particularly American—commitment with health aid during the pandemic (Chang 2021, 4). Yet, China insisted on offering Sinovac for sale, which Malaysia eventually accepted (Xinhua 2022) insofar as the delivery of both Astrazeneca and Pfizer shots were not delivered on time. Thanks to Chinese supply of shots, argues May (2023), improved Beijing's influence and image in Malaysia. As a member of the BRI, the country also integrates the so-called HSR, as explained in the previous

section, consists of investing Chinese resources in health-related research and development and medical practice in partner countries. In a similar vein, Indonesia—which also disputes claims in the South China Sea while being a BRI and HSR participant—will receive the same set of investments (Chang 2021, 6) and entered China's vaccine diplomacy network.

Therefore, if generalized, Indonesia's and Malaysia's cases indicate that the Chinese supply of vaccine can have been driven by soft power concerns as much as by specific demands related to the preservation of trade linkages and the BRI investments. We can then expect that:

- **Hypothesis 2a**: China's vaccine diplomacy is driven by pre-pandemic motivations related to trade connections.
- **Hypothesis 2b**: China's vaccine diplomacy is driven by pre-pandemic motivations related to the BRI.

In addition, vaccine diplomacy can enhance ideological affinities. Outside the realm of health diplomacy, the formation of the Asian Infrastructure Investment Bank (AIIB) exemplifies how China rely on autocratic powers. Founded in 2015, the AIIB has its origins in a memorandum of understanding that Beijing had signed in 2013 with about a dozen states from its immediate neighborhood in Asia that are both autocratic and distant from US ideological positions in foreign policy (Rodrigues Vieira 2018). Indeed, states in the Global South are anything but unconditional allies of the US and the West in general due to mistrust that arises from colonial legacies (Rodrigues Vieira and Vinícius 2015). Moreover, considering that, as discussed above, Beijing prefers engaging in development aid with autocratic states (e.g., Dreher and Fuchs 2015), we expect the following:

- **Hypothesis 3a:** China's vaccine diplomacy is driven by Beijing's pursuit of ties with autocratic states.
- **Hypothesis 3b:** China's vaccine diplomacy is driven by Beijing's pursuit of ties with states distant from US positions at the UNGA.

Research Design

To examine our hypotheses, we utilize a cross-sectional data for 213 countries (see the supplemental files for details) to estimate our regression models using two different estimators: one for assessing whether countries received vaccines and another focused on the quantity of shots either donated or sold by Beijing.

Gatekeeping Stage: Vaccine Distribution Model

We estimate the probability of country ***c*** receiving COVID-19 vaccine from China during the period ***p*** (2020–2021) as:

$$P(vaccine_{cp} = 1) = \varphi_c + \beta X_{cp} + \beta Z_{cp} + \beta G_{cp} + \lambda_r + \omega_{cp} \quad (1)$$

Wherein, $\boldsymbol{vaccine_{cp}}$ is a discrete variable taking the value 1 if country ***c*** has received vaccine from China at least once in period ***p*** i.e., during the 2020–2021 years and 0 otherwise. We rely on the China COVID-19 Vaccine Tracker setup by the Bridge Consulting firm (2021) based in Beijing to track data related to China's international vaccine outreach during the Covid-19 pandemic. The tracker conducts daily searches on public search engine platforms such as Google, and social media channels like Twitter to find the latest updates on Chinese vaccine deliveries, purchases, and donations (see further details in the supplemental file).

The descriptive statistics suggest that about 51% of the countries in our sample,[1] which is about 110 countries, received Chinese vaccine at least on one occasion as of September 2021. Figure 1 displays a map that highlights which countries received vaccines from China, which include much of Latin America, Central Asia, and parts of Southeast Asia and Sub-Saharan Africa. Figure 2 provides precise breakdown by geographic region and type of transfer (donation or purchase). About 35% of the 110 vaccine recipient countries are in Sub-Saharan Africa, while 18% happen to be Latin America. This is followed by the Middle East, North Africa and Southeast Asia.

Our main explanatory variables are grouped into three categories. First set of variables addresses hypothesis 1 and capture China's soft-power-related motives in vector $\boldsymbol{X_{cp}}$. These include income status of countries measured using two dummy variables. One takes the value of 1 if a country is classified as a Low-income country and zero otherwise. The other is coded as 1 for Middle-income states and zero otherwise (World Bank 2020). These two dummy measures capture the level of economic development as the income level has a bearing on vaccine distribution via its impact on Covid-19 deaths.[2] Next, we also capture soft power-related motives of China to help many middle- and low-income countries scrambling for vaccination dosses by including *Covid-19 deaths per million* (log) in country ***c*** as of 30th August 2021 (Worldmeter 2021).

[1]Some countries, such as small island states, drop out of our sample when estimating regression models as the data on number of variables are not available. That is why in the models the number of observations never reaches the full sample size.

[2]Replacing these dummy measures with Per capita GDP (log) sourced from the WDI, World Bank (2020) does not alter our findings. We continue to find a negative and significant effect of Per capita GDP (log) across the models.

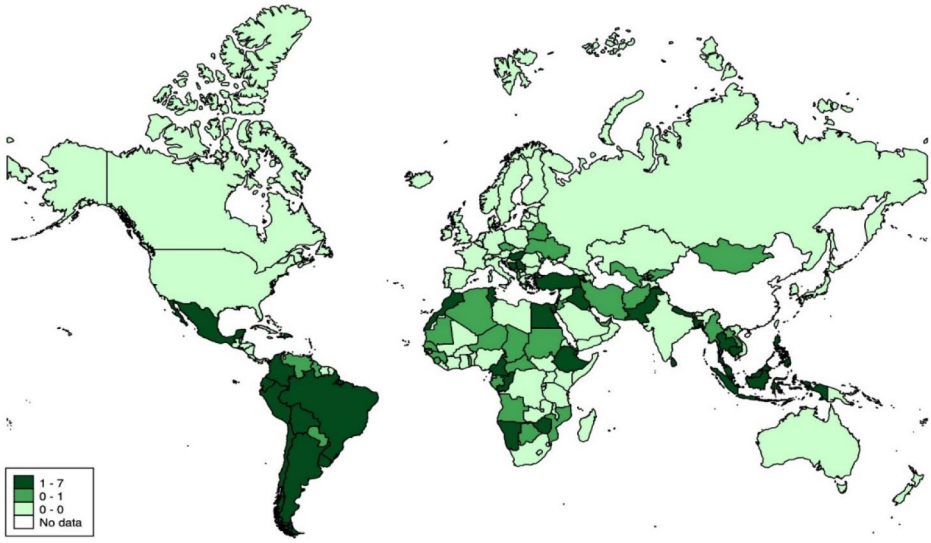

Figure 1. Chinese vaccine recipient countries.

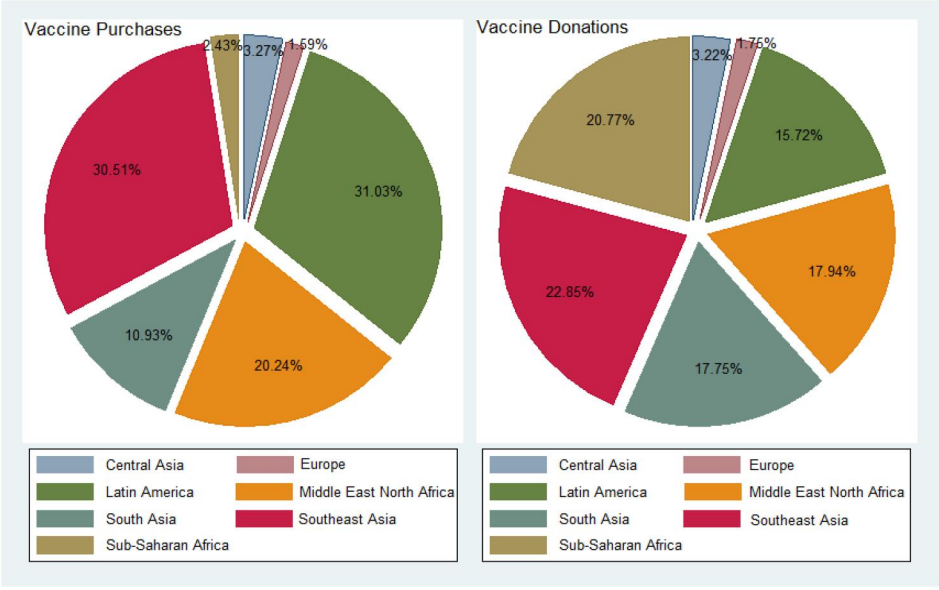

Figure 2. Chinese vaccine purchases and donations by geographic regions.

Our second set of variables allows testing hypotheses 2a and 3a vis-à-vis hypothesis 1 by capturing commercial ties with China and the domestic politics of Beijing's partners. Accordingly, for measuring the latter, we include a measure of *democracy* using the Freedom House's (2021) index coded on a scale of 0 to 7 wherein highest value denotes greater civil and political liberties. To account for commercial interests, we include the

mean of total trade of China during the period ***p,*** i.e., between 2015 and 2019 with country ***c*** as a share of China's total trade with rest of the world (average 2015–2019). Ideally this variable should capture trading interests of China as Beijing is providing medical aid and assistance to boost trading ties with other countries (Kobierecka and Kobierecka 2021).

Our final set of variables account for hypotheses 2b and 3b. We include two measures, namely a dummy variable for testing hypothesis 2b as it captures BRI membership. The dummy is coded as 1 if country ***c*** is a member of the BRI during the period ***p***, i.e., from 2013 to 2021 August, and 0 otherwise (see supplemental files for details on data collection and coding). For operationalizing hypothesis 3b, we employ the UNGA voting alignment index covering the votes of interest for the US (Bailey, Strenzhnev, and Voeten 2017). The index codes a vote in agreement with the US as 1, in disagreement as 3, and 2 for abstentions. The resulting numbers are then divided by the total number of votes in the UNGA each year, resulting in a measure between 0 and 1. A value closer 1 denotes complete agreement with the US on votes in the UNGA in 2019.[3]

To estimate our models in equation (1) we utilize a *logit* estimator with heteroskedasticity consistent robust standard errors. Note that we also include geographic regional dummies (λ_r) to account for regional heterogeneity.

Allocation Stage: Vaccine purchase and donation model

Next, we estimate vaccine purchase and donation models as:

$$\begin{aligned} y_{cp} &= \max\ (0,\ x_c\ \beta\ +\ \xi_r\ +\ \mu_c) \\ \mu_c \mid x_c,\ \xi_r &\approx \ \ Normal\ (0,\ \sigma^2{}_\mu) \\ \xi_r \mid x_c &\approx \ \ Normal\ (0,\ \sigma^2{}_\xi) \end{aligned} \tag{2}$$

where, the dependent variable y_{cp}, sourced from Bridge consulting, is **(a)** *purchase of vaccine*, and **(b)** *donations of vaccine* to country ***c*** from China during the period ***p***, i.e., September 2020 until August 2021, respectively, measured in millions of vaccine dosses. While the mean of purchases is 7.22 million doses, it is 0.53 million for donations. Figure 2 provides geographic regional breakdown of both purchases and donations of Chinese vaccines. Some interesting trends are noteworthy. While 31% of the total purchases are from Latin America, only 15.7% of donations have gone to that region. Likewise, Southeast Asia has 30.5% of the total purchases, about 22.8% of the donations have been to this region. Apart from Southeast Asia, most of the donations have gone to Sub-Saharan Africa. The share of donations to Middle East North Africa and South Asia is about 18% each. Note that while the two poorest regions in the world,

[3]Replacing UNGA voting alignment index of US with China only reverses the result in which we find a positive and significant effect of UNGA voting with China.

Sub-Saharan Africa, and South Asia, received a large share of vaccine donations from China, their share in purchases are low. This breakdown of vaccine purchase and donation numbers by geographic regions provide some evidence that altruistic motive of vaccine distribution by China cannot be ruled out.

A distinguishing feature of these two dependent variables in equation (2) is that over 60% of the observations are zeros. Estimating such models with Ordinary Least Squares (OLS) estimator would violate several assumptions such as a zero mean for the OLS errors resulting in biased estimates (Neumayer 2002). Thus, we estimate a Tobit maximum likelihood procedure with heteroskedasticity consistent robust standard errors (Beck and Katz 1995).

x_c refers to the main variables of interest discussed earlier; ξ_r are the geographic regional fixed effects, while μ_c is an independently distributed error term assumed to be normal with zero mean and constant variance σ^2. It is noteworthy that the interpretation of β coefficient in the nonlinear Tobit model is not straightforward. We compute the marginal effects of the explanatory variables on either $P\left(y_{cp} > x_c \mid\right), E(y_{cp} \mid x_c, y_{cp} > 0)$ or $E(y_{cp} \mid x_c)$. Note that the Tobit models report coefficient values in the regression results tables but use marginal effects to interpret the results.

Results

Table 1 reports the results estimated using logit assessing the gatekeeping stage of Chinese vaccine distribution. While Table 2 presents the results on Chinese vaccine purchases, Table 3 provides results on vaccine donations using tobit estimators.

Model 1 of Table 1 examines hypothesis 1 only, while model 2 also captures the commercial interests of China and its political affinities with autocracies (hypothesis 2a and 3a). Finally, model 3 accounts for all hypotheses, including those associated to BRI membership (hypothesis 2b) and opposition to the US at the UNGA (hypothesis 3b). Model 1 offers strong evidence about soft power-related motives driving the distribution of Chinese vaccines as both low-income and middle-income countries are associated with an increased probability of a receiving vaccines from China, with statistically significant results at the 1% level. The substantive effects are quite large. Computing odds ratios suggests that a low-income country increases the probability of receiving vaccines from China by up to 186% compared with middle- and high-income states. Furthermore, we find that deaths from Covid-19 to be positive and significantly different from zero at the 5% level. The substantive effects suggest that a standard deviation increase in Covid deaths per capita (log), holding other variables constant

Table 1. Vaccine distribution model (logit).

	(1) *Vaccine*	(2) *Vaccine*	(3) *Vaccine*
Low-Income Countries	2.975***	1.939***	1.655***
	(0.501)	(0.542)	(0.602)
Middle-Income Countries	2.100***	1.052*	1.015*
	(0.486)	(0.540)	(0.572)
Covid deaths per million (log)	0.200**	0.251*	0.328**
	(0.0966)	(0.132)	(0.150)
Freedom House index		−0.175	−0.0305
		(0.135)	(0.168)
Trade with China/Total Trade		−0.385*	−0.279
		(0.229)	(0.320)
Belt & Road Initiative			1.020*
			(0.560)
UNGA alignment with US			−6.068***
			(2.093)
Southeast Asia dummy	1.960***	2.426**	2.366*
	(0.708)	(1.009)	(1.337)
Sub-Saharan Africa dummy	0.694	0.882	0.719
	(0.548)	(0.635)	(0.791)
Latin America & Caribbean dummy	0.291	0.767	0.00525
	(0.557)	(0.655)	(0.733)
MENA dummy	0.896	0.263	−0.668
	(0.649)	(0.626)	(0.854)
Central Asia dummy	0.398	0.319	0.0872
	(0.777)	(0.776)	(0.832)
Constant	−2.968***	−1.466	−0.714
	(0.690)	(0.990)	(1.497)
Estimator	*Logit*	*Logit*	*Logit*
Regional dummies	No	Yes	Yes
Number of countries	188	157	153
Observations	188	157	153

at their mean values, increases the likelihood of receiving vaccines from China by 59%.

Model 2 indicates that the degree of democracy is statistically insignificant, while trade ties does not drive vaccine distribution, thus ruling out both hypotheses 2a and 3a against hypothesis 1, which nevertheless remains valid. To examine the predictive performance of models 1 and 2 in Table 1, we follow Fawcett (2006) and examine the ROC curve which plot the true positive rate (or the sensitivity of the model) on the *x*-axis versus the true negative rate (or the specificity) on the *y*-axis (Figure 3). As seen on panel 1 in Figure 3, the baseline model (no. 1) performs relatively well given the location of its line relative to the 45°line, which is the point at which randomly guessing the outcome lies. The Area Under Curve (AUC) ranges from 0 to 1, with 0.5 corresponding with random performance. The shape of the curve exhibits the inverse relationship between sensitivity and specificity at different cut points. The AUC displayed is at 0.71, which denotes robustness. However, it is noteworthy that with the inclusion of democracy and trade variables into model 2, the AUC merely increases to 0.78, thus ruling out hypothesis 3a.

Table 2. Vaccine purchases model (Tobit estimator).

	(1) *Purchase*	(2) *Purchase*	(3) *Purchase*
Low-Income Countries	17.97***	21.00***	21.40***
	(6.271)	(7.801)	(7.941)
Middle-Income Countries	12.41***	13.19**	13.36*
	(4.623)	(5.898)	(6.897)
Covid deaths per million (log)	2.707**	3.704**	3.641**
	(1.085)	(1.500)	(1.527)
Freedom House index		−0.749	0.265
		(0.839)	(1.167)
Trade with China/Total Trade		5.975	6.043
		(4.884)	(4.838)
Belt & Road Initiative			3.972
			(3.506)
UNGA alignment with US			−14.27
			(22.20)
Southeast Asia dummy	23.39*	22.90	23.45
	(12.36)	(16.49)	(17.59)
Sub-Saharan Africa dummy	−7.606	−5.063	−5.151
	(5.126)	(6.714)	(7.242)
Latin America & Caribbean dummy	5.834	9.781	8.525
	(4.861)	(6.756)	(7.342)
MENA dummy	6.735	6.401	7.401
	(8.017)	(8.848)	(10.71)
Central Asia dummy	−7.959	−7.688	−7.098
	(4.922)	(6.205)	(6.448)
Constant	−17.49**	−24.14	−26.05
	(8.053)	(14.68)	(16.71)
Estimator	*Tobit*	*Tobit*	*Tobit*
Regional dummies	Yes	Yes	Yes
Number of countries	187	156	152
Observations	187	156	152

In model 3, BRI membership is positive and significantly different from zero at the 10% level, while UNGA index is negative and significant at 1% level. The substantive effects suggest that, holding control variables constant at their mean values, BRI membership increases the probability of receiving Chinese vaccines by 77%. The substantive impact of UNGA voting alignment index is very large. Yet, as displayed by the ROC curve in Figure 3 that contrasts models 1 and 3, the AUC, derived from the later which includes all variables increases just from 0.71 to 0.76, then indicating the strength of hypothesis 1 over 2b and 3b (altruistic/soft-power motivations vis-à-vis considerations related to the BRI and voting alignment at the UNGA by recipient states).

Tables 2 and 3, in turn, report the results on vaccine purchases and donations estimated using tobit estimator. For all models, we control geographical location by employing regional dummies. Again, there is strong evidence that altruistic/soft-power motivations guide donations as much as vaccine purchases. Both income status of countries and Covid-19 deaths remain positive and significantly different zero at the 1% and 5% levels in both tables, respectively. In other words, recipient needs remain the common factor in vaccine allocation stage, be it purchases or donations.

Table 3. Vaccine donations model (Tobit estimator).

	(1) *Donation*	(2) *Donation*	(3) *Donation*
Low-Income Countries	1.544***	1.409***	1.247***
	(0.385)	(0.448)	(0.429)
Middle-Income Countries	0.648***	0.512**	0.432*
	(0.183)	(0.241)	(0.235)
Covid deaths per million (log)	0.0751*	0.134**	0.150**
	(0.0419)	(0.0672)	(0.0738)
Freedom House index		−0.159***	−0.0579
		(0.0516)	(0.0509)
Trade with China/Total Trade		−0.0672	−0.0197
		(0.141)	(0.160)
Belt & Road Initiative			0.412**
			(0.204)
UNGA alignment with US			−3.101**
			(1.202)
Southeast Asia dummy	0.650	0.916	0.734
	(0.487)	(0.738)	(0.823)
Sub-Saharan Africa dummy	−0.828**	−0.888**	−1.067**
	(0.351)	(0.417)	(0.445)
Latin America & Caribbean dummy	−0.139	−0.0676	−0.469
	(0.250)	(0.370)	(0.418)
MENA dummy	0.121	−0.213	−0.482
	(0.567)	(0.587)	(0.629)
Central Asia dummy	−0.817***	−1.019***	−1.102***
	(0.277)	(0.345)	(0.402)
Constant	−0.344	0.190	0.653
	(0.329)	(0.562)	(0.669)
Estimator	Tobit	Tobit	Tobit
Regional dummies	Yes	Yes	Yes
Number of countries	187	156	152
Observations	187	156	152

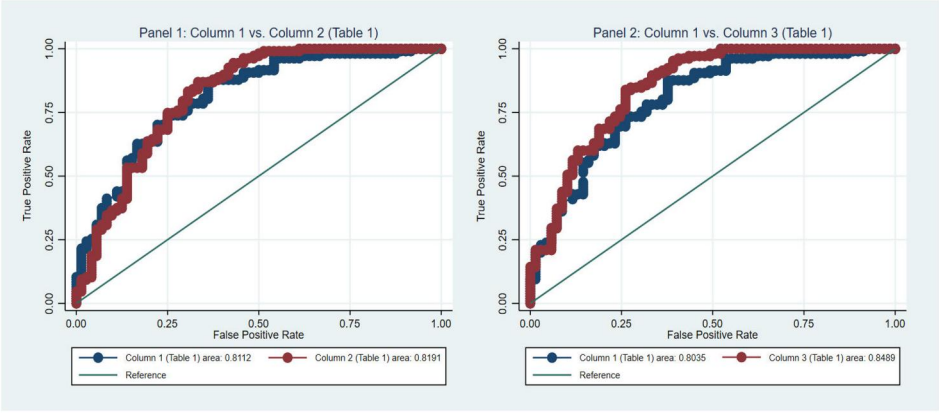

Figure 3. In sample ROC curve (Estimation from Table 1).

However, when it comes to vaccine donations, we hypotheses 1, 2b and 3b are corroborated. For instance, the substantive effect from model 3 in table 3 suggests that a BRI member country is associated with 0.41 points increase the predicted value of donated doses, which is roughly 29% of the standard deviation in vaccine donations. This result is significantly different from zero at the 5% level.

For robustness checks, we first employ alternative measures of BRI membership, Covid deaths, China trade, income status, Freedom House democracy index and UNGA index variables. Second, we include variables that previous works (e.g., Leigh 2021; Vadlamannati & Jung 2023) identified as having impacted China's vaccine distribution: distance between Beijing and recipient country's capital measured in kilometers (log), natural resource rents to GDP, trade openness (trade/GDP), debt to GDP capturing indebtedness of a country, and public health spending to GDP. Lastly, we use the data from McGill COVID-19 Vaccine Tracker[4] to secure information on whether a country has approved of vaccines for use from other sources than China (e.g., Covaxin, Covishield, Moderna, among others). Availability of vaccines from other sources may decrease the reliability on Chinese vaccine and vice-versa.[5] Our main results remain firmly robust to these robustness tests reported in supplemental tables 6 to 11.

Conclusion

Results suggest that China's vaccine diplomacy positioned Beijing as a donor/supplier of last resort for mitigating the ills low-income countries have faced throughout a pandemic that has evolved amidst a deficit of global governance. These findings echo arguments based on the logic of providing global public goods. Hence, instead of crafting a coalition of autocratic states and a sphere of influence linked to trade linkages, China employed health diplomacy for consolidating its diplomatic leverage vis-à-vis the Global South through soft power. In addition, Beijing sought to enhance ties with states that received BRI funding and have opposed the US at the UNGA. Such a strategy strengthens China's status as a contestant rather than a revisionist challenge of the LIO. Vaccine diplomacy can therefore be a tool for a rising power like China to reaffirm its emerging status and commitment with development aid. In contrast to the broad literature on development aid, our findings therefore suggest that the claims that bilateral flows are politicized and driven by realist motivations may be overstated.

Future research must consider any reliable data on the pandemic that is eventually made available by governments and academic sources. It will therefore be possible to scrutinize whether ties established through vaccine diplomacy shall remain solid in the post-pandemic context, thus yielding further gains for Beijing. Indeed, previous evidence focused on the US suggests that multilateral aid does not buy political loyalty from states that

[4]See: https://covid19.trackvaccines.org/vaccines/approved/.

[5]We find that while access to other vaccines have increased the chances a country purchasing vaccines from China, it has no significant effect on donations from China.

rank high in terms of material capabilities and are regional powers (Obydenkova and Rodrigues Vieira 2019). Case studies involving Brazil, Mexico, and South Africa—which fit into that category and are also middle-income nations—can therefore shed light over the complex relationship between health aid and alignment in world politics that has the potential to impact the structure of the US-led LIO.

For now, there is strong evidence to claim that China deployed bilateral vaccine diplomacy for expanding its soft power while consolidating the BRI initiative alongside the strengthening of ties with states that, regardless of political regime, oppose the US at the UNGA. More than exploring the deficit of American leadership in global governance, Beijing took advantage of the pandemic to foster its soft power and eventually change its image as a neo-colonial power. In this vein, future research must also assess whether China will retain a benevolent/soft-power image and keep contesting instead of challenging the LIO as long as Beijing engages in the provision of global public goods—including health-related ones—over this decade notwithstanding growing tensions with the US and its Western allies.

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